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

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GENERAL NEWS SECTION.....

*Illustrated.

At a meeting held last week the executive committee of the Chicago Association of Commerce adopted the following resolutions expressing the appreciation of the association of the notable service rendered by the steam roads during the strike of the employees of the Chicago traction lines on June 14, 15 and 16:

An Appreciation of an Unusual Service

Whereas, In the recent emergency created by the withdrawal from service of all the facilities of the street railway and elevated railway lines of the city, the general public was greatly assisted by the immediate action of the steam railroads affording suburban service, the railroads making extraordinary efforts to provide for the tremendous increase in their patronage, not only by using to the fullest extent all equipment at hand, but by bringing in all available equipment within a radius of several hundred miles;

Resolved, That The Chicago Association of Commerce, through its Executive committee, hereby expresses its appreciation of the notable service

rendered by the steam railroads, whose efforts contributed in a most efficient manner to the means by which the city was enabled to meet a situation that otherwise could only have resulted in the serious curtailment, if not cessation, of many commercial, industrial and social activities.

The remarkable accomplishment of the Chicago roads, which suddenly found themselves the sole means of transportation for the bulk of the population of the city and were required, with only a few hours' notice, to accommodate over 625,000 people a day in their suburban service, or five times their normal suburban traffic, was described in last week's issue. "Extraordinary efforts" well describes the exertions made by some of the roads that were called upon practically to improvise a suburban service over night or by the roads that on account of their location were called upon to handle the majority of the crowds. The railroads performed a great public service on this occasion, and the Chicago Association of Commerce committee has done a handsome thing in thus making public acknowledgment of its appreciation.

L. F. Loree, president of the Delaware & Hudson, has received in answer to inquiries sent to all railroads above 100 miles in length

Two and a Half Billion of Foreign Holdings

replies indicating that at about the first of the present year there were approximately \$2,576,000,000 of American railroad securities held abroad. The total as shown by this investigation is only about half of what was estimated by some bankers at the beginning of the European war which probably shows that the early estimates were entirely too high. A classified summary of the replies is published elsewhere in this issue. When James J. Hill, some years ago estimated the needs of American railroads for new capital at over a billion a year his estimate was criticized by Congressmen and others, with no knowledge of the facts, as absurdly high. Time has proved that this estimate was not far from the mark, but must be remembered that European investors have during the past years helped to absorb a part of these securities. If, however, the present capacity of American investors is \$1,000,000,000 a year for railroad securities, it would take 2½ years for this market to take back from Europe the European holdings, even if no new capital was provided for railroad purposes for the entire 2½ years. The importance of the fact cannot be over-estimated. Squarely facing the fact, is not depreciating the value of American railroad securities as an investment for a moment. Money invested in these securities will be employed in the production of wealth, whereas money invested in war loans of the European governments is employed in the destruction of wealth. Since money, however, is going to seek investment that will give it the highest interest return commensurate with a certain degree of safety, the possible aggregate of securities which may come onto this market, as shown by the European holdings of American railroad securities is impressive.

While again declaring that the ownership of stock in a coal sales company by a railroad or by a railroad company's stockholders does not constitute an interest direct or indirect of the railroad company in the coal which the sales company offers to it for transportation, the United States Supreme Court, in the Delaware, Lackawanna & Western case handed down recently, decides that the contract between the sales company and the railroad company cannot legally make the sales company a mere agent for the railroad company. The court has, therefore, ordered the district court to enjoin the Lackawanna from carrying coal sold by the railroad company to the sales company under the contract now in force. When the commodities clause was enacted the Lackawanna formed a coal sales company with which it made a contract, and it is the terms of this contract which so bind and restrict the sales company as to make it a mere agent of the railroad company, that the Supreme Court

The Commodities Clause Again

now finds to be illegal. The railroad company kept possession of its coal mines and continued to mine coal after the formation of the coal sales company. The contract with the coal sales company provided that the railroad company should receive 65 per cent of the market price of coal at New York, and was also to receive, of course, the legal rate for transporting the coal to New York. The railroad company could sell as much or as little coal to the sales company as it wanted to, and, on the other hand, the sales company could buy coal from no one else, and had to take all the coal which the railroad company wanted to sell it at the market price. The Supreme Court holds that this contract violates both the Sherman law and the commodities clause. It is very careful to point out that there is no intention on the part of the court of objecting to the contract simply because it protected the property interests of the railroad company, but the court finds it illegal because in the attempt to protect these interests the contract made by the sales company went so far as to obviously violate the intention of the commodities clause. It would appear plain from the decision that any one of the anthracite carriers may or may not now have such relations with its affiliated coal sales company as to violate the commodities clause, but, on the other hand, the decision describes clearly the kind of relation which it will not tolerate, and it should be possible for any company to act accordingly.

The decision of the Supreme Court annulling the Wisconsin law of 1911, requiring sleeping-car companies to give the occupant

**Wisconsin
Upper Berth
Law**

of a lower berth the free use of a part of the space allotted to the upper berth, until the upper is sold, fills six pages and cites 19 decisions; but the statute was so utterly childish that it is not worth while to discuss it. The gist of the basis of the decision is in the paragraph quoted in the abstract of the report printed elsewhere. The wonder is that there are two justices who dissent from the majority's opinion. The dissenting opinions were not put in writing. The Supreme Court of Wisconsin, which reversed the trial court (and is now itself reversed) sustained the statute on the ground that the rule which it prescribed "contributed to the comfort and convenience of the traveling public"; but it could so contribute, even theoretically, only by facilitating the circulation of air, and the evidence showed that this theory was too vague to be worthy of notice. The statute appears to have been one of the worst examples of meddling, pure and simple. An earlier statute (1907) gave the man in the lower berth the option of ordering or not ordering the upper berth to be kept up, or closed; but this was declared unconstitutional, and the 1911 statute was made mandatory: "the upper berth shall not be let down." What is next to be expected is hard to guess. Probably a law requiring the employment as porters of prestidigitateurs who can put a passenger into an upper berth at 1 a. m. without disturbing the sleeping passenger in the lower; with perhaps a paragraph declaring that for a passenger to seek privacy is against public policy. The short cut would be to order upper berths abolished and the price of sections reduced to \$1.50; but from the agitator's point of view that is too simple.

In an editorial in our issue of May 21, we referred to the fact that the National Transcontinental Railway of Canada, as built

**The Cost of
The National
Transcontinental**

by the government, has cost almost three times as much as the original estimate. In another place in the same editorial there appeared the statement "If, as has proved to be the case in Canada, a government will spend three times as much to build a railway as would be spent by a private company," etc. A valued correspondent writes to call attention to the fact that it does not follow, because the government so far exceeded its own estimate, that it spent three times as much as a private company would have. That is manifestly true. In making the statement questioned we had in mind what the government has spent, and what the

private railways of Canada are capitalized for. The private railways of Canada, old lines and new, equipped and in operation, are capitalized, according to the official reports, for \$53,619 a mile. On the other hand, the latest figure for the cost of the National Transcontinental which we have seen is \$98,898 a mile. Furthermore, the National Transcontinental is not finished, in the sense that the private railways are. It is not equipped, and its terminals are not completed. At the rate expenditures have been made on it in the past, how much will it have cost when it is finished? Perhaps it is putting it a little strong to say it has cost three times as much as a private company would have spent; but the government investigating commission said in its report, "the competing roads are only capitalized at from one-third to one-half as much per mile as the National Transcontinental."

STOCK WITHOUT A PAR VALUE

THE committee on railroad bonds and equipment trusts of the Investment Bankers' Association of America is sending out to members of the association a list of ten questions for consideration and discussion. The second of these questions is of particular interest because of the coincidence that it comes at the time of Clifford Thorne's final argument in the rate advance case of the Western roads at Washington. Investment bankers are asked whether the amount of bonds which should be issued to cover new property should be 100 per cent of cost or less. Clifford Thorne argues that the proposed rate advances are for the purpose of making additions and betterments to property from earnings, and that whereas the public is willing to pay rates sufficient to yield a return on the cost of new property, the public is not willing and should not be made to pay the principal.

A strong railroad company can, under present conditions, issue bonds up to 100 per cent of the cost of a comparatively small new line which holds out a fair chance of earning a return on the investment; but this is true only because the equity back of these bonds consists of the seasoned earning power and the credit of the railroad company. It is hardly conceivable that any banking house would finance a new company building a new line up to 100 per cent of the cost through the issue of bonds without any bonus or margin of safety of stock. The tendency to raise new capital through the issue of mortgage bonds up to the neighborhood of 100 per cent of the cost of additions and betterments is generally recognized as one of the dangers of the present railroad situation. Past experience and business practice in other lines both indicate beyond a reasonable question that all of the new railroad capital required for additions and betterments and extensions from year to year should *not* be raised through the issue of mortgage bonds up to 100 per cent of the cost of the improvements.

If, however, a part of the cost of improvements is to be provided for either from current funds, which means surplus earnings, or through the sale of stock, the railroad company has either got to have surplus earnings or has got to find a market for stock. The Chicago, Milwaukee & St. Paul could finance the greater part of the cost of the Pacific coast extension through the sale of the stock to its own stockholders only because it had been paying 7 per cent for years and earning a surplus above dividend requirements. Stockholders, even of this company, however, have had to accept a reduction to 5 per cent, and this was not earned by the new extension for some years after it was opened and may not yet be earned by the new extension.

The laws of many states do not permit the issue of stock below par; but where is the investor to be found who will pay par for stock issued to pay for 30 per cent of the cost of an extension or betterment work when the other 70 per cent of the cost is paid through the issue of 4½ or 5 per cent bonds, which can be sold only at the face value or less, and whose claims as to earnings and assets must be satisfied in full before the stockholder has any equity whatsoever?

A possible solution of this problem and of the problem that is facing the reorganization committees of many of the roads now in the hands of receivers might be furnished through the issue of stock without a par value. Of course, the manner in which any particular railroad company could readjust its finances to permit of the issue of stock without par value would be a specific problem and one which would have to be treated differently, probably, in each different case. The investor, it would seem, might be willing to put new capital into a railroad project if he knew that a part of the cost had been raised through borrowed money—the sale of mortgage bonds—and by taking stock without a par value he was to become an owner of the property and participate pro rata with other owners in profits commensurate with his risk. An analogous argument would apply in the case of reorganizations such as that of the Chicago, Rock Island & Pacific and the Missouri Pacific.

THE EXTENT OF GOVERNMENT OWNERSHIP

ARCHIV FÜR EISENBAHNWESEN, the official publication of the Royal Prussian Ministry of Public Works, has recently issued its annual compilation of the railway statistics of the world, showing the mileage, capitalization and the proportion of government-owned and privately-owned lines in each country for the year 1913, with comparisons with previous years. It is stated that, although most of the figures are derived from official sources, it has been necessary to depend in part on unofficial reports. Railways owned by governments are listed as state railways, whether they are actually operated by the government or by private companies. The mileage figures for 1913 are as follows:

EUROPE			
Country	Total	Private	State
Germany	39,831	2,998	36,833
Austria-Hungary	28,872	5,293	23,579
Great Britain	23,572	...	...
France	31,992	26,350	5,642
European Russia	38,873	14,167	24,706
Italy	11,021	1,878	9,143
Belgium	5,508	2,787	2,721
Luxemburg	328	205	123
Netherlands	2,035	915	1,120
Switzerland	3,039	1,328	1,711
Spain	9,593	9,593	...
Portugal	1,864	1,147	717
Denmark	2,356	1,132	1,224
Norway	1,932	288	1,644
Sweden	9,056	6,175	2,881
Serbia	638	...	638
Roumania	2,351	133	2,218
Greece	1,005	1,005	...
Bulgaria	1,206	...	1,206
European Turkey	1,246	1,246	...
Malta, Jersey, Man	68	68	...
Total	216,396	100,285	116,111

AMERICA			
Country	Total	Private	State
Canada	29,468	27,687	1,781
United States	256,823	256,823	...
Newfoundland	773	773	...
Mexico	15,932	3,509	12,423
Central America	2,016	1,655	361
Greater Antilles	3,425	3,275	150
Lesser Antilles	338	338	...
Columbia	625	515	110
Venezuela	637	569	68
British Guiana	104	104	...
Dutch Guiana	375	375	...
Ecuador	655	655	...
Peru	1,728	670	1,058
Bolivia	1,511	1,511	...
Brazil	15,615	8,849	6,766
Paraguay	233	233	...
Uruguay	1,648	1,648	...
Chile	3,981	1,988	1,993
Argentina	20,759	17,249	3,510
Total	356,317	328,094	28,223

ASIA			
Country	Total	Private	State
Russian Central Asia	9,943	3,100	6,843
Siberia	6,158	6,158	...
China	6,866	1,968	4,898
Japan, including Korea	34,850	4,362	29,488
British East Indies	606	...	...
Ceylon	33	33	...
Persia	3,417	2,500	917
Asia Minor, etc.	51	51	...
Portuguese Indies	862	862	...
Malay States	1,783	238	1,545
Dutch Indies	706	105	601
Siam	2,310	2,310	...
Cochin China, etc.	...	...	...
Total	67,591	33,298	44,292

AFRICA			
Country	Total	Private	State
Egypt	3,716	790	2,926
Algeria and Tunis	3,988	2,175	1,813
Belgian Congo Colonies	868	868	...
South African Union	...	...	...
Cape Colony	3,999	548	3,451
Natal	1,109	...	1,109
Central South Africa	3,488	157	3,331
Rhodesia	2,420	2,420	...
Colonies—	...	...	...
Germany:	...	...	...
German East Africa	896	...	896
German Southwest Africa	1,315	...	1,315
Togo	204	...	204
Kamerun	193	...	193
England	2,368	1,047	1,321
France	2,011	2,011	...
Italy	96	96	...
Portugal	1,015	1,015	...
Total	27,693	11,129	16,564

AUSTRALASIA			
Country	Total	Private	State
New Zealand	2,906	30	2,876
Victoria	3,693	25	3,668
New South Wales	4,120	167	3,953
South Australia	2,326	234	2,092
Queensland	4,845	296	4,549
Tasmania	705	196	509
West Australia	3,449	570	2,870
Hawaii, etc.	88	88	...
Total	22,136	1,615	20,521

SUMMARY

	Total Mileage		State		Private	
	1913	Gain	1913	Gain	1913	Gain
Europe	216,396	2,256	116,111	1,590	100,285	666
America	356,317	9,990	28,223	5,841	328,094	4,149
Asia	67,591	1,498	44,292	152	23,298	1,346
Africa	27,693	1,002	16,564	613	11,129	389
Australasia	22,136	385	20,521	1,448	1,615	1,063*
Totals	690,133	14,206	228,712	9,644	464,421	5,487

* Loss.

Of the total mileage of the world for 1913—690,133 miles—private companies owned 464,421 miles, or 67 per cent, and governments owned 228,712 miles, or 33 per cent. In 1912 the private railways owned 68 per cent. The government railways gained one per cent by increasing their mileage by 9,644 miles, while the mileage of private companies increased only 5,487 miles.

However, an analysis of the statistics given for the various countries shows that this gain by the state railways represented the absorption of existing lines rather than greater activity in railway construction. For example, 4,478 miles of line were added to the government total in Mexico, and 1,002 in Argentina, without any increase in the total mileage of the country. In Australasia there was also a gain of 1,448 miles for the government lines by the absorption of private lines, although the total mileage of the country increased only 385 miles. The privately-owned lines, therefore, actually increased their mileage by construction 12,000 miles, of which about 6,500 miles was offset by the acquisition of lines by the governments.

It will be noted that, in respect of length of lines, outside of North and South America, government ownership greatly predominates, but that the privately-owned mileage in the United States, 256,823, greatly exceeds the mileage of all the government-owned roads in the world. It is somewhat surprising, however, to find that the greatest increase in government mileage is in North and South America, due to the absorption of private lines in Mexico and Argentina. Even outside of the United States, however, private ownership is greatly predominant in America. Excluding our 256,823 miles, there are in this hemisphere 71,261 miles of private railways, against 28,223 miles of government railways. In only two countries in this hemisphere, Mexico and Peru, is government ownership the predominating policy, and in Peru the roads are operated by companies.

In a majority of the countries of the world, also, private ownership of railways continues to prevail. Of 75 nations and colonies for which statistics are given in this compilation, 42 have more private than government mileage, while 33 have more government mileage. While in 26 countries the entire railway mileage is privately owned, in only 7 are all of the railways owned by the state. These are Serbia, Bulgaria, Natal and four

German colonies in Africa. In Europe state ownership predominates in only 10 out of 21 countries.

All the railways of the United States, Great Britain, Spain, China and Rhodesia are in the hands of private companies, and most of those in Canada; in France four-fifths of the mileage is privately owned, in Sweden nearly two-thirds and in Brazil and Argentina company mileage is greatly predominant. In Germany, Austria-Hungary, Russia, Italy and Japan government ownership is the dominant policy.

Of the total railway mileage of the world for 1913, over 37 per cent was in the United States. The total increase for the year was about 15,000 miles, of which 5,019, or about one-third, was reported for the United States, although this figure for this country is undoubtedly too high. The increase for the world was less than the gain reported in 1912 or 1908.

The total railway capitalization of the world as reported by this publication was \$60,222,036,784. In this is included, however, over \$19,000,000,000 as the capital of the railways of the United States, which erroneously includes all the duplications due to inter-corporate ownership. The Interstate Commerce Commission's figure for 1913 is \$15,330,131,446. With this correction the world's total in 1913 stood at \$56,350,804,230, an increase over the preceding year of \$1,848,250,566. The average capitalization per mile for the world was \$82,313, as against \$65,861 for the United States. The average for Europe was \$70,656, and 18 countries are reported as having a greater railway capitalization per mile than the United States. It will be noted that while this country has 37 per cent of the world's mileage, only 27 per cent of the total capitalization is chargeable against the railways of the United States.

JAMES J. HILL PROFESSORSHIP OF TRANSPORTATION

PRESIDENT LOWELL announced at the commencement exercises of Harvard University that a gift of \$125,000 had been received to endow the "James J. Hill Professorship of Transportation" in the Harvard Graduate School of Business Administration. A list of the donors and some other information regarding the establishment of this new chair are given elsewhere in this issue.

The endowment of this professorship is a tribute to Mr. Hill; and surely no tribute ever was more deserved. Take him all in all, he is probably the greatest genius who ever devoted his energies to railway transportation. He has been equally pre-eminent as a railway builder, as an operating executive, as a traffic manager and developer and as a financier. The various lines now constituting the Great Northern Railway were laid out and constructed so successfully under his immediate direction. He is the father of the "tonnage system"—the system of the largest practicable train loads, which has done more to promote economy in railway operation than any other practice ever introduced into it. He established a system of rate making on the Great Northern which has contributed enormously both to the development of the Northwest and to the upbuilding of a profitable traffic for the railways in that section. He has caused the railways which he has controlled to be so skillfully financed, as well as to be so efficiently developed and operated, that, considered as a whole, the great system which he dominates is one of the most prosperous in the world. Probably America has produced no other man who has combined in more pre-eminent degree the greatest qualities of both the business man and the statesman. We say "America" because, although he came to the United States when young, Mr. Hill was born in Canada.

Not only is the tribute paid to Mr. Hill so well deserved, but the establishment of the professorship itself is highly gratifying. Never was there in any country such need of a thorough and impartial study and exposition of transportation problems as there is in the United States at the present time. The railways of this country have 37 per cent of the total mileage of the globe. Whether viewed from this standpoint,

or that of the traffic they handle, the investment they represent, the number of men they employ, or their relative position in industry, our railways are very much the most important system in the world. For many years we have been confronted with the "railway problem"—the problem of how to regulate the railways, or as to whether the government should acquire and manage them. Never, apparently, was this problem farther from solution than now. It is a problem in the solution of which it would seem that the schools could help very materially. But although the United States has many universities in which some attention is given to transportation, it is a regrettable fact that most of them have contributed little, and many of them less than nothing, to the solution of this problem. Here and there are professors of economics and of transportation who realize that no man can safely draw definite conclusions regarding this problem's many important phases without having first spent some years in familiarizing himself with the history of railways and with the multifarious, complex and widely varying facts regarding their operation, rate-making, financing, etc. But thus far the good work of these men has been more than offset by that of the much larger number who have been willing to reach their conclusions first and find facts to fit them afterward, if indeed they ever find them at all. If many of the professors betray as much ignorance and bias in their class rooms as they do in their writings on railway subjects, it is easy to understand why so many of our young men graduate with their heads stuffed with misinformation and foolish hypotheses concerning railway matters.

The main function of a chair of transportation should not be the industrious formulation and elaboration of baseless hypotheses regarding the nature of the railway business, but the ascertainment and teaching of facts regarding it. If there be suggested some conclusions based on the facts ascertained, this is also a useful service. The Harvard School of Business Administration already has achieved a high reputation for the excellence of the research work and teaching done by its professors. It is reasonable to assume that in filling the James J. Hill Professorship the university authorities will show a high regard for the proprieties by apportioning to it a man whose knowledge of both the theory and the practice of transportation are such as will enable him to impart to students real knowledge. A wider diffusion of real knowledge of the subject is one of the greatest needs of the country, and Harvard can render no greater service than to set the example of imparting such knowledge to the nation's studious and ambitious young men.

Perhaps a word will not be out of place in this connection regarding those who have done most to secure the establishment of the James J. Hill Professorship. Probably those who have been most active in bringing it about are Howard Elliott, chairman and president of the New York, New Haven & Hartford, and Thomas W. Lamont, of J. P. Morgan & Co. Both of these gentlemen are graduates of Harvard, and in furthering the creation of this professorship they have rendered a service not only to their alma mater, but also to the public.

NEW BOOKS

Statistics of Railways in the United States; Twenty-sixth Annual Report. 751 pages, 9 in. by 12 in. Cloth. Prepared by the Interstate Commerce Commission, Division of Statistics. Issued by Superintendent of Documents, Government Printing Office, Washington, D. C. Price \$1.

The present volume is for the fiscal year ending June 30, 1913. The principal totals for the whole country, as given in this report were printed in the *Railway Age Gazette*, July 17, 1914, from a preliminary abstract sent out by the Interstate Commerce Commission. The first 62 pages of this report, giving the tabular summaries, came out last December and was noticed in the *Railway Age Gazette*, December 11, page 1074. At that time the commission expected the complete volume to be out in one month.

Letters to the Editor

DOES LABOR CREATE ALL WEALTH?

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Warren S. Stone, grand chief of the Brotherhood of Locomotive Engineers, in the wage arbitration at Chicago repeatedly took the ground that labor produces all the wealth that exists, and, therefore, should come into the possession of all of it.

This seems to be a revival of an archaic notion. From pages 402, 403 and 406 of Webb's "Industrial Democracy" (a strongly favorable presentation of Trade Unionism), I quote the following:

"The operative bootmaker has inherited a rooted belief that the legitimate reward of labor is the entire commodity produced, or its price in the market. This idea was the economic backbone of Owenite Socialism, with its projects of Associations of Producers and Labor Exchanges. In the first number of the "Poor Man's Guardian," a widely-read journal of 1831, it was expressed in the following verse:

"Wages should form the price of goods;
Yes, wages should be all,
Then we who work to make the goods,
Should justly have them all;

"The same idea inspired the proposals of Lasalle, and most of the inferences drawn from Karl Marx's 'Theory of Value,' whilst it still lingers in the declarations and programmes of German Socialism and its derivatives. . . .

"Though the Owenite assumption here referred to was formerly accepted by large masses of English workmen, and though it still lies at the root of the desire for Co-operative Associations of Producers, it cannot be said to characterize the Trade Unionism of the present day, and it will accordingly not be discussed in our chapter on 'The Assumptions of Trade Unionism,' . . .

"If the operatives desire to maintain the modern Trade Union principle of the Standard Rate, they must abandon, once for all, the diametrically opposite assumption that 'wages shall be the price of goods.' . . ."

F.

RAILROAD ADVERTISING

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I am aware that a layman has little business to butt into your columns. And yet sometimes the man outside the business can get a perspective that the railroader himself fails to vision. It is for this reason I make bold to address sundry observations to the *Gazette*.

These remarks were brought to a head by the admirable article on railway advertising by Edward Hungerford, published in one of your recent issues. Mr. Hungerford's article, excellent in everything touched on, failed to treat of certain details which have been somewhat painfully brought to my attention.

As manager of the Travel and Resort department of a leading magazine, I have an unquenchable thirst for information regarding passenger and more especially tourist traffic.

It has been my observation that in the Broadway ticket offices are many clerks who are grossly ignorant of the lines which they represent. I have frequently encountered clerks who did not know certain essential facts relative to passenger service which were familiar to me, an entire outsider. One illustration will suffice. In the mountains of a neighboring state is located a mountain resort fairly well known. It lies on a branch line just off one of our great systems. The writer 'phoned to the chief branch ticket office of this line and asked the clerk to give the nearest station on his line to this resort. After considerable delay and evident consultation this individual replied:

"About this here—(naming the resort). There ain't no such place on our line." And yet the place in question is listed in the system's summer book as among its particular attractions!

My advice to the G. P. A.'s is to conduct a course of instruction in railroad geography. Also in the dull season to round up all the ticket counter staff and take them out to see where and how the road actually goes. Such an excursion would result in more tickets being sold. It requires imagination to talk intelligently and compellingly of places you have never actually seen with your own eyes. Imagination is not a conspicuous quality in the ticket clerk. He sells transportation in most cases automatically. If he had a quarter of the courteous suggestion and clear intelligence found in the salesman of our high grade retail stores the road he represents would sell more transportation. If Mr. Ticket Buyer who has decided to take a trip to what we may call Mount Lookout is politely told he should not miss the scenic glories of the Sapphire Lakes, which are only 150 miles beyond on the same system and can be included in an attractive excursion rate for just a little more, nine times out of ten he will welcome the suggestion and purchase more transportation than he had intended.

Another criticism arises every spring. It is prompted by efforts to obtain the summer transportation literature in good season. There are always many laggards who are late with their summer booklets. They have all winter, presumably, to get this literature off the press. Yet in the first week in June I always receive circular post cards somewhat similar in their wording to the following from one of the leading summer tourist roads:

"Your request for our 1915 Summer Book is received today, and will be complied with immediately upon receipt of books from printer. The large amount of work entailed has slightly delayed the issuance of these books, but it is expected that they will be ready for distribution by June 5. Regretting the unavoidable delay, and thanking you for your interest, we are—"

The road that sends out this card has been advertising its resorts extensively. Every advertisement mentions the summer booklet. Readers who answer the ads get the above replies. Imagine such methods applied to retail trade, and yet the sale of tourist transportation is precisely the same in theory and should be the same in practice as the sale of watches.

There is also a deplorable lack of system in maintaining mailing lists of persons who should receive folders, etc. The writer maintains a complete file of folders, revised twice a year, and yet not a dozen roads mail him their literature unless written to semi-annually. My address should be always retained on a well arranged mailing list. Yet I am obliged to send a circular request out to several hundred G. P. A.'s twice each year.

If the same general methods of circularizing used by any big, first-class business were followed by the railroads' passenger departments there would be a heap more tickets sold.

Very beautiful, complete, and well written are the summer booklets this year, but in their intelligent distribution there is woeful lack of system or enterprise.

OUTSIDER.

PORTUGUESE RAILWAY RATES INCREASED.—The Portuguese railway companies have notified the public that, in view of the enhanced cost of fuel and other materials in consequence of the war, a general increase has been decided upon in all rates and fares, amounting to about 10 per cent. This action on the part of their neighbors will possibly surprise the people in Spain who have been agitating recently for a reduction in railway rates on the same grounds. Imported coal is now costing, in the peninsula, almost double the July prices, and Spanish coal has increased almost as much, the local mine owners having taken advantage of the situation to raise their prices. To counteract this the government has suspended the protective customs duties temporarily. An attempt is also being made to introduce Pocahontas coal from this country. Welsh steam coal is being quoted at 60s. (\$15), and Pocahontas at 53s. (\$13.25), c. i. f., Mediterranean ports.

*From a paper read at the annual meeting of the American Society for Testing Materials, Atlantic City, N. J., June 22-26, 1915.

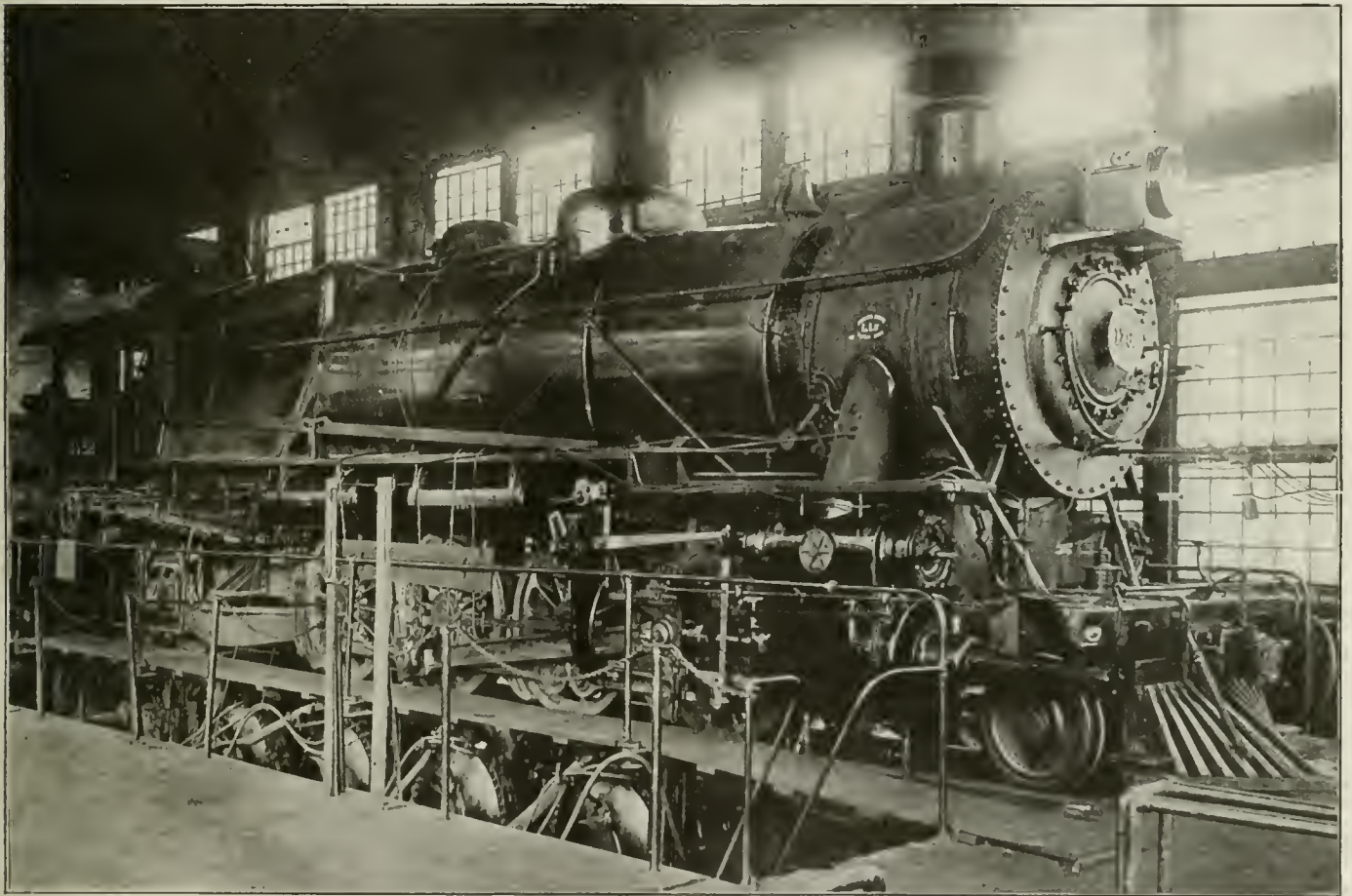
available in a part of the shop office and storehouse building, where the departments finally occupied 15,476 sq. ft. of floor area on four floors. That the growth of the departments has been rapid is also evidenced by the diagram, which shows the number of employees, the number of routine physical tests, and the number of standard specifications in force for each year from 1874 to 1914. The quarters having become congested in the past few years, a new building with a floor area of 41,000 sq. ft. was begun in 1913 and completed in 1914. Thus, in 35 years the requirements of the departments, as shown alone by the floor space occupied, have increased more than 35 times; or, there has been an average increase of over 100 per cent for each year since the work began. The growth of the test department and laboratory has been very much more rapid than the increase in

the main floor. There is a machine room in the basement and in this all of the metal test specimens are prepared. On this floor there are two large fireproof vaults for the storage of letter files and the like, and a room for chemical stores.

The first or street floor is devoted to physical tests. It contains a physical laboratory with five universal tension and compression testing machines, the largest of which has a capacity of 1,000,000 lb., and all are served by the traveling crane. On this floor are separate sections for oil, cement and lagging, hose, rail, miscellaneons and heat-treatment tests.

The second floor is used for office, locker and toilet rooms, the south end being occupied by the office force of the engineer of tests and the north end by that of the chief chemist.

The third floor is divided into laboratory rooms for bacterio-



The Locomotive Testing Plant, with a Mikado Type Locomotive in Position for Testing

tonnage hauled, or the extension of the general business of the railroad. The reason for this is that there was almost as wide a field for the application of specifications, and the inspection and testing of materials, in the beginning as at the present time.

THE NEW BUILDING

The new building at Altoona which has just been occupied is constructed of reinforced concrete, the reinforcement being of twisted bars. Structural steel cores are used in the concrete columns. The whole exterior is finished in red brick and red terra-cotta. It is arranged with a central service portion consisting of the middle bay which contains a stairway and an electric elevator, giving access to all parts. On the basement floor of the service section there is a receiving room for materials. This room communicates with the elevator for the distribution of small samples to the different sections of the building, while large pieces may be lifted to the physical-test section by means of a ten-ton traveling crane with a hatchway in

logy, rubber, water and gas analyses, photometry and lamp tests, and the calibration of electric instruments.

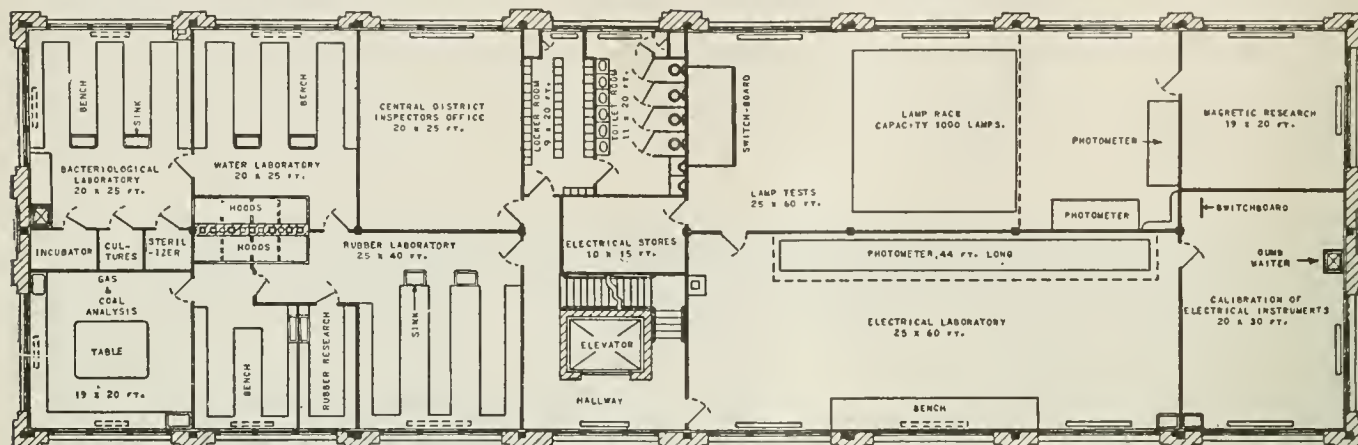
The whole fourth floor is used as a general chemical laboratory with a separate chemical balance room. The central bay is extended up to form a fifth floor, which comprises a photographic studio and dark room, while the roof of the remaining portion of the building is used for experimental work and tests where exposure to the atmosphere is required.

Direct lighting with tungsten lamps is the system of illumination. "Abolite" metal reflectors are used in the basement and on the first floor, with "Pyro" glass reflectors on the second or office floor. In the chemical laboratory, where metal would be injuriously acted upon by gases, "Holophane" glass reflectors are in use. All of the lighting and power conduits were placed in the floors before pouring the concrete. Telephone, dictaphone and buzzer systems are installed in the floor conduits, and in addition great flexibility is possible in the location of these fixtures by the use of a chair rail around the walls

of each room, the chair rail having three separate grooves for wires.

The building is heated by direct steam radiators with a single pipe system, and the radiators are placed under the windows. A hot water service, with a heating and circulating tank in the basement is provided. The gas, steam, air, water and hydraulic lines are of open work, and all pipe risers are in a common

One vibratory endurance spring testing machine of 75,000-lb. capacity.
One 43-ft. drop-testing machine;
Two vibrating staybolt testing machines;
One Brinell hardness testing machine;
One 2,000-lb. cement testing machine;
One horizontal microscope, with camera for metallographic work;
One grinding, buffing and etching outfit for the preparation of samples for microscopic work.



Plan of the Third Floor, Giving an Idea of the Floor Layout in the New Building

conduit which is located in the central service bay of the building.

The interior of the building is finished in natural chestnut throughout, with the exception of the office rooms, which are finished in imitation mahogany. All interior doors and partitions are glazed. The floors, with the exception of the basement where

In the machine room, where the sample test specimens are prepared, the following tools are used:

Two 14-in. engine lathes;	Two milling machines for specimens.
One 12-in. drilling lathe;	One 30-in. cold saw;
One 24-in. shaper;	Two motor hack saws;
One 24-in. radial drill;	Two tool grinders.

For the work in testing air brake, signal and tank hose and other miscellaneous tests including steam and hydraulic gages, there are:

Six rubber stretching machines;
One friction test rack for rubber;
One hose mounting machine;



The General Laboratory in the Laboratory Car

the floor is of concrete and the physical laboratory where it is of wood on concrete, are of magnesium-cement composition.

It is noteworthy that the building was constructed and equipped complete within the original estimates and appropriation. The building itself cost about \$150,000. An estimate of the value of the contents is, for the physical laboratory, \$100,000; and for the chemical laboratory, \$25,000. With equipment complete, the investment for the laboratories is about \$275,000.

PHYSICAL LABORATORY

Among the machines and apparatus that compose the equipment of the physical laboratory, there are the following:

Five universal tension and compression testing machines, one of 1,000,000, two of 300,000, two of 100,000 lb. capacity;



Metallographic Laboratory

One vibrating test rack for hose;
One continuous test rack for rubber;
Four tension testing machines for rubber;
One stretching machine for rubber insulation;
One spring micrometer machine;
One vacuum gage testing machine;
One arbor press specimen cutter;
One hydraulic gage testing machine, capacity 25,000 lb. per sq. in.;

One dead-weight gage testing machine, capacity six gages;
 One wiggling testing machine for hose;
 One bumping testing machine for gages;
 One whipping testing machine for gages;
 One hydraulic machine for testing gage glasses.

The materials for test, including samples which have been obtained by the inspectors at outlying points and those sent to the department by the shops, are brought into the building through the receiving room. They are distributed throughout the building from that point, the metal specimens going to the machine room in the basement for preparation, then to the phys-

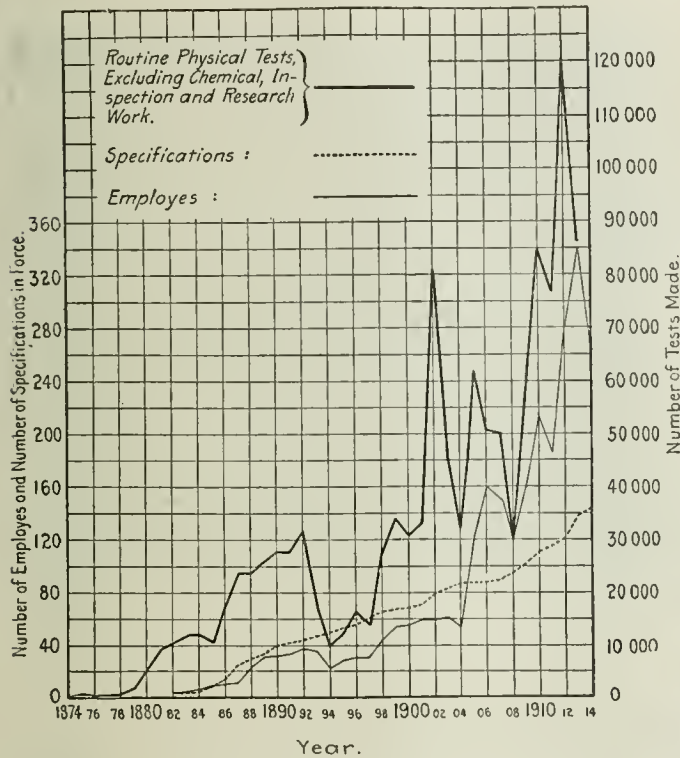


Diagram Showing the Growth of the Department of Inspection and Tests of the Pennsylvania Railroad

ical laboratory for tension, compression, vibratory or other tests, and to the chemical laboratory for analysis.

Rubber, Air Brake Hose and Miscellaneous Laboratory.—The extent of the work of this department is indicated by the fact that the needs of the railroad are about 635,000 pieces of air brake hose per year. There are now being installed machines for air brake, signal and tank hose, and other miscellaneous tests, including steam and hydraulic gages, and gage glasses for boilers and lubricators.

Heat-Treatment Laboratory.—This department, on the first floor, is for the development of standards in the heat-treatment of metals during the process of their manufacture for use in railway equipment. Investigations are carried out to study the effect of various heat treatments on a large variety of carbon and alloy steels. They are also made to determine the properties of non-ferrous alloys, including the co-efficient of expansion. Shop-manufactured locomotive and car springs, involving as they do a form of heat-treatment, are sampled and tested regularly to determine their acceptability for service.

Large castings of various kinds have been heat treated by this department with the aid of outside facilities with a gratifying degree of success. The effect of chemistry and heat-treatment upon the endurance of materials to repeated stresses is tested out by revolution and vibration tests, including vibration tests on complete springs. Rails, splice bars and tie plates are heat-treated to study the increased service it is possible to secure. The effects of heat-treatment are noted and a wide range of working conditions are applied on a variety of the high

speed tool steels to ascertain the best chemical characteristics.

Investigations are made on various types of fireproof material for the purpose of maintaining a high standard. The testing of felt and insulating papers used for lining refrigerator cars has been made necessary by the large variety of materials of this kind on the market, the keen competition among manufacturers, and the ease with which the highest grade and best material can be closely imitated by cheap and inferior products. This laboratory is equipped with an insulated room and electrical heating arrangements for this work, the tests being designed to represent as nearly as possible the service conditions to which these materials would be subjected. Temperature measurements are made of various types of refrigerator-car construction by means of resistance thermometers. Aside from the measurements of high temperatures in the laboratory, periodic calibrations are made of the various pyrometers. The heat-treatment department in general carries on a large variety of special work, and there is but little that falls without its range of possibilities even to the extent of heat treating glassware.

ELECTRICAL LABORATORY

Lamp Tests.—On the third floor the equipment for lamp tests consists of three photometers, a lamp test rack of 1,000 lamps capacity, with switchboard, transformers and potential regulator equipment. This work was taken up in 1902, with a view of obtaining data for the preparation of specifications to secure uniformity in the ordering of incandescent lamps, and the maintaining of sufficiently high standards. It consists mainly of life tests of lamps at abnormal voltages and tests for the efficiency of illumination, as well as the investigation of new developments in the general field of illumination as applied to railway work.

Standardization of Instruments.—A division of the electrical laboratory is employed in investigations and development work along electrical lines, and the standardization of electrical in-



The Water Testing Laboratory

struments. Part of this work is done at the laboratory, and part of it, when necessary, at other points, by laboratory men. The character of the work may be judged from the following examples upon which comprehensive reports have been made:

- An investigation of electrolysis in systems of underground electric structures.
- Tests and investigations of the construction of various kinds of transformers.
- Tests of various makes of primary and secondary batteries.

Oscillographic tests for linear and angular velocity, wave forms, etc.;
Investigations of special cases of electrical troubles;
The development of an electrical method of measuring the hardness and homogeneity of steel.

Matters such as these are reported on and recommendations made. Electrical instruments are sent in from all points on the Pennsylvania system to this department for calibration and repair, and men from the laboratory are sent out to inspect and check electrical instruments on switchboards at the various power plants, and at other points.

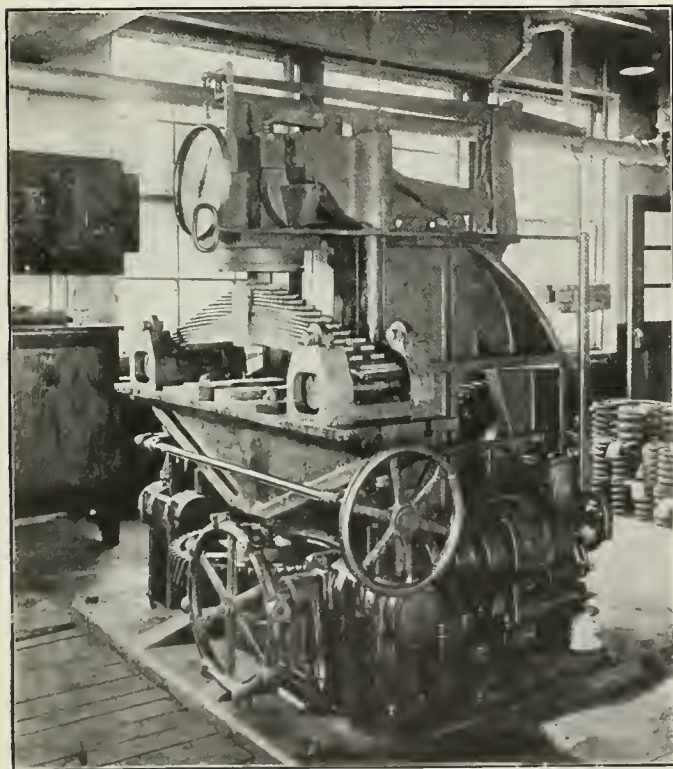
LABORATORY AND ROAD ASSISTANTS

The large room on the second floor is provided for the force of laboratory and road assistants coming under the direction of the foreman of road tests and special tests. The duties of these men are varied, and include tests of locomotives on the road or tests of equipment with special devices; the tonnage rating of trains and the following up of all experimental appliances which are put into service for test purposes.

The fifth floor has been arranged for photographic work, consisting largely in making prints of metal sections, photomicrographs of steel rails forming a large part of these. Photographs of parts which have failed in service are also made for convenient preservation and study. The photographic work requires the services of two men and about 25,000 prints per year are made.

CHEMICAL LABORATORY

Metallurgical Work.—The main chemical laboratory on the fourth floor is divided by the central balance room, into two

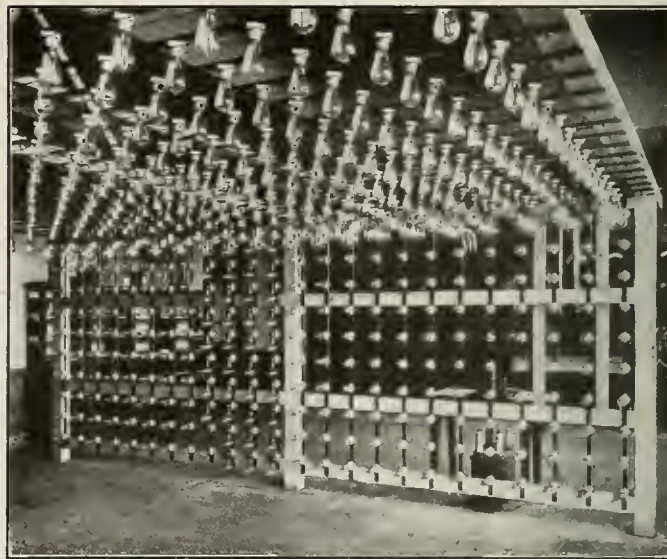


Vibratory Endurance Testing Machine for Springs

departments, the larger one of these being devoted exclusively to metallurgical chemistry. In this department methods are developed for the determination of the elements in plain-carbon steels, alloy steels, and non-ferrous alloys used for bearing backs and linings, packing-ring metal for different purposes, etc. Data are obtained leading to the development of specifications for this class of products, and samples of shipments are analyzed to determine whether they are acceptable under the specifications adopted. This steel laboratory has facilities for analyzing 100,000 samples per year.

Miscellaneous Work.—The smaller of these two laboratories is for work of a more general character, being used for the examination of fuels, the development of specifications for paint products, lubricating and burning oils, boiler compounds, lacquers, plush, car cleaners, cutting compounds, belt dressing, polishing compounds, hydraulic-jack liquids, fuses, track caps, fire-extinguishing preparations, the recovery of used or wasted products, etc.

In both of these laboratories much time has been spent in the examination of broken or "failed" parts of equipment, in an effort to determine the cause and with a view to the preven-



Lamp Test Rack with a Capacity for Making Efficiency and Life Tests of 1000 Lamps

tion of accidents which aside from the money losses, might result in injuries or loss of life.

Certain food products used in the dining car service are also examined here at times; many other miscellaneous investigations are made, as of conditions which may have led to loss from the damage of freight in transit, and to so establish methods for preventing such loss. During the past year a considerable amount of work has been devoted to the chemistry of tunnel air in connection with the installation of ventilating systems. The total list of activities touched upon would be too long for enumeration in an article of this character.

The chemical analysis of rubber compounds has been studied and much experimental work done in perfecting a method whereby material of this kind can be bought on specifications which define and limit its chemical properties. At present there is in force a specification for high-grade rubber insulation. Samples from all shipments are analyzed as well as some other rubber compounds. At the same time experimental work is being carried on to improve the method of analysis, and to devise others so that specifications may be drawn covering the chemical properties of other grades of rubber materials.

Manufacturing Laboratory.—A manufacturing laboratory, which might be called a small factory, is maintained in a separate building which is under the direct supervision of the chief chemist, and new products are manufactured in this until such time as it is found advisable to purchase them from "outside" manufacturers.

Laboratory Car.—In addition to the steel-rail work at Altoona a laboratory car has been built to be moved, as required, to that point where steel rails in process of manufacture are to be inspected. The object in equipping this car is to make chemical analyses of the finished rails at the mills by a force of chemists under the chief chemist. This, it is expected, will avoid delays which at times occur in the operation of the mills, and are im-

possible to avoid without the facility of a suitable force at hand at the time and when the rolling is taking place, in order to keep up with the chemistry requirements of the company's specifications. The car is equipped with furnaces for combustion and all other necessary apparatus for general chemical work in connection with the inspection of steel rails.

Bacteriological Laboratory.—When the department of chemistry was established, problems were frequently presented which applied chemistry could not solve satisfactorily. It was found, for example, that a chemical examination of water might show the presence of organic constituents, but it was impossible to tell the source of these. A water might contain a large amount of organic material of vegetable origin and yet not carry any infectious material which would likely give rise to disease, while other samples low in organic constituents were believed to carry infectious germs which might render their use very dangerous to employees or patrons of the road.

It was also found necessary to supervise certain sanitary matters and to disinfect cars, offices and waiting rooms under certain conditions, but it was not known what disinfectants were destructive to specific disease-producing bacteria. Manufacturing concerns were offering various disinfecting preparations, but the officers of the company had no means of determining which ones were efficient and the problem could not be solved by chemistry alone. These questions were considered so important that it was decided that a division of bacteriological chemistry was necessary, and on November 1, 1899, such a laboratory was established.

The work in bacteriology and water analysis has increased constantly, and at the present time four men are employed in the laboratory. The department co-operates with the surgeon general of the United States in the enforcement of the quarantine regulations of 1913, which require that railroad companies shall furnish wholesome drinking water and proper ice supply to passengers using their cars. Water which contains anything indicative of injurious contamination is not permitted to be introduced into the drinking containers of a Pennsylvania coach.

The department regulates the standardization of disinfectants and issues instructions concerning their application for the protection of passengers and employees, as well as the disinfection of stock cars. Special care is taken to prevent any infected employees from coming in contact with the public.

In 1914 bacteriological and chemical examinations were made of 609 samples of drinking water. There were 3,112 bacteriological examinations of pathological specimens, submitted by the relief association physicians. The total number of bacteriological examinations was 3,621, or an average of more than ten per day.

In addition, this department has under its care the examination of boiler feed waters and the formulation of methods for their treatment. In 1913, examinations of 287 boiler feed waters were made, while in 1914 the number was 282.

OTHER EQUIPMENT

As part of the equipment of the test department there is a dynamometer car which was built in 1906, and is the fifth of a series of such cars which have been in use on the Pennsylvania Railroad. There is also the locomotive testing plant which is located adjacent to the test department building. This plant was erected in 1905, after having been in use at the St. Louis Exposition in 1904, and is operated by a force of 26 men.

There is being installed in a separate building a brake shoe testing machine which will be the first of its kind, in that it will have two dynamometers of 4,000 lb. capacity, which will make it possible to obtain the co-efficient of friction of brake shoes when two shoes are applied to a single wheel (clasp brake conditions). The car wheel will run upon an idler wheel, representing the action of a rail upon the wheel.

EXTENT AND VARIETY OF MATERIALS TESTED

The scope of the work now embraced by these departments coming under the jurisdiction of J. T. Wallis, general superintendent of motive power, at Altoona, can be better appreciated

when it is understood that the cost of the materials covered by the inspection and tests, and entering into the construction of the railroad rolling stock and track, in 1913 amounted to \$82,119,480, while the cost of operating the test department and chemical laboratory for the same year was \$534,060. For an approximation and using these figures, it is interesting to observe that the total cost of operating the departments, including all additional work and inspection, is about 0.6 per cent of the cost.

The year 1913 was perhaps a record one for the test department and laboratory, and the extent and variety of the work of the departments can be shown by a few examples for that year. There were 61,148 separate reports of material tests issued by the test department. In the physical laboratory, while no record was kept of the number of samples examined, 138,886 tests were made. These tests represented quantities such as the following:

Of bar iron 149,863,693 lb. were tested and 6,246,611 lb. rejected; of staybolt iron, 15,385 tests representing 8,301,960 lb. were made; of cement, 29,231 tests were made, representing 587,900 bbl., of which 13,600 bbl. were rejected; of wheels, 310,381 were inspected, and 1,213 were rejected; of axles, 164,810 were tested and 8,035 were rejected; 290 samples, representing 56,322 yd. of plush, were tested; of air brake hose, samples representing 634,807 were tested and 84,826 rejected.

In the chemical laboratory, during 1913, a total of 57,309 samples were analyzed, involving about 286,545 determinations.

There are 85 items, ranging from asphaltum to zinc, which are now bought under specifications and which must be passed upon by the test department or the chemical laboratory.

During 1913 there were inspected, while building at manufacturers' works, 24,966 freight cars, 343 steel passenger cars, and 190 locomotives. The value of the materials rejected through the test department in 1913 was for the physical laboratory, \$776,928; and for the chemical laboratory, \$65,767.

ORGANIZATION OF DEPARTMENTS

As outlined in the diagram of the organization, the inspection at the manufacturers' works and the collection and forwarding of samples to Altoona is carried out under the direction of the chief inspector, with permanent resident inspectors and forces for the central district at Altoona, the western district at Pittsburgh and the eastern district at Philadelphia. In addition, when equipment is being built at outlying points, temporary inspection forces are maintained at these places during the progress of the work.

As previously stated, the work of the department began under the direction of John W. Cloud. In May, 1879, he was appointed the first engineer of tests and continued under that title until July, 1886, when he succeeded to the office of mechanical engineer, retaining control of the test department. Axel S. Vogt, the present mechanical engineer, succeeded Mr. Cloud in March, 1887. The work of the department under the mechanical engineer was in direct charge of W. O. Dunbar from July, 1886, to July, 1893. From the latter date to July, 1903, the assistant mechanical engineer had direct charge of all the work of the department. During this latter period the assistant mechanical engineers were A. W. Gibbs, from July, 1893, to August, 1902, and W. F. Kiesel, from the latter date until July, 1903. In August, 1903, E. D. Nelson was appointed engineer of tests, and in September, 1911, was succeeded by the writer.

Two men have been in charge of the chemical laboratory, Dr. Charles B. Dudley from November, 1875, until his death, December 10, 1909. Since December, 1909, Dr. F. N. Pease has held the position.

That the information collected and the developments which have been made in the chemical laboratory and the test department have been freely given to the public, is well exemplified by papers and addresses which have been presented by the late Doctor Dudley. In addition to the works of Doctor Dudley, there have been published by the test department, 27 printed bulletins covering field tests and the work of the locomotive testing plant.

TRIES TO USE RAILROADS AS SELLING AGENTS

An example of methods by which shippers may cause a great deal of trouble for railroads is illustrated by an experience which the Erie and other Chicago lines have been having with a small mail order house in Chicago, which apparently has been trying to coerce them into acting as selling agents for its products, and when some of the roads refused, has attempted to boycott them.

Ward & Company, located at 730 North Franklin street, Chicago, who deal in soap and toilet preparations and other articles, have been making a practice of shipping packages of their goods to prospective agents to be sold on a commission basis, the agent to keep half of the sale price and remit the other half to the company. The agents are required to pay the freight charges in both directions, but when they are unable to sell the goods they have often returned them to Ward & Company, without prepayment of the freight charges on the return movement. There have been other cases where the consignee has refused to accept the goods on arrival, leaving them in the hands of the carrier, without recourse of the latter to collect charges in either direction; in one instance at least, shipment was made to a young boy, who had answered the alluring advertisement of the concern.

This company sends to its prospective agents a blank contract form to fill out, in which the agent agrees to dispose of the goods within 30 days, and also to pay freight charges and take them promptly from the freight station. So many of the shipments were returned that the Chicago freight stations were congested with them, and when Ward & Company were notified they advised the railroad that they would accept no shipments on which the freight charges were not prepaid in full by the shipper, and requested the road to notify its agents to that effect. On January 27, 1913, the railroad did issue a circular to all its agents and connections advising them not to accept such shipments unless all freight charges were fully prepaid, but in the large number of circulars handled by the average station agent they were often overlooked and the shipments kept coming in. Also, in many cases the consignees declined to accept the shipments and they were sent to the unclaimed freight depots.

Ward & Company gave instructions to the railroad to sell the shipments for charges and to remit the balance. They usually claimed that the value of the shipments was \$10 and authorized the railroad to sell them for \$5, but the railroad could not dispose of them for anything above 75 cents. Authority was finally obtained to dispose of the packages at 75 cents each, which was not sufficient in all cases to cover the charges. Finally, notice was served on Ward & Company that commencing February 20, 1915, the railroad would require the prepayment of freight charges on the shipments on the ground that the goods were not worth the freight charges.

This action resulted in the issuance by Ward & Company of various notices not to ship goods over the Erie, which was some relief to the road, although giving it some unpleasant advertising, but the goods continued to be shipped to points which could be reached only by its lines. Red pasters were placed on all packages sent out by Ward & Company containing the notice in large type "Ship no goods to Ward & Company over the Erie Railroad," and postal cards were mailed to agents of the road containing the same notice, with a footnote "Account of Erie Restriction on Ward & Company's Outgoing Shipments." Similar notices were issued applying to the Baltimore & Ohio, Chesapeake & Ohio and Chicago & North Western. The railroad cannot collect the charges from the original consignees, the latter claiming that the goods are the property of Ward & Company, while the Ward company disclaims ownership but claims to have a lien on the property. Ward & Company, in a letter to the Erie, have stated that the matter will be taken up with the Illinois Public Utilities Commission and the Interstate Commerce Commission, and that, if possible, an injunction will be obtained restraining the road from refusing to accept their shipments with charges collect.

WISCONSIN BERTH LAW ANNULLED

The United States Supreme Court has declared unconstitutional the statute of Wisconsin prohibiting the making up of an upper berth in a sleeping car until the berth is engaged. The decision is by Justice Lamar who holds such a regulation unconstitutional as taking private property without compensation. Moreover, the practice interferes with interstate commerce in that it is an inconvenience for a passenger to have the upper berth made up after he has got into the lower one.

The statute was passed in 1911, being designed to take the place of one passed during the year 1907, and found to be unconstitutional. The suit was brought by James T. Hall, against the Chicago, Milwaukee & St. Paul, which runs its own sleeping cars.

On the trial the railroad company insisted that the statute was arbitrary and unreasonable; not designed to accomplish a legitimate public purpose and contrary to natural justice. It claimed that the statute denied to it the equal protection of the laws; took its property without due process of law in violation of the Fourteenth Amendment and attempted to regulate interstate commerce. There was a hearing before the trial court without a jury. Some of the averments in the railroad's answer were admitted to be true. In addition witnesses were sworn whose testimony—admitted over objection—was to the effect that—while the company had a pecuniary interest in having the upper berth kept down when the lower was occupied yet—such lowering was necessary to secure the comfort of the occupant of the lower berth and to prevent him or her from being wakened or disturbed if it became necessary to put down the upper berth and arrange it so that it could be occupied by a passenger who had purchased such upper space during the night. The evidence was to the effect that the opening of the curtains, the glare of the light, the noise of the lowering the berth, the work of arranging the bedding for the upper berth and securing the holding wires would necessarily inconvenience the man or woman occupying the lower berth; deprive him or her of the privacy to which they were entitled and interrupt the rest and sleep to secure which they had engaged the berth.

There was evidence, and contention based on common knowledge, that the letting down of the upper berth did not affect the health or convenience of the occupants of the car or of either berth. This was demonstrated by the absence of injurious effects and the fact that lower berths with the upper berths down had thus been constantly used by travelers since sleeping cars were invented. . . . And if it was harmful to let down the uppers it would be even more harmful to permit additional passengers to come into the car and occupy them.

The decision declares that the objection to the act of 1907, which was annulled by the Supreme Court of the state, has not been overcome by the language of the act of 1911. The state could not authorize the occupant of the lower berth to take salable space without pay, neither can it compel the company to give that occupant the free use of that space pending actual purchase by another passenger. The owner's right to property is protected even when it is not actually in use, and the company cannot be compelled to permit a third person to have the free use of such property pending the appearance of a buyer. The statute cannot be sustained as a health measure. The right of the state to regulate public carriers in the interest of the public is very great, but that great power does not warrant an unreasonable interference with the right of management.

Counsel for the state argued that the statute should be sustained as an exercise of the state's reserved power to alter the charter of the company; but this view is rejected; the right to amend a charter does not authorize the taking of the property without just compensation. The power of amendment is not without limit.

Justices McKenna and Holmes dissented; but delivered no written opinions.

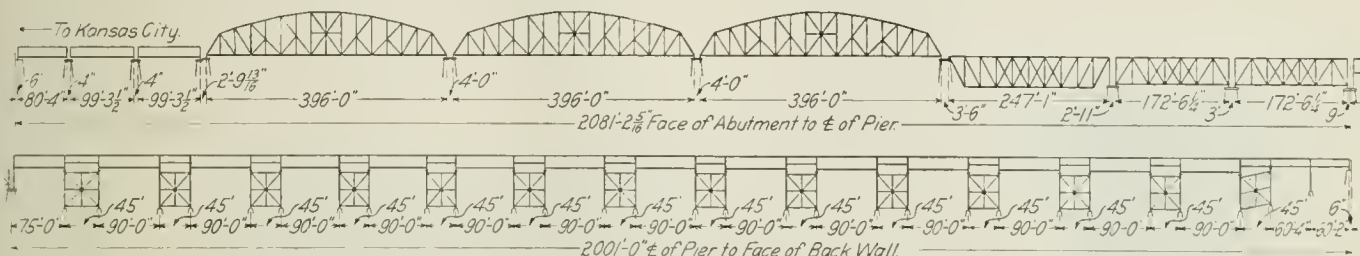
New Bridge Across the Missouri River at Sibley, Mo.

The Santa Fe is Completing the Renewal of a 4,100 ft. Structure With a Ballasted Deck Under Traffic

The Atchison, Topeka & Santa Fe is now completing a new bridge across the Missouri river at Sibley, Mo., on its main line about 25 miles east of Kansas City, which is of interest on account of its size, the advanced design adopted including the use of a creosoted ballasted deck, and the fact that the replacement of the old structure with the new was carried on without interference with a relatively heavy traffic. This problem was further complicated by the raising of the viaduct at the

construction imperative. For two years preceding its renewal large engines were not allowed to work steam when crossing the long spans and a pusher was attached on the approaches to the bridge.

The old crossing was at right angles to the stream and tangent for its entire length, with a 6-deg. curve on the bank at each end. The west approach required practically no embankment as the line is supported on the high bank which rises abruptly



Elevation of Santa Fe Bridge Across the Missouri River at Sibley, Mo.

east end a maximum of 7 ft. to reduce the approach grade from 0.8 per cent to 0.5 per cent. Approximately 9,600 tons of steel were required and the total expenditure was about \$1,300,000.

The old bridge was built in 1887 at the time the line was extended to Chicago. Beginning at the west end it consisted of one 80-ft. deck girder span, one 200-ft. deck truss span, three through-truss spans 396 ft. long, one 247-ft. deck truss span, two 172-ft. 6-in. deck truss spans and 2,000 ft. of steel viaduct

from the river. The east approach ascended from the adjoining low flood plain on a fill nearly two miles long and 60 ft. high at the bridge. When the renewal of this structure was first considered it was proposed to build the new bridge on another location closely approximating an extension of the east approach tangent. This would have eliminated the two 6-deg. curves and a small amount of distance, while it would have enabled the new bridge to be built without any conflict with traffic. It would



The New Santa Fe Bridge across the Missouri River at Sibley, Mo.

composed of 30-ft. tower and 60-ft. intermediate spans, making a total length of 4,082 ft. between parapets. This was a single-track bridge designed for a loading approximately equal to Cooper's E-24, and had become too light for the engines and trains operated over this line. Faulty details in the lateral system of the long spans, in the longitudinal bracing system in the windward towers and in the ends of the columns, made its re-

however, have resulted in the abandonment of the present sub-structure and have required a very considerable extension to the approach fill on the east end. It was therefore decided to rebuild on the present alignment.

Approaching the old structure from the east was an 0.8 per cent grade, extending across the long approach fill and the viaduct to the truss spans. The grade was level across the seven

truss spans and then ascended on the west bank on a 0.3 per cent grade. When originally built, the ruling grade on the Missouri division was established at 0.8 per cent. Recent improvement and second-track work has gradually reduced this to 0.5 per cent, except at one or two points. In considering the reconstruction of this bridge it was therefore decided to reduce the grade on the east approach to the new standard, which necessitated a maximum change in elevation of the viaduct of 6.9 ft. at the east end and a maximum raise in grade on the approach fill of 22 ft. The river spans provide a clearance of 50 ft. above the high water elevation of 1903. The maximum variation between high and low water elevation at this point is 37 ft.

The new structure is being built for a gauntlet track. As this is the only stretch of single track between Chicago and Kansas City, the advisability of building a double-track structure received very careful consideration. However, it was finally

THE MAIN SPANS

While in general the old masonry was still in good condition, it was necessary to repair and remodel it in several places. The west abutment was enlarged and wing and parapet walls added. The west pier was raised to support the new girder spans. A new pier was also necessary to support the two 100-ft. girder spans which replaced the 200-ft. truss, while the change in grade at the east end of the viaduct and the increase in length also made necessary the reconstruction of the east abutment.

With the exception of the pier under the east end of the east deck truss span, which is supported on oak piles driven to rock, and that under the west end of the west truss span, which rests directly on a rock ledge a short distance below low water, all the piers under the truss spans are carried on pneumatic caissons founded on rock. The four piers under the main channel spans are faced with granite to the elevation at which the ice usually goes out. The remainder of the material is Strong City



Views Showing (left) The Bottom Lateral System and (right) The West Portal

decided that as there is double track up to both ends of the bridge, a gauntleted single-track structure would provide sufficient capacity for any increase in traffic which might be expected during the normal life of the new structure, and that when it again required renewal, the traffic might justify a double-track structure on the proposed new alignment. The construction of the gauntleted bridge on the existing alignment and including the reduction of the grade on the east approach showed a saving of over \$500,000 in comparison with a double-track structure on the new location.

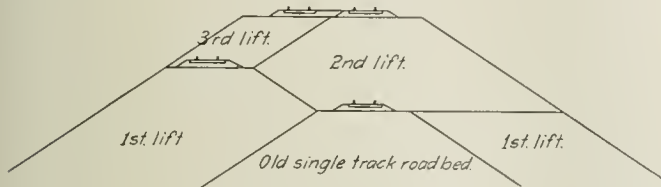
In the new bridge the 200-ft. deck truss span near the west end is replaced by two 100-ft. deck girder spans, resting on a new center pier. All other spans are replaced with others of the same length. The steel viaduct at the east end consists of 45-ft. tower and 90-ft. intermediate spans.

(Kan.) sandstone. While these piers were of ample dimensions for the new structure, the stone in the upper courses of four of them had become frost-broken, so that it was necessary to replace this with concrete for a distance of 12 to 20 ft. from the top. To accomplish this it was necessary to support the spans independently of the tops of the piers during their reconstruction. Two cofferdams were sunk onto the top of the pneumatic caisson on each side of each of these four piers. Concrete buttresses were then built in each of these cofferdams, supported on the caissons and extending up to average high water level. The buttresses on opposite sides of the pier were anchored together with 1½-in. rods extending through the pier. The concrete was placed by floating equipment. Steel hents were then erected on these buttresses and the load transferred from the masonry to these steel columns, after which the faulty

masonry was removed and the concrete placed. In the accompanying photographs of the reconstructed piers it will be noted that there is no projecting coping at the top, a standard practice on this road for concrete masonry.

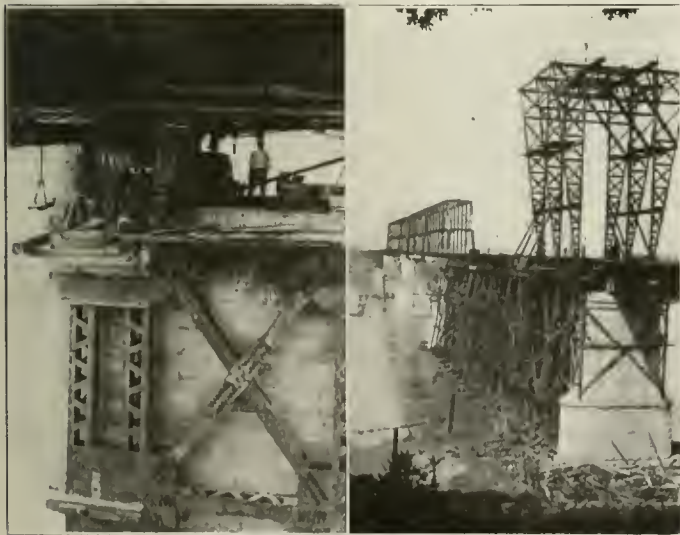
The remodeling of these piers and the placing of the concrete was done during the winter, much of it when the temperature was below zero. To prevent injury to the concrete in these exposed places the materials were heated before mixing and the green concrete was covered with tarpaulins, inside of which live steam was circulated.

This bridge is designed for Cooper's E-60 loading without modification. It follows the railway company's general stand-



Various Steps in the Construction of the East Approach Fill

ards of design except in a few instances. No adjustable members are placed in any of the large spans. To secure the desired strength and rigidity the various sections were designed liberally. To give an idea of the size of some of the more important members, the end post and top chord sections include three 40-in. web plates and 48-in. cover plates. In these sections no plates thicker than $\frac{3}{4}$ in. were used. The heavy design is especially noticeable in the bottom lateral system, which weighs 1,200 lb. per lin. ft. and in the top lateral system weighing 800 lb. per lin. ft. No curved members are employed, even at the portals, but care was taken in the design to use plain members



Transferring the Span from the Masonry to the Steel Post

Renewing the Floor on the First Long Span

throughout to secure a minimum cost of fabrication without sacrifice of serviceability or appearance.

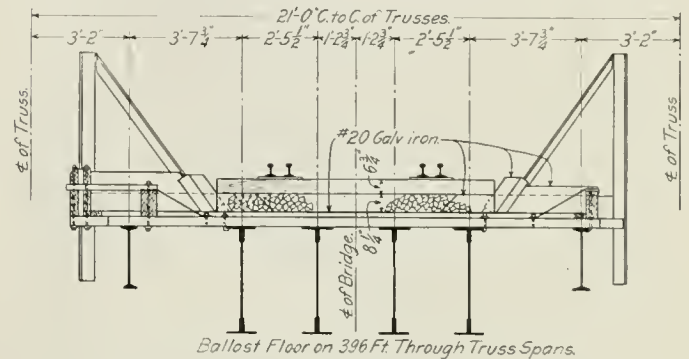
To provide a horizontal seat without vertical offsets at pier 6, the east end of the 247-ft. deck truss span is carried on a vertical steel bent on a rocker bearing. A similar arrangement is provided at pier 8, where the first girder span of the viaduct is also supported on steel posts.

In replacing the long spans, they were first transferred to falsework, one at a time, and dismantled by a traveler in the usual manner. The floors were then changed out and the new spans erected. Especially when changing out the floor, the necessity of avoiding interference with traffic was a serious problem.

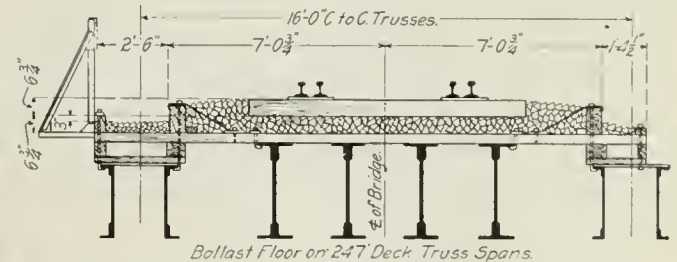
The government refused to permit the three long spans to be erected continuously across the stream, but required the west span to be erected first, the east long span next and then the middle span. This made it necessary to move the 150-ton traveler across the old center span. This was accomplished by laying stringers on the top chord of the span and placing rails on them. All movable equipment was removed from the traveler to lighten it, after which wheels were put under it and it was pulled across the center span by means of cables attached to a hoisting drum. While the removal and replacing of the equipment required considerable time, and this requirement of the government entailed an additional expense of \$1,500, the time actually consumed in moving the traveler across the span was less than 30 minutes.

THE VIADUCT

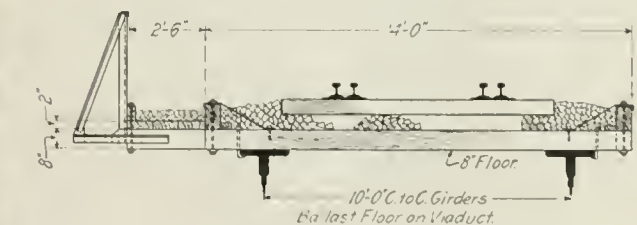
In designing the viaduct the principal problem arose from the necessity of adopting span lengths such that the new piers would



Ballast Floor on 396 Ft. Through Truss Spans.



Ballast Floor on 247 Deck Truss Spans.



Typical Sections of Ballast Floor

miss the old ones in all cases, as the masonry in the old pedestals was faulty and could not be used. With a careful adjustment of span lengths it was possible to design the new viaduct so that no new pier came within 12 ft. of an old one, measured between centers. Because of the difference in depth, the 45-ft. tower girder spans are supported on shelf projections on the ends of the intermediate spans, and all loads are transferred to the steel posts through the longer girders. One end of each long span is carried on expansion bearings consisting of four 12-in. segmental rockers. The towers are built to a batter of 2 1/2 in. to 1 ft. and are heavily latticed.

The viaduct is supported on massive concrete pedestals carried on from 12 to 16 concrete piles each. They were cast at the site and were designed to carry 20 tons each. They were driven until 60 blows were required to sink them one inch. The pedestals are connected with a thin reinforced concrete wall extending from just below the ground line to the top of the piers, this wall being built monolithic with the pedestals. After

the erection of the steel towers the bottoms of the posts were filled with concrete to protect the connections from moisture.

As it was necessary to erect this viaduct under traffic the track had to be raised to the new grade before placing any of the new steel. This required raising the deck of the old structure vertically a distance ranging from nothing at the connection with the main spans at the west end to 6.9 ft. at the east end. This was accomplished by lifting the girders at one end of each span one foot at a time with a derrick and blocking under it on the top of the tower. This process was continued from span to span until the track over the entire viaduct was at the required grade when the new viaduct was erected and the load transferred to it.

OTHER FEATURES

One of the special features of this structure is the use of a creosoted ballasted floor throughout the entire length. While this form of construction has come into quite general use on short spans, its application to truss spans 396 ft. long is unusual. However, careful records of the cost of maintenance of other structures, equipped with this type of floor on the Santa Fe, showed that it was economical, even on these long spans, because of the decreased cost of track maintenance. It was on this consideration that it was adopted here. Four-inch by 8-in. creosoted timbers are laid solidly on 24-in. 85-lb. I-beam jack stringers between vertical curbs spaced 13 ft. 11 in. between faces and allowing 8½ in. of ballast below the 6¾-in. by 9-in. by 9-ft. ties at the end of the spans and a minimum of 6 in. at the center with the span carrying the full dead load. No attempt is made to build this floor waterproof.

Although gravel ballast is shown in the accompanying photographs, this will be replaced with stone in the near future, as the hauling of dirt across the bridge for the east approach fill is now almost completed. New ties and 90-lb. rails will also be laid and the gauntlet track added at that time. The track will be laid with screw spikes and special tie plates and rail anchors. No. 20 frogs will be employed at the ends of the gauntlet. The creosoted floor provides for a sidewalk and hand rail across the entire structure. Telegraph brackets are attached on the downstream side, especially designed to afford ready access for the linemen.

The east approach fill is 10,000 ft. long and 65 ft. high at the highest point. In addition to being widened for double track it was raised a maximum distance of 22 ft. to conform to the new grade. This required placing 1,750,000 cu. yd. of material, all of which was secured from a cut about 3 miles west of the fill and across the bridge. This was loaded by two 95-ton Bucyrus shovels into 20-yd. Western air dump cars hauled by road locomotives. In spite of the necessity of avoiding interference with main line trains, as much as 5,400 cu. yd. of material was brought to the fill and unloaded in 9 hours. The accompanying sketch shows the manner in which the fill was widened and raised in three lifts.

The material was largely clay, which slid badly when saturated. After several slides had taken place about 80 large rock drains were built into the bank with outlets below the toe of slope in a quicksand bed. These drains were spaced as closely as 50 ft. apart in some instances where conditions were especially bad. After their completion a berm was built along the outer slope, since which there has been no further movement.

A new station with a 16-lever interlocking machine has been built at Sibley, near the west end of the bridge, to control the operation of the gauntlet tracks. Home and distant signals are provided at each end.

This work has all been handled without interference with the regular traffic, which amounted to an average of about 8 passenger and an equal number of freight trains during the 10-hour working day. When renewing the floor on the truss spans and when placing the 90-ft. girder spans on the viaduct, two passenger trains were detoured over another line to give a longer continuous working period. With this exception all trains were

handled over this bridge during the entire progress of the work. This added materially to the complexity of the problem as indicated by the fact that the gang placing the creosoted ballast floor was frequently only able to get in 3 hours actual work in a day.

This work was started in September, 1911. The premature moving of the ice took out the falsework under the west long span in February, 1912, without, however, damaging the structure. As soon as possible it was replaced and the erection of steel started in July, 1912. The three long spans were completed in January, 1913. Ice again took out the falsework under the west 175-ft. span in April, 1913. This was replaced and the deck truss spans were completed in June, 1913. Work on the viaduct was then postponed for some time until the east approach fill was raised sufficiently to enable the track on the viaduct to be raised to its permanent grade. Work was then carried on simultaneously on the fill and the viaduct until March 1914, when the steel work was completed. The construction of the fill is now practically completed, and it is expected that the final track construction will be installed by July.

This work has all been handled under the direction of C. F. W. Felt, chief engineer, and A. F. Robinson, bridge engineer system, with G. J. Bell, division engineer, and F. H. Frailey, assistant engineer, in charge on the ground. The steel was fabricated by the American Bridge Company at the Gary plant. The Missouri Valley Bridge & Iron Company, Leavenworth, Kan., erected all the steel except for the viaduct, and did all concrete work except building the east abutment. The viaduct was erected by company forces, who also built the east abutment and placed the ballast deck on the entire structure.

THE TRAIN DESPATCHERS' CONVENTION

The 28th annual convention of the Train Despatchers' Association of America was held at St. Paul, Minn., beginning Wednesday, June 15. President Charles A. O'Connor (B. & A.) in the chair. George T. Slade, vice-president of the Northern Pacific, welcomed the convention on behalf of the railways of the Twin Cities, and J. E. Scott, chairman of the train rules committee, responded. The president, in his annual address, reviewed the work of the year, congratulated the association on having reduced its deficit of last year by \$140, although the expenses of the official organ had exceeded its income by over \$500, and urged that some measure be taken to reduce this burden. He also recommended that the president's term be two years instead of one. There were thirty-seven applications for memberships and six for reinstatement, all favorably acted upon.

Charles F. Banks, former officer in charge of efficiency on the Northern Pacific, made an address on "Safety First," describing methods and their results on that road.

The report of the executive committee showed receipts for the year to be \$3,297. It was recommended that members be requested to pay for the "Bulletin" a club rate of 25 cents a year, and that the practice of issuing a free copy to each member be abandoned. This would make possible the publication of advertising matter, which, with some effort on the part of members to increase its circulation, would result in making the "Bulletin" self-sustaining. This plan was approved by the convention. The membership account showed that at the end of last fiscal year there were 1,151 members on the roll, to which were added during the year by election and reinstatement, less members deceased, withdrawn and lapsed 88, leaving the present membership at 1,239. Adding members elected at the convention, the membership of the association now stands at 1,282.

The train rules committee, which is joint with that of the American Association of Railway Superintendents, announced that the committee had no report to submit this year, the report of a year ago being incomplete and requiring still further revision. The committee had been in session for the two

previous days discussing certain questions as to which no satisfactory conclusions had been reached, and desired the views of the members of the convention thereupon. On these questions, relating to various phases of train rules, there was an informal discussion which continued until adjournment for the day.

On Wednesday, the second day, the members listened to the "Wonder-Phone," a loud speaking telephone, capable of delivering speech in a loud, clear, articulate manner to individuals or large audiences, and with a soft pedal which can reduce the sound to any extent. The convention was greatly interested in this.

Train rules were again discussed, nearly all day, being interrupted only by an address of half an hour by M. H. Clapp, superintendent of telegraph of the Northern Pacific, on the construction and maintenance of the telephone as a medium for train despatching. Mr. Clapp urged despatchers to more fully inform themselves as to details of telephone maintenance; many despatchers seem to take only a superficial interest. The train rules discussion covered the consideration of Rules 9, 20, 22, 37, 93, 202, 208, 210, 211, 218, 220, 221, 223, and Forms B, C, E, F, G, H and K of the Standard code. The discussion was concluded in the session of Thursday night. The convention affirmed by unanimous vote its opinion that Example 3 of Form G, or some similar example of Form C, giving right or "superiority" of one extra over another, was necessary to efficient single-track train despatching, and approved the Form C examples governing such movement framed by the train rules committee as being safe and effective; also approving the use of the middle order when practicable. There was some discussion as to the word "afterward" in the explanation to Example 4 of Form H, some roads having authorized the combination of this with Examples 1, 2 and 3, when the necessity for protection against certain extras already on the road was apparent at the time of issue of Example 1, while others required, under such circumstances, the issue of Example 4 separately, under a higher number, although delivered with the Example 1 order. The subject was referred back to the committee. There was also considerable discussion as to the practicability of relieving scheduled extras from the restrictions of Rule 93 in the numerous so-called yards where no yard engines are employed. The consensus of opinion was against such action.

The election of officers resulted in the choice of E. W. Weston, chief dispatcher, Northern Pacific, Livingston, Montana, as president; Frank I. Felter, chief dispatcher, Electric Division New York Central, as vice-president, and of John Colclough, dispatcher, Intercolonial, Riviere du Loup, Quebec, as member of the executive committee for four years. Toronto, Ontario, received the almost unanimous vote of the convention as the next place of meeting, and June 20, 1916, is the date.

The third day, Friday, was devoted to the reading and discussion of three papers. One on Checking Train Orders, by C. C. Barnard (St. Joseph & Grand Island); one on Team Work between train dispatchers, the yard, the engine house, the train crew and the operators in reducing over-time, by J. P. Finan (A. T. & S. F.), and one entitled The Curve Line of Horse Sense, by E. A. Parker (C. R. I. & P.).

Mr. Barnard presented a table for the year ending December, 1914, showing the number of errors found in each month by inspection of train orders and clearance cards. Out of 18,815 train orders issued in the twelve months the total number of errors found was 266 or 1.41 per cent of the number of orders. The number of errors in clearance cards was 163. The most numerous errors were the use of unauthorized abbreviations; the scratching out of words and the substitution of others; the use of misspelled words and illegible writing, the use of poor carious and the use of Ex for extra. The number of errors found in the month of January was 100; in February 78; in March 47, and so on down to the end of the year, when the total number was only 11. Notes concerning errors are entered in the personal records of the men making them, and the records

may at any time be useful as evidence that proper effort has been made to secure the best service.

The attendance at the convention was very good, there being 201 train despatchers registered, besides ladies and visitors; and it was declared the best convention the association has held since 1892. The whole five days were filled with entertainments for the ladies, a part of the excursions being participated in also by the men.

RAIL SPECIFICATIONS*

BY A. W. GIBBS

Chief Mechanical Engineer, Pennsylvania Railroad

In this country we are using heavier concentrated loads than are carried elsewhere. Much has been written to show the relative increases of the weights of rail and of loads carried, and conclusions have been drawn that one or the other has unduly increased. The variables in the conditions of service are very great and very perplexing. The climatic conditions are directly reflected in the monthly record of failures of all kinds, and a spell of unusually severe winter weather is immediately marked by a sudden increase in the number of failures. On the other hand, a succession of mild winters may show such a comparative immunity from failures as to delude us into the belief that at last we are making definite progress. The number of rails which fail annually, as compared with the total number in service, is very small when reduced to percentages. In many materials it could be ignored as purely an economic loss, and not very large at that. It is because the rail is part of a chain that its occasional failure assumes such importance.

With the above points in mind, it must be said that the available data do not show that progress in performance which we have a right to expect. That the real answer to this great problem has not been reached is proved by the continued unrest in our specifications, and by the everlasting changes in sections.

What answer can we make? First, as users, we can and should lessen as far as possible unnecessary punishment of the rail by improvements in the mechanical design and maintenance of our equipment. We can be expected to improve our structure under the rail as our loads increase, and this change is in progress. It is but fair to say that bad conditions, both as to equipment and track structure, have contributed to rail failures. That the large number has attracted no more attention is because of the vigilance of the track inspection. In the very great majority of cases the rails are removed before any serious results ensue.

Against these unsatisfactory conditions we have several possible solutions: Better steel, in the sense of more uniform steel; better steel in connection with more rational sections; materially heavier sections; or retrogression in loads and speeds. To date, a combination of the first and second has been chosen. There has been a very general change to open-hearth steel, at an increased cost.

Neither the American Society for Testing Materials nor the American Railway Engineering Association specification really protects the buyer as to chemistry. Neither puts any limit on the amount of segregation permitted, and it is well known that this ranges over wider limits than would be permitted in the ladle analysis.

In investigating the causes of the failures of individual rails, many analyses have shown such startling discrepancies between the composition of the failed rail and the analysis purporting to represent the heat that it was difficult to believe that they could represent the same material. Either the ladle analysis is an unreliable index of the quality of the

*Abstract of the presidential address delivered before the American Society of Testing Materials, which met at Atlantic City, June 22-23. The complete report of the convention will be covered in these columns next week. The election of officers, etc., is mentioned in the General News Section of this issue.

material in the rail or there is a great need for chemical reform. We know by experience that when put to it the chemists of the producers and the consumers can tally within very reasonable limits. This is a serious matter for the consumer. How far the difference between chemists is due to difference in methods I do not know, but possibly the methods by which the chemistry is determined may have to be agreed upon and made a part of our specifications. Dr. C. B. Dudley, who did much work on standardizing methods of chemical analysis, would in his specifications not only state the composition required, but also the methods by which the determination was to be made.

From the physical standpoint both specifications are defective, as both contain the provision that if the test piece meets the requirements the material will be accepted; but in the event of the failure of the first test piece, two more tests are made, and if both pass, the material is accepted. We hold that this is a pernicious practice, in that the consumer has positive proof that some of the accepted material does not meet the requirements. The American Society for Testing Materials specification includes all the machinery for detecting physically unsound material by nicking and breaking, and then provides that the rails represented by these unsound test pieces shall be accepted as "Special" rails. Presumably they are to be used in some unimportant location. This is another very bad practice. It is not always possible to find unimportant places.

Summed up, the rail specification of the society does not put a proper premium on the selection of the better part of the ingot for one of the most exacting services for which steel is used. Where our specification differs from that of the American Railway Engineering Association it is not so good.

The rail committee is composed of able men. Among them are some of the ablest metallurgists in the country, and we should look to them for that constructive work which would make our specification beyond criticism. The purpose of the society is to make specifications and have them used. If year after year we retain provisions that lessen the incentive to improve the product, we cannot wonder if other specifications are preferred.

If we consider all the steps in our rail industry, we find very few improvements in methods other than those which lend themselves to increased output or reduced cost. There are some notable exceptions to this, three in particular; namely, the electric furnace, for producing steel; the sinkhead process for casting ingots, for producing better ingots; and the descaling process, for producing better rails, by mechanically removing some surface defects which would later develop into seams. All of these processes are represented by rails actually in track under observation, but it is yet too soon to justify an opinion as to their value, nor have any of these methods been generally adopted.

It is to be hoped that some of the large-scale experiments now in progress will show what is to be looked for from a more uniform product. One of these includes the requirement that the chemistry shall be from the rail, instead of from the ladle test ingot, and the segregation must be within reasonable limits. This experiment will, at least, give a quantity of fairly uniform material, so far as any practical method of representative testing will insure it.

Aside from these, and some experiments on too small a scale to deserve special notice, the rail situation remains very much as it was seven or eight years ago. Any deviation from the beaten path is immediately met by an increase in the price asked, the reasonableness of which the purchaser has no means of determining. In at least one case of which I have knowledge, the actual expense of every kind, so far as it could be ascertained, due to rail breakage on a certain system was less than one-fifth of the annual increase in the cost of rail due to the introduction of a proposed new speci-

cation designed to secure the quality of rail desired. The year taken was not an abnormal one in any way. One serious wreck would, however, entirely have changed this showing. It requires a lot of courage and a strong sense of duty to justify such an expenditure when the direct return is problematical.

There are many who believe that we cannot hope for relief by the use of more uniform steel. They make the point that, if this is the solution, it can be obtained by a discard larger than the ordinary. They cite the records of the carriers to show that the failures, especially the breakages, are fairly well distributed throughout the ingot, so that no practicable discard would eliminate the trouble. They also call attention to the many examinations of broken rail which reveal no defect that we can recognize as such. From these conditions they argue that the only remedy is to use more steel—that is, heavier sections—without any change in the specifications as to quality. Possibly this is correct, but we would call attention to the fact that post mortems on rail sometimes give negative results, because we have not before us all the related evidence. The rail may have been damaged by unfair usage, of which there is no evidence. If due to defective support, the evidence is lost when the track is repaired. Damage from defective wheels, etc., leaves no permanent mark. There is a growing belief that the straightening press, by straining the material beyond the elastic limit, is responsible for many otherwise unexplainable failures, and it would also explain why rails from the lower part of the ingot figure so prominently in the breakage record.

As to the quality, we cannot ignore the fact of the difference between rails from different mills. There have been some notoriously bad rollings, as shown by the records of various roads, and these mills have subsequently turned out an excellent product. If all of the rail was as good as the best, we would have very little room for complaint.

The present line of progress includes a general increase in the weight of sections throughout the country. The 100-lb. mark, or that neighborhood, seems to be one of the halting spots, but some sections go considerably beyond this figure. A careful study has been made of the sections, and the new ones, especially of the heavier weights, are believed to be better adapted to secure good mill results, as well as better performance in the track.

Personally, I believe that the time has arrived for a considerable increase in the weight of sections, and I am not so certain that a change of quality is required at the same time. One reason that appeals is the presence within recent years of that class of failures known as "transverse fissures." So far there seems to be no satisfactory explanation. It seems surprising, if this class of breakage develops in the rail, that it should not also do so in the tire, which is subject to the same intensity of pressure. The tire, however, has an immensely greater section than the head of the rail. If the mere fact of the relatively large area of section of the tire contributes immunity from this class of failure, it is fair to assume that somewhat the same result could be looked for in the case of the rail head.

Certain practices, such as the present system of straightening, have long called for improvement. Nearly all rail passes through the gagging press. The rail specifications are possibly too exacting in requiring that all rails shall be "smooth, straight in line and surface, and without any twists, waves, or kinks." It is a question whether this is not asking too much for the good of the rail and whether it would not be well to make the greatest possible tolerance in the way of accepting rail with such variations from straightness as can be reasonably eliminated in laying.

In the search for a remedy for our troubles, some have proposed to improve the product by more or less radical changes in the mill practice. It must be remembered, however, that a modern steel mill, like the railroad, can only

exist by being operated on a large scale. It is designed in advance with a view to a certain sequence of operations, and if proper provision has been made for each, smooth operation follows. The mill, however, is only balanced when it performs these operations in the prearranged order, and to make a radical change—as, for instance, slow rolling, cold rolling, more passes, or one of the many other innovations suggested—may seriously unbalance the whole operation. It is not to be expected that a mill will be willing to make changes in its practice until after experimental work has demonstrated that the proposed practice is practicable and valuable. In conclusion, I must repeat that the rail situation, as we see it, is disappointing. To add to the complexity of the situation, the government, through some of its bureaus, is taking a hand and investigating every serious failure, apportioning blame and suggesting remedies. This will probably increase rather than diminish, and may some day be very awkward for the producer as well as for the user.

RAILWAY TELEGRAPH SUPERINTENDENTS

The 34th annual convention of the Association of Railway Telegraph Superintendents was held at Rochester, N. Y., June 22, 23 and 24. Acting President E. C. Keenan (N. Y. C.) in the chair. There was an attendance of about 200, including wives, daughters and friends. At the first session, largely social, Belvidere Brooks, vice-president of the Western Union Telegraph Company, made a short address. The Western Union takes much interest in these conventions. They promote the adjustment of relations between the telegraph company and the railroads. He reminded his hearers that Rochester was the birthplace of the Western Union Company.

Acting President Keenan stated that the past year had been a prosperous one for the association. Messrs. W. H. Potter and M. H. Clapp, chairmen of the Eastern and Western Divisions of the association, respectively, reported on the meetings of the two divisions during the year. The chairmen of the various committees also made their reports.

The first paper was on "Interference from Single-Phase High-Tension Power Lines on the New York, New Haven & Hartford," by N. E. Smith, of that road. He gave a history of the work of electrifying that road west of New Haven and the difficulties experienced with induction on telegraph and telephone lines. The methods experimented with to overcome these troubles were gone into in detail. The paper contains a fund of information on this difficult subject. In the discussion of the paper I. C. Forshie, of the Pennsylvania Railroad, described the work of electrifying the section of that road between Philadelphia and Paoli, 20 miles, including the sixteen tracks at the Broad Street terminal. All wires throughout the section are being put underground. The telephone and telegraph conductors are in two cables, one of which is called the trunk cable, carrying the through circuits. With the long distance telephone wires phantom circuits are operated and these are composited and duplexed. The Philadelphia-Pittsburgh phantom, 350 miles long, has four telegraph circuits which are operated duplex. He described experiments made during the electrification development to determine what effect would be produced by the different trolley currents. High insulation of the telephone and telegraph circuits and perfect balance both for resistance and capacity are necessary to insure satisfactory operation in the electrified district. The lead sheath of the cables, he said, has taken care of electrostatic induction, but it has no appreciable effect upon electromagnetic induction.

The next paper read was on "Primary Battery for Transmission on Train Despatching and Other Telephone Lines" by G. W. Nelson and E. E. Hudson. This paper dealt principally with the use of low internal resistance, closed-circuit primary cells as a reliable and efficient source of energy for

telephone train despatching, arguing that the reliability insured by this source of current is more important than low cost of operation; though a substantial saving in maintenance was also claimed.

In the discussion W. E. Harkness pointed out the advantages and disadvantages of the caustic type of cell. While the caustic soda cell is superior to the dry cell for despatchers' transmitters, it is a question if it can show any advantage over storage cells in this service. For way-station transmitters the caustic soda battery, when properly maintained, has given satisfactory service. It would not, however, furnish a uniform or high grade of service when subjected to heavy or long periods of discharge. Under ordinary conditions storage cells cannot compete with either the caustic soda cell or the dry cell in way-station service. He favored the use of the caustic soda cell for booth and other outdoor telephones. The soda cell is superior to the dry cell, he said, as a common source of current. He thought caustic soda cells could be used with advantage for the operation of telegraph sounders.

R. F. Finley (N. Y. C.) read a report, giving results of tests of wet and dry batteries on that company's lines, with comparative costs.

At Wednesday's session the first paper was by M. H. Clapp (Northern Pacific). He reviewed the development and the growth of the use of the telephone in railroad service. The Northern Pacific has made extensive use of telegraph wires for telephones in a variety of combinations, and has extensive plans for further utilization of existing facilities for operating by the latest methods. When pole lines are rebuilt all wires are transposed, anticipating future needs. Railroads should establish more private telephone exchanges. The loud-speaking telephone is now an assured success.

G. A. Cellar (Pennsylvania Lines) and E. C. Keenan (N. Y. C.) and others told of high satisfaction with the telephone for despatching. The meeting brought out no dissenting voice. The telephone accomplishes great economy, but members who asked questions as to exact data received no answer. In most cases recent installations are less costly than earlier ones. The use of automatic telephone exchanges was looked upon favorably by several members.

R. E. Chetwood (Western Union) read a paper on "Screened Cable Conductors and their Application in Telegraph Service," which was briefly discussed. C. S. Rhoads (C. C. C. & St. L.) sent comments on this in writing. In closing the discussion Mr. Chetwood, answering questions, said that the screen only reduced interference from high speed circuits; that the cable is used largely for automatic circuits, and that other metals than copper had been considered for the screen, naming one cable with a brass screen. He said that very little was gained by loading screened cables.

There was a short discussion of the effect of aurora borealis on telephone and telegraph working, manifestations of this force having been observed in many places within the last two months.

Prof. C. A. Culver, of Beloit College, Beloit, Wis., gave a brief talk on radio (wireless) telegraphy and telephony. Great progress is being made in these fields. Recent inventions have simplified many processes, and next August an important patent expires. Professor Culver believes that high towers are no longer necessary for wireless sending. A relay for wireless communication is about perfected.

At Thursday's session, W. H. Hall (M. K. & T.) read a paper on "Censorship of Railway Messages," an abstract of which was printed in the *Railway Age Gazette* last week, page 1479. In the discussion of this paper J. F. Caskey (L. V.) told of the employment of a censor on his road for seven months, particularly for messages sent by Western Union lines under frank. All officers were instructed to send

copies of each such telegram to the superintendent of telegraph. Every message so sent was carefully edited and in many cases recast and unnecessary words cut out. He estimates the saving at \$2,000 yearly in excess of the salary of the censor. The railroad telegrams of the larger offices were also censored, with the result that in one department alone an estimated wastage of \$31 a day was reduced 85 per cent. The discussion on this subject showed that a number of roads have compiled comprehensive codes to be used in all departments. Mr. Caskey endorsed Mr. Hall's views in regard to the "mailgram." Such a system was being used on his road with success.

E. A. Chenery (Missouri Pacific) read from records showing the number of messages sent during the years 1913, 1914 and up to May this year from 12 important offices on his road. Since March, 1913, the total number of messages per day has been reduced from about 15,000 to 11,500 and the average monthly office expenses from about \$8,500 to \$7,300. This is the result of constant supervision and censorship. Mr. Chenery recalled the fact that Charles Selden, on the Baltimore & Ohio, did some effective censoring twenty years ago, by recording a charge for all railroad messages, the same as if they were to be paid for, and advising each department, monthly, of the totals for which that department was responsible.

H. D. Teed (St. L. & S. F.), in a written communication, told of the good results of censorship on his road. Formerly the officers sent letters very freely by wire. The "mailgram" system is very useful. These envelopes are a half hour quicker than ordinary train mail. In 1914 the number of railroad messages on Frisco wires was reduced very largely, as compared with 1913, and the total of the payrolls of the telegraph offices was reduced 18 per cent. In the relay offices the reduction was much larger than this.

The discussion of Mr. Hall's paper brought out considerable sentiment against the use of codes, based on the feeling that an excessive amount of time and work are required to code and decode messages. Simplicity is a cardinal principle in this matter and the use of ordinary language, properly condensed, may be the best way of adhering to this principle. Some departments have their own codes, for use between offices within their own control—the supply department and the auditor's department being mentioned—but that is not the telegraph department's concern. These short codes, prepared by departments, are probably a good thing; but a more comprehensive code is likely not to be appreciated. It was said that the American Railway Association's general code had never been adopted by anybody. One member remarked that the cost of railroad telegrams on his road, counting the wages of telegraph managers and messengers, was from 1½ cents to 2 cents a message. One large road had calculated that the total cost of railroad telegrams, including all expenses except maintenance of wires, averaged not over five cents a message; while the cost of coding, if done by a stenographer who is paid \$75 a month, may add considerably to the total expense.

David Sarnoff, contract manager of the Marconi Wireless Telegraph Company of America, gave an interesting talk on radio telegraphy, questioning some of the conclusions of Professor Culver, the previous speaker on this subject. He referred to the use of wireless amplifiers as repeaters on the transcontinental telephone line. The two great difficulties encountered in the development of the wireless telephone, he said, were, first, to get a transmitter that will be adequate for the current, and second, the proper regulation of voice currents; but he expects to see the success of the process.

Mr. Foley (D. L. & W.) said that recently five messages had been sent by telephone, with his wireless apparatus, from Scranton, Pa., to Binghamton, N. Y., about 60 miles.

E. C. Keenan and J. J. Ross (Mich. Cent.) told of the very satisfactory use on the Michigan Central of special signals at non-telegraph stations to instruct freight trains to enter sidings. These signals are controlled by the despatcher by

means of the selector calling-apparatus the same as is used to call station operators, the selectors for the outlying sidings being on the same wire with the station selectors. The signals are enclosed disks formerly used as block signals. They are not interlocked with the switches and are arranged to give the indication to the train by oscillating; and the conductor, having cleared the main track, acknowledges the signal by telephoning to the despatcher. Records for six months in 1914 showed the use of these signals 600 times, with 12 failures. These caused only slight delays except in one case. Answering questions, Mr. Ross emphasized the importance of care and accuracy in using this arrangement. If the despatcher sets the "head-in" signal at the wrong station he can cause annoying delays. It is important too to have the automatic "answer-back." The necessary modifications of apparatus have been made by the General Railway Signal Company and the Western Electric Company. All of these signals are on double track lines equipped with automatic block signals. More of them are to be installed.

St. Paul, Minn., June 20, 21 and 22, were the place and dates chosen for the 1916 convention.

The following officers were elected: President, E. C. Keenan (general superintendent of telegraph, New York Central, Lines West of Buffalo), Chicago; first vice-president, L. S. Wells (L. I.); second vice-president, M. H. Clapp (N. P.); secretary and treasurer, P. W. Drew (M. St. P. & S. S. M.), Chicago. Messrs. W. H. Potter and F. T. Wilbur were elected chairmen of the Eastern and Western Divisions, respectively.

UNIFORM TRAIN ORDERS

By J. L. Coss

Why is it that on a large railway system it is frequently found that the forms of orders and the instructions as to their use differ on different divisions?

For instance; one division may use the right-of-track order while on another its use is not allowed. One division may use the straight meet order, as between passenger trains while another will use the time order. There will also be found different wordings of certain forms of orders. On some districts forms which are not prescribed by the book of rules, are used freely. Especially will this be found to be the case when changes have been made in the despatchers, men from other lines using the forms they have been accustomed to until they are broken in; and sometimes they keep it up for a long time.

The general manager should have an experienced and competent despatcher on his staff to inspect the different despatchers' offices on the system; and this inspector should have the authority to require a uniform use of train orders. He should take the train order books and check back in them to see that the orders are used according to form; and should instruct all concerned in the manner of their use. He should also be qualified to render a decision on any order that may be in controversy. He should inspect the orders handled by operators at the large offices, as well as the small ones occasionally; and should see that block and clearance cards are made out correctly and handled properly. If a man is found who is not up to the standard in the handling of orders and other matters pertaining thereto, he should put him right, or recommend a remedy.

Train and enginemen, despatchers and operators are transferred from one division to another every now and then, and a form of order which they are not accustomed to may cause a difference of opinion, and possibly may result in something more than that.

This inspector, while on his trips, could look up other things for the general officer and in that way be of great assistance to him. A man from the general office, making visits of this kind occasionally, will have more influence on the employees than will local officers, even though they visit every week, for the men will know that if an irregularity is discovered the facts concerning it will go direct to the top.

Automatic Signals on Norfolk & Western Electrified Line

Installation of Most Modern Signaling in the Mountains of West Virginia, with Costly Refinements of Detail

The electrification of the Norfolk & Western between Bluefield, W. Va., and West Vivian, recently completed, made necessary the change from d. c. to a. c. operation for the automatic signals in this territory. As the signals in service before the electrification were practically new, it was deemed advisable to make use of them on other parts of the road and to install new a. c. signals on the bridges supporting the overhead power line.

The electrified section, known as the Elkhorn grade, is on the main line through the Pocahontas coal fields, about 105 miles west of Roanoke. The line is double track throughout, except in the Elkhorn tunnel, 0.7 miles long, which is single track. Be-



Fig. 1—Signal Near Graham, W. Va.

tween Bluestone Junction and Ruth there are two single-track lines, 2.9 miles and 1.9 miles long, respectively, which are normally operated as double track, both of which are signaled for traffic in both directions. The line has a large amount of curvature and heavy grades, varying from 1 per cent at the west end to 2.5 per cent just east of the Elkhorn tunnel.

Single-phase, 25-cycle power is used for traction and 60-cycle power for the signal system. All current is generated at the company's power house at Bluestone Junction, about 10 miles west of Bluefield, where plenty of good water is available and the coal supply is convenient. For the propulsion current, three 11,250-kv.a., 25-cycle, 11,000-volt, single-phase steam turbine engine sets are used, current from these being stepped up to 44,000 volts and distributed to substations at Bluefield, Maybeury, Northport and East Vivian, and also to substation transformers in the power house, where it is stepped down to 11,000 volts for the trolley wires.

The 44,000-volt feeders for the propulsion current are carried on bonnet posts on the south side of the bridges, and the signal transmission line, consisting of two No. 2, B. & S. hard-drawn, bare copper wires, carrying 4,400 volts, are supported on bonnet posts on the north side. All signal control, telegraph and telephone wires are carried on poles at the extreme northerly edge of the right of way. In order to provide against induction in these lines from the high-voltage propulsion current, the main transformer substations were located somewhat closer together than was required by considerations of voltage regulation and losses; and to provide for emergency conditions when one substation may be out of service, or for excessively high current, which occurs in cases of short circuits and grounds, it was decided to install so-called track transformers, or "boosters," in the trolley and track circuits at intervals of about one mile. The purpose of these transformers is to cause the return current, a considerable amount of which would ordinarily leak to earth, to

flow in the track rails and thus keep it at a fixed distance from the trolley wires and the telephone and telegraph lines. This required special consideration for the balancing of track circuits, and also for cross-bonding, to insure that there would be no lessening in the protection against broken rails otherwise provided.

Current for the signal system is generated in the power house by two 100-kv.a., 4,400-volt, 60-cycle steam turbine sets, connected directly to the signal transmission line. These are duplicate sets, one alone being of sufficient capacity to carry the entire signal load. The signal transmission line is carried on porcelain insulators and is broken at intervals of two miles on strain insulators. It is carried through a double-pole, single-throw oil switch at each of these points, so that it may be opened for testing or repairs.

A 1-kv.a., 4,400-110-volt transformer, having 5 per cent and 10 per cent taps for line-drop compensation, is used at each signal location, except at a few points where more current is required, 3.5-kv.a. capacity being provided in these cases. Each transformer is protected by 4,400-volt, graded shunt resistance multi-gap lightning arresters, and has 6,600-volt fused cutouts. The signal transformers, cut-out boxes and lightning arresters are mounted on the bonnet poles carrying the signal transmission wires. Screens are placed under these wires, so that persons on the bridges cannot come in contact with them. A hand-railing extends all the way around the platforms on the bridges, to which access is had by ladders at the north end. These platforms are not carried to the south end of the bridges, so that maintainers need not approach the 44,000-volt propulsion current feeders. The ladders on the north end of the bridges extend down only to a point 7 ft. above the ground, thus preventing unauthorized persons from climbing to the platform. The maintainers are provided with small ladders.

At each westbound signal location, the common wire is broken



Fig. 2—Signal Near Bluestone Junction

and small one-to-one transformers are placed in the control circuit in order to minimize the effects of induction and to localize the effect of grounds on any control wire. These transformers and the lightning arresters are mounted on a wooden box on the signal bridge. Switches are provided so that current may be cut off from the signal while the maintainer is working about it. The leads for the track transformer are taken from the

transformer side of this switch, so that the signal in the rear is not disturbed when one of these switches is open.

Double-rail track circuits are used throughout, the average block length being 4,500 ft., while some of the circuits in interlocking limits are as short as 300 ft. The U. S. & S. impedance bonds on the main line have a capacity of 200 amperes per rail continuously, or 400 amperes for two hours. At the turnouts to colliery sidings and other places where a large amount of propulsion current will not be used, bonds which have a capacity of 50 amperes per rail continuously and 100 amperes for two hours are used. The track circuits are supplied by small air-cooled transformers. In three cases where track circuits are very long and ballast conditions bad, 1-kv.a. transformers are used. The track transformers are supplied from the 110-volt taps of the signal transformers. Reactance coils having an adjustable air-gap in the magnetic circuit are used between the track transformers and the track to limit the amount of current when the circuit is shunted and to adjust the current and phase relation in the track coil of the track relay.

All insulated joints are six-hole, Keystone, having bakelized canvas insulation. These joints in most cases are staggered, but at booster transformer locations they are placed exactly opposite, also at crossovers between the main tracks, the joints are placed opposite, so that an electric locomotive using the crossover will not deliver return propulsion current to one rail of the track circuit, thereby unbalancing it and blowing the relay fuse. The track relays are of the U. S. & S. centrifugal, two-element type. The track transformer, track relay, reactance coil and line relays are housed in cast iron relay boxes on concrete foundations at the base of the bridge on which the signal is located. Track wires are carried from the relay boxes to the tracks in 1½-in. fiber conduit, and the wires are carried to the signal transformer, transmission line, etc., in galvanized steel conduit. No. 14, B. & S. solid copper Kerite wire is used on all control and signal circuits, and No. 9 B. & S. stranded Kerite is used for connections to the track. All line wires are No. 10, B. & S., copper-clad double braided, weatherproof. At the track, a cast-iron box, with a cover and a hooded opening for the entrance of the wires, is placed over the end of the conduit and concreted. The wire is soldered to a short piece of bond wire, both ends of which are bonded to the rail. At a standard signal location, an 8-in. by 12-in. by 12-in. cast-iron pull box is located on the bridge just underneath the signal platform, and from this a 2-in. conduit is run to the relay box, a 1½-in. to the lightning arrester box, a 1¼-in. to the signal and a ¾-in. to the transformer, to carry the necessary control wires. These conduits are fastened to the pull box, relay box, etc., by lock nuts over cup washers and lead washers, making a water-tight joint. Rubber-covered wire, run in galvanized cable rings and suspended from messenger wire, is used for the connection from the pole line to the signal bridges.

SIGNALS AND INDICATORS

The 70 automatic signals required on this section are the U. S. & S. Co.'s style S, upper-quadrant, operated by 110-volt, 60-cycle induction motors. The signals are mounted on the top of the structural bridges, special attention being paid in the design of these bridges to the elimination of obstructions to the view of the signals. The signals have enameled steel blades and Armspear spheroidal lens lamps. These lamps were found particularly desirable in this case on account of the large amount of curvature in the line, and also because in a number of cases on curves it would be difficult to provide an entirely satisfactory view of the signals if ordinary lenses were used, because of the obstruction caused by overhead structures.

The photographic illustrations, Fig. 1 and Fig. 2, show typical situations where, if the engineman of a passenger train had to depend on a lamp throwing rays only in lines parallel to the axis of the lens, he would have but a few seconds in which to get a good view of the light. (In Fig. 1 the location of the signal is indicated by the arrow.) As is well known, enginemen running under conditions of this kind are liable to get into the habit of ac-

cepting a very poor indication, finding this more convenient than to watch out with the care necessary to get a view of the signal at the exact moment when it can be seen at its best.

The spheroidal lens was described in the *Railway Age Gazette*, September 19, 1913, in connection with a report of its use on the Long Island Railroad. It is so shaped as to spread the light of an ordinary burner 90 deg.; that is to say 45 deg. on each side of the axis. And this is accomplished without impairing the visibility of the light on tangents. Tests have shown satisfactory results with green lights at a distance of two miles and red lights at over three miles.

At short distances the differences between the ordinary inverted lens and the spheroidal are not great; but at 900 ft. from the light and 15 deg. from the axis the stellar magnitude of the inverted lens measures 0.50, while the spheroidal measures 4.25. In a test made 1,890 ft. from the lamp and 15 deg. from the axis, the light from an inverted lens was entirely lost while the Armspear at that point measured 3.00.

The lamps on the Norfolk & Western are similar in appearance to the well-known design shown in the Armspear Manufacturing Company's bulletin, except that, being electric, there are no ventilating parts at the top. The lamps have the standard R. S. A. sockets and have relays, specially designed for these lights, to cut in the second lamp in case the first one fails; and have spherical silvered glass mirrors for reflectors. All metal parts are made of No. 18 gage steel plates. The signal lights are 10-watt, 110-volt tungsten, current being supplied from the signal transmission line to these lamps as well as to stations, towers and yards, also for operating the motor-driven air-compressor set at the Elkhorn tunnel, and for lighting the warning signs where the trolley wire is low.

Switch indicators are provided at all main-line crossovers where a train could clear the main track. These give an indication for the block in which they are located and for two blocks in the rear. They are of the vane type and operate on 110 volts. At the ends of passing sidings and other points where the protection is necessary, triple-lock switch machines are provided. These are controlled in the same manner as the switch indicators and the switch is held locked upon the approach of a train. Shunt boxes are used on all main-line switches and siding details.

INTERLOCKING PLANTS

The electro-mechanical interlocking plant at Graham has 14 working and 2 spare mechanical levers, and six electric levers. A similar plant at Bluestone Junction has 22 working and 2 spare mechanical levers, and 14 electric levers. All control circuits and indicators at these plants are d. c., operated by a battery of five 120-a. h. lead type cells, which are charged from a mercury-arc rectifier, taking current from the signal transmission line. The indication circuits for the levers in these plants are alternating current. Approach and route locking are provided for all through movements at all of the interlockings.

The electro-pneumatic interlocking plant at Elkhorn tunnel, which operates the switches on both sides of the tunnel, has a 17-lever machine with 13 working levers, which operate one three-arm, four two-arm, six one-arm and three dwarf signals, eight switches and five details. Air compressors, with a capacity of 50 cubic feet per minute, driven by 15-hp., single-phase, 60-cycle motors, are used to supply air for the plant at the tunnel, and instead of extending the air line through the full length of the plant, two 15-cu. ft. per minute air compressors were installed at a crossover located 5,500 ft. west of the tower, these compressors taking current from the signal transmission line.

This installation was made by company forces under the direction of D. W. Richards, signal engineer, to whom we are indebted for the above information.

WOMEN CLERKS ON THE BRIGHTON LINE OF ENGLAND.—Young girls are now being taught the duties of booking and parcel clerks and telegraphers in a special school at East Croydon, organized by the London, Brighton & South Coast.

New Railroad Legislation in Fifteen States

Regulation of Innumerable Details, Large and Small, Operating, Legal, Socialistic ; North, South, East, West

Laws affecting railways which have been passed in 1915 by the legislatures of fifteen states are abstracted below :

PENNSYLVANIA

Only two bills affecting railroads were enacted into laws as a result of the recent session of the legislature of Pennsylvania and neither of them affects operation. The governor vetoed the bill to repeal the full crew act of 1911, withholding his announcement of disapproval until eighteen hours after the time limit, although he acted on the bill and officially certified his action within the specified period. Other bills affecting railroad operation and equipment were defeated or died in committee.

The new acts affecting railroads are as follows:

Permitting testimony to be taken by examiners to be named by the Public Service Commission anywhere within the state and allowing appeals direct to the superior court instead of through the Dauphin county court, which has jurisdiction in state cases. The act may have bearing on pending appeals, of which there are a dozen, and an official decision is to be asked.

Changing period for reports on capital stock and loans for state taxation to the calendar year. Provision is made so that arrangements can be made for filing, under certain conditions, at times required for federal reports. Heretofore reports were required for an official year materially different from a calendar year.

A bill providing for a new railroad map of the state was vetoed.

As the result of an appropriation being allowed for maintenance, the Pennsylvania State Bureau of Railways, a branch of the Internal Affairs department, has been revived. Freeman C. Gerberich is again chief. The bureau is a constitutional office and it was sought to make it ineffective by withholding appropriations in 1913, the contention being that the functions were performed by the Public Service Commission. The bureau receives and files certain reports.

INDIANA

The Indiana legislature at its recent session passed the following laws relating to railroads:

House bill 11 authorizes the public service commission to compel railroads to place a flagman or install an automatic gong at any public crossing where the view of approaching trains is obscured, if unable to remove the obstruction.

Senate bill 239 amends the grade separation law to permit the public service commission in ordering any separation of grades to relocate or consolidate highway crossings over railroads, street railroads, interurban lines or suburban roads, and to relocate or control highways leading to any such crossings.

Senate bill 318 amends the public utilities act to allow railroads to furnish free or reduced service or transportation to any bona fide employee or officer thereof, to carry free or at reduced rates agricultural experiment and demonstration cars or trains and lecturers, and to carry at free or reduced rates its furnished, pensioned or superannuated employees, persons who have become disabled or infirm in its service, etc.

House bill 110 prohibits interference with railroad safety appliances, signal wires or telephone or telegraph apparatus.

MINNESOTA

Railroad laws passed by the Minnesota legislature this year include the following:

A bill requiring public service corporations to pay their employees at least semi-monthly the wages earned by them to within 15 days of the date of such payment.

A law providing for the sanitation, inspection and cleaning of stock cars.

An act enlarging the powers of railway companies, terminal companies, depot companies in respect of acquiring property by purchase or condemnation.

A law prescribing clearances.

A law regulating the furnishing of cars for the transportation of livestock.

A law authorizing the state railroad and warehouse commission to prescribe schedules of reasonable maximum rates.

OREGON

Railroad legislation passed at the recent session of the Oregon legislature includes a law to provide penalties for obstruction of railroad block signals, crossing bells, crossing gates, signal flags, torpedoes, etc. Another law requires reports of all industrial accidents to be made to the state industrial accident commission. Railroads will no longer be required to report to the labor commissioner, but are required to give immediate notice by telegraph, telephone or personally to the railroad commission of accidents attended by loss of life or limb or serious damage to property. Another law requires an annual accounting to be made to the commissioner of labor statistics by persons, firms or corporations withholding any portion of the wages of employees for the maintenance of any hospital or relief fund. The name of the Railroad Commission of Oregon is to be changed on July 1, 1915, to the Public Service Commission of Oregon.

NEBRASKA

The Nebraska legislature at its recent session passed the following laws affecting railroads:

Senate bill 26 provides that railroads shall furnish shippers of livestock with transportation of caretakers for shipments of one or more cars.

House bill 21 provides for cumulative voting and voting by proxy by stockholders of any company incorporated under the laws of Nebraska.

House bill 217 regulates the stringing of electric wires over railroad tracks.

House bill 304 requires express companies to properly house livestock entrusted to their care.

House bill 391 relates to destruction of weeds on railroad right of way and compensation therefor.

House bill 526 provides a penalty for injury or interference with telephone, telegraph or electric light wires and fixtures.

House bill 749 makes an appropriation for the use of the state railway commission to be used in the investigation of railroad rates.

NORTH DAKOTA

There were no railroad laws of any especial importance passed at the last session of the legislature of North Dakota. The following is a short summary of the laws that were passed:

House Bill 6 provides that railway cars shall be cleaned and disinfected before being used for transporting livestock into the state.

House Bill 154 provides that railroad companies shall build a hog-tight fence along their right of way when the owner of abutting property has enclosed the other three sides of his land with such a fence.

House Bill 159 provides that the state railroad commissioners may require railroads to build and maintain stock yards at stations.

House Bill 398 provides that a railroad corporation incorporated in one or more states increasing its capital stock shall pay to the state of North Dakota a fee on such proportion of the

increase as the mileage in the state of North Dakota bears to its total mileage.

Senate Bill 178 prohibits children from trespassing on railroad property.

Senate Bill 216 provides for the liability of railroad companies in case of employees suffering personal injuries. This law is substantially the same as the federal employers' liability act and applies to railroads engaged in intrastate business.

NEVADA

Laws passed by the Nevada legislature at its recent session include the following: An amendment to the state extra crew law, providing that the law shall not apply to railroad companies less than 95 miles in length, or on which but one train a day is operated in each direction.

An amendment to the electric headlight law, providing that any electric headlight "which will pick up and distinguish an object the size of a man dressed in dark clothes on a dark and clear night at 1,000 ft." will be deemed equivalent to a 1,500 c.p. headlight measured without a reflector. Section 2 of the act, which required such a headlight on the rear of engines when operated backwards at night, is repealed.

An amendment to the state railroad commission law prescribing regulations for the filing and posting of rates, and providing for the suspension of advanced rates by the railroad commission.

UTAH

The only legislation directly affecting railroads enacted at this year's session of the Utah legislature was the act prohibiting the transportation of intoxicating liquors into "dry" territory.

MISSOURI

The Missouri legislature, which recently adjourned, passed a law requiring railroads to maintain lights at night on main line switches and all lead switches in yards where cars are switched in making up or breaking up trains. The law does not apply to branch lines where trains are not run at night, or to independent lines of less than 50 miles in length, nor to trailing point switches on double track lines.

OKLAHOMA

The Oklahoma legislature at its recent session passed a law prohibiting railroads from maintaining or establishing a name for any railroad station other than the name of the town or city within which it is located, if the latter bears the name of the postoffice as given by the United States government.

ARIZONA

The only legislation affecting railroads enacted during this year's session of the Arizona legislature was Senate bill 36, providing that it shall be the duty of all railroad companies in the state to require section foremen or persons discharging like duties to keep at the section house a specified record of all stock killed or crippled upon their respective sections, which record shall be open and free for inspection by the public at all reasonable times. The law also provides that each engineer shall report to the railroad company on arrival at terminals all stock killed by his train, and that such report shall be posted on Monday of each week at the section or station nearest to the point where the accident occurred and shall be kept for 30 days.

FLORIDA

The 1915 session of the Florida legislature has just come to a close with less railroad legislation to its credit than any other in recent years. Only one bill was passed that might be called direct railroad legislation, and that was an act empowering the railroad commission to require the use of docks and terminals of a company operating the same under a franchise granted by the state or city, by any other such company. The Railroad Commission, after a hearing and investigation, is authorized to direct that track connection be made for transfer of freight, and the free use of the property by another such terminal company.

If the two terminal companies cannot agree upon terms of re-

muneration to be paid to the owning company, the railroad commission is to determine.

In the city of Pensacola, the Louisville & Nashville has large dock and terminal facilities. The city is contemplating the construction of a municipal belt line railroad and terminals, and the Louisville & Nashville would possibly object to this belt line railroad entering and using its facilities. However, this Act does not apply to municipalities that have elected Boards of Port Commissioners.

A large number of other bills were introduced during the session affecting railroad companies, but failed of passage. Among these were the "full crew bill," and one requiring running water to be provided in lavatories on passenger trains, with sanitary towels and soap.

SOUTH DAKOTA

The principal laws affecting railroads passed by the legislature of South Dakota at its recent session include the following:

Senate bill 55 amends the law with reference to taxation of railroad companies and other corporations, and provides for a tax on gross earnings and reports to be filed with the tax commission.

Senate bill 83 regulates the issue of warehouse receipts.

Senate bill 314 amends the law with reference to procedure before the state railroad commission and provides for the enforcement of commission orders by mandamus.

House bill 114 requires railroads whose rights of way divide farm lands to construct and maintain farm crossings when ordered by the railroad commissions.

House bill 271 prohibits railroads from increasing any intrastate rate or changing any classification rule or regulation without first obtaining the consent of the railroad commission.

House bill 272 authorizes the state railroad commission to reject and refuse to file any schedule or tariff of rates, rules or regulations unless handed to the commission not less than 30 days before the effective date.

House bill 175 gives the railroad commission authority upon petition to require railroads to construct track scales for the weighing of freight in carload lots from team tracks at any station at the expense of the shippers petitioning for such scales.

Senate bill 288 authorizes the railroad commission to prescribe rules for the weighing of carload lots and of livestock at track scales and of other commodities in ton lots. The commission may require all track scales to be sealed.

Senate bill 142 authorizes the railroad commission to require all railroads to erect at any station in the state proper and suitable stock yards and to equip them with feed troughs, racks and watering troughs and water supplies.

House bill 348 provides that on failure by a common carrier to appeal from any final order of the railroad commission or upon the affirming of any order from which an appeal has been taken, the railroad commission is authorized by mandamus to compel carriers to comply with such orders.

IDAHO

Laws affecting railroads enacted by the Idaho legislature at its recent session include the following:

Minor changes were made in provisions of the public utilities act including an amendment to the anti-pass provisions withdrawing the power of the utilities commission to designate the state officials to whom passes may be issued and enacting that passes may be issued to the members of the commission, or such of its officers and employees as the commission may designate, when traveling exclusively in the transaction of public business, or to such other state or county officials to whom the issuance of free transportation may be authorized by law. The amendment also enlarged the class of persons to whom passes may be legally issued to include veterans of the civil war. There was also enacted a uniform bill of lading act. Certain amendments were also adopted to the laws relating to the issue of bonds and notes by railroad corporations and the execution of mortgages to secure them.

WASHINGTON

Railroad laws passed at the recent session of the Washington legislature include the following:

Senate bill 144 regulates the issuance of bills of lading and the rights, obligations and liabilities thereunder.

Senate bill 258 authorizes the Public Service Commission of the state to suspend increases in rates for a period of 90 days with a possible extension for 60 days, pending a hearing and decision.

Senate bill 215 makes certain amendments to the laws regulating the purchase of railroad stocks, bonds and property by railroad companies. The law provides that the purchase, sale, consolidation or lease of another company shall be approved or ratified by persons holding 75 per cent of the capital stock of the company selling or disposing of its stock or bonds or leasing or otherwise disposing of its property. The law also provides that no railroad or transportation company shall consolidate its stock, property or franchise with that of any other railroad or transportation corporation owning a competing line, or purchase either directly or indirectly any stock or interest in a railroad or transportation company owning or operating a competing line. The law also requires the approval of the Public Service Commission for the consolidation of railroads and provides that the capital stock of the company formed by such consolidation shall not exceed the sum of the capital stock of the companies consolidated at the par value.

TRANSPORTATION AND CAR ACCOUNTING OFFICERS

The summer meeting of the Association of Transportation and Car Accounting Officers was held at Niagara Falls, Ontario, June 22 and 23, with 130 members in attendance, and J. M. O'Day (I. C.), president, in the chair. At the opening session there was an address by E. F. Kearney, president and receiver of the Wabash, who, while general superintendent of transportation of the Missouri Pacific, represented that company in this association. Mr. Kearney spoke at length on the causes leading up to the present agitation against railroads, calling attention to the fact that railway officers and employees were themselves largely to blame. He advocated the maintenance of high moral and business standards. He regarded patriotism as one of the greatest essentials in raising standards; if the ideals of patriotism are thoroughly instilled into the minds of the younger generation the old-time bad or questionable practices will not be repeated.

The report of the executive committee shows a membership operating 249,718 miles of road and having in service 2,557,365 cars. It was decided to continue the consolidation of the committees on conducting freight and passenger transportation and the committee on joint interchange and inspection bureaus for the succeeding six months, the combined committee to be known as the "Committee on Conducting Transportation."

The committee on car service reported the action of the Freight Claim Association at its Galveston meeting, wherein that association decided that demurrage or storage refunded under legal liability or when uncollectible owing to negligence in transportation shall be charged to the liable line or lines. The effect of this rule (which was approved) will be to make the lines which are liable for the freight charges on refused freight also liable for demurrage charges on such shipments; demurrage charges, when legally assessed, are a matter of filed tariff and cannot be voluntarily waived.

The association adopted for submission to the American Railway Association the proposed addition to the Switching Reclaim Rules of a definition to cover "intra-terminal switching," viz., "A car loaded within the switching limits for unloading within the same switching limits." It is provided that no reclaim shall be allowed for an intra-terminal switching movement.

The association concurred in the findings of the committee to the effect that at present there should be no change in Rule 8 to relieve the holder of the car from per diem where material for repairs has been shipped by the owner and lost in transit; but the committee requested that the subject be referred back. The findings of the committee were also concurred in, that, where the holding road orders material from the owner for repairs to a car and such material is not used because other material has been found, such a case does not come under Rule 8. In connection with the question of the advisability of establishing a reclaim for per diem on cars undergoing repairs or transfer because of the delivering line's responsibility, the committee on car service presented a recommendation to the effect that no reclaims should be presented or allowed under Car Service Rule 15; that at points where such reclaims had been in effect they had been eliminated by reason of the fact that experience demonstrated that the conditions were so thoroughly reciprocal that the amount involved in the reclaims did not pay the expense of the accounting incident thereto. The recommendation of the committee was adopted.

The association adopted for submission to the American Railway Association proposed form of per diem Rule 13, providing that reclaims under Rules 5 and 14, or on account of special conditions, must be presented within one year from the last day of the month in which the per diem is earned; this, however, will not prevent the continuance of any reclaim after the period named if it has been previously opened, even though the reclaim should eventually rest upon some road other than the one originally addressed, except that the privilege of continuance shall cease when the claimant fails to return reclaim or present it to another road within a period of six months from date such reclaim is last returned to claimant. The amended rule also provides that reclaims under this rule must be made by the designated transportation officer of the road which pays the per diem to the designated transportation officer of the road from which the allowance is claimed, unless specifically agreed by the interested roads to permit the presentation and acceptance of such reclaims by local representatives.

The proposed form of per diem Rule 14 as presented by the committee was also adopted for submission to the American Railway Association. The amendment to the rule provides that a connection intending to reclaim against a delinquent line for its failure to accept cars shall notify such delinquent line daily, prior to midnight, through the designated officer, or in such manner as may be agreed upon locally, of the cars held for it; also that when the hour at which the receiving road clears the interchange track is so late that the delivering road cannot deliver before midnight, the receiving road is to be responsible for the per diem on such cars for the following day, subject to local agreement as to time required to make delivery.

The committee on continuous home route cards reported that about 250 railroads are using the standard continuous home route card. The discussion on this report showed that those roads which have not adopted the card are deferring action principally for the reason that they do not wish to incur any obligation, under the rules, until, by the action of the American Railway Association, all roads are placed on a common basis. While much empty mileage can be saved by short-routing empty cars home, there must be a good deal of education of agents if they are to be allowed to do this on their own initiative. Thus far there has been much imperfect work, cards being filled out in a very slovenly manner.

The committee was requested to present a method for computing the saving in empty car mileage by the adoption of the standard continuous home route card.

The list of accepted assignments of reporting marks to cars of private ownership, presented by the committee on office methods and accounting, was adopted for submission

to the American Railway Association. The report of the committee indicates that approximately 385 owners of private cars have accepted assignments of reporting marks and are applying them to their cars. The marks are limited to four letters, except in certain instances where the short "&" is used to enable car owners to use reporting marks which correspond to the corporate initials of the owner. Up to the date of meeting 407 railroads have accepted the reporting mark assigned.

The committee is also engaged in assigning marks to cars of railroad ownership with a view to preventing duplicate marks. Assignments of marks have been made to every standard gage railroad in the United States, Canada and Mexico. The marks assigned to railroads are limited to three letters, except in certain instances where the short "&" is used to enable car owners to use reporting marks which correspond to the corporate initials of the owner. Up to the date of meeting 407 railroads have accepted the reporting mark assigned.

The committee has prepared forms for the collection of data relating to the subject of per diem, and these forms will be forwarded to members for the compilation of the data required by the committee for the period July, 1915, to December, 1915; and upon receipt of these statistics the committee will present the same to the American Railway Association as indicating the condition of per diem records of American railroads generally, such data affording a basis for future action affecting per diem discrepancy claims.

The association adopted for submission to the American Railway Association the proposed form of car tender report and the proposed form of summary of per diem reports as presented by the committee.

Acting in compliance with the request of the American Railway Association, the committee on office methods and accounting reported that, after a series of conferences held between representatives of the Freight Claim Association and representatives of the Transportation Association, by joint action of representatives of the two bodies a code of rules governing the application, inspection, recording and care of car seals was adopted, for presentation to the Freight Claim Association and the Association of Transportation and Car Accounting Officers for joint action by the respective associations. The Freight Claim Association at a meeting held June 16, adopted the rules presented. The Association of Transportation and Car Accounting Officers at this meeting also adopted the proposed rules for submission to the American Railway Association. These rules as adopted embody very full and elaborate instructions for the guidance of the seal inspector.

The association adopted for submission to the American Railway Association the recommendation of the committee on handling railroad business mail, that packages containing claim papers shall bear on the face thereof the fact that they relate to the business of the carriers handling the same.

The committee also recommended that roads receiving letter mail on which postage is due shall keep such envelopes, and where repeated instances from the same source are noticed the department at fault shall be advised of the inadequacy of postage. If the practice should not cease a corrective may be applied by rendering bill against the particular department of the carrier at fault, accompanying the same by a file of envelopes showing the postage due. The committee also recommended that all inquiries relative to the handling of railroad business mail be forwarded direct to the general secretary of the American Railway Association.

The association adopted the recommended form of yard check book as presented by the committee on conducting transportation. This form, in addition to providing space to show date and time of check and signature of man making the check, shows the following heads as necessary: Initials, Number, Condition (Loaded, Unloading, Empty, etc.), Location, Weather Record, Class of Car, Capacity of Car, Lading and Condition of Driveway at Team Tracks.

The association adopted for submission to the American Railway Association the recodification of car service rules as presented by the committee on conducting transportation.

The rules as presented provide for a separation of the car service rules relating to freight equipment cars from those relating to passenger equipment cars, the freight rules being numbered from 1 to 17, while the passenger rules are numbered from 101 to 113. In the recodification the committee presented a passenger car rule providing that "A foreign passenger equipment car must be promptly returned to its owner via the route and junction point received, unless the owner otherwise agrees. A road responsible for delay will be charged per diem rates in addition to mileage for the period of delay." The passenger car rules also provide that "Should a passenger equipment car, without consent of the owner, be delivered to a road other than connection from which received, the road responsible shall pay to the owner the per diem rate from the hour of appropriation until the hour car is returned to its owner or to the joint service and in addition thereto the established mileage rate shall be paid the owner by each road using the car."

The committee also reported that the committee on joint interchange and inspection bureaus at Toledo, Ohio, has completed its work and submitted its report and recommendations to the general managers, and that at Cincinnati a committee is at work with a view to installing a bureau in zones, contemplating eventually covering the entire terminal.

The election of officers resulted as follows: President, J. T. King (Atlantic Coast Line); first vice-president, F. E. Higbie (Central New Jersey); second vice-president, J. W. Nowers (A. T. & S. F.); secretary, G. P. Conard (75 Church street, New York); treasurer, F. M. Luce.

It was decided to hold the next meeting at St. Louis, December 14 and 15, 1915.

THE BATTLE OF THE MARNE

By WALTER S. HIATT*

Never in railroad history have men worked under operating conditions similar to those that existed in France during late August and early September last when the territory to the northeast of Paris became the scene of one of the most gigantic battles of the war.

The role the railroad men played in that battle is but vaguely understood even at this late date. In the frightful scramble that preceded the battle of the Marne, the railroad officers in Paris gave out the following notice to their employees: "Think of your helpless wives and children; work to get troops to the front." These men, thinking of what the Germans had done to women and children in Belgium, worked like demons, slept and ate at their posts for two weeks, and strained every nerve to get troops to the points required. The 17 railroads of the German government, all built with an eye for military purposes, may be admirable from the standpoint of construction and operation. They have certainly done great service in the war, but they have not to date been tried by the fire that assailed the French railways.

In a previous article I have sketched the general features of the mobilization in France, and showed how the railroads responded magnificently to the demands made upon them. I have also showed how 10,000 trains were kept going during the 20 days of the first period, transferring men from their homes to their regiments, thence to their army corps and to the front; and how the mad throngs of the civil population were cared for. This work was done without serious accident; the roads held up under a tremendous pressure, and they are today running as in times of peace.

But it is the work connected with the battle of the Marne that must forever form a monument to the French railroad men. It has already gained for them the gratitude of the French people, as has been indicated by the bestowal of the cross of the Legion

*The second article from our special European correspondent. The first appeared in the *Railway Age Gazette* of May 21, page 1047.

of Honor on dozens of station masters, enginemen, firemen, conductors and others. No soldier, or "hairy" man, as they call the unshaven heroes of the trenches, has given a better account of himself, or made more untiring sacrifices for his country than have the *cheminots*, the railway officers and employees.

"Then came Charleroi," is a phrase found in every soldier's account of the early campaign. The fall of Charleroi was the beginning of the battle of the Marne. In war time the French railways are under the control of the war department, the operation of each road being directly in charge of its own commission, consisting of a military commissioner and an operating director, who report to the war department's transportation officers. On August 17, the minister of war had issued a note of thanks to the various roads stating that, as the work of concentration was about finished, the government wished to acknowledge the efforts of the railroad employees and officers in preparing the way for victory.

This was the first brilliant period of the war when the nation was resounding with the glorious resistance of Liège and the rapid invasion of Alsace and Lorraine. The 58 German army corps forming the eight powerful armies thrown on France as the first big stroke of the Germans were still at the frontier and their terrific blow, so deliberately planned, had not been struck. The railroads of France had just finished concentrating her seven armies, and between August 12 and 20 the Northern, Western and Orleans railways had hauled the little English army of about 200,000 men from Boulogne, Nantes and Saint-Nazaire to Mons, handling 420 trains, many of them at six minute intervals, without disturbing the general concentration work of the French army.

The railroads were settling down to the more steady work of carrying food and ammunition to the front, and bringing back the wounded to Rheims and Châlons. Each of the six armies along the front from Maubeuge to Belfort, the seventh being at Paris, had its own central commissary, the vast stores of which were being renewed each day by the 42 trains set aside for that purpose. To be sure, there were a few changes of front to be made for certain army corps. The railroad men also had to take into account that the fifth German army under the Crown Prince had cut the line connecting the Northern and the Paris-Lyons-Mediterranean lines just south of Longwy, and that this meant new connections; but on the whole, the work was not too severe. On August 20, however, near Morhange, the army of Bavaria, the sixth German army, drove back the French to the river Meuse and united with the fifth. On August 22, at Charleroi, to which the Paris-Lyons-Mediterranean a week before had so proudly brought 60,000 troops across France from Africa, the battle began which lasted until the 26th and ended in a French defeat.

COVERING THE RETREAT

While the battle raged—the generals having orders to hold their positions as long as possible—the railroads were told to make ready to save as many as possible of the troops who otherwise might have been lost, for in a retreat foot stragglers are an easy prey. General Joffre insisted that the trains wait until the last. He wanted the men for the big coup which he seemed already to have decided upon.

But meanwhile, before the fall of Charleroi, the railroads were also busy doing what they could to save the civil population fleeing out of Belgium and the invaded French provinces all but submerged by the Teutonic flood. Some of the Belgians went to Holland; others went by boat to England. Several hundred thousand were placed in cars and transported to Calais and Havre, or directly to Paris with the French refugees. Further, no less than 2,700 Belgian locomotives were run upon French rails towards Paris and saved.

On August 23 the little line from Sedan to Lerouville was still open. While the troops disputed every foot of ground, burning or blowing up fine steel bridges as they retreated, hundreds of trains were being used to save the cannon, the munitions, and

other valuable material. Even the food was gathered from the storehouses so that nothing would be left for the Germans. All these trains were directed to the points along the Marne indicated for each army corps. On some of these days 120 trains, and on others as many as 170 were used in this vast retreat.

Von Kluck's army, the German right wing, was meanwhile advancing toward Paris. To check it a little, other hundreds of Eastern, Western and Northern trains were rushed to pick up all the troops that could be spared from before the left wing in the Argonne region and to swing them around to form a new army behind Lille and Arras.

The biggest thing of all, however, was to transport an army from along the Meuse, north to Verdun, to within 18 miles of Paris, to block the passages to the coveted city. This army, composed of the fourth, sixth and eighth army corps was supposed to be defending the Meuse to the south of Longwy. When that place capitulated on August 27, these three army corps, leaving but a skeleton behind, were put aboard 180 waiting trains and hurried through Verdun, Sainte-Menehould, Châlons, Bar-le-Duc, Chaumont, Troyes, to Raincy, whereby within a week the army made an entire change of front. Owing to the marvelous efforts of the railroad men, this army of about 100,000 men later played the chief role in the battle of the Marne. It was the lost army which the Germans located too late. Near Raincy it was joined by the little English army, rushed in the nick of time to Crècy-en-Brie, and by the army of Paris which was thrown out at the last minute on railroads, in automobiles and almost on foot, helter-skelter.

The army of General Manoury which the railroads assembled behind Rheims, and the two armies assembled at Nancy, where Generals Castelnau and Sarraill took the offensive against the Crown Prince, then fell upon the Germans from three sides, caught them as in a sack, and there followed the bloodiest and most decisive battle of the war. The Germans as a result of it were pushed back to a position behind the river Aisne, which they were able to hold only because the French grew short of ammunition and had to rely on blank cartridges, rob the German dead of their rifles and cartridges or make bayonet charges when these means failed.

The sleepless railroad men behind meanwhile were practically scouring France for more troops and bringing up others to take the places of the fallen.

GOLD TRAINS AND PALACE CARS

Panic reigned everywhere but among the *cheminots*. The French government, on its part, as a matter of sound prudence, determined to move to Bordeaux. Three special trains were made ready for this purpose before midnight of September 2, and arrived without accident or incident at Bordeaux the next day. The first train, composed of six sleeping and parlor cars, carried President and Madame Poincaré, and arrived at 12:05. The second train, carrying Monsieur Viviani and other ministers, arrived at 12:25 and the third train, with more ministers and their secretaries, arrived twenty minutes later at 12:45. Later in the day arrived other trains concerning which but little has been said, arrived carrying the \$800,000,000 gold deposits of the Bank of France, the valuable state papers of France, and all the documents necessary to keep the government going on an official footing. After the removal of the government, other trains were forthcoming to carry away the precious paintings and statuary and other treasures of the Louvre, in the Luxembourg gallery and other places.

The cool-headed though bodily wrought railroad men had yet more to do. The officers of the government left openly, announcing that their removal was a measure of prudence and not of cowardice. After they had gone, the people in Paris came upon some frightful hours. The city was apparently calm, but it realized at last what was happening, and even the bravest and the most carefree determined that it was time to move to places of greater safety. At the American embassy, notices were printed to be tacked on houses belonging to or inhabited by American citizens,

warning the German soldiery to respect the rights of neutrals. These notices were never circulated. So it came about that in these frightful hours when Paris thought it was lost, while the railroads were desperately hurrying men and munitions forward, they also began to carry refugees from Paris by the hundred thousand. All the north of France was bent on flight. The terminals in Paris, in fact, became so crowded that the alarmed people hurried out on the roads, pushing their carts loaded with valises, trunks and household treasures before them.

Large numbers slept at the stations. The line at the Saint-Lazare station was 200 yd. long and that at the Orleans station 300 yd. long. Mothers with babes in their arms waited for 24 hours on the sidewalks, and they and others, when the chance came, thronged upon flat cars and into box and cattle cars. All sorts of cars took away 50,000 people daily. It took three days to make a trip that today takes three hours, for the military train had to pass at all hazards and had the right of way. They passed and passed eternally, it seemed, a few minutes apart, night and day.

The railroad men continuing at their posts of duty, were conscious that on them depended the safety of the women and children, as well as that of the troops. Their patience was tried beyond belief, but they remained at their posts. Never in this world, surely, have railroad men given such proof of their readiness and courage.

In all France was there but a single example of a *cheminot* who failed in his duty, and that example is widely known because of its singleness. A station master at Rheims, it is said, was discovered just before the Germans began arriving there in telephone conversation with a German officer somewhere out in the country. Fate would have it that the man's own boy led the French officers who were looking for him to give him orders, to the telephone booth. Of course the station master was executed as a spy.

Each day brought new difficulties. On the Northern and Eastern railroads, half of whose trackage was within the German lines, there were no more machine shops or roundhouses available. New ones had to be improvised. Right behind each locomotive was hauled a sort of wrecking car, wherein the train crews ate and slept, and wherein were carried relief crews and repair materials.

WORK, ALWAYS MORE WORK

With the German flood dammed and flung back upon itself, the task of these overworked railroad men nevertheless continued. They had to bring up re-inforcements to the River Aisne where the Germans halted in their retreat from the Marne. Fresh troops, more food, more ammunition had to be carried forward. The returning trains carried back more refugees, took German prisoners to the east and south, and hurried the thousands of wounded to the hospitals.

While the cannon were thundering along the Aisne, the spare railroad men about the shops of Paris and Lyons and Orleans were put to work manufacturing wagon, caisson and cannon wheels, shells and even cannon parts. These they loaded on cars. They helped hurry the heavy cannon from Creusot and Saint-Chamond to the Aisne to answer those the Germans had brought up, and emptied arsenals of their 50-year old mortars, now once more of use in the siege warfare of the trenches.

Trains carrying troops, ammunition, cannons, food and other supplies were run ceaselessly. In five weeks one of the six rail-

way companies ran no less than 1,600 provision trains, part of the run being made over lines new to the crews. At one time no less than 1,300 locomotives and 4,000 men were thus detoured.

DETAILS OF THE RAILROAD BATTLE

Amid this seemingly hurly-burly one astonishing transportation feat was accomplished right after the battle of the Marne by one railroad when 52 ships arrived at Marseilles in the south of France with 70,000 Indian troops and their immense amounts of baggage. In three days these troops were discharged at their camping ground of Cercottes near Orleans, where they remained 20 days before proceeding to support the English at Nieuport-Dixmude.

The people remaining in the regions covered by the German invasion had to be fed and provided with the necessities of life. From September 21 to November 14, 43 different trains were made up in different parts of France for this purpose.

A mail service, beginning on a large scale from the end of September, demanded a mail car a day attached to every train to carry the millions of letters and packages sent to or by the soldiers. Gradually the railways also put themselves in position to take care of regular demands of commerce. Schedules were arranged on a stationary basis by October. The civil life of the country now goes on as usual.

One apparent explanation of the success of the railroad men in this ordeal is to be found in the network of roads that spreads over France, fan-like, with Paris as the center. When one route is interrupted there almost is always a possible detour.

Another thing which has contributed so largely to the success of French arms has been the unfailing good will, and the easy going spirit with which the railroad men are blessed. Often irritable in small things, the French railroad man, trained in a hard school, is never seriously annoyed for any long period by any kind of a job. When all seems lost, he begins to look for daylight. War, anyway, is an energizer, and it has found a fertile field in the French in the midst of their greatest trial.

RAILROAD SECURITIES HELD ABROAD

The following is the gist of the statement given out by L. F. Loree, president of the Delaware & Hudson, in regard to the investigation which he made of the amount of American railroad securities held abroad:

Requests were sent to 145 railroad corporations, being all the railroads in the United States above 100 miles in length. Replies were received from 136 companies, 100 companies furnishing statements of securities held abroad, while 37 replied that none of their securities was so owned. Eight companies have not yet replied, and of them seven are of minor and one of medium importance, the combined mileage being 3,725 miles. They cannot materially affect the result.

The stocks were identified by entries in the transfer books of the issuing companies. To the extent that they may be carried in the names of domestic bankers, brokers, or institutions, for foreign holders, the amount would be understated. Inquiries indicate that such holdings will not exceed \$150,000,000 par value.

The bonds were in the main identified by the "slips" filed by the payee under the requirements of the federal income tax law. Where interest is in default there would be no income

RAILROAD SECURITIES HELD ABROAD

Security	On or before January, 1919	Jan. 1, 1920, to Dec. 31, 1924	Jan. 1, 1925, to Dec. 31, 1929	Jan. 1, 1930, to Dec. 31, 1939	On and after Jan. 1, 1940	Grand total
First preferred stock.....						\$161,280,900.00
Second preferred stock.....						99,900.00
Common stock.....						633,802,162.00
Notes.....	\$54,921,000.00	\$6,438,640.16	\$16,000.00			61,375,640.16
Receivers' certificates.....	998,000.00					998,000.00
Collateral trust bonds.....	5,606,000.00	71,060,567.00	10,082,000.00	\$8,408,000.00	\$132,453,848.26	227,610,415.26
Equipment bonds.....	1,332,000.00	1,129,700.00	14,902,589.00			17,364,289.00
Car trusts.....	792,000.00	16,000.00				808,000.00
Debenture bonds.....	33,210,000.00	928,000.00	85,941,500.00	82,693,160.00	1,232,650.00	204,005,310.00
Mortgage bonds.....	16,129,400.00	62,365,367.00	182,978,300.00	180,952,216.00	826,631,443.00	1,269,086,726.00
Total.....	\$112,988,400.00	\$141,938,274.16	\$293,920,389.00	\$272,053,376.00	\$960,317,941.26	\$2,576,401,342.42

tax certificates in respect of coupons not paid, and to that extent the amount would be understated.

The information was determined from data collected from October, 1914, to April, 1915, and during that period there have been large sales of these securities for foreign account in the American markets, and to that extent the amount would be overstated.

There are held in France several hundred million dollars' worth of American railroad securities that are not repayable except in francs and that cannot in any likely contingency come upon this market, unless as a result of action by the French government. Where such bodies are in default it may be that there will be issued in place thereof, when reorganization is carried through, bonds payable in dollars. The amount of such bonds in default is not great.

There are held in Great Britain many of these securities by life and fire insurance companies that are likely to be held against calamities. There are also large amounts held by trustees and people of large means in that and other countries likely to be retained as insuring an income against any possibility of disaster.

It is believed that this information is of such general importance as well as of such particular importance to the railroads as to warrant a continuance of this investigation, especially in view of the large amount of these securities that have since the beginning of the European war been returned to this market. Blanks will therefore be sent later in the year to the 100 companies as above, with the request that information be reported for the six months, July 1 to December 31, as to bonds and other evidences of indebtedness, and for July as to stocks.

CALCULATING CROSS SECTION AREAS ON RAILROAD VALUATION WORK

By F. T. MORSE

Assistant Engineer, Chicago, Rock Island & Pacific, Chicago

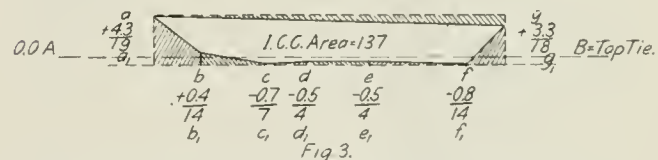
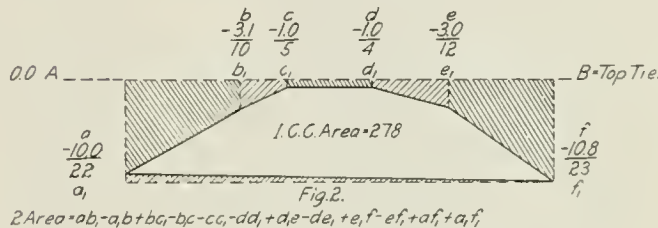
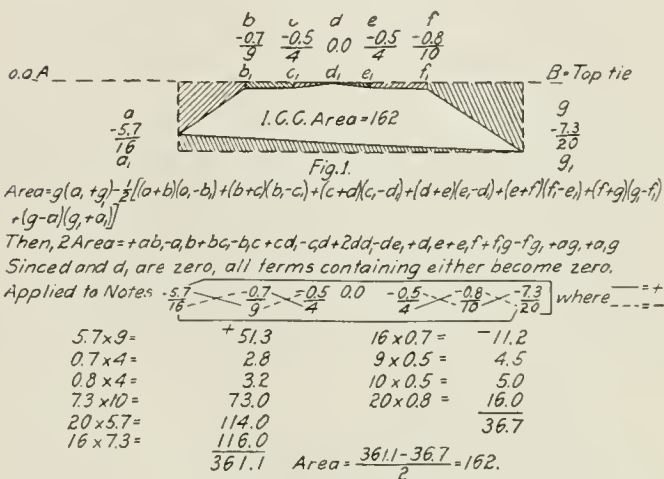
The cross section of the roadbed of a railroad taken by the government valuation field parties is so different from that taken on the original surface of the ground at the time of construction that the ordinary formulas or methods do not apply. The following method of calculating such areas quickly was developed in checking over the I. C. C. inventory notes now being taken on the Chicago, Rock Island & Pacific.

In the accompanying diagram are shown typical sections as taken by the I. C. C. field parties, Fig. 1 being in embankment on a branch line where the roadbed is surfaced with dirt only, Fig. 2 in embankment where there is ballast, the top of the section being the bottom of the ballast, Fig. 3 in cut, and Fig. 4, a side hill section with both cut and fill. In each case 0.0 is the top of tie.

As no vertical distance through the required area is given, one cannot conveniently draw triangles and figure the area in the usual way. However, by enclosing the section in a rectangle, triangles or trapezoids are obtained which may be easily figured and their area subtracted from that of the rectangle giving the required section area. The general method has been expressed in letters, then these terms expanded and many cancelled, leaving the result as indicated. The method in Fig. 1 is used when the area between the ends of the ties is in the form of triangles. In Figs. 2 and 3 this area is a rectangle or trapezoid. The same method is used to produce the formula as shown below Fig. 3, which is exactly the same as in Fig. 1, with the addition of the two terms $-dd$ and $-ee$, which take care of the difference in area between the ends of ties in the two cases. In cut sections, as in Fig. 3, it is necessary before multiplying to add to each elevation reading an amount equal to the greatest minus reading, to bring the reference line A-B to the lowest point of the cross section so that we have the general type of section shown in Fig. 2.

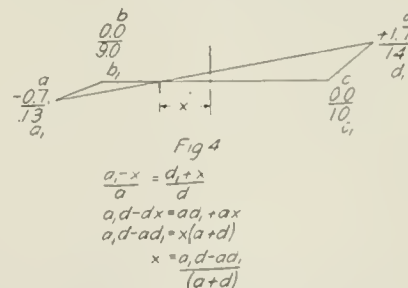
The application of this method to a side hill section is shown in Fig. 4. Ordinarily the government engineers plot all irregular or peculiar sections and measure the area with a planimeter, but the same general method explained above can be applied to such cases also if desired.

With practice most of the multiplying may be done mentally or by the machine when necessary, and the results re-



By adding 0.8 (f), to each reading to bring reference line through lowest point of cross section the formula becomes similar to Fig. 2.

$2\text{Area} = ab - a^2 + b^2 - bc - cd - c^2 + dd - ee + e^2 + ef - fg + g^2 + ag + a^2$



Area having largest reading = $(c_1 + x) \frac{d}{2}$ Area having smallest reading = $(b_1 - x) \frac{d}{2}$

$2A = d(c_1 + x)$ Substituting the value of x and simplifying

$A = \frac{(a_1 + c_1)d^2 - (d_1 - c_1)ad}{2(a+d)}$

$2A = d(b_1 - x)$ Substituting the value of x and simplifying

$A = \frac{(b_1 + d_1)a^2 - (a_1 - b_1)ad}{2(a+d)}$

Diagram of Typical Cross Section Areas

corded at the same time, using an Ensign electric calculating machine or a comptometer, with the minus quantities in the right hand three columns and the plus quantities in the left hand three columns. When the last multiplication is completed the total plus and minus quantities can then be read on the machine, mentally subtracted and divided by two, giving the desired area.

General News Department

Among the bills aimed at the railroads which have been prepared for introduction in the Alabama legislature are a "full crew" bill, a maximum train bill, an anti-negro helper and fireman bill, and an employers' liability bill, all prepared by railway labor union interests.

H. U. Mudge has resigned as a member of the western group of the Presidents' Conference Committee for the Federal Valuation of the Railroads. H. C. Phillips, valuation engineer of the Atchison, Topeka & Santa Fe, has been elected assistant general secretary of this committee.

The railway department of the American Federation of Labor has issued a notice officially calling off the strike of the mechanical department unions which was declared on the Illinois Central, the Harriman Lines and the Pere Marquette in 1911. From the point of view of the railways the strike was terminated over three years ago.

The freight clerks of the New York, New Haven & Hartford, who have been threatening to strike finally agreed, on June 24, to submit their claims to arbitration, the leaders of the brotherhood and the officers of the railroad company having agreed to leave disputed questions to G. W. W. Hanger, assistant commissioner of mediation, at Washington.

The Pennsylvania Railroad announces that the operation of electric trains between Broad street, Philadelphia, and Paoli, will not begin until about the middle of August. Copper, needed for changes to be made in the overhead structure, cannot be had without considerable delay because of the pressing orders for munitions of war on which American shops are now engaged.

Reports from Ottawa say that the agreement between the government and the Grand Trunk Pacific for the operation by the government of the branch of this road extending to Fort William has been concluded, and that the rental to be paid is \$600,000, said to be equivalent to 4½ per cent on the cost of the line. Included in this property are the extensive terminal facilities at Fort William.

The Canadian Department of Labor has appointed a board under the Industrial Disputes Act to deal with a difference which has arisen between the Canadian Northern and two brotherhoods, those of the locomotive enginemen and the firemen. The men have asked that the conditions under which they work in the East be raised to the level of conditions prevailing on the Western lines.

The Erie Railroad has sold four of its largest steamships which are in use on the Great Lakes, and the ownership of which the company has to divest itself in accordance with the recent decision of the Interstate Commerce Commission. It is understood that the boats will be cut in two and taken through the St. Lawrence river to the Atlantic ocean, there to be again put together and to be used by the purchasers in the coastwise trade.

The Interborough Rapid Transit Company, New York City, has reduced the working hours of all employees of the station department from twelve hours a day to ten hours, with no reduction in pay. This puts the station men and train men on the same basis as regards hours. The order affects 1,927 persons, about two-thirds of whom are on the elevated lines and one third in the subways. It will be necessary to employ about 20 per cent more employees in this department.

The Interstate Commerce Commission, Division of Valuation, is preparing to issue Orders Nos. 17, 18 and 19, requiring telegraph, telephone and railway companies, respectively, to furnish information regarding the purchase of materials and rates of compensation similar to that required of the railways under Valuation Order No. 14, issued some time ago. Only those carriers are expected to furnish this information upon whom these orders are served.

A party of officers of the Chicago Great Western left Chicago on Monday on a special train for a "safety first" inspection trip,

making short stops at various points for the purpose of inspecting conditions with respect to safety and to receive suggestions from the local committees. Short talks were made by J. A. Gordon, general manager; G. O. Perkins, superintendent of telegraph; G. E. Stoup, trainmaster; T. A. Sweeney, J. W. Mulhern, and C. A. Shoemaker, superintendents; G. A. Brown, superintendent of car service, and G. M. Crownover, superintendent of motive power.

The court at Buffalo, N. Y., has again postponed (to September 1) the date limiting the time during which the Buffalo & Susquehanna may be operated under the present temporary arrangement. It was September 1, 1914, when, in the receivership proceedings, the operation of the road was ordered discontinued, because of insufficient income; but negotiations for the sale of the property have been continued and now it is hoped soon to find a purchaser. It is reported that W. R. Page, of Olean, N. Y., chief owner of electric lines in that region is to take over the property and operate it in connection with the electric lines.

Daniel Willard, LL. D.

Daniel Willard, president of the Baltimore & Ohio, is now doctor of laws, that degree having been conferred on him last week by Dartmouth College, Hanover, New Hampshire. Professor Lord, in introducing Mr. Willard at the commencement exercises, alluded to his familiarity with railroad management, and his ability to set forth its principles with literary skill and convincing force; and to the fact that his wider interest in human and intellectual relations had led to his election as a trustee of Johns Hopkins University. In conferring the degree, President E. F. Nichols said:

"Daniel Willard, born among these hills, a man of rare sagacity, an acknowledged master mind, and gifted also with that higher, finer appreciation of human values, the college to which your youth aspired welcomes you in your maturity and honors your large achievements, though compassed without her aid."

Mr. Willard was born at North Hartland, Vt., in 1861. His career, with which our readers are already acquainted, may be summarized: Track laborer, fireman and engineman from 1879 to 1884; trainman, conductor, trainmaster and superintendent, 1884 to 1901; general manager, vice-president and president, 1901 to 1915.

Baltimore & Ohio Staff Meeting

At Deer Park, Md., last week, Friday and Saturday, officers of the Baltimore & Ohio, to the number of 300, led by Vice-president A. W. Thompson, held a general staff meeting, reviewing the work of the past 12 months and discussing plans for the future. The appropriations for maintenance of equipment for the fiscal year now closing will amount to \$12,000,000. About 4,000 cars will be dismantled during the coming year. During the year closing 1,690,000 new ties were put in the tracks at a cost of 75 cents each, or 50 per cent more than in 1905. Over 400,000 tons of stone ballast were put into the tracks last year. The efficiency of the track forces has been increased, and they are receiving higher wages.

Officers of the traffic department reported that a brighter outlook is dawning, judging by conditions in the industrial and agricultural communities in which they are engaged. A letter from President Daniel Willard was read at the opening session, reviewing the betterments which have been made to the property during the last five years at a cost of more than \$100,000,000, approximately half of which amount was spent for additional tracks and terminals, and the reduction of grades.

Mr. Thompson made an address designed to stimulate the pride of each man connected with the property. He urged loyalty at all times within the ranks, as well as a due sense of the railroad's duty to promote friendly public relations. A speaker from each department outlined his work for the enlightenment of his fellow workers in other departments. The Baltimore & Ohio glee club of forty-five voices gave a concert

at the opening of the night session, and an illustrated lecture on the Magnolia cut-off improvement was delivered by Vice-president Thompson.

J. J. Hill Professorship of Transportation at Harvard

President Lowell of Harvard University announced during the commencement exercises last week a gift of \$125,000 to the university to endow the James J. Hill professorship of transportation in the Harvard School of Business Administration, contributed by 12 present or former presidents of some of the most important railways of the country, over 20 prominent bankers, and other friends of Mr. Hill in all parts of the country, to the total of 74. The gift was arranged and the sum was collected by a committee consisting of Robert Bacon, G. F. Baker, Howard Elliott, Arthur Curtiss James, Thomas W. Lamont and Robert T. Lincoln. The list of donors is as follows:

RAILROAD PRESIDENTS

William C. Brown, former president New York Central Lines, Clarinda, Ia.
 Frederic A. Delano, former president Wabash, Washington, D. C.
 Howard Elliott, president New York, New Haven & Hartford, Boston.
 S. M. Felton, president Chicago Great Western, Chicago.
 J. M. Hannaford, president Northern Pacific, St. Paul.
 Fairfax Harrison, president Southern, Washington.
 Hale Holden, president Chicago, Burlington & Quincy, Chicago.
 L. E. Johnson, president Norfolk & Western, Roanoke.
 L. F. Loree, president Delaware & Hudson Company, New York.
 Samuel Rea, president Pennsylvania, Philadelphia.
 F. D. Underwood, president Erie, New York.
 Daniel Willard, president Baltimore & Ohio, Baltimore.

BANKERS

Robert Bacon, New York.	John R. Mitchell, St. Paul.
Everett H. Bailey, St. Paul.	John J. Mitchell, Chicago.
George F. Baker, New York.	J. P. Morgan, New York.
George F. Baker, Jr., New York.	Charles D. Norton, New York.
F. A. Chamberlain, Minneapolis	Albert L. Ordean, Duluth.
H. S. Cole, St. Paul.	William H. Porter, New York.
H. P. Davison, New York.	F. H. Rawson, Chicago.
James B. Forgan, Chicago.	Jacob H. Schiff, New York.
A. Barton Hepburn, New York.	Grant B. Schley, New York.
Francis L. Hine, New York.	E. T. Stotesbury, Philadelphia.
Thomas W. Lamont, New York.	A. M. White, New York.
L. F. Lusk, Missoula, Mont.	A. H. Wiggin, New York.

OTHER FRIENDS OF MR. HILL

Charles W. Ames, law publisher, St. Paul.
 Estate of John H. Barker, Haskell & Barker Car Company, Michigan City, Ind.
 E. A. Baughman, Richmond, Va.
 Gebhard Bohn, White Enamel Refrigerator Company, St. Paul.
 C. W. Bunn, general counsel Northern Pacific, St. Paul.
 Thomas Burke, lawyer, Seattle, Wash.
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 Pierce Butler, lawyer, St. Paul, Minn.
 Robert F. Carr, president Dearborn Chemical Company, Chicago.
 Hovey C. Clark, lumberman, Minneapolis.
 D. M. Clough, lumberman, former Governor of Minnesota, Everett, Wash.
 W. H. Cottingham, president Sherwin-Williams Paint Company, Cleveland.
 Otis H. Cutler, president Am. Brake Shoe & Foundry Company, New York.
 William B. Dean, hardware, St. Paul.
 Mrs. W. H. Dunwoody, Minneapolis.
 Samuel Hill, Maryhill, Wash.
 A. N. Holter, hardware, Helena, Mont.
 P. L. Howe, director, Great Northern, Minneapolis, Minn.
 Arthur Curtiss James, vice-president El Paso & Southwestern System, New York.
 William V. Kelley, chairman American Steel Foundries Company, Chicago.
 A. H. Lindeke, dry goods, St. Paul.
 Robert T. Lincoln, chairman of board, Pullman Company, Chicago.
 W. J. McBride, president Haskell & Barker Car Company, Michigan City, Ind.
 J. T. McChesney, real estate, Everett, Wash.
 Alfred H. Mulliken, president Pettibone-Mulliken Company, Chicago.
 Edward A. More, St. Louis.
 B. F. Nelson, lumberman, Minneapolis.
 Northern Malleable Iron Company, St. Paul.
 A. R. Rogers, lumberman, Minneapolis.
 W. J. Rucker, lumberman, Everett, Wash.
 John D. Ryan, president Amalgamated Copper Company, New York.
 T. A. Schulze, boots and shoes, St. Paul.
 Thomas W. Slocum, New York.
 Howard C. Smith, bill broker, New York.
 William B. Thompson, New York.
 Samuel Thorne, director Great Northern, New York.
 Theodore N. Vail, president American Telephone & Telegraph Company, New York.
 F. A. Weyerhaeuser, lumberman, St. Paul.

The Western & Atlantic

Governor Slaton, of Georgia, in his message to the legislature, delivered last week, recommends legislation concerning what shall be done with the Western & Atlantic Railroad, owned by the state, the lease of which to the Nashville, Chattanooga & St. Louis will expire in 1919, or before the end of the next legislative term. Among the questions which have been under discussion in this connection have been proposals to lease a part of the property of the railroad in Atlanta and also some in Chattanooga, for outside purposes, not being needed in the operation of the railroad. The governor has appointed an agent, E. M. Durham, Jr., on behalf of the state, to participate with the officers of the Nashville, Chattanooga & St. Louis in the valuation of the Western & Atlantic in co-operation with the Interstate Commerce Commission. The North Georgia Mineral Railway is the name of a corporation, chartered last autumn, which proposes to build a railroad from Atlanta to a point in Bartow county, parallel to the Western & Atlantic. The governor raises the question of the effect which the construction of a new line would have on the value of the Western & Atlantic; and a bill has been introduced in the legislature designed to forestall any injurious competition in this field.

American Association of Railroad Superintendents

The twenty-eighth annual convention of the American Association of Railroad Superintendents is to be held at San Francisco on August 19 and 20. The convention will be opened with an address of welcome by Mayor James Rolph, Jr., of San Francisco, and there will be other addresses throughout the two days' sessions. Some of the speakers will be: William Sproule, president of the Southern Pacific; Hale Holden, president of the Chicago, Burlington & Quincy; W. R. Scott, vice-president of the Southern Pacific; A. G. Wells, general manager of the Atchison, Topeka & Santa Fe Coast Lines; W. E. Williams, general manager of the Missouri, Kansas & Texas, who will speak on "The Railroad, a Public Servant," and W. M. Jeffers, superintendent of the Nebraska division of the Union Pacific, who will speak on "Discipline." Reports will be presented by the executive and advisory committees and also by the committees on transportation, on interchange car inspection, and on arbitration. A complimentary train, including a composite car and five sleeping cars, will be run over the Atchison, Topeka & Santa Fe and the Southern Pacific for the accommodation of members and their families, leaving Chicago on August 14, and arriving at San Francisco on August 18. The membership of the association is about 500, and it is expected to have between 150 and 200 people, including members and their families, on this train. The convention headquarters will be at the Hotel Sutter. Saturday, August 21, has been set aside by the executive committee of the Panama-Pacific International Exposition as Railroad Superintendents' Day.

Convention of the American Society for Testing Materials

The eighteenth annual meeting of the American Society for Testing Materials was held at the Hotel Traymore, Atlantic City, June 22-26, President A. W. Gibbs, chief mechanical engineer of the Pennsylvania Railroad, presiding. The address of the president and a paper by C. D. Young describing the test department of the Pennsylvania Railroad are published elsewhere in this issue and a complete report of the convention will be published next week. The following officers were elected for the coming year: President, Mansfield Merriman; vice-president, W. H. Bixby; members of the executive committee, J. H. Gibboney, W. K. Hatt, J. A. Mathews and Edward Orton, Jr.

Joint Committee on Classification of Technical Literature

The Joint Committee on Classification of Technical Literature, W. P. Cutler, secretary, 29 West 39th street, New York, is desirous of obtaining assistance in making a collection of classifications of applied science which have been developed independently in the offices of manufacturing plants, engi-

neering firms, etc., especially those which exist in manuscript form, and have been used for filing or indexing data. The committee would especially like to have copies of any extensions of present systems to cover any special industry or branch of engineering not now fully covered by the published classifications.

MEETINGS AND CONVENTIONS

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

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 2-5, 1916, Atlanta, Ga.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill.

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

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Puttritt, 8 W. 40th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.

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

AMERICAN RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.

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

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Frisch, 900 S. Michigan Ave., Chicago. Next convention, March 21-23, 1916, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June, 1916.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

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

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

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, Rooms 1116-8, Woodward Bldg., Washington, D. C. Annual meeting, June 28, 1916, Detroit, Mich.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago.

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

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

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

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

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

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

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

FREIGHT CLAIM ASSOCIATION.—Walter P. Taylor, Traffic Manager, R. E. & P., Richmond, Va.

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

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, C. & E. L., 922 McCormick Bldg., Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Win. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

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

MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. L. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June, 1916.

NATIONAL RAILWAY APPLIANCE ASSOCIATION.—C. W. Kelly, 349 Peoples Gas Bldg., Chicago. Next convention, March, 1916, Chicago.

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

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

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

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

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Eric R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May. Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Naxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria Hotel, New York.

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

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, N. Y. C. R. R., Box C., Collingwood, Ohio.

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

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

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

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

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

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

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

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, September, 1915.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, July 15, 1915, Atlanta. Annual meeting, January, 1916.

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

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

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

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

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

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

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Genl. Agt., Eric R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.

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

TRAIN DISPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-10, 1915, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

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

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

Traffic News

The Southern Pacific has just finished at Galveston, Tex., a new 1,000,000-bu. concrete grain elevator, built at a cost of \$500,000.

In suburban passenger cars on a branch of the Erie road in New Jersey passengers now see advertisements like those which are common in elevated and subway city railways.

The Denver & Rio Grande and the Rio Grande Southern will place on sale July 1, a new mileage book containing 1,000 coupons for \$30, which will be good for passage of the buyer and the dependent members of his family.

The Chesapeake & Ohio announces that the sale of intoxicants has been discontinued on all of its dining and buffet cars. Prohibitory laws now prevail in a large part of the territory traversed by the lines of this company.

On July 1, the Chicago & Alton, the Chicago, Burlington & Quincy and the Nashville, Chattanooga & St. Louis established a new daily through package freight car from Chicago to Memphis, Tenn., making third morning delivery in Memphis.

Receipts for tolls on vessels passing through the Panama Canal during the month of April amounted to \$442,415, or \$84,112 more than the cost of operation and maintenance, not counting interest on capital investments. April was the first month in which the receipts exceeded the charges.

Pineapples from Cuba, by way of Key West, are being rushed north nowadays at the rate of 25 miles an hour. The Nashville, Chattanooga & St. Louis reports that the first 15 freight trains run for this traffic made the distance from Atlanta, Ga., to Martin, Tenn., 431 miles, in an average running time of 17 hours 16 minutes, which makes the average rate noted in the above.

The Pere Marquette has made a change in the route by which its passenger trains enter the city of Chicago. From Pine, Ind., into the city it now uses the tracks of the Baltimore & Ohio and the Baltimore & Ohio Chicago Terminal; and trains arrive in and depart from the Grand Central station. Heretofore the Pere Marquette used the tracks of the Pennsylvania for part of the distance.

Trains 39 and 54 of the Central division of the Pennsylvania now have a day-coach buffet car between Kane, Pa., and Erie, 94 miles. These are through trains which have no dining cars. The buffet occupies a space of about 8 ft. in length at one end of the car, and food is served on small tables placed between seats. Breakfast is served on train 39, westward in the morning, and supper on train 54, eastward in the evening.

Over 700 car loads of strawberries have been shipped from the East Tennessee section and points south of Chattanooga to Cincinnati and other western markets this year, according to figures of the Queen & Crescent Route, over which practically the entire crop moved. The great bulk of this freight comes from stations north of Chattanooga on the C. N. O. & T. P. The crop this year was much larger than last year, but good prices were realized, growers receiving an average of \$1.75 a crate, or about \$700 a car.

The Missouri Pacific has received a gold medal for its passenger traffic exhibit at the Panama Pacific Exposition, made on behalf of itself, the Denver & Rio Grande and the Western Pacific. The exhibit, heretofore described in these columns, is an immense globe, 52 feet in diameter, representing the world, the Missouri Pacific and affiliated lines being prominently shown, with miniature trains running to and fro. The interior of the globe is entered through massive arches guarded by statues, and is arranged to represent various scenic attractions along the companies' lines.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Arguments before the commission in the western advance rate case were completed on June 26. Chairman McChord has announced that the hearings relative to the rates on various commodities scheduled to be held in Chicago on July 19 and succeeding days (*Railway Age Gazette*, June 25, page 1491) will be cancelled, as the carriers have agreed to suspend the proposed advances until September. The increases mentioned were some proposed after the hearings in the original case were begun. They were made the subject of a separate case by the commission.

The Business Men's League of St. Louis has filed a complaint against the railroads, objecting to the alleged discrimination created by the five per cent advance in freight rates and advanced passenger rates permitted by the Interstate Commerce Commission in Official Classification territory, while no advance was made between points in the state of Illinois in the territory adjacent to St. Louis. The complaint states that prior to such advanced interstate rates becoming effective, passenger and freight rates between St. Louis and points in Illinois were, generally speaking, on the same general basis as the intrastate rates. The commission is asked to require the defendant carriers to make such a readjustment of the Illinois intrastate passenger, class and commodity rates as will remove the "unjust, unreasonable, discriminatory and unduly prejudicial rates."

Transportation of Potatoes in Refrigerator Cars

Opinion by Commissioner Harlan:

In *Rental Charges for Insulated Cars*, 31 I. C. C., 255, the commission found not to be unreasonable a proposed charge of \$5 per car per trip for the use of a refrigerator car in the movement of potatoes from points of origin in Minnesota and neighboring states and permitted to become effective tariffs naming rates on potatoes which contained the following provision:

Rental charge on insulated cars.—When shipper orders a refrigerator or other insulated car to be heated by him or to move without heat, a charge of \$5 per car per trip will be made for the use of the car and will accrue to the owner thereof.

It has now been proposed to eliminate from the above rule the words "and will accrue to the owner thereof." The commission finds that this change should be made, it being held that the charge to avoid discrimination should be uniform and collected from every shipper who has the use of a refrigerator car. There should be no discrimination between shippers using railroads, private car lines or privately owned refrigerator cars, and the proposed rule reduces to a minimum the possibility or probability of discrimination. (34 I. C. C., 255.)

Des Moines Commodity Rates

Opinion by Commissioner Harlan:

In accordance with previous decisions of the commission the carriers have graded the 80-cent scale of class rates from Chicago to the Missouri river, back across the state of Iowa to the 37½-cent and the 41.7-cent scales of class rates at the Mississippi river. Commodity rates, however, are still based largely on the scale of rates from Chicago or St. Louis to Minneapolis and St. Paul. The commission is of the opinion that the commodity rates would be more equitable if they, too, were scaled back across the state like the class rates.

These complaints, however, were filed in behalf of Des Moines only. Without knowing the consequences to other points in Iowa, the commission does not believe that it can enter any order dealing with Des Moines commodity rates that will require a wholesale readjustment of the rates to and from other points in Iowa. It is, nevertheless, shown that several of the commodity rates to Des Moines are in need of correction and the commission suggests that a conference between the parties in interest be held to see if these rates cannot be made the sub-

ject of an agreement between them. The commission will enter an order if the parties fail to agree before August 1, 1915.

Certain complaints involving class and commodity proportional rates between Des Moines and the Mississippi river on shipments originating at or destined to points east of the Illinois-Indiana state line are dismissed in view of the fact that the entire proportional rate structure has been readjusted in accordance with the decision in the *Interior Iowa Cities case*, 28 I. C. C., 64, and 29 I. C. C., 536.

The commission also takes into consideration a number of the commodity rates in question. The rates on cherry lumber and glove leather from Chicago to Des Moines are found unreasonable to the extent that they exceed the present fourth class and second class rates, respectively. (34 I. C. C., 281.)

Shipments Billed to Intermediate Points to Secure Lower Rates

Kanotex Refining Company v. Atchison, Topeka & Santa Fe. Opinion by Commissioner Harlan:

The Kanotex Refining Company ships regularly large quantities of petroleum from its refinery at Caney, Kan., to Woodward, Okla. In order to take advantage of the substantially lower Kansas intrastate rates on refined petroleum, the complainant devised the plan of billing its tank cars to one L. B. Hill of Kiowa, the latter point being the last in Kansas intermediate to Woodward. Hill was its agent for the sole purpose of acting as the consignee of the shipments and of rebilling them from Kiowa to Woodward, and he took no actual possession.

The carrier upon learning of this plan refused further to bill the shipments from Kiowa, except at the balance of the through interstate rate, and it also presented undercharge bills for the previous shipments.

The complainant frankly admitted that the cars were billed to Kiowa and then rebilled to Woodward for the sole purpose of securing lower rates; that Woodward was the intended destination of the shipments; and that the cars were expected to move to that point as a continuous shipment, subject only to the delay incident to the rebilling at the intermediate point.

The commission finds that the carrier acted entirely within its rights and that it exercised a plain duty under the law, when it refused to continue to rebill at Kiowa the shipments involved. The commission in so deciding adheres to the proposition that on any through carriage of traffic between interstate points the lawfully published interstate rate must be applied, and that where the through interstate rate is higher than the aggregate of the intermediate rates any plan of first billing to an intermediate point a shipment that is really intended to reach a destination beyond is simply a device for defeating the lawful through rate, and is unlawful. (34 I. C. C., 271.)

STATE COMMISSIONS

The Railroad Commission of Louisiana has ordered that, beginning with July, monthly reports of railroad accidents shall be made on forms identical with those prescribed by the Interstate Commerce Commission.

The Pennsylvania Public Service Commission has begun a series of hearings at points throughout the state, which indicates that the commissioners will not spend much time on vacations. The commission met in Scranton last week and is in Erie this week, considering grade crossing and switching cases. It will meet in Harrisburg in the week beginning July 6, in Pittsburgh the week of July 13, and in Harrisburg the remainder of the month, with hearings to be held in Philadelphia, Pottsville, Manheim and Williamsport.

It is probable that the superior court of Pennsylvania, at its session in Philadelphia on July 20, will be asked to pass upon the constitutionality of the act of 1915 providing for appeals from decisions of the Public Service Commission to the superior court instead of through the Dauphin county court. The primary object is to get a decision as to the effect of the act on the twenty appeals now pending in the Dauphin county court. These appeals include the anthracite rate case and a number of important railroad suits. The failure to provide in the new law for the disposition of pending appeals has caused the Dauphin county court to refuse to hear any appeals until the question is settled.

The California Railroad Commission, after an investigation, has issued an order holding that carriers have a legal right to collect an excess charge from passengers boarding trains at agency stations without tickets, provided the charge is published in their tariffs. The commission says that the manifold duties required of conductors in the operation of their trains do not permit of their spending any more than the shortest possible time in the collection of fares without more or less seriously jeopardizing the safety of the passengers; that the collection of cash fares demands considerably more additional time of the conductor than the collection of tickets, and to minimize such practice as much as possible an excess fare is just and reasonable; and that to give refund checks for the excess amount collected would only tend to considerably increase this practice. Carriers are authorized to collect an excess fare of 10 cents on amounts up to \$1.45, and approximately 10 per cent on amounts over that sum up to \$5; provided that no excess charge will be made where passengers have been unable to buy tickets; also, no excess fare shall be collected on electric or interurban lines.

The New York State Public Service Commission, Second district, in an opinion by Commissioner Hodson, has given a decision on the Salamanca grade crossing case, which has been before the commission for a long time and which involves a new interpretation of the grade crossing law. It is held that where, as in the present case, changes concededly needed in the railroad structure of an existing grade crossing are of such a nature as to relate back to the original plans for the elimination of the crossing they cannot be considered as maintenance and repair, for which the railroad [the Erie] alone would have to pay, but must be considered as changes in the said original plans, the cost of which, like the original work, must be divided among the municipality, the state and the railroad. This crossing presented structural difficulties in the first place due to the fact that the bridge carrying the tracks could not be raised much on account of the proximity of a large yard and the level of Main street could not be much depressed on account of difficulties of drainage. The engineers at that time sacrificed the ballast on the bridge and secured the rails to the bridge floor. But water leaked through the bridge and the old railroad commission ordered changes in the drainage to be made and assessed against all three parties to the elimination. The same trouble has again developed, and the commission will take up the case under the amended law.

PERSONNEL OF COMMISSIONS

William T. Gunnison has been appointed a member of the New Hampshire Public Service Commission in place of John E. Benton.

R. F. McLaren, secretary of the Montana Railroad Commission, has resigned. Mr. McLaren was formerly, for 17 years, in the employ of the Northern Pacific and subsequently was superintendent of the Montana, Wyoming & Southern.

COURT NEWS

The Supreme Court of Nebraska has denied the petition of the Missouri Pacific for a writ of mandamus to compel the state railway commission to issue an order increasing passenger fares within the state from 2 to 2½ cents a mile. The court was divided, four to three, the majority holding that the action of the legislature in fixing passenger rates in the state at two cents a mile is controlling, while the minority were of the opinion that when the legislature later passed a bill creating the railroad commission it gave power to the commission to change rates fixed by the legislature.

The Supreme Court of Missouri has this week sustained the demurrer of the Chicago & Alton in the suit of the attorney general of that state against the road to recover \$2,000,000 for alleged excess fares collected while suits were pending relative to the law limiting all fares to two cents a mile. This action of the Supreme Court sustains that of the court of Saline county in favor of the road. The attorney general had brought similar suits against other companies claiming altogether about \$24,000,000. When the Supreme Court of the United States sustained the law limiting fares to two cents, the railroads at once reduced their fares (from 2½

cents); but nothing was said about refunding the half cent a mile (above 2 cents) which had been collected while the law was in litigation.

Secret Rebates Judgment Affirmed

In an appeal from a judgment of the Pennsylvania Supreme Court (241 Pa. St. 536) awarding a shipper of coal damages for secret rebates to other shippers, the railroad company contended that part of the shipments—those to Greenwich, Pa., "included coal destined to points beyond the state," in respect of which no recovery could be had in this action. The United States Supreme Court affirmed the state court's judgment, holding that there was no evidence that any of the coal went out of the state or, if it did, that the circumstances were such that its carriage from the mines to Greenwich was in fact but part of an intended and connected transportation beyond the state. (*Pennsylvania v. Mitchell Coal & Coke Company*, June 14.)

Transverse Drains Law Upheld

In an action for the flooding of land in the Missouri river bottoms from the defendant's roadbed, which was not provided with transverse culverts, or openings of any kind, as required by the statute of 1907, it was argued by the defendant that the statute was invalid as an *ex post facto* law. This argument was based on a reading of the limiting clause "within three months after the completion of the same," which would make it apply to railroads already in existence. The United States Supreme Court holds that the express limit of three months applied only to railroads constructed after the passing of the act, and allowed railroads already in existence a reasonable time within which to make the openings. It also holds that the statute does not impair the obligation of the contract between the state and the railroad company, and is not repugnant to the "due process" and "equal protection" provisions of the Fourteenth Amendment. (*Chicago & Alton v. Traubarger*.)

Survival of Right to Damages for Pain and Suffering Before Death

In an action under the federal employees' liability act of 1908, as amended by the act of 1910, damages were awarded by the Arkansas Supreme Court of \$1,000 for the pecuniary loss (to the father) by reason of the death and \$5,000 for the conscious pain and suffering of the deceased before he died. It appeared that he survived his injuries more than half an hour, and that they were such as would naturally cause him extreme pain and suffering, if he remained conscious. This judgment is affirmed by the United States Supreme Court, which says that the original statute made no provision for a survival of the right of action for pain and suffering before death, and as that statute superseded the state statutes, many of which provided for such a survival, the act was apparently amended to make it as broad as the state statutes. While considering the award large, it involved only a question of fact and was not open to reconsideration by the Supreme Court. (*St. Louis, I. M. & S. v. Craft*.)

Coal Docks Not a Nuisance

A railroad, some time after the grant of a right of way from the United States in the city of Missoula, Mont., constructed thereon a coal dock. Residents in the neighborhood, who had received title to their property after such grant, sued the road for maintaining a nuisance, alleging that the dock caused coal dust to penetrate into their houses, etc. They did not allege that the dock was improperly equipped or operated. The Supreme Court of Montana held that the railroad was not liable, since the grant carried with it the right to maintain all kinds of property and do all sorts of acts necessary in constructing and operating the road, the term "railroad" fairly including all structures necessary to its operation. While cases involving coal docks are rare, the authorities are agreed that, when the grant of a right of way is made to a railroad without restrictions, it contemplates not merely the railroad as it is established in the first instance, but the road with its necessary appurtenances as it may from time to time come necessarily to be. (*Smith v. Northern Pacific (Mont.)*, 148 Pac., 393.)

Railway Officers

Executive, Financial, Legal and Accounting

H. C. Ausley, treasurer of the Southern Railway at Washington, D. C., has been elected treasurer also of the Danville & Western, succeeding C. L. Booth, resigned.

Bond Anderson, assistant auditor of the Blue Ridge Railway at Anderson, S. C., has been appointed auditor of that road, also of the Danville & Western, the Augusta Southern, the Tallulah Falls and the Hartwell Railway, with headquarters at Atlanta, Ga.

Operating

J. Lowell White has been appointed assistant to general superintendent of transportation of the Atlantic Coast Line.

S. Ennes, general superintendent of the Western Maryland at Hagerstown, Md., has been appointed general manager, with office at Hagerstown, and the position of general superintendent has been abolished.

Alexander Grant has been appointed general superintendent of mail transportation of the Southern Railway, the Virginia & Southern and the Northern Alabama, with headquarters at Washington, D. C.

S. E. Cotter, general superintendent of the Wabash at St. Louis, Mo., has been appointed general manager, with headquarters at St. Louis; J. W. Jones, superintendent of terminals at St. Louis, has been appointed superintendent of the Western division with headquarters at Moberly, and C. F. Ocheltree, assistant superintendent at Forrest, Ill., succeeds Mr. Jones.

E. T. Whiter, general superintendent of the Northwest system of the Pennsylvania Lines West of Pittsburgh, at Pittsburgh, Pa., has been appointed to the new position of assistant general manager of the Pennsylvania Lines West of Pittsburgh, with headquarters at Pittsburgh. W. C. Downing, general superintendent of the Central System at Toledo, Ohio, has been promoted to general superintendent of the Northwest system, with headquarters at Pittsburgh, succeeding Mr. Whiter, and I. W. Geer, superintendent of the Cleveland and Pittsburgh division at Cleveland, has been promoted to general superintendent of the Central system, with office at Toledo, succeeding Mr. Downing.

Franklin P. Brady, whose appointment as general superintendent of the National Transcontinental, in charge of the section between Quebec and Winnipeg, and of the Lake Superior branch of the Grand Trunk Pacific between Fort William and Superior Junction, with headquarters at Cochrane, Ont., has already been announced in these columns, was born on June 22, 1853, at Haverhill, N. H., and was educated at Newbury Seminary, Newbury, Vt. In May, 1869, he began railway work on the Connecticut & Passumpsic Rivers, now a part of the Boston & Maine, and in February, 1873, served consecutively as station baggage master and telegraph operator at Lyndonville, Vt. He was then tram despatcher on the Northern New Hampshire, now a part of the Boston & Maine at Concord, N. H., and from 1880, to November, 1887, was chief train despatcher on the South-Eastern Railway, now a part of the Canadian Pacific at Farnham, Que. He subsequently became trainmaster on the same road, and from July, 1888, to May, 1896, was assistant superintendent of the Canadian Pacific. He was then to May, 1901, superintendent of the same road, with headquarters at Smith's Falls, Ont., and later served as superintendent at Toronto, Ont., and at Fort William until May, 1903, when he was appointed assistant general superintendent of the same road at Winnipeg, Man. In February, 1904, he was appointed general superintendent at North Bay, Ont., remaining in that position until September, 1908. The following May, he became a member of the Government Railways Managing Board and general superintendent of the Intercolonial and the Prince Edward Island Railways. In June, 1913, the Government Railways Managing Board was abolished, and since that time Mr. Brady served as general superintendent of the Canadian

Government Railways, until his recent appointment as general superintendent of the National Transcontinental as above noted.

Traffic

J. D. Kenworthy, assistant general freight agent of the Denver & Rio Grande, at Pueblo, Colo., has been transferred to Salt Lake City, Utah, in the same capacity, succeeding S. V. Derrah, deceased.

Thomas F. Hartnett, commercial agent of the Cleveland, Cincinnati, Chicago & St. Louis, at Toledo, Ohio, has been appointed to the newly created office of Pacific agent, with headquarters at San Francisco, Cal. W. F. Benning has been appointed to succeed Mr. Hartnett.

George H. Eaton, general freight agent of the Boston & Maine at Boston, Mass., has been appointed assistant freight traffic manager; William T. Lamoure, assistant general freight agent at Boston, has been appointed general freight agent, and Emery W. Abbott, division freight agent at Troy, N. Y., has been appointed assistant general freight agent.

R. M. Burr, traveling passenger agent of the Cincinnati, New Orleans & Texas Pacific at Cleveland, Ohio, has been promoted to district passenger agent, with headquarters at Cleveland, and the office of traveling passenger agent has been abolished. J. C. Volz, traveling passenger agent at Cincinnati, has been promoted to central passenger agent, with headquarters at Cincinnati, and the office of traveling passenger agent has been abolished. A. C. Mathias has been promoted to northern passenger agent, with headquarters at Chicago.

Engineering and Rolling Stock

J. S. Sheafe, master mechanic, Staten Island Lines of the Baltimore & Ohio at Clifton, Staten Island, N. Y., has been granted leave of absence for one year.

E. F. Vincent, assistant chief engineer of the Colorado & Southern, has been appointed chief engineer, with headquarters at Denver, Col., succeeding H. W. Cowan, deceased.

W. M. Bosworth, mechanical engineer of the Louisville & Nashville, at Louisville, Ky., has been appointed mechanical engineer of the Norfolk Southern, with office at Berkeley, Va.

Frank E. Wilmore has been appointed assistant road foreman of engines of the Pennsylvania Lines West of Pittsburgh, with headquarters at Fort Wayne, Ind., succeeding Robert J. Lyons, assigned to other duties at his own request.

A. H. Mahan, locomotive foreman of the Grand Trunk Pacific at Prince George, B. C., has been appointed general locomotive foreman in charge of territory from Prince George to Edmonton, Alta., including intervening branch lines; J. F. Moffatt, road foreman at Wainwright, Alta., has been appointed general locomotive foreman in charge of the territory from Transcona, Man., to Fort William, Ont.; H. R. Simpson, road foreman at Jasper, Alta., has been appointed general locomotive foreman in charge of the territory from Watrous, Sask., to Winnipeg, Man., including intervening branch lines; W. G. McConachie, road foreman at Edmonton, Alta., has been appointed general locomotive foreman in charge of the territory from Edmonton to Watrous, including intervening branch lines, and A. Watt, general foreman at Prince Rupert, B. C., has been appointed general locomotive foreman in charge of the territory from Prince Rupert to Prince George. D. W. Hay has been appointed locomotive foreman, with office at Prince George, B. C., succeeding A. H. Mahan, and J. A. Miller has been appointed locomotive foreman at Endako, succeeding G. H. Laycock, transferred to Jasper, Alta.

OBITUARY

James J. Goodwin, a director of the Erie, died on June 23, at Hartford, Conn., at the age of 80.

William M. Hughes, formerly consulting engineer of the New York, Chicago & St. Louis, and at one time bridge engineer of the city of Chicago, died at his home in Chicago, on June 25.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE INTERCOLONIAL RAILWAY OF CANADA has ordered 15 locomotives from the Canadian Locomotive Company.

THE ISTHMIAN CANAL COMMISSION, Major F. C. Boggs, general purchasing officer, will receive sealed proposals until August 16 for 12 electric towing locomotives for canal locks.

THE CAROLINA, GREENEVILLE & NORTHERN, an electric line. F. A. H. Kelley, chief engineer, Greenville, Tenn., is preparing specifications for motive power and rolling stock. See item under Railway Construction.

CAR BUILDING

CAROLINA, GREENEVILLE & NORTHERN. See item above under Locomotive Building.

THE GREAT NORTHERN has ordered 500 box cars from the Haskell & Barker Car Company.

THE NORTHERN PACIFIC has ordered 750 center constructions and 750 sets of draft sills from the Western Steel Car & Foundry Company.

THE BALTIMORE & OHIO is in the market for 35 coaches, 5 passenger and baggage cars, 2 combination baggage and mail cars, 4 baggage cars, 2 parlor-cafe cars and 2 cafe coaches.

THE CHICAGO, BURLINGTON & QUINCY is inquiring for 1,500 to 2,000 40-ton steel underframe box cars. This company is also reported to have asked bids on 55 coaches and 10 dining cars.

THE INTERCOLONIAL has ordered 650 80,000-lb. capacity box cars from the Canadian Car & Foundry Company, and 350 80,000-lb. capacity box cars from the National Steel Car Company.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA has ordered 750 box cars from the American Car & Foundry Company, and 750 from the Haskell & Barker Car Company. It is also inquiring for 100 refrigerator cars.

THE INTERNATIONAL & GREAT NORTHERN, which was reported in the *Railway Age Gazette* of June 11 as negotiating for 1,000 freight cars with the Mount Vernon Car Manufacturing Company, has ordered 500 box cars, 200 stock cars and 300 gondola cars from that company.

THE CHICAGO & NORTH WESTERN has ordered 10 coaches, 3 smoking cars and 10 60-ft. baggage cars from the American Car & Foundry Company, 3 70-ft. baggage cars, 10 70-ft. combination baggage and mail cars, 2 reclining chair cars, 5 combination baggage and passenger cars, 4 parlor cars and 2 dining cars from the Pullman Company, and will also place orders for 5 more passenger cars.

IRON AND STEEL

THE EL PASO & SOUTHWESTERN has ordered 8,000 tons of 90-lb. rail from the Colorado Fuel & Iron Company.

THE CHICAGO, MILWAUKEE & ST. PAUL has ordered 585 tons of steel from the Federal Bridge Company for five 105-ft. spans.

THE NEW YORK PUBLIC SERVICE COMMISSION, First district, will advertise for bids, to be opened July 16, for 40,200 tons of rail for equipping new rapid transit lines of the dual system.

THE SIAMESE ROYAL RAILWAY DEPARTMENT invites bids for three steel viaducts. Specifications and drawings may be obtained from the Siamese Legation at Gloucester, Mass., on payment of a fee of \$4 for each set.

THE UNION STATION COMPANY, Chicago, has ordered 1,150 tons of steel for its Monroe street bridge from the Chicago Bridge & Iron Company, and 155 tons for the machinery of this bridge from the Allis-Chalmers Company.

Supply Trade News

The Linde Air Products Company, New York, is completing plans for a one-story 80-ft. by 100-ft. plant to be erected at Milwaukee, Wis., at a cost of \$30,000.

H. F. Dow, for a number of years superintendent of the screw-machine department of the United Shoe Machinery Company, Beverly, Mass., and later a member of the firm of Babson-Dow Manufacturing Company, Boston, has recently been placed in charge of the automatic department of the American Steam Gage & Valve Company, Boston, Mass.

The Allegheny Steel Company, Pittsburgh, Pa., has completed plans to enlarge its plant at Brackenridge, Pa., for the manufacture of pressed steel side frames for steel cars. Material for the new addition will be furnished by the 100-inch plate mill of the company. Several new buildings will be erected, including one 90 ft. by 126 ft., one 60 ft. by 120 ft., and two 30 ft. by 135 ft.

The Standard Steel Car Company intends to make some large additions to its New Castle, Pa., plant. A contract has already been given to the McClintic-Marshall Company for the steel for a new building to replace a structure destroyed last fall by fire. A large amount of new equipment will be installed, and it is planned to build steel cars complete. Hitherto only parts of the cars were made and assembled for finishing at Butler, Pa.

Edward M. Hagar, whose election as president of the Hagar Portland Cement Company, was announced in this column last week, was graduated from the Massachusetts Institute of Technology in 1893. In 1894

he received a master's degree from Cornell University for postgraduate work done at that school. He then came to Chicago and formed the corporation known as Edward M. Hagar & Co., which acted as agent for several machinery manufacturers. In 1899 he was appointed manager of the cement department of the Illinois Steel Company. The manufacture and sale of Universal Portland cement was carried on by the Illinois Steel Company until 1906 when the Universal Portland Cement Company was formed with Mr. Hagar as its president. Under his

management the manufacture of Universal increased from 32,000 barrels in 1900 to 12,000,000 barrels in 1914. Mr. Hagar resigned the presidency of the Universal Portland Cement Company in February of this year to form a new company for the purpose of acquiring a chain of Portland cement plants extending across the country.

The International Jury of Award of the Panama-Pacific International Exposition has awarded to the Western Electric Company the following medals for its exhibit in the Palace of Manufacturers: the Grand Prix for the exhibit as a whole; gold medals for telephone switchboards and equipment, for telephone train despatching and control apparatus and for insulated wires and cables and two bronze medals for mine rescue equipment and mine telephones.

Frank C. Rose, formerly purchasing agent of the Foundation Company, Ltd., Montreal, has been appointed general purchasing agent of W. S. Barstow & Co., Inc., engineers and managers, New York, operating the General Gas & Electric Company and the Eastern Power & Light Corpora-

tion. Previous to his connection with the Foundation Company, Ltd., Mr. Rose was assistant purchasing agent of J. S. White & Co. and prior to that general confidential assistant to the purchasing agent of the Delaware, Lackawanna & Western.

The United Railway Specialties Company, 30 Church street, New York, has been appointed representative of Mudge & Co., Chicago, in the New England, eastern and southern states. Representation will cover Mudge motor cars, Mudge-Peerless ventilators and the Mudge-Slater removable box front end for locomotives. The United Railway Specialties Co. is a comparatively new company. Its officers are: R. A. Patterson, president; H. M. Buck, treasurer, and John B. Given, vice-president. Mr. Patterson was for a number of years associated with Fairbanks-Morse & Co., Chicago, in charge of the railroad department of their New York office. Mr. Buck has been associated with the Railway Supply Company, Chicago, for many years as eastern representative. Mr. Given was at one time in the service of the Duplex Metals Company and is now also associated with the Galena-Signal-Oil Company. The United Railway Specialties Company, in addition to representing Mudge & Co., also represents the National Standard Company, Niles, Mich.; the W. E. Caldwell Company, Louisville, Ky.; the Continental Fibre Company, Newark, Del.; the William Robertson & Co., Chicago; the Railway & Traction Supply Company, Chicago, and a number of other companies.

Charles B. McElhany, general manager of sales of the Cambria Steel Company, has been elected also a vice-president of that company. Mr. McElhany has been in the steel business

for about 20 years, and in the service of the Cambria Steel Company for four years. His early years in the steel industry were spent in the employ of the Braddock Wire Company, the American Steel & Wire Company, the Union Steel Company and the Pittsburgh Steel Company. About nine years ago he entered the service of the Colorado Fuel & Iron Company, becoming assistant general manager of sales of that company. He then became assistant manager of sales of the Cambria Steel Company, in charge of the wire division. He was later appointed assistant general manager



C. B. McElhany

of sales, and on March 1 succeeded J. L. Replogle as general manager of sales.

Two court decisions have recently been handed down relative to infringement of patents held by the Safety Car Heating & Lighting Company, New York. In the suit of the Safety Car Heating & Lighting Company v. the United States Light & Heating Company, the circuit court of appeals has affirmed the decision of Judge Hazel of the western district of New York, which held that the first eight claims of the Creveling patent No. 747,086, owned by the Safety Car Heating & Lighting Company, which were the only claims involved in the suit, were valid, that they were entitled to a broad interpretation, and that they were infringed by both the taper charge and stop charge systems of the defendant. The Safety Car Heating & Lighting Company believes that this patent as thus adjudicated covers not only the systems of the United States Light & Heating Company, but also practically all modern systems now in use on the railroads of this country. In the case of the Safety Car Heating & Lighting Company v. the Gould Coupler Company, in which the Safety Car Heating & Lighting Company sued for infringement of the patent to H. G. Thompson, No. 1,070,080 which it holds, patent claims 1, 9, 10, 11, 12 and 13 were alleged to be infringed by the Snepex system of the Gould Coupler Company in



E. M. Hagar

both the constant battery current and constant generator current forms. Judge Hazel of the United States court for the western district of New York at Buffalo, holds all the claims valid and all infringed by both the constant battery current system and the constant generator current system of the Gould coupler Company.

Harrison G. Thompson, whose appointment as general sales manager of the Edison Storage Battery Company, Orange, N. J., was announced in this column last week, has been in the service of that company since July, 1910, and a vice-president of it since July, 1913. Mr. Thompson was born at Weston, Mass., in 1875. In 1896 he entered the service of the Pullman Company and after having been with that company for two years was made foreman of electricians. In 1900 he resigned to become foreman of the battery department of the Riker Motor Vehicle Company, but left the latter at the time of its absorption by the General Vehicle Company, of Hartford, Conn., to become associated with W. L. Bliss, one of the pioneers in electric car lighting development. In 1905 he entered the service of the Pennsylvania Railroad and was placed in charge of electric car lighting with headquarters at Jersey City, N. J. About one year later he became electrical superintendent of the Safety Car Heating & Lighting Company, New York, and was in charge of that company's electrical laboratories during the development of its first electric car lighting system. In December, 1909, he was appointed manager of the railroad department of the Westinghouse Storage Battery Company and later for a short time was in the employ of the United States Light & Heating Company, New York. In July, 1910, he became manager of the railway department of the Edison Storage Battery Company.



H. G. Thompson

TRADE PUBLICATIONS

ELECTRICAL TESTING SERVICE.—The Electrical Testing Laboratories, Inc., New York, have recently issued an attractive loose-leaf booklet describing the equipment, organization and work of these laboratories.

PASSENGER CAR COUPLERS.—The McConway & Torley Company, Pittsburgh, Pa., has recently issued an eight-page booklet descriptive of the Pitt passenger coupler. In addition to an illustration of the coupler, the booklet also contains three drawings showing the coupler's great flexibility of curvature. Figure 1 shows the limits of such flexible movement; figure 2, the extreme positions to which the couplers will adjust themselves in passing over a curve and tangent, and figure 3, the relative positions on a reverse curve.

CONNECTING DEVICES FOR WIRING.—The Fargo Manufacturing Company, Inc., Poughkeepsie, N. Y., has issued three very full and complete catalogs of its connecting devices for wiring of all kinds. These devices are designed to be the very best of their class, both for strength and for quality of workmanship. Catalog No. 700 showing types A and B illustrates the straight connection, type A 3; the steel cable grip type A 4; steel guy grip; a cable lug; cable grip type A, and straight connection, type B. Bulletin No. 402 shows an insulated case for a straight connection, a bus bar connection grounding devices and tee and ell connections. Catalog No. 800 shows these and other devices with large illustrations and additional details of the uses to which they may be put. Ground and terminal connections are shown in great variety.

Railway Construction

ALAMANCE, DURHAM & ORANGE RAILWAY & ELECTRIC COMPANY.—Plans have been made to build an electric line from Altamahaw and Ossipee, twin manufacturing villages in the northwestern section of Alamance county, N. C., in a southeasterly direction through the manufacturing villages of Hub Mills, Glencoe, Carolina and Hopedale, thence via Burlington, Graham, Swepsonville, Saxapahaw and Chapel Hill to Durham, about 50 miles. Contracts for building the line will probably be let in November. J. H. Harden, president, Burlington, and H. G. Palmer & Co., Yorkville, Ill., and office at Burlington, N. C., are the engineers.

AMERICUS, FLINT RIVER & GAINS.—The city council of Americus, Ga., has given a franchise to the Georgia Lumber Company to operate a railroad into Americus. The company has the right of way secured, it is said, for a line to be about 25 miles long, and construction work is to be started before September. The projected route is from Byromville, Ga., west across the Flint river, thence to Americus, and the plans call for putting up a steel bridge over the Flint river. It is proposed later to extend the line which will probably be built under the name of the Americus, Flint River & Gains. The headquarters of the company are at Americus, and it is said that the plans call for establishing shops at that place.

CALHOUN COUNTY RAILWAY.—This company proposes to build a railroad from Pearl, Ill., to run south through Bee Creek, Cliffdale, Kampsville, Hamburg, Batchtown and Brussels to Golden Eagle. Grading in the district of Hardin, Ill., is in progress, and it is expected track laying will begin about August 15. The general contracts have been awarded to the Western Illinois Development Company. John E. Melick, Kampsville, Ill., is president and chief engineer of the railroad.

CAROLINA, GREENEVILLE & NORTHERN (Electric).—A contract has been given to A. H. Jacoby, Greenville, Tenn., for some of the work on this line. The company plans to build from Bristol, Tenn., west to Kingsport, thence southwest via Newport and Sevierville to Knoxville, about 140 miles. The maximum grade will be 1.5 per cent, and the maximum curvature 10 deg. There will be three steel bridges aggregating 1,500 ft. on the line. The company expects to develop a traffic in lumber, iron ore and coal. H. S. Reed, president, Los Angeles, Cal.; F. A. H. Kelley, chief engineer, Greenville, Tenn. (June 11, p. 1265.)

CHARLESTON SOUTHERN.—Under this name a line is projected from the Carolina, Atlantic & Western at Charleston, S. C., southwest to Savannah, Ga., 86 miles. The company has not yet been incorporated. G. E. Dargan and B. Williamson, Darlington, S. C., also J. E. Evans, Florence, S. C., are interested.

CHESAPEAKE & CURTIS BAY.—Incorporated in Maryland with \$50,000 capital, it is said, to build a line at Curtis Bay and at East Brooklyn suburbs of Baltimore to connect with the Baltimore & Ohio. The incorporators include R. D. Upham, New York; J. C. Boyd, Baltimore; J. H. Zink and R. B. Pue.

FLORENCE & HUNTSVILLE INTERURBAN.—According to press reports from Florence, Ala., the Lauderdale Power Company is promoting the construction of this line. The plans call for building from Florence east via Athens to Huntsville, about 75 miles, and about 12 miles of spur lines. (September 25, p. 587.)

KEOKUK, ROCK ISLAND & CHICAGO.—This company proposes to build a railroad from a point on the Chicago, Burlington & Quincy near Keithsburg, Ill., to a point opposite Muscatine, Iowa, and thence to Chillicothe, Ill., a distance of about 130 miles. Several bridges will be required. M. J. Healy, Joy, Ill., president and chief engineer, would like to hear from contractors.

MONTREAL & SOUTHERN COUNTIES (Electric).—An officer writes that work was resumed on June 1, on the extension from St. Césaire, Que., to Granby, 15 miles. This work was first started in May, 1914, and was shut down in August of the same year. Track has already been laid on three miles. Grant, Campbell & Company, St. Césaire, are the contractors. There

will be five short wooden pile trestles on the line, also car-barns and substation at Granby, and a station at Abbotsford. (January 15, p. 116.)

NEW YORK CONNECTING.—This company has given contracts to the Wilson & English Construction Company, New York, for the construction of Section 1, and to P. McManus, Incorporated, Philadelphia, Pa., for the construction of Section 2. This work is for the sections of the New York Connecting Railroad between Bowery Bay Road and the Long Island Railroad at Fresh Pond Junction, in the borough of Queens, New York. (May 28, p. 1139.)

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, will open bids on July 20, for the construction of Section No. 1 of Route No. 49, a part of the Culver rapid transit railroad. Section No. 1 extends from a point in Thirty-seventh street 246 ft. southeast of Tenth avenue under private property and intersecting streets to Gravesend avenue and over Gravesend avenue to a point about 525 ft. south of Bay Parkway (Twenty-second avenue) produced.

NORFOLK, WASHINGTON & NEW YORK.—An officer writes that this company has secured most of the right of way on the section between Riverside, Va., and Sheperd's, D. C. The company plans to build from Newport News, Va., north via Washington, D. C. Channing M. Ward, president, Richmond, Va.

NORTH CAROLINA ROADS.—Plans are being made, it is said, to build a line from Rutherfordton, N. C., southwest to Columbus, about 15 miles. L. D. Miller, Rutherfordton, may be addressed.

NORTH GEORGIA MINERAL.—Surveys are reported under way on about 25 miles for a line from Atlanta, Ga., north to a point in Bartow county. Application was made by this company for a charter in Georgia last year with a capital of \$1,250,000, to build from Atlanta, northwest through the counties of Fulton, Cobb, Cherokee and Bartow, about 50 miles. W. J. Morrison, A. C. King, J. J. Spalding, Atlanta, are interested. (September 25, p. 587.)

OZARK SOUTHERN.—This company has projected a line from Harrison, Ark., it is said, south to Jasper and Parthenon, about 20 miles. The line may eventually be extended south of Parthenon. G. W. T. Shaw, Lee Center, Ill., is consulting engineer, and W. T. Allen, Jacksonville, Ala., and F. B. Moody are interested.

PENNSYLVANIA RAILROAD.—A short branch line is to be built at Steelton, Pa., to reach some industries without using main line track as at present.

SOUTHERN PACIFIC.—This company announces that the work between Eugene, Ore., and Marshfield is nearly completed. There remains some bridge work which is now in progress, after which there will be some trestle work, track laying and ballasting to complete.

STATESVILLE AIR LINE.—Financial arrangements are now being made, it is said, to carry out work on this line. The plans call for building from Statesville, N. C., north via Harmony to Houstonville, about 25 miles. Grading has been finished on about 20 miles, and track laying may be started soon. W. D. Turner, president; W. Wallace, vice-president; D. M. Ausley, treasurer and general manager.

TENNESSEE ROADS (Electric).—Plans are being made to build an electric line, it is said, from a connection with the Nashville, Chattanooga & St. Louis at Lebanon, Tenn., southeast to Smithville, about 35 miles. C. Edwards, representing White & Company, Chicago, Ill., is said to have made arrangements for building the line. J. T. Odum, Lebanon, may be addressed.

RAILWAY STRUCTURES

AUGUSTA, GA.—An officer of the Georgia & Florida is quoted as saying that the company will start work at once on a new passenger station at Twiggs and Calhoun streets in Augusta. The company was granted permission recently by the Railroad Commission of Georgia to discontinue use of the union station in Augusta, and to build a new station.

BROOKLYN, N. Y.—Contracts for the construction of eight elevated railroad stations in connection with the third-tracking of

the Broadway elevated railroad in the borough of Brooklyn have been approved by the New York Public Service Commission, First district.

CLAREMORE, OKLA.—The St. Louis, Iron Mountain & Southern contemplates building a new depot at this place. No definite decision has yet been reached as to the size of the building, or when it will be constructed.

COLEMAN, TEX.—The Gulf, Colorado & Santa Fe has awarded the contract for the construction of a brick and stucco depot at this point to H. D. McCoy, of Cleburne, Tex.

DALLAS, TEX.—The Dallas Union Terminal Company will construct a heat, light and power plant to supply the terminal now being built at that place. The estimated cost is \$60,000.

FROSTBURG, MD.—A contract has been given to the Luten Bridge Company, York, Pa., to build a 44-ft. concrete span bridge over the Cumberland & Pennsylvania tracks at Bowery street, Frostburg. The town of Frostburg and the Cumberland & Pennsylvania will jointly pay for the improvements, which are to cost \$5,340.

HERR'S ISLAND, PA.—A contract has been given by the Pennsylvania Railroad to the Bailey & Lush Company, Philadelphia, at \$150,000 for building a double-deck stock pen on Herr's Island.

HOPEWELL, VA.—An officer of the Norfolk & Western writes regarding the construction of a new freight warehouse at Hopewell, Va., that nothing definite has been decided as to the construction of this warehouse. It will probably be of frame construction and the work may be carried out by company forces.

KANSAS CITY, MO.—The Chicago, Burlington & Quincy has awarded the contract for the steel work of its Kansas City bridge to the American Bridge Company. The contract calls for 5,500 tons of steel.

MANSFIELD, OHIO.—Plans are being made by the Erie for building an addition, 40 ft. by 50 ft. to the freight house at Mansfield, at a cost of between \$8,000 and \$9,000.

PHOENIXVILLE, PA.—The Pennsylvania Railroad has given a contract to the James McGraw Co., Philadelphia, Pa., for building the concrete arch bridge at Campbell's Crossing, west of Frick's lock. The bridge is to consist of seven 84-ft. concrete arches for double track. (June 11, p. 1266.)

RIDGEWOOD, N. J.—The Erie has given a contract to the Corning Building Company, Corning, N. Y., for building a new station at Ridgewood. Another contract has been given to Arthur McMullen, New York, for constructing a pedestrian subway and the approaches to the new station, also for the paving, etc.

RAILWAY PROPERTY IN ASIA MINOR.—A telegram from Constantinople received in Amsterdam via Berlin states that it is reported in competent circles that the Porte has decided to abolish the Turco-French financial agreement drafted last year, the execution of which would have impeded the future development of the Hedjaz Railway. The government has decided to buy back all railway property in Syria and in the Lebanon district which is the property of alien enemies.

RAILWAY EXTENSION IN INDIA.—The Indian Railway Board has sanctioned the following new construction: the construction by the South Indian Railway, on behalf of the District Board of Tanjore, of a branch meter-gage line between Tiruturaipundi, a station on the South Indian Railway and Vedaraniam, a distance of about 23 miles; a survey by the agency of the Darjeeling-Himalayan Railway for a line between Thakurgunge and Sikti, a distance of about 44 miles; the construction by the Bengal Provincial Railway of a 2 ft. 6-in. gage line between Dasghara station on the Bengal Provincial Railway, and Jamal Purgunj, a distance of about 8 miles; a survey by the Assam-Bengal Railway administration for meter-gage lines between Karinganj into the Longai Valley and Hathikheri, with a branch into the Chargola Valley, length about 44 miles, and between Silchar and Dwarbund, with branch to Sonaimukh and Dhalai, a length of about 30 miles. On the Great Indian Peninsula Railway the four trading lines up to Kalyan have made good progress, but the completion of the work will be delayed, owing to the war.

Railway Financial News

ALABAMA & MISSISSIPPI.—This company has leased the Pascagoula, Moss Point & Northern. The Alabama & Mississippi runs from Vinerga Bend, Ala., to Leaksville, Miss., 17 miles, and the Pascagoula, Moss Point & Northern runs from Pascagoula, Miss., to Evanston.

BOSTON & MAINE.—President Hustis gave out the following statement after a meeting of the executive committee of the Boston & Maine, held on June 29:

"There is no friction between the directors of the Boston & Maine Railroad and the committee representing the leased line interests. This committee, of which Richard Olney is chairman, is fully alive to the importance of avoiding a receivership and is working to that end. They realize if receivership is to be avoided legislation must be secured in New Hampshire and that to secure legislation in New Hampshire the leased line interests must be practically a unit requesting it.

"The statement that because of a steady improvement in net earnings, reorganization is unnecessary, and that there will be no need of a receivership in case reorganization is not effected should not be regarded seriously. It is understood by all interests that no plan short of a permanent reorganization and one that will restore credit to the road will avail.

"It is true that net results of operation as compared with last year are continuing to show a favorable tendency. The report for the 11-months' period, published today in face of a loss in the operating revenue of \$1,335,000, shows a shortage of only \$773,000 in the amount required to pay fixed charges as against a shortage of \$2,186,000 for the same period of the previous year; but regardless of this favorable showing it is apparent that fixed charges will not be earned this fiscal year, although the result would have been more favorable had not track work been started earlier this year than last."

Chairman MacLeod, of the Massachusetts Public Service Commission, gave out on June 29 the following statement:

"The present corporate body of the Boston & Maine Railroad is a menace to any sound reorganization; the Public Service Commission does not favor any receivership if it can be avoided, but a reorganization on a sound basis. In conformity with the law as passed by the legislature, the stockholders may negotiate with the leased line interests, but any deal consummated must be within a capitalization fixed under the enabling act.

"Until the Boston & Maine gets rid of the fixed charges that it is now under there cannot, in my opinion, be any healthy reorganization effected. The road must be reorganized on such a basis that it will be able to weather any time of future stress."

CHICAGO, ROCK ISLAND & PACIFIC.—Judge Carpenter, in the United States district court, has authorized the receivers to issue \$2,500,000 5 per cent receivers' certificates, the proceeds to be used to pay interest due on July 1 on underlying bonds. The issue of certificates was opposed by Samuel Untermeyer, representing the Amster interests, but the objections were overruled by Judge Carpenter. The receivers' certificates were sold to the First National Bank of New York.

The following have formed a protective committee to represent the interests of the first and refunding mortgage bonds: Charles A. Peabody, president of the Mutual Life Insurance Company, chairman; Allen B. Forbes, of Harris, Forbes & Company, New York; W. A. Day, president of the Equitable Life Assurance Society; A. J. Hemphill, chairman of the board of directors of the Guaranty Trust Company, and Alfred W. Harris, president of the Harris Trust & Savings Bank, Chicago.

FLORIDA RAILWAY.—William B. Winslow, of New York, has been appointed receiver of the Florida Railway by United States District Judge Hand. The receivership suit was brought by Carl J. Sauer on the part of certain bondholders because it was alleged that the Union Trust Company of Florida, which was to have acted as trustee for the bonds, never qualified as trustee. The Florida Railway runs from Live Oak, Fla., to Jacksonville and Fernandina.

HOCKING VALLEY.—A dividend of 1 per cent has been declared, payable June 30. Six months ago 3 per cent was declared. This makes a total of 4 per cent for the year.

NEW ORLEANS, MOBILE & CHICAGO.—The United States district court has ordered the sale of the New Orleans, Mobile & Chicago under foreclosure within the next two months. A petition to intervene in the receivership proceedings made by L. S. Berg, formerly president of the company, and representatives of French bondholders was denied.

NEW YORK CENTRAL.—Residents of Yonkers have, after making an attempt to persuade the New York Central to electrify the Yonkers branch, made the railroad company tentative propositions looking to buying this branch and themselves electrifying it and operating it. The cost of electrification has been estimated at from \$450,000 to \$500,000.

PASCAGOULA, MOSS POINT & NORTHERN.—See Alabama & Mississippi.

PENNSYLVANIA RAILROAD.—This company now has over 93,000 stockholders, of whom 44,848, or 48.22 per cent, are women. This is an increase in the total number of stockholders of 3,158 as compared with June, 1914. The women stockholders, while aggregating in number 48.22 per cent of the total stockholders, hold 28.09 per cent of the stock, the average holdings per woman stockholder being 63 shares.

ST. LOUIS & SAN FRANCISCO.—The bondholders' protective committee representing the first and refunding 4 per cent bonds, has made arrangements to advance the interest due on July 1 on these bonds to holders who have deposited their bonds with the committee.

SOUTHERN PACIFIC.—The Supreme Court of the United States on Monday handed down a decision holding that the 2,300,000 acres of land located in Oregon and granted to the Oregon & California Railroad Company, a subsidiary of the Southern Pacific, is not forfeited to the government and that the Southern Pacific is entitled to hold this land, but an injunction is issued preventing the railroad company from selling it for a period of six months pending further action by Congress.

The Southern Pacific will operate beginning with July 1 as part of its Pacific system the properties of the Corvallis & Eastern; Portland, Eugene & Eastern; Coos Bay, Roseburg & Eastern; Pacific Railway & Navigation, and Salem, Falls City & Western.

WABASH.—The sale of this property, which had been set for June 23, has been postponed upon the application of the Equitable Trust Company, New York, to July 8.

WABASH-PITTSBURG TERMINAL.—The reorganization committee, of which James N. Wallace, of the Central Trust Company of New York, is chairman, has submitted to securityholders a plan of reorganization. This plan provides for a reduction in the par value of securities and outstanding indebtedness from \$91,000,000 to \$44,000,000. Of the former capitalization \$81,000,000 was bonds. This would be reduced to \$5,000,000, reducing fixed charges from \$2,783,000 to \$261,000 annually. The new securities to be issued will consist of \$9,100,000 6 per cent preferred stock, cumulative after January 1, 1921, and \$30,500,000 common stock, and the \$5,000,000 underlying bonds will remain undisturbed.

DUBLIN RAILWAY STRIKES.—Some 200 men left their work at Broadstone Railway Station on Monday, June 14, without notice. Many of them are members of the Irish Transport Union. Some 50 men failed to resume work on Monday morning at the locomotive and car shops of the Dublin & South-Eastern at Upper Grand Canal street, following an application for an advance of 6s. (\$1.50) per week in wages. The men belong to the Transport Union, which sought to secure the advance. The directors of the Midland Great Western decided on June 15 to grant a war bonus to their employees, i. e., 1s. (25 cents) a week to those earning 12s. (3s.) a week or less; to members of the clerical and wages staff (1) receiving more than 12s. and not exceeding 30s. (\$7.50), 1s. 6d. (38 cents) a week, (2) receiving more than 30s. and not exceeding 39s. (\$9.75), 1s. a week.

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WE GUARANTEE, that of this issue 8,650 copies were printed; that of these 8,650 copies 7,335 were mailed to regular paid subscribers to the weekly edition, 155 were provided for counter and news companies' sales, 988 were mailed to advertisers, exchanges and correspondents, and 172 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 258,100, an average of 9,218 copies a week.

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*Illustrated.

Chaloner Whin is the latest train accident reported on by the British Board of Trade; and it is another case in which the inspector points out the need of a cab signal or its equivalent; but the recommendation is couched in the inspectors' customary mild language. Chaloner Whin is two miles south of York, on the North Eastern, which road has a considerable equipment of cab signals. The report is abstracted on another page. Incidentally it shows also the comparative uselessness of an apparatus to enable a signalman to put torpedoes on the rail opposite his cabin. In this case the engineman ran past distant and home signals set against him and was thrown off the track, just beyond the cabin.

The Cab Signal Propaganda in England

at a movable frog, which was open because the signal man tried to move it when it was clogged with snow. The rule prohibits signalmen from thus introducing an obstruction—moving the frog was an obstruction—when a train is known to be approaching; it requires him first to stop the train at home signal. The inspector calls for enforcement of the rule; the company says that at busy junctions it would cause congestion; and the inspector ends the discussion by declaring that, at least in the case of a passenger train, the moving of a frog (or switch) should be prohibited. This general rule, which means that a distant and a home signal cannot be depended on to stop a train, has for many years been a prominent feature of the English signaling creed; and for an equal number of years has been ignored by individual railways, in many situations, on the plea that it was an unreasonable restriction. Logically, this difference of view, as between the Board of Trade inspectors and the men who have the responsibility of actual railway operation, can be settled only by early and general adoption of cab signals, or their equivalent; but whether or not the inspectors are prepared to take such a positive stand does not year appear.

The annual meeting of the American Society for Testing Materials, held in Atlantic City, June 22-26, was successful both in the quality of the material presented and the number of members present. The work of the committee was painstaking in the extreme and their findings were accepted with little or no question by the

American Society for Testing Materials

society. There were two reports of committees on standard specifications and tests for cement and concrete that went through with little or no discussion, and it seemed as though the whole subject would be passed over in this way, but when the first paper, which was on the microstructure of concrete, was presented all such ideas were dissipated. The new method of examining concrete for the purpose of analyzing the reasons for failure was so simple in its procedure and seemed to appeal so strongly to the sense of what was fit that the meeting took on a tone of vigor that was quite unexpected. Then came three more individual papers, each dealing with a method of research that was important, which were discussed with interest and appreciation, the net result being a symposium along a single line of work that was valuable and suggestive. One of the most important papers, though there was no criticism or discussion on it, was that of C. D. Young, engineer of tests of the Pennsylvania Railroad, descriptive of the Altoona laboratory. This was printed in the *Railway Age Gazette* of July 2, 1915. In the first place, very few outsiders realize the extent of the activities of the test department of the Pennsylvania Railroad; then to those who are more or less familiar with its early, and one might almost say struggling, beginnings, its present magnitude, as indicated by this paper, comes as a startling contrast. The use of the proposed tentative specifications has worked out in a manner that is very gratifying. By this means the specifications are placed for one year in such a position that any necessary changes will be made before they are adopted as standard. This avoids the frequent disrupting of the standards.

The last two decades have been marked by an ever-increasing demand on the part of the public for the elimination of crossings of railways with highways at grade. This movement has become especially active within the last five years, particularly in the smaller cities and the rural communities, where it is largely a result of the "good roads" agitation promoted chiefly by the owners of automobiles. In consequence, the railroads are constantly called upon to face new demands for work of this kind. Early efforts to secure elimination of grade crossing were characterized by unreasonable requirements, in some instances amounting to virtual confiscation, due largely to a lack of comprehension on

The Public and Grade Separation

the part of the public authorities of the true considerations involved and also to a certain extent to a limited point of view. Railroads usually receive the most consideration in cities where the municipal authorities and the public have a proper understanding of the principles involved, resulting from past experience. For this reason, the paper presented by C. N. Bainbridge before the Western Society of Engineers and abstracted in this issue, is of interest at this time as a clear, concise statement of the problem encountered. It draws attention to the necessity for careful independent consideration of each individual project. Each problem is just as surely one for independent and special solution as the location of a new railroad. It is not only necessary to consider the natural physical situation, but as well the arrangement of the improvements to which the community and the railroads have already been committed, largely as the result of the location originally selected for the railway. It is only in extraordinary cases that the slate may be washed clean to get a fresh start. It is also necessary to realize at the outset that there are several parties to the contract, each of whom is entitled to fair consideration and that the object to be attained is the elimination of the grade crossings in question at the least expense and with the minimum inconvenience to all. It is well to remember that the public eventually pays for these expenditures, though the immediate distribution of the expense usually is an equitable one, and that a city has no right to demand an extravagant, inefficient plan for track elevation or track depression, the cost of which will be borne by the public at large.

GOVERNMENT RAILWAY BUILDING IN CANADA

A WESTERN Canadian editor writes: "We want more railways. Optimism will never return to the west until the Dominion government builds some." To which the Montreal Gazette replies in an editorial: "It will be time enough to build new railways when they are needed." It adds:

"The three prairie provinces and British Columbia have incurred a gigantic indirect liability in guaranteeing railway bonds, while the Dominion government has just been obliged to take over the Transcontinental, which, including the Lake Superior branch, is 2,000 miles long and has cost well on to \$200,000,000. It is likewise engaged in constructing the Hudson Bay Railway, which can pay for axle grease only by diverting traffic from the Transcontinental and other Canadian routes; and some of these days may have to furnish additional aid to the Canadian Northern or perhaps to assume the ownership and operation of that large system. Facts such as these impress the eastern man, but the western optimist is never so much at ease as when advocating the throwing of good money after bad, provided of course it is someone else's money."

Especially pertinent is the reference to the National Transcontinental, which the government "has been obliged" to take over, because it was built by a government commission through an unproductive territory on such an extravagant scale of expenditure that the government could not get a private company—the Grand Trunk Pacific—to operate it rent-free for seven years and thereafter pay for 43 years a rental of three per cent on a cost which a government investigating commission found to include a waste of \$40,000,000. With these facts in mind the Montreal Gazette points out that just now it would be difficult for the government to borrow for new railways, even if it were disposed to do so, for the following reason:

"Our experience of them (government railways) has not been encouraging. The usual plea in their behalf, that a government can raise money on better terms than a company, may be true; but it is equally true that a company is less extravagant and far more business-like. The Transcontinental is a monument more lasting than brass to the wasteful and bungling methods of government construction; and we may be sure that no matter how careful Mr. Cochrane and Mr. Gutelius may be supervising its operations the results will scarcely equal those of private management."

As the government has often failed to earn operating expenses on the Intercolonial, to say nothing of interest on the investment, there is foundation for this prediction. With reference to government railway management in another part of the world the Montreal Gazette adds:

"In Australia the government roads are suffering from poor crops and the depression, but instead of practicing economy the ministers in charge have been forced to spend freely for useless extensions in order to provide work for the unemployed in other walks of life."

In recent years Canada has been building railways at a very rapid rate. It not only has practically three transcontinental lines, but shorter lines and feeders are numerous. Last year Canada built 1,978 miles of new railway, or more than the United States, and in 1913 railway construction in Canada was only 60 miles less than in the United States. But for some time not only the government railways but even the better-located and better-operated private railways have been suffering from a scarcity of traffic.

Perhaps the Montreal Gazette might appropriately have said: "It will be time enough for the Canadian government to build more railways when some of the railways already built are needed."

LET YOUR LIGHT SHINE

FOR a long time the Pennsylvania Railroad has made a practice of publishing leaflets containing information for employees and the public concerning the service of the railroad and its many activities in various directions. These are sent to newspapers and employees and placed on its trains where they may be available to the public. One of its latest bulletins is entitled "He Serves the Railroad Most Who Serves Its Patrons Best," and is devoted to a number of instances in the everyday routine of the railroad where individual employees have won commendation for themselves and for the company by acts of special courtesy, kindness or thoughtfulness toward patrons. In most cases these incidents were brought to the attention of the company by letters from patrons written without the knowledge of the employees concerned.

For example, one of the letters was written by a passenger who happened to observe the unusual kindness of a station master to a foreign woman traveling with three children, who was compelled to wait over night at his station before resuming her journey on a morning train. The station master, noticing that the woman appeared ill, found that she and the children were hungry and provided lunch for them and lodging for the night. Another letter was from a man who was taken ill while on a train and wished to call the attention of the company to the courtesy of the conductor and trainmen in looking after his welfare. Another told of the courtesy of a station agent who loaned money to buy a ticket to a man who had inadvertently left his purse at home. Several of the letters expressed appreciation for unusual efforts or promptness on the part of employees in tracing and returning lost articles. In one case a roll of bills containing \$390 was dropped on a station platform by a passenger, found by a station porter and returned to the owner the following morning. Another story referred to the award of a Carnegie medal to a crossing watchman for heroism in rescuing a little girl who had run in front of a moving engine.

Giving publicity to incidents of this kind is of benefit in two ways. It not only shows the employees that the company appreciates courtesy on their part, but it is the best kind of advertising for the railroad. It shows the public that it is the intention of the railroad not only to furnish safe and prompt transportation but to go further and treat the passenger as a guest. The employees are made to realize that their efforts to give good service are not always unnoticed and the public is given an opportunity to recognize that an occasional lack of courtesy on the part of an employee does not represent the policy of the company.

The Pennsylvania's information bulletins of this kind represent an admirable method of obtaining publicity for and setting the example of good service, which has also been adopted to some extent by other roads. The New York, New Haven & Hartford has recently begun the issuance of a similar leaflet and many other roads accomplish the same result in various ways. As far as the employees are concerned the various employees' magazines afford an excellent medium for disseminating information regarding examples of special service or faithfulness, but the importance of bringing such matters to the attention of the public should not be overlooked.

A RIGHT OF THE STATES

A VERY notable discussion of regulation of commerce is the address by Alfred P. Thom entitled "A Right of the States," which was delivered at the recent meeting of the State Bar Association of Tennessee. An abstract of this address is published elsewhere in this issue. The principle of "state's rights" is often advanced as an argument against the increase of federal regulation of commerce. Mr. Thom by broad implication points out that this overlooks one of the most vitally important rights of the states—their right to be protected by the federal government from unfair and burdensome regulation of their commerce by one another.

He recalls the historic fact that the need for regulation by some central authority to stop legislation by the individual states which burdened the commerce of all was one of the main reasons for the creation of the federal government. The states, by their jealous, selfish and parochial measures, were mutually ruining each other; and it was to forever end this internecine warfare that the federal constitution was made to provide that Congress should have power "to regulate commerce with foreign nations and among the several states." It was recognized from the start that this was one of the most important provisions of the constitution, and that one of the most important rights of the states was to have Congress exercise the authority conferred by it. Therefore, to contend, as some do, that it is an invasion of the constitutional rights of the states for Congress to take appropriate action to protect them in the enjoyment of their express constitutional right to be free from measures adopted by individual states which burden the commerce of all is highly irrational.

Turning from the legal to the practical aspect of the matter, there never was, as Mr. Thom clearly shows, more need than now for the federal government to put into effect measures adapted to protect the states and the nation from action by individual states having the intention and result of burdening commerce in general. A very much larger proportion of the country's commerce is "among the states," and a very much smaller proportion of it intrastate, than was the case at the time of the adoption of the constitution. The tendency of the individual states, as strikingly illustrated by their regulation of railways, to strive to promote their apparent interests at the expense of the interests of the other states and of the nation as a whole is, however, as strong now as it was then. The result of this relatively enormous increase of commerce "among the states," without any diminution of the tendency of the individual states to try to secure unfair advantages over the other states, is that the right of each and all of the states to have their commerce move freely and be handled economically, efficiently and profitably, is being flagrantly violated to the injury and loss of the people of every state and of the nation.

The unfair and injurious regulation of commerce by the individual states, as applied to railways, takes multifarious forms. Texas first, and then other states following its example, have tried to so regulate state rates as to make them lower than the corresponding interstate rates and than the intrastate rates of other states, and as to secure a monopoly of their own markets for their own producers and jobbers. This practice has been condemned by the Interstate Commerce Commission and the Supreme Court of the United States in the *Shreveport* case, but is still widely persisted in. Many states have passed laws making requirements as to the construction, equipment and operation of railways which are much more drastic and expensive than those which have been imposed by their sister states or by the federal government. The effect of such regulation cannot be confined within the boundaries of the states imposing it. It increases the cost both of transportation in other states and of interstate transportation. In many cases it requires the railways, in rendering their services in other states and their interstate service, to do things which the other states and the federal government do not want them to do.

Numerous states have passed laws for the regulation of the issuance of securities by railway companies chartered by these particular states. There is hardly a railway in the country which does not operate in more than one state, and most of them operate in several states. In consequence, when one state regulates the issuance of securities it determines how and to what extent a railway company may finance its development in from one to 14 or 15 other states. Such regulation is not state regulation. It is the regulation of "commerce among the states," and if not in violation of the letter is certainly in violation of the spirit and intent of the constitutional provision giving Congress alone power to regulate commerce "among the states."

Not only do the states pass much regulatory legislation by which they harm each other and the nation, but in many cases where uniform action by them is needed it is impossible to secure it. For example, last winter and spring legislation was needed and sought in various New England states to permit the reorganization of the Boston & Maine system. Some of the states passed it and others refused to. There being no uniformity, either those that acted were wrong or those that refused to act were wrong.

Moreover, while state regulation very generally harasses and burdens the commerce of the several states and of the nation, it also often leaves loopholes through which railway companies may escape from needed control. There has been much denunciation of the financial mismanagement of the New York, New Haven & Hartford under the Mellen regime. But this could never have occurred but for the looseness of the laws of one state—Connecticut. The New Haven had one charter from Massachusetts and another from Connecticut. As the Massachusetts Public Service Commission said, in a report rendered by it last February, under the laws of Massachusetts railway companies "have been given no broad, unsupervised power to acquire even the stock of other railroad companies. The general policy of Massachusetts is expressed in an act which provides that a railroad corporation shall not without express authorization by the proper officials, directly or indirectly subscribe for, take or hold the stock or bonds of or guarantee the bonds or dividends of any other corporation. 'The policy of Connecticut,' as the Massachusetts commission said, 'has been very different. The New York, New Haven & Hartford Railroad Company, under Connecticut law, has for many years had unlimited power to acquire the stock or securities of any other corporation at any time and at any price and no matter what kind of a corporation it might be . . . In respect to the issuing of stock and securities, the inconsistency between the laws of Massachusetts and Connecticut is equally marked. . . . The contrast between the provisions of the Connecticut and Massachusetts statutes in the foregoing and in other respects is very great. They cannot be harmonized nor reconciled. To sum the situation up briefly, and yet with reasonable accuracy, Massachusetts has tried to make the New Haven a supervised railroad corporation; Connecticut has made it largely a non-supervised holding company. For years the New Haven company disregarded the laws of this commonwealth and relied upon the broad powers and privileges granted by Connecticut."

Practically every transaction under the Mellen regime which has been condemned by public sentiment was carried through under the Connecticut laws which the Public Service Commission of Massachusetts denounces. So it has been with respect to the abuse of the holding company. Under the common law one corporation could not own stock in another corporation. The legislatures of New Jersey and several other states abrogated this common law principle and turned loose all kinds of holding companies to prey upon the people of the United States in order that the states creating them might profit by receiving fees for chartering them.

We might go on and fill column after column with other specific examples of the way in which the individual states, by foolish and vicious legislation, have denied to the several states and to the

nation the right to which Mr. Thom refers to have their commerce left free from injurious restrictions and burdens. Experience has demonstrated only too conclusively that this "right of the states" will never be properly and adequately safeguarded and upheld until the federal government fully asserts its paramount authority over interstate commerce. Such action is essential for the protection and furtherance of the rights of the people of the very states which resort to such foolish and harmful legislation.

The first step in this direction should be the passage of an act for the federal incorporation of all corporations doing an interstate business. The next should be the passage of a law either abolishing all state regulation of railways which affects interstate commerce, or making all state regulation of railways subject to review and control by the Interstate Commerce Commission. There is no more sense in the kind of state regulation of railways which we have now than there was in the sort of state regulation of commerce which contributed so largely to forcing upon the attention of the people originally the need for the adoption of the federal constitution.

THE L. C. L. FREIGHT PROBLEM

NO subject has received more attention from railway men during the last three or four years than the reduction of loss and damage claims. Any money paid out on this account is a direct economic waste, as it depletes the funds of the railway without adding to the property of the claimant. The largest single source of such claims is l. c. l. traffic. One road with annual gross freight earnings of over \$75,000,000 finds that over 30 per cent of all payments for claims go for l. c. l. shipments in spite of the fact that this traffic forms considerably less than 10 per cent of the total business handled. These heavy losses arise primarily from rough handling of fragile materials and from errors in forwarding. In another column there is described a method to reduce losses from the latter cause employed at the Chicago freight house of the "Soo" for a year, which is both inexpensive and simple. This is only one of numerous methods which are being tried at various points. The test of the practicability of any of these plans is whether the claims are reduced by an amount sufficient to offset the increased expenditure.

While given a large amount of attention, the reduction of claims is only one phase of the l. c. l. problem. This class of traffic is very expensive to handle at best. Facilities must be provided in industrial centers where property values are high and where fixed charges are in proportion. It is therefore necessary to design and to operate these facilities to the best advantage in order to reduce the unit overhead cost to the minimum. The nature of the traffic also makes necessary a heavy expense for handling. To reduce the amount of labor necessary, motor trucks, elevators and other forms of mechanical appliances have been perfected and are being used while a number of methods are also being employed to increase the efficiency of the labor itself, such as the bonus system and piece-work.

The handling of l. c. l. freight has many ramifications, the study of any one of which may lead to important economies. To secure a full discussion of these various developments we have announced a contest on The Handling of L. C. L. Freight to include all phases of this problem from the time the freight is received at the freight house until it is delivered to the consignee at destination. We desire to secure general discussions of this subject with particular reference to improved designs and methods of operation. Data regarding such improvements should be given in detail. Prizes of \$50 and \$35 will be paid for the two best papers received, the award being based upon the completeness of the discussion and the practicability of the ideas presented. All other contributions accepted and published will be paid for at our regular space rates. All contributions should be sent to the Editor of the *Railway Age Gazette*, 608 South Dearborn street, Chicago, and must be received before August 1, to be considered by the judges.

Letters to the Editor

DEPRECIATION AND "CONFISCATION"

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In his article on "A Billion Dollar Confiscation," Morrell Walker Gaines exhibits some confusion regarding the subject of depreciation reserves and retirement accounting which should be explained, especially since the points were not developed in your editorial comment.

The requirement that plant retired be credited to fixed capital and charged to a depreciation reserve is a book transaction, designed to keep the fixed capital accounts in conformity with actual fact. If the reserves are inadequate and a part of the charge must be divided between income and surplus, investors are not being mulcted in any way. In fact, their interests are being conserved by the required accounting. The depreciation reserve is created for the protection of the capital investment: income is charged to build up a reserve which will restore the capital that has been consumed in the plant retired. If it so happens that reserves for this purpose have not been created, the charge to income or surplus for any deficit is *prima facie* evidence of neglect in insuring the perpetuity of the capital investment and of effective, though perhaps rigorous, steps being taken to remedy past neglect.

Another advantage of the required accounting is that it provides for the replacement of original capital investment, not of items of plant. From which it follows that any increased costs of new plant are automatically capitalized, as they legitimately should be. Mr. Gaines also speaks of the hardship to the roads in requiring them to charge expense with the annual depreciation quota at the same time they are bearing the deficit of their reserves in income. Undoubtedly this charge to expense will diminish distributable earnings, but the investors are benefited and the credit of the road improved by the process.

In the first place the creation of a depreciation reserve by charging expense results in a diversion of income from surplus to the reserve. The road loses nothing by the transaction, but really gains from an investing point of view. This is seen to be true when it is recalled that a depreciation reserve is pledged to the protection of the capital investment, with consequent greater security to stockholders and increased stability to bondholders. The practice of issuing long term bonds on the security of the stock investment in plant, whereby the term of the bonds exceeds the life in service of the plant, requires depreciation reserves to insure the replacement of the bondholders' equity. Therefore, if reserves are created, the bondholders are protected and they will accept lower interest rates in consequence.

The stockholders also have their proprietor shares enhanced, since the depreciation reserves are invested in the plant and are unalienable, while surplus may be invested in outside securities of doubtful value and subject to market fluctuations.

From the point of view of sound accounting, depreciation reserves are absolutely necessary in a continuing public utility. And they are based on good economic theory. Both the public and the investors are protected by the reserves and the carrier's best interests as a public utility are conserved. If testimony were needed in support of these assertions, the practice of telephone, telegraph, light and power, water companies and others would be sufficient. It should also be recalled that recognition of depreciation charges in the expense accounts for the replacement of capital places the roads in a much better position in rate cases, since it removes one more point of dispute regarding the legitimate requirements of the road for revenue.

LAWRENCE K. FRANK.

A Study of Grade Crossing Elimination in Cities*

A Discussion of the More Important Elements Which Must Be Considered in the Solution of This Problem

By C. N. BAINBRIDGE

Office Engineer, Chicago, Milwaukee & St. Paul, Chicago

The question of the separation of grade crossings in municipalities is vital and its importance cannot be denied. No single question affecting the relations of railroads to cities has received more consideration during the last decade. Various cities, utilities commissions and legislatures are requiring the railways to separate the grades of their tracks from those of the streets, and in practically all instances where such orders are issued, they specifically designate the manner in which the separation of grades shall be made.

The railroads recognize the right of a city to interfere with the grade of the railway tracks only as is imposed by its duty to preserve, as far as possible, the safety of public travel upon and along the streets and avenues intersected by such tracks, but do not concede that a city has authority to determine whether grade separation should be accomplished by elevation or depression of the tracks. The railways claim that they, and not the city, are entitled to the choice between two methods that are equally safe.

Numerous articles have been published covering track elevation. Little, however, has been written concerning the depression of tracks partially or completely and carrying the streets over the tracks on bridges or viaducts. It can not be said conclusively which method is the more satisfactory. Although track depression has found favor in several cities, few projects of this nature have been carried to completion, and it remains for time to determine whether track depression will be as satisfactory as track elevation is.

It is the purpose of the writer to set forth some of the general features which must be considered by the engineer, in studying a problem of grade crossing elimination. Probably the biggest factor is the cost, this being the most vital to the railroads, who generally bear the greater burden of the expense. The geological character and topography of the country and the effect on the grade of the railroad are also big factors in selecting a plan. In a flat low district like that around Chicago, there is little choice. Track depression would be out of the question on account of difficulties due to water and interference with the sewer system. This leaves the alternative of elevation, or partial elevation. Chicago, however, is only one city in many where grade separation is being carried on, and at other places where the tracks are at the summits of ascending grades, the natural selection would be depression, unless this proved to be too expensive. There are still other places where the ground is high above water and the present tracks nearly level, where either track elevation or track depression could be adopted without excessive gradients.

Numerous elements are involved in the study of a project of this nature and for convenience they will be considered in the following order: Excavation or embankment; clearances; bridges; right of way and retaining walls; changes in streets; apportioning of expenses; advantages and disadvantages, and conclusions.

EXCAVATION OR FILL.

To carry the tracks over the streets requires a vertical separation of grades of from 15 ft. 6 in. to 17 ft. 6 in., allowing from 3 ft. 6 in. to 4 ft. for floor depth and 12 ft. to 13 ft. 6 in. for headroom. To carry the streets over the tracks requires a vertical separation of grades of from 21 ft. 6 in. to 26 ft. 6 in., al-

lowing from 18 to 22 ft. for clearance and from 3 ft. 6 in. to 4 ft. 6 in. for floor depth. The difference of from 5 to 11 ft. in the amount of vertical separation of grade, required for complete elevation and complete depression, together with the increased width of roadbed required for track depression over that required for track elevation, in order to provide for drainage, makes the amount of excavation, in the case of track depression considerably more than the amount of fill required for track elevation. This is illustrated by the accompanying figure.

Other things being equal, material can be excavated as cheaply in a cut for track depression as in the borrow pit for track elevation; but usually the cost of dumping material for fill will exceed the cost of wasting material from the cut, due to the fact that material for fill is usually dumped from a trestle, and the cost of the trestle is chargeable to the fill. The additional cost of a trestle will go a long way toward balancing the cost of additional yardage required in the project of track depression.

It is sometimes the case that a project of grade crossing elimination is carried on to advantage in conjunction with some other project, such as the construction of freight yards, where considerable grading is necessary and material may be borrowed or wasted to good advantage and at small expense. Other items,

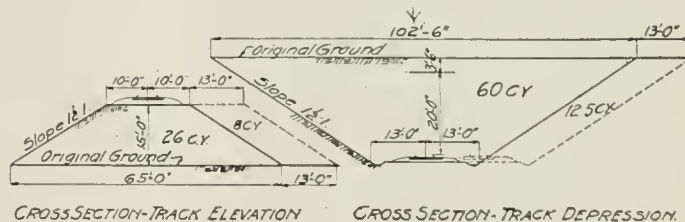


Fig. 1 Typical Sections for Track Elevation and Depression

such as the difference in the cost of bridges and walls, the number of tracks, and the cost of maintaining traffic, changes to sewers, the nature of the material to be excavated, the depth of depression and the amount of elevation may throw the balance either one way or another.

CLEARANCES

In recent years numerous state legislatures have passed various laws regarding vertical and side clearances.[†] In some cases the requirements of these laws are more rigid than the present standards. In most cases, however, there is a provision in such laws which allows this clearance to be reduced in special cases, if approved by the city or railroad commission. For track depression projects the overhead clearance generally adopted is between 18 ft. and 22 ft., but in some instances where passenger traffic alone is handled on the lines this is reduced to 16 ft., although this latter figure is somewhat scant if electrification is contemplated at some future date.

Where the tracks are elevated, the clearances of the bridges over the streets varies in different localities, the usual clearances being 12 ft. to 13 ft. for streets without street cars, and 13 ft. 6 in. to 14 ft. 6 in. for those with street cars. For proposed work there is little variation from the above clearances for bridges over streets, but there is a strong tendency, as indicated by recent legislation, to specify clearances under bridges over the

*Abstracted from a paper presented before the Western Society of Engineers, Chicago, June 4, 1915.

¹For a discussion of cleavage legislation see *Railway Age* Oct. 1, 1914, August 28, 1914.

tracks of 21 or 22 ft. wherever possible, although much smaller clearances have been used in the past.

BRIDGES†

Bridges for track elevation or track depression projects are in practically all instances of a permanent nature and are constructed either of structural steel or reinforced concrete; or a combination of both. A few of the roads are adopting concrete, wherever possible, to the exclusion of steel in structures of this class, as the first cost is the same or less than steel, the maintenance is less, and it can be treated aesthetically to better advantage where such treatment is warranted.

Bridges for track elevation can be divided into four types:

- Type A. Structures spanning the full width of the street with single spans.
- Type B. Structures spanning the full width of the street with two spans, supports being placed in the center of the street.
- Type C. Structures spanning the full width of the street with three spans, supports being placed at the curb lines.
- Type D. Structures spanning the full width of the street with four spans, supports being placed at the curb lines and at the center of roadway.

In practically all types it is desirable to: Keep the floor of the bridge as thin as possible; to avoid any projections above the top of rail, which might be a menace to safety, and to select a type of bridge which can be altered readily to provide for additional tracks.

Except in cases of narrow streets where comparatively short spans can be employed, bridges of types A, B and C have no alternative, except the use of steel girders, although they have been used to some extent by resorting to a combination of structural steel and reinforced concrete, but not to the exclusion of the deep side girders. These types, however, have the first qualification of thin floors, but cannot in all cases meet the second qualification of no projections above the top of rail, nor do they meet the third provision for taking care of additional tracks without considerable alteration and expense.

Bridges of types B and D have the objection that the roadway is obstructed by the supports in the center of the street, but, with the possible exception of structures spanning boulevards, there is no serious disadvantage in this, provided the roadway on each side of the center supports is of sufficient width to allow one vehicle to pass another going in the same direction. This objection would be even less for structures spanning streets with double street car tracks, although it requires the spreading of the car tracks. The car tracks themselves form a natural barrier in the center of the street, there being little occasion for traffic from one car track to the other, especially in the short distance occupied by the bridges.

Bridges of type D meet the three requirements of thin floors; no projections above the top of the rail and ease of alteration to provide for additional tracks. Due to the comparatively short spans, this type is well adapted to be constructed either of steel or concrete.

It has been recognized by practically all parties interested that tight floors are a necessity in bridges crossing city streets, not only to prevent grease, dirt and water from dropping through, but also to deaden the noise of trains passing at high speed across the bridges. There are numerous types which might be adopted, the various roads using the one with which they have had the greatest success, but in all probability floors as used in concrete bridges of type D will remain the cheapest.

Bridges for track depression projects may be divided in two main types:

- Type E. Bridges spanning the tracks with clear spans.
- Type F. Bridges spanning the tracks with two or more spans with intermediate supports.

In bridges for track depression it is also desirable to keep the floor of the bridges as thin as possible; avoid any obstructions between tracks, and to select a type of bridge which can be altered readily to provide for additional tracks.

Bridges of type E meet the first of these requirements, but in

most cases not as well as structures of type F. For streets with narrow roadways and short spans, not exceeding three tracks, the deck type structure of either concrete or steel can be adopted. For longer spans and wide roadways, however, the deck type must give way to the through type with girders projecting above the roadway, and reinforced concrete cannot be used to advantage; but a combination of structural steel and concrete may be used. For narrow roadways but two lines of girders need project above the roadway, one on either side at the curbs; but for wide roadways center girders are required. Structures of type E do not lend themselves well to the third requirement, that of additional tracks. Either additional tracks must be provided for when the structure is built, or considerable expense must be incurred to lengthen the bridge to provide for them later.

Bridges of type F meet the first requirement of thin floors and the third requirement of providing for additional tracks, but do not meet the second requirement of no obstructions between tracks. They are well adapted to the use of concrete.

RIGHT OF WAY AND RETAINING WALLS

In general, for the same number of tracks in each case, track depression will require a greater width of right of way than track elevation, even where the tracks occupy the full width of right of way and where retaining walls are resorted to. It has been shown that the amount of additional right of way required for track depression over that required for track elevation, if no retaining walls are used, depends on the amount of elevation and depression of the tracks.

In cases where the entire right of way is occupied by tracks retaining walls would be required for both track elevation and

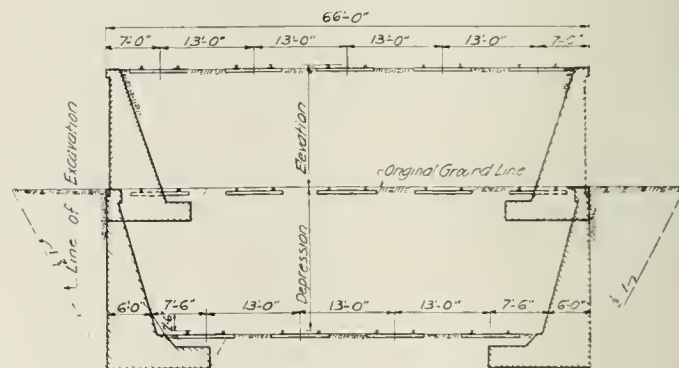


Fig. 2—Relative Track Capacities for Track Elevation and Depression

track depression. In such cases it is seen from the figure that it is necessary to acquire additional right of way to accommodate the same number of tracks in depression as in elevation, or else eliminate one track to allow room for the retaining walls, which must be built on railroad property. The loss due to the elimination of one track to the railroad company is impossible to determine. An order of any city or commission calling for track depression under such circumstances, in the face of the railroad's opposition, amounts to confiscation of railroad property without compensation and without due process of law, and it is doubtful if it would be upheld in the courts.

Both of these conditions are serious handicaps for track depression, for in the majority of cases the districts where grade separation is required are such as to make the acquisition of additional right of way almost out of the question on account of the value of adjacent property, so that the building of retaining walls is the only alternative.

There may, however, be instances where the tracks run through a strictly residence district, where land values would not be excessive, but this condition is the exception rather than the rule.

Any one of numerous types of retaining walls may be adopted on any project, economy being the prime factor in the selection. Much literature has been published regarding the economy of

†For an article on track elevation subways see *Railway Age Gazette*, March 6, 1914, page 459.

various types of walls, and this phase of the subject will not be discussed further than to state that for walls of the height required for track elevation and track depression a gravity wall will, under ordinary conditions, be cheaper than the reinforced concrete types

CHANGE IN GRADE OF STREETS

So far only complete elevation and complete depression of the tracks have been considered, which require very little change in the grades of the streets. The question immediately arises as to whether or not a partial elevation of the tracks with a partial depression of the street, or a partial depression of the tracks with a partial elevation of the streets, would not be the plan to adopt. It might be said here that on practically all projects for complete track elevation or depression the plans usually provide for at least a slight change in grade of the street, varying from 1 ft. to 3 ft., which change can readily be made without incurring excessive expense or property damage. It may also be said that to change the grade of the street entirely without changing the railroad track is unusual, except in the case of isolated crossings or in country districts.

To change the street grade any appreciable amount brings up questions of allowable grades on streets, economy, drainage and interference with sewers, gas and water mains, and property damages. Chicago has fixed by ordinance a maximum grade of 3 per cent. To adopt this grade, however, in all cities would be unquestionably in error, especially so in a hilly city, where existing street grades of from 6 to 8 per cent are not uncommon.

Although most cities try to limit the allowable grades to 3 per cent or 4 per cent, the following table gives some of the grades which have been used on work of this nature in various cities:

Location	Maximum Grade
Chicago	3½ per cent, usual 3 per cent
Buffalo	4 per cent
Joliet, Ill.	3½ per cent
Evanston	3½ per cent or 3 per cent
Milwaukee	4 per cent
Minneapolis	5 per cent, 4 per cent, usual 3 per cent
Cleveland	6 per cent, usual 4 per cent
Detroit	4 per cent, usual 3 per cent
Philadelphia	5½ per cent, usual 3 per cent
Indianapolis	4½ per cent, usual 3 per cent
Washington	9 per cent, 8 per cent, 6 per cent, usual 3 per cent, 4 per cent
Newton, Mass.	9 per cent, 8½ per cent, 7½ per cent, 6 per cent, usual 3 per cent and 5 per cent
Lynn, Mass.	3 per cent, 4 per cent, and 5 per cent
Brockton	9 per cent, 5 per cent

Where the street is to be carried over the tracks, the sidewalk and roadway must be elevated the same amount, but where the street is carried under the tracks the roadway is sometimes depressed 4 or 5 ft. further than the sidewalk at the deepest part. This has the disadvantage of high curbs, but where wagons would back up to property adjacent to right of way for loading or unloading it would be an advantage. It also has the additional advantage of producing a smaller actual damage to property, as very often the sidewalks can be left at the original level, though the streets may be depressed 4 or 5 ft.

At first glance it would be natural to say in most projects that the less the grade of the tracks is changed the less the project will cost. Streets, however, may occur with such frequency that the cost of excavating or filling streets, the cost of repaving streets and sidewalks, alterations to sewers and water pipes, and property damaged, will be equal to or greater than the cost of excavation or embankment for track elevation or depression.

Wherever streets are depressed adequate provision should be made for drainage. Catch basins with proper connections to sewers should be placed some distance outside the portals of the bridge so that in winter or spring time, when the thaw starts, they will not be in the shadow of the bridge and remain frozen. Similar provision and precaution to provide for drainage should be exercised in the cut in the case of track depression.

In cases where the streets or tracks are depressed to such an extent as to interfere with sewers, the problem is much more complicated. Either new sewers must be constructed at a lower level or else the sewage will have to be siphoned. Both of these

schemes entail considerable expense and are serious handicaps to track depression.

Interference with the water and gas mains is a less serious objection, the question of gradients there being a secondary consideration. Although it adds quite an item to construction cost, provision can be made to carry them across the bridge floor, or depress them under the cut.

The question of property damage is one for which it is impossible to lay down any set rule. In making allowance for this phase of the question, each problem will have to be handled separately, the damages estimated and an amount allowed which would be sufficient to put the property back into as good a condition or perhaps better condition than previously existed. It will be found, in many cases where damages are settled out of court, that considerable saving can be effected by buying the property damaged and selling it again after the work is completed.

APPORTIONMENT OF EXPENSE

The question of apportioning the expense incident to the separation of grades is of great importance, and with the exception of a few states, where legislation divides the expense on a percentage basis, the question is far from settled. There are a few cities where the railroads are required to pay the entire cost of grade separation. The unfairness of such order, however, needs little comment. There have been cases also where the expense has been borne by the municipality, the steam railroad, the street railway, and the various other public utilities, each doing the work and bearing the expense incurred by the changes to the property which it controls. Where this plan is followed there is controversy between the parties interested relative to procedure of the work, etc. It has in consequence not proved entirely satisfactory and is giving way to the more reasonable and logical method of considering the work as a unit and dividing the total cost of the project among the parties interested on a percentage basis agreed upon by the interested parties before work is started.

An examination of the different state laws and city ordinances enforcing grade separation shows that the apportionment of cost on a percentage basis has been followed in the majority of cases.†

ADVANTAGES AND DISADVANTAGES

Some of the benefits or advantages and disadvantages applying especially to either track elevation or track depression may be summarized as follows:

1. For track elevation, the work of construction can be carried on with little or no interference to traffic, either in the streets or on the railroad. It is, however, exceedingly difficult to depress the tracks without stopping traffic on both streets and railroads, or building a detour around the entire project. The question of time on construction is also an important factor. A track elevation project can be completed in considerably less time than it would take to depress the same number of tracks, because it is possible to carry on the work at many different points simultaneously.

2. A distinct advantage of track elevation is the ease with which the industrial situation can be handled. Industries having side track facilities can adapt themselves to take trackage from the elevated level by slight alterations to their buildings and doing their receiving and shipping from the second floor. For coal yards, trestles can be readily provided and are particularly advantageous. Also during construction elevation has the advantage that shipping facilities are disturbed very little, causing practically no interruption to business. Where tracks are depressed, there is usually not sufficient distance between bridges, nor between right of way lines to allow inclined tracks leading the cars from the depressed tracks to the former ground level to serve the industries, and it is therefore necessary for the in-

†For an account of grade separation laws and requirements see *Railway Age Gazette*, December 15, 1913, page 1118.

dustries to adjust themselves to take trackage from the lowered track level by altering buildings. Even if there were sufficient distance between bridges to allow inclined tracks, such an arrangement is objectionable, as it requires the right of way to be encumbered with massive walls which tend to restrict the development of the right of way and the industries. Much inconvenience and interruption to business must be contended with, while the tracks are being lowered and changes to buildings are being made.

The expense for making such changes, either in the case of elevation or depression, represents a considerable sum. The industries have claimed that the railways should bear the expense of changes to industries and industry tracks made necessary by the change in grade of the railway company's tracks. The railway companies do not concur in this and the practice has been for the industries to bear the expense, as the railway companies contend that the grade of the tracks are changed not on their initiative, or for their benefit, but by orders of the cities, or utilities commissions.

3. The annoyance from noise, smoke and gases will be less from track elevation than track depression. Little need be said to convince all that the smoke and gas nuisance will be less to those on the streets from tracks on a high level than from tracks on the lower level. The question of noise, however, is one on which there can be some difference of opinion.

From the foregoing considerations it may be said in a general way that track elevation is more satisfactory than track depression, both to the railroads and to the industries, and at the same time possesses many advantages to the city. With the possible exception of cases where the tracks pass through a high class residence district where the aesthetic is of such importance as to outweigh the other factors, track elevation would appear to be the best solution of the problem.

ACCIDENT CAUSED BY DEFECTIVE WHEELS

H. W. Belnap, chief of the division of safety of the Interstate Commerce Commission, has made a report on the Chicago, Milwaukee & St. Paul derailment which took place at Oakwood, Wis., on February 9, 1915, an abstract of which follows:

The accident to the freight train resulted in the derailment of 29 cars, 11 of which, together with the station building, were destroyed by fire. The train involved in the accident was a west-bound freight train consisting of 75 cars and a caboose, and was derailed at the frog of the house-track switch near the station at Oakwood, while moving at a speed estimated to have been about 25 miles an hour.

Examination of the track showed that the first indication of anything wrong was at a point about one mile east of Oakwood, where an oil box, brass, packing waste, etc., were found on the east side of the track. About 370 ft. west of this point the rear truck under Missouri, Kansas & Texas box car 60628, the tenth car in the train, left the rails and ran along on the ties until the frog at the house track was reached, where the other 28 cars were derailed. The oil box, etc., were found to have come from the rear truck of the box car, the partial destruction of the truck at this point evidently having been due to the defective condition of the wheels under the truck. Three of the four wheels were defective, the left forward wheel being the only one intact. The others had flat spots, broken flanges, etc.

Investigation developed that this car was received from the Belt Railway at Chicago in a transfer train at 5:35 p. m. on February 8. Before the train was broken up and switched around all the cars in the train were inspected and, although wheel defects were found in other cars, none was found under car 60628. Although this car was again inspected by two car inspectors, one safety-appliance man, and two oilers before being sent out, no defects were discovered.

Engineman Christoph stated that as his train was approaching Oakwood he looked back and noticed fire flying from under the train, and at once made an application of the air brakes, at about

which time the derailment occurred. Previous to this he did not notice anything wrong. At Wadsworth, a station 30 miles east of Oakwood, the train was inspected by the brakemen, but nothing wrong was discovered at that time.

This accident was caused by the defective condition of wheels in the rear truck of M. K. & T. box car 60628. This defective condition resulted in the partial destruction of the truck and its subsequent derailment.

The examination to determine the reason for the failure of the wheels under the car was conducted by James E. Howard, engineer physicist, tests being made in conjunction with representatives of the Chicago, Milwaukee & St. Paul at the shops of that company in Milwaukee, Wis.

SUMMARY

The examination of the wheels in the truck which was under M. K. & T. box car 60628 clearly fixed the immediate responsibility for this derailment on the worn treads of two of the wheels. These flat spots were not "slid flat" places, but were grooves 11 in. long each, worn in the treads, and having depths of three-eighths and five-sixteenths of an inch, respectively. The grooves were wider than the head of a 100-lb. rail. The axles drifted to the right, in the direction of these wheels, which showed worn flanges, approaching vertical faces.

The examination also revealed the fact that these wheels had less depth of chill than customary in wheels of this type, and at the worn spots the chilled metal was entirely absent.

The lack of rotundity of the wheels was such that excessive wobbling of the journals occurred at every rotation, bringing undue strains on the truck frame. At usual speeds these oscillations took place several times a second, and they are believed to have been the cause of the injury to the truck and the immediate forerunner of the derailment.

Furthermore, the mated wheels were of different sizes. Those on the right-hand ends of the axles were three and four "tape sizes" smaller, respectively, than the left-hand wheels. These differences would tend to cause the truck to run in an oblique position, not square with the track, and also be the equivalent of a certain amount of braking power set against the train.

A conspicuous feature associated with conditions of these wheels is the fact that the inspections which had been made from time to time failed to detect the presence of the flat spots. These defects in the treads were undoubtedly of long standing, and the car must have passed quite a number of inspections since the wheels had become unserviceable. These defects were of such a nature that they should have been discovered by ordinary inspection.

In a previous report covering the investigation of a derailment of a passenger train, due to a broken wheel, attention was called to the alarming frequency of accidents due to broken wheels, and statistics covering a five-year period were published, showing that during that period the derailments attributable to defective wheels were approximately 31 per cent of the total number of derailments charged to defective equipment. In the commission's Accident Bulletin No. 52 there is published a summary of derailments due to defects of equipment on steam railways for 13 years ending June 30, 1914. This summary shows that of 37,456 derailments due to equipment defects 12,882, or more than 34 per cent of the whole, were caused by defective wheels. The property loss suffered by the railroads on account of these 37,456 derailments was \$30,138,241, of which sum \$12,506,766, or about 41.5 per cent of the whole, was attributed to derailments caused by defective wheels.

These figures indicate that defective wheels constitute one of the most prominent causes of derailments. In the interest of safety, as well as of economy, steps should be taken by the railroads to insure that sound wheels will be obtained from the manufacturers in the first instance; and methods of inspection should be adopted to prevent the placing in service of defective wheels and insure that wheels which have become defective through service shall be removed in ample time to provide for the safe operation of trains.

"A Right of the States" Which is Often Overlooked*

Constitutional Duty of Federal Government to Protect From Harmful Regulation of Commerce by Sister States

BY ALFRED P. THOM,

General Counsel of the Southern Railway

One hundred and twenty-six years ago the United States became a nation. On the 4th of March, 1789, they joined in putting into effect the Constitution which formed them into "a more perfect union" and organized them to take their place as a unit among the nations of the earth.

Only recently they had been separate and distinct colonies of Great Britain, legally foreign to each other, and were bound together by no ties except a sense, common to them all, of oppression and discontent and a common aspiration and purpose of liberty. They combined to declare and to fight for their independence, and to assert that, as free and individual states, they had "full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent states may of right do."

During the succeeding epoch-making struggle, they sought to bind themselves together by something more enduring than the sympathies and exigencies of the existing war, and, to this end, adopted as their bond of union the Articles of Confederation.

The Articles of Confederation were soon found to be utterly inadequate to a national existence. A government without a purse, and hence without power to provide for the common defense, or to insure domestic tranquillity, was a mere "rope of sand" and could not long endure.

But there was another cause for dissatisfaction, which was hardly of less importance than a provision for the common defense and for the preservation of the national existence. The needs of trade were becoming more and more apparent and its just regulation the subject of greater and more universal public concern.

When the war ended and independence was an accomplished fact, each state possessed a sovereignty which was practically unlimited over its foreign commerce and over its commerce with the other states. Between many of them there was a race of greed and selfishness for commercial advantage and supremacy.

It will be noted that each state possessed the power of imposing export taxes and could thus keep its products at home, excluding them from the use and enjoyment of the people of the other states; that each state possessed the power of imposing import duties and thus could exclude people of the other states from its markets; and that each state retained complete control over its own ports, and thus, by its commercial policy, could, through the competition of ports, regulate or break down the commercial policy of another state in regard to its own ports and in regard to its own commerce.

EARLY ABUSES OF REGULATION

Nor were these powers merely theoretical. They were brought into active and oppressive operation. They were made the means of commercial war by one state upon another.

For example:

Virginia, by her export duties and inspection laws, with the incidental tax, sought to keep her tobacco at home.

Maryland, by her inspection laws and taxes, sought to do the same with regard to her potash and pearlash.

Massachusetts prohibited the exportation of grain or unmanufactured calfskins and imposed an onerous inspection tax on exports to other states of tobacco, butter, and other products, while North Carolina laid, for a limited time an embargo on the exportation to other states of corn, wheat flour, beef, bacon, and other necessities of life.

Turning to imports:

New York, by imposing an import duty, sought to exclude from its markets the butter, milk, and other dairy products of New Jersey and the firewood of Connecticut.

Rhode Island imposed an ad valorem tax of five per cent on all articles imported into that state from the other states as well as from foreign countries, with a proviso for reciprocal relief. And so with other states.

In regard to the commercial rivalry and war of ports, it was customary for states having available ports to impose an unlimited tax on all goods reaching this continent through their ports, and thus subjecting, for the benefit of themselves, the people of the other states to a substantial burden of taxation.

For example, the ports of Boston and New York were at one time far behind Newport in the value of their imports, and Rhode Island, according to the Supreme Court of the United States, paid all the expenses of her government by duties on goods landed at her principal ports.

The condition at that time of commercial selfishness and greed between the states is thus described by Fiske in his work on the "Critical Period of American History, 1783-1789," at page 144:

"Meanwhile, the different states, with their different tariff and tonnage acts, began to make commercial war upon one another. No sooner had the other three New England states virtually closed their ports to British shipping than Connecticut threw hers wide open, an act which she followed by laying duties upon imports from Massachusetts.

"Pennsylvania discriminated against Delaware; and New Jersey, pillaged at once by both her greater neighbors, was compared to a cask tapped at both ends. The conduct of New York became especially selfish and blameworthy. . . . The feeling of local patriotism waxed strong, and in no one was it more completely manifested than in George Clinton, the revolutionary general, whom the people elected governor for nine successive terms. . . . It was his first article of faith that New York must be the greatest state in the union. But his conceptions of statesmanship were extremely narrow. In his mind, the welfare of New York meant the pulling down and thrusting aside of all her neighbors and rivals. . . . Under his guidance, the history of New York, during the five years following the peace of 1783, was a shameful story of greedy monopoly and sectional hate. Of all the thirteen states none behaved worse except Rhode Island.

"A single instance, which occurred early in 1787, may serve as an illustration. The city of New York, with its population of thirty thousand souls, had long been supplied with firewood from Connecticut, and with butter and cheese, chickens and garden vegetables from the thrifty farms of New Jersey. This trade, it was observed, carried thousands of dollars out of the city and into the pockets of detested Yankees and despised Jerseymen. It was ruinous to domestic industry, said the men of New York. It must be stopped by those effective remedies of the Sangrado school of economic doctors, a navigation act and a protective tariff.

"Acts were accordingly passed obliging every Yankee sloop which came down through Hell Gate, and every Jersey market boat which was rowed across from Mulus Hook to Cortlandt street, to pay entrance fees and obtain clearances at the custom house, just as was done by ships from London or Hamburg; and not a cartload of Connecticut firewood could be delivered at the back door of a country house in Beckman street until it should have paid a heavy duty. Great and just was the wrath of the farmers and lumbermen. The New Jersey legislature made up its mind to retaliate. . . . Connecticut was equally prompt. At a great meeting of business men, held at New London, it was unanimously agreed to suspend all commercial intercourse with New York. Every merchant signed an agreement, under penalty of two hundred and fifty dollars for the first offense, not to send any goods whatever into the hated state for a period of twelve months. By such retaliatory measures, it was hoped that New York might be compelled to rescind her odious enactment. But such meetings and such resolves bore an ominous likeness to the meetings and resolves which in the years before 1775 had heralded a state of war, and but for the good work done by the Federal convention another two years would scarcely have elapsed before shots would have been fired and seeds of perennial hatred sown on the shores that looked toward Manhattan Island."

But these discriminations and exactions of one state as against

*Abstract of an address delivered before the State Bar Association of Tennessee at Chattanooga on June 25.

the trade of another, this fierce commercial rivalry, this internecine warfare which threatened the commercial destruction of some states and the undue elevation, prosperity and dominance of others, were not the only reasons for the insistent demand, which preceded and finally controlled the Constitutional Convention of 1787, in regard to the establishment of a system of just and equitable regulation of commerce between the states by an authority fairly representing them all.

The question of commercial regulation, in addition to its commercial relation to the trade between the existing states, possessed also a most important and commanding political aspect. The development of the great west was then going on and had been stimulated by the emigration thither from the older states incident to the readjustments after the war, and the settlement of the whole western region was proceeding with great rapidity. The west was spoken of by George Washington as a "rising world," and signified particularly, in the minds of the statesmen of that day, the territory now constituting the states of Tennessee and Kentucky and the states afterwards carved out of the territory northwest of the Ohio and east of the Mississippi rivers. The question of the future political affiliations of this large and important territory was a question of prime and of vast importance to the then existing states.

Great Britain or Spain, close neighbors on the north and south, could easily outbid such a policy of narrowness and greed as the people of the west saw already in operation in many of the most important eastern states, and it was apparent that, whether or not such a policy should be adopted, could not be safely left to the individual states.

George Washington, in speaking of the future political affiliations of these pioneer western people, said:

"If we cannot bind these people to us by interest, and it is not otherwise to be effected but by a commercial knot, we shall be no more to them after a while than Great Britain or Spain, and they may be as closely linked with one of those powers as we wish them to be with us, and, in that event, they may be a severe thorn in our side."

It thus became politically, as well as economically, necessary to find a way of fairly regulating commerce in the interest of all, free from the narrowness, the greed and the selfishness of particular states.

FEDERAL GOVERNMENT ESTABLISHED LARGELY TO STOP SUCH ABUSES

The only way of remedying these commercial evils, which were flagrant and were universally recognized, and of meeting the political exigencies of the situation, was, according to the practically universal belief of the day, to exclude the states from the power to regulate commerce among the states and with foreign nations, and to confer that power upon a central authority which should fairly and equitably represent them all.

The public consciousness on this subject was, prior to the convention, indicated in a great variety of ways and from a great variety of sources.

Alexander Hamilton declared for a central government with "complete sovereignty over all that relates to war, peace, trade, and finance."

James Monroe, as chairman of a committee of Congress, in 1785 submitted a report declaring that:

"The United States in Congress assembled shall have the sole and exclusive right and power of determining on peace and war, except in the cases mentioned in the sixth article, . . . and of regulating the trade of the states, as well with foreign nations as with each other," . . .

James Madison moved in the General Assembly of Virginia a resolution for a convention of delegates of all the states "to take into consideration the trade of the United States; to examine the relative situation and trade of the said states; to consider how far a uniform system in their commercial regulations be necessary to their common interest and permanent harmony," etc.

There were similar expressions of view in the legislatures of Rhode Island, of Connecticut, of New Jersey, in resolutions of town meetings and in reports of committees of Congress.

The Madison resolution resulted in the assembling of the Annapolis Convention in 1786 and in a recommendation, by the

delegates there assembled to consider the regulation of commerce, that Congress should call a general convention of all the states to meet in Philadelphia on the second Monday in May, 1787, "to devise such further provisions as shall appear to be necessary to render the constitution of the federal government adequate to the exigencies of the union."

This was the convention which framed the Constitution, and the declaration of the Supreme Court of the United States in the case of *Cook vs. Pennsylvania*, 97 United States, 574, is amply justified, to the effect that:

"A careful reader of the history of the times which immediately preceded the assembling of the convention which framed the American constitution cannot fail to discover that the need of some equitable and just regulation of commerce was among the most influential causes which led to its meeting."

The result of its deliberations on the four large subjects of national concern enumerated by Alexander Hamilton—which are the four fundamental essentials of national existence and efficiency—and as to which Hamilton declared that the federal government should possess complete sovereignty, namely, the purse, war, peace, and commerce, is exhibited in the following clauses of the Constitution:

"The Congress shall have power:

"To lay and collect taxes, duties, imports and excises, to pay debts and provide for the common defense and general welfare. . . .

"To borrow money on the credit of the United States.

"To regulate commerce with foreign nations and among the several states, and with the Indian tribes.

"To declare war. . . .

"To raise and support armies.

"To provide and maintain a navy."

The fullness, the competency and the completeness of no one of these powers has ever been questioned, except of the power to regulate commerce. It is universally recognized that it is a right of each state that the federal government shall provide for the common defense; that the federal government shall determine as between peace and war; that it shall raise and support armies and shall equip and maintain a navy.

But there are other rights of the states not less important and not less sacred. These include the right to avail themselves, separately and individually, of the protection guaranteed to them and to their people by the Federal Constitution against the selfishness in trade of their sister states.

In adopting the commerce clause of the Constitution they intended to secure protection against this very thing. In the light of the history of its adoption, is it not, since the Constitution, a right of New Jersey that New York shall not regulate the trade between them as it did when it excluded the products of New Jersey industry from the New York markets; is it not a right of the state of Connecticut, since the Constitution, that its products shall not be excluded from the markets of New York and Boston by state action, and is it not since the Constitution, a right of each of the states that Virginia and North Carolina and Tennessee and the great food-producing states of the west shall not be able, as Virginia and North Carolina once did, to put an embargo upon the shipments of their products beyond their respective borders, and shall not be able to exclude the people of the other states from the riches of their farms, of their forests, of their mines, and of their factories? Is it not a right of each state that Congress alone, which represents all, shall be the exclusive arbiter of what is right and just in interstate and foreign trade, and that no state shall be permitted to advance itself at the expense, and to the disadvantage of the others, perchance by its narrowness, its greed, and its selfishness in trade?

INTELLIGENT INTERSTATE REGULATION NOW OF SUPREME IMPORTANCE

The existence of this exclusive power in Congress to regulate interstate and foreign commerce is of no less importance—is in fact of far larger importance—as a state's right now, than it was when the Constitution was adopted.

Commerce itself in these one hundred and twenty-six years has assumed a far greater consequence in the affairs and destinies of men and of nations, than it had in those early days. Steam

and electricity have come with their mighty revolutionizing influence and have brought all the states and all the nations into close and intimate commercial relationships. Men no longer deal in trade most largely with their immediate neighbors, but find it essential to their success to have free and unimpeded and adequate access to the markets of the world.

The interests of the producing states—particularly the states of the south and west where there are no markets of the first importance—imperatively require easy and quick transportation to the world's great market cities, such as New York, Philadelphia, Boston, and Chicago in this country, and Liverpool, London, Paris, and Berlin abroad.

It may be safely stated that at least eighty-five per cent of the trade of Tennessee, and of the United States generally, moves in interstate and foreign commerce.

To meet these economic conditions—to satisfy the essential needs and to accommodate the movement of this great traffic—it has become necessary to create long and continuous lines of railroad in the place of the short and disconnected lines which were once adequate to the requirements of trade. These large systems of railroad, which have come in obedience to the economic law which demands continuous, rapid, and unbroken transportation, necessarily extend across, and are, under existing law, in many respects subject to the varying policies of many states.

The problem of greatest magnitude which concerns the country in regard to them, is how their continuity of service shall be preserved unimpeded and what shall be the quality of adequacy and efficiency which their transportation facilities shall possess.

A broad and wise policy in dealing with the instrumentalities of commerce is, therefore, a matter of supreme interest to all the states. A narrow, or niggardly, or selfish policy, if adopted by any one of the states through which a railroad passes, may seriously cripple and depress the commerce of every other state which the railroad serves.

No adequate conception of the railroad problem, as it affects the development of the country and the growth of its commerce, can ignore the necessity that transportation facilities must be all the time growing and improving to keep pace with the growth and expansion of commerce—otherwise there will be no growth or expansion of commerce.

Such an increase in railroad facilities involves the constant input of new capital, for no railroad is ever finished except in a dead country. It is a mere platitude to say that new capital can only be attracted by credit. While no one state through which a railroad passes can alone establish its credit, a single state can impair or destroy it.

If a railroad runs through and serves eleven states, ten of them may be guided by broad and liberal views and may be controlled by the policy of encouraging the establishment and maintenance of adequate transportation facilities. The eleventh may, however, have no adequate commercial outlook or may be temporarily under the domination of small and time-serving politicians. It may reduce rates on state traffic so as to barely escape the line of confiscation. It may be unwilling that its state traffic shall contribute anything to the liberal program, favored by the other ten, which would build for the future and insure the present and continuing adequacy of the transportation facilities on which all are equally dependent.

In such a case, what shall be done? Shall the ten states bow to the will or caprice of the one and allow it to control?

If, on the other hand, the standard of facilities is not brought down to this low level and is to be made adequate to the needs of all, then the commerce of the other ten states, or interstate commerce, or both, must bear the burden, which the dissenting state has refused to share, of building up adequate transportation facilities.

HARMFUL FEATURES OF STATE REGULATION

In either case, the dissenting state, in a very effective way, regulates the commerce and the business opportunities of all.

Moreover, in the Shreveport case, recently decided by the

Supreme Court of the United States, and in another state which I shall not more particularly identify, state rates have been greatly reduced for the avowed purpose of preserving state markets for state trade, and thus excluding and discriminating against the trade of other states.

Is it not a right of each of these states, thus oppressed by the narrow and selfish policy of one, to have its commerce freed from these state restrictions and regulated by Congress, representing all the states, in accordance with the compact of the Constitution?

I have referred to the great importance to the welfare of all the states of transportation facilities. In this connection, and as exerting an important influence on the financial capacity of the carriers, it is appropriate to consider their capacity to issue and to dispose of their securities.

It is manifest that, if such issue is to be regulated by the individual states, every state is at the mercy of the others. A bond, to be available in the market, must, as a rule—especially now when most bonds are necessarily junior liens—be secured upon the whole railroad line; and this crosses many states. One of the states, therefore, if it possesses the power to regulate the issue of securities of an interstate carrier, may disappoint and defeat a financial plan approved by all the other states and necessary to the carrier's transportation efficiency.

Even if the state does not press its authority to the extent of absolutely declining to sanction the issue, it may selfishly and as a political expedient, attach a condition that a designated portion of the proceeds shall be spent within its borders where it may not in fact be needed, when the needs of interstate commerce and the commerce of other states fairly require that the whole shall be expended elsewhere.

The power of the state to consent, or to withhold its consent, is equivalent to a power to control the character and the location of additional transportation facilities against the views and the interests of all the other states.

But even if the necessity for the new capital is universally recognized, and the approval of the states is not ultimately withheld, the time necessary to permit the investigation and to secure the approval of so many would, or might, constitute a fatal obstacle in the way of a successful financial operation. Promptness—ability to avail without unreasonable delay of a favorable market—is essential to success in placing large financial offerings.

From whatever standpoint, therefore, it be considered, the destructive effect of a power in the several states to determine and limit the financial capacity of the carriers, through a regulation of the issue of their securities, is apparent. It is manifest that the financial capacity of a carrier which serves many states is a matter of transcendent importance to them all. No one of them should be allowed to control or to injuriously affect it. It is a right of each of the states that a matter so important, and in which all of them have so vital an interest, shall not be controlled by one which may have a selfish interest or an illiberal policy.

It is a right of the states, in respect of this matter of common and supreme concern, that an authority, which is the authority of all, whose power is delegated by all, which represents all and which acts for all, shall alone be the arbiter of what may be conflicting views and interests, and shall alone regulate and control.

And yet sixteen states have enacted statutes, each asserting for itself the individual right to control the issue of stocks and bonds of interstate carriers. And the end is not yet, for many other states are considering legislation which will give to them a power which they see is already being exercised by others.

Another striking illustration of the exercise by one state of a power to discriminate against and to injure the commerce of other states and interstate commerce is found in the state laws which impose heavy penalties for failure to furnish cars or other instrumentalities of commerce within a limited time.

One of the states now imposes a fine of \$5 for each day of delay; an adjoining state fixes the fine at \$1 per day; and the

interstate commerce law fixes no per diem penalty at all. A case may well be imagined where a carrier is reasonably supplied with equipment, but a large portion of it has moved in the regular channels of commerce to a point on or off its line and distant from the place where the demand for it is made. If, under these circumstances, there is a demand for a car by a shipper of intrastate traffic in the state which imposes a heavy fine for delay, and is also made by a shipper in the state which imposes a light fine and is also made by a shipper in interstate commerce as to which no fine at all is imposed, and there is at the moment, by reason of special circumstances, only one car available to meet all three of these demands, it, of course, results that the carrier in self-protection must deliver the one available car to the shipper in the state which imposes the largest fine, and the other must go without. In other words, the greediest, the most selfish and the most unreasonable state thus secures by its own laws a preference for its own commerce over the commerce of its sister states and over interstate commerce itself.

It is not a right of the other states to have the question of a fair distribution of available car supply determined, not by one of the interested states, but by the authority which represents them all and can see that a rule of equity and fairness shall prevail?

In addition to what has been said, a long and formidable list of state statutes, already in effect, might be given, which, without the consent of the other states, impose serious burdens of expense upon their commerce, and thus upon their people. All discriminate or have the effect of discriminating, against their commerce, both state and interstate.

Thus, three states have passed laws making it illegal for a carrier having repair shops in the state to send any of its equipment, which it is possible to repair there, out of the state for repairs in another state; fifteen states have attempted to secure preferred treatment of their state traffic, either by heavy penalties for delays or by prescribing a minimum movement of freight cars, some of them requiring a minimum movement of 50 miles per day, whereas the average movement for the United States is not over 26 miles per day—one of these states imposing a fine of \$10 per hour for the forbidden delay; 20 states have hours-of-service laws, varying from 10 to 16 hours; 20 states have full-crew laws; 28 states have headlight laws, with varying requirements as to the character of the lights, and 14 states have safety-appliance acts.

Let me take an illustration from a single class of these statutes. I will select the full-crew laws of New Jersey and Pennsylvania.

These laws impose upon the railroads operating within their respective limits an expense for unnecessary employees amounting to more than \$1,700,000 a year. There is nothing in these state laws putting the burden of this expense on their own traffic alone. That burden extends to all the traffic these railroads carry, and thus the traffic of Virginia and Tennessee and Mississippi and of all the American states whose traffic enters New Jersey or Pennsylvania is laid under tribute by these state enactments.

Or, the proposition may be stated another way. The expense put upon the railroads by the full-crew statutes of these two states would pay the interest at 5 per cent upon a capital fund of more than \$34,000,000. By requiring an amount equivalent to the interest on this capital to be expended on useless employees—at least on employees as to which the other states were not consulted—instead of being used to obtain new capital, these two states have by their own independent action reduced the borrowing capacity of the railroads to the extent of \$34,000,000. That amount of capital would have bought 1,360 locomotives, or 3,400 steel passenger cars, or 34,000 freight cars, or 1,133,000 tons of steel rails, or would have block-signalized 13,600 miles of road.

Thus, facilities immensely valuable to the traffic of the other states have been made impossible—not by their own action, but by the independent action of New Jersey and Pennsylvania.

STATE REGULATION WHICH VIOLATES "A RIGHT OF THE STATES"

It is apparent that these and similar statutes which impose burdens and create discriminations violate the principle of just

and equal treatment as against the states which have a more liberal policy, and constitute serious invasions of the field of regulation by the states which adopt them to the substantial prejudice of those which have not sought to obtain special or preferential treatment.

Again, it may be asked, is it not a right of the states that no one state shall possess the power of imposing a burden which the people of other states must help to bear, or of securing a preference for its own traffic over the traffic of the others?

In order to secure equality of burden and of privilege and the benefit of an adequate and efficient transportation system, the power to regulate commerce among the states and with foreign nations was, by their own action, withdrawn from the individual states and conferred upon Congress, which represents them all.

In fact, it may be truly said that the Constitution itself was the offspring of the insistent demand of the states for protection in trade against the other states. It is, therefore, peculiarly a right of the states to have this purpose fully and fairly carried into effect.

It seems not unprofitable to turn from the problem of commercial regulation, considered only as a problem of peace, to the lessons we must learn in regard to it from the great events now occurring on the continent of Europe.

We had fondly dreamed that the possibility of great wars had disappeared in the purer light of civilization, and that the barbaric and savage instinct of nations had been obliterated by the advance of moral and intellectual principles among mankind.

This dream has been rudely dissipated and the world has been made to realize that, when it comes to war, there has been no advance in humanity or morality since the Goths and Huns and Vandals fought and slew and pillaged fourteen centuries ago. The only difference is a difference in slaying power and in efficiency. The world has marveled to see a nation, with comparatively small territorial possessions, rise in arms against the strongest nations of the earth and defy them all with its organized energy and power.

Whatever may be the ultimate result of this titanic struggle, the lesson of national efficiency has been taught and will never be forgotten. We have had it borne in upon us that the most militant and most efficient nation of Europe has outgrown its territorial limits and is looking for other lands to colonize, into which it will introduce its own national ideals, its own national efficiency and its own militant and aggressive spirit.

If it should happen that her policies embrace the acquisition and colonization of certain parts of South America, our Monroe Doctrine would stand in the path of her ambition. Whatever course we may then pursue—whether we limit the application of this doctrine to North America or undertake to enforce it as to the entire Western Hemisphere—we shall be confronted by greatly increased international complications and will need both national power and national efficiency to deal with the conditions which will be certain to arise.

THE SUPREME NEED OF EFFICIENCY

Steam and Electricity and Science have done their work and have made great nations essential to meet these mighty forces.

Wisdom requires us to recognize the change which these mighty forces and these mighty events have wrought. We cannot step backward and disintegrate ourselves into separate states. We must be efficient as a nation if we are to deal successfully with our national emergencies.

We must realize that the agitation must cease for a divided sovereignty in respect of functions which are in essence national. We must appreciate that efficient transportation is an essential condition of national efficiency, and if we are to halt or weaken our transportation systems at state lines, by permitting the imposition of burdens or the exercise of hurtful, inharmonious or unwise regulation, we will make national efficiency impossible.

Is it wise for us to subject a matter of such universal concern and of such national importance to the uncertain policies and partial and inadequate outlook of a single state? The Constitution confides it to Congress, which represents the general

welfare and common interests of all the states. The evolution of forces, the progress of events, and the growth of nations emphasize the wisdom and necessity of reposing the power of commercial regulation, which so essentially involves the national interest and the national efficiency, in the hands of the authority which is alone responsible to all the people for the performance of national duties and the preservation of our national liberty.

If it was to the interest of the individual states to have a single and impartial regulation of interstate commerce and its instrumentalities when the question was the free introduction into New York of the firewood of Connecticut and the dairy products of New Jersey, it is far more so now in view of the influential relationship which transportation has come to bear to our national efficiency and to the liberties and destinies of our people.

It must also be realized that the regulation of interstate commerce and its instrumentalities is no violation of the rights of the states, is no invasion of their prerogatives, is in no sense in derogation of their reserved sovereignty, but in reality is merely the specific performance of the contract which each state bargained for when it subscribed to the Constitution. It is their covenanted right, and the covenanted right of each of them, as well as their highest interest, that the commerce in which one in common with another state is interested shall be regulated by the fair and impartial judgment of the authority which alone springs from and is responsible to them all.

DERAILMENT ON THE NORTH EASTERN

The British Board of Trade has issued a report, by Lieut. Col. P. G. von Donop, on a derailment at Chaloner Whin, on the North Eastern Railway, two miles south of York, on the night of March 18, about 10 o'clock. No person was killed or injured, but the inspector reports the case in great detail because of the general interest in its causes. The signalman, in disregard of a clearing-house rule, gave authority for the train to leave the last station north of him before he had set up the route over which it was to pass; and when he came to set the switches, including a movable-point frog, he was unable to do so, because of snow. He at once sent two trackmen to clear out the snow; and while he was watching these men at the work the train came on, at high speed, having passed a distant and a home signal set against it. The engineman and fireman say that the distant signal was off, but the inspector finds that this testimony cannot be accepted.

To the claim of the company that the rule forbidding switches to be moved after a train has left the last preceding block station cannot be enforced regularly, the inspector replies that, perhaps, with freight trains this is to be admitted; but with passenger trains, at all events, such difficulties should not arise; the rule should be enforced.

This signal cabin has a torpedo placer, provided for emergencies; but in this case the signalman, watching the men at work on the tracks, did not see the train until it was close to his cabin, and it was then too late to make use of the torpedoes. Moreover the obstruction was only a few yards beyond the cabin.

Continuing, Colonel von Donop says:

"This case is another instance of an accident mainly due to the fact of a driver not noticing that his distant signal was at danger. This is a matter to which the North Eastern Railway Company has, for some years past, been devoting attention; trials have been made by them of different devices for giving the driver an indication on the engine as to the position of the distant signal when he passes it, and over certain portions of the system devices are fixed which are in operation with North Eastern engines. None of them were, however, installed at Chaloner Whin, and even had one of them been installed there it would not have acted in this instance, as the engine, which belonged to the Midland Railway, would not have been equipped with the necessary apparatus. No such device has, however, as yet been decided on for general adoption on the company's system, and they inform me that at the present time the matter is practically at a standstill,

as far as their system is concerned; the reason of this is that they consider that it is essential that whatever system is decided on should be universally adopted by all railway companies, and they are therefore waiting until railway companies can agree upon a method suitable for universal adoption. It is understood that a committee has been appointed by the railway companies to consider this matter, and it is hoped that a decision may before long be arrived at."

Engines of six different roads run past Chaloner Whin every day, namely, the North Eastern, the Great Northern, the London & North Western, the Midland, the Great Eastern and the Great Central. These companies own in the aggregate about 14,000 locomotives. There are numerous union stations and junctions, both in England and in Scotland, where conditions much like this prevail.

A SIMPLE METHOD OF CHECKING L. C. L. FREIGHT

A very complete and simple system of securing two independent checks of outbound l. c. l. freight is in force at the new local freight terminal of the Minneapolis, St. Paul & Sault Ste. Marie at Chicago (described in the *Railway Age Gazette* of August 22, 1913). This system was installed when the terminal was opened about a year ago and has been in continuous use since that time with very satisfactory results.

As soon as the general plans for the new terminal were decided upon the local agent and his staff began the study of the methods under which it should be operated. The locations of the cars set at the house were first fixed, placing them so that trains might be made up in station order by doubling from one track to another and eliminating all switching. It is interesting to note a recent performance in this connection whereby without any attempt to make a record one of the regular merchandise trains was made up and passed the Soo Line outer yard, 19 miles out of the terminal 2 hr. and 5 min. after the house was

			Mdse.Car	Refr.Car	Load	
	Abbotsford	Wis	Soo	54	108	W&S
X	Ackerville	"	"	85	48	D
	Adams Center	"	"	84	68	D
	Addison	"	"	85	48	D
X	Agnew	"	"	34	108	M&S
	Agenda	"	"	34	108	W&S
	Albertville	"	"	92	88	M&S
	Alden	"	"	92	88	M&W
	Algoma	"	GB&W	104	68	D
	Allen	"	F&NE	44	68	D
	Allenton	"	Soo	85	48	D
	Allouez	"	C N	111	78	D
	"	"	N P	63	68	D
	"	"	DSS&A	73	68	D
	Alloa	"	Soo	84	68	D
	Alma Center	"	GB&W	104	68	D
	Almenda	"	Soo	53	98	M&P
	Alois	"	"	75	48	D
	Alpha	"	N P	121	78	D
	Alstad	"	"	121	78	D
	Altendorf	"	Soo	54	68	D
X	Altamont	"	DSS&A	73	68	D
X	Alverno	"	Soo	124	68	D
X	Ambridge	"	"	123	68	D
X Prepaid stations			M&S	Monday and Saturday		
D Daily			W&S	Wednesday and Saturday		

Fig. 1—Sample Page from Receiving Clerk's Book

closed. In fixing the location of the cars, those normally loaded heavy were placed next to the house, and cars loaded more lightly on tracks further removed, the refrigerator cars being placed on the outside tracks. In this way trucking through the cars was reduced to the minimum. Permanent numbers were assigned to these locations, eight numbers being allotted to each door or run, as for instance, 81 to 88.

Having determined on the car locations a complete list of all stations for which freight can be received at this terminal was very carefully prepared from the tariffs. This list was made alphabetically and was grouped by states and provinces a con-

siderable amount of freight being received here for points in western Canada. Where alternate routes exist, as for instance to Alibeu in Fig. 1, these are given separately. Opposite each station is placed the road over which freight should be forwarded and the number of the location of the car at the house in which it should be loaded with a symbol indicating the days on which refrigerator cars are loaded for those points.

A copy of this complete list is given to the receiving clerk at each receiving door. As freight is received the caller calls the destination to the receiving clerk, who secures the car location from the book and marks the number of the run on the

daily, all of which have passed the receiving clerks and would otherwise be loaded in the wrong car. While all of the stowers are foreigners with only a very meager knowledge of English, it is surprising to see the care with which they detect errors. All mistakes caught by them are investigated by the foreman. If the number chalked on the box is incorrect, while the shipping bill shows the correct run, the error arose from the caller writing it down incorrectly, while if the run number on both the bill and the freight is wrong, the fault evidently lies with the receiving clerk who called it. Likewise, all "overs" found on the line caused by wrong loading are reported by car number and the responsibility placed with the stower at fault.

Since each of these 8 or 10 errors caught daily by the stowers would have gone wrong otherwise, the payments for claims on freight shipped from Chicago have shown a material decrease, although no definite comparison has been made. Aside from this, each receiving clerk has at hand for ready reference, a complete list of the stations for which freight can be accepted and he has no excuse for accepting freight which cannot be handled by this line. He also has no excuse for guessing at the car in which irregular shipments should go and it is not necessary for him to consult the foreman in such instances. Likewise, the foreman is relieved from work of this nature and can devote his entire time to supervision. While these lists necessarily had to be compiled with great care to include all stations correctly, after once being prepared it has enabled a double check to be secured on all shipments with no increased labor or delay.

This system was devised and put into operation by J. Corrigan, local agent of the "Soo" Line, Chicago, Ill.

ELECTRIC LOCOMOTIVE WITH STEAM LOCOMOTIVE CHARACTERISTICS

By Q. W. HERSHEY

In the usual operation with steam locomotives where long, heavy trains are being handled, with one or more locomotives on the head-end and one or more locomotives doing pusher service, concurrent starting of the head-end and pusher locomotives is secured by signaling with the whistle. Little or no difficulty in starting heavy trains in this manner is experienced owing to the well known characteristic of the steam locomotive to take up slack and stand against the load.

In connection with the electrification of the Elkhorn grade of the Norfolk & Western* the practical necessity that the locomotives be able to take up slack to their full tractive effort and stand stationary against the load until the action of the locomotives on both ends of the train becomes concurrent, was taken into consideration in the design of the electric locomotives. The traffic on the Elkhorn grade consists almost wholly of long heavy tonnage trains which are operated under such conditions that there is difficulty in securing simultaneous action in the starting and stopping of the locomotives at opposite ends of the trains.

The use of three-phase current at the motors has made possible the application of polyphase induction motors designed and constructed without commutators or commutating devices of any kind. They are therefore not subject to sparking, burning, pitting or brush troubles which would be found with ordinary direct current or series type motors. The peculiar "hang-on" feature of the alternating current locomotive is available entirely on account of the inherent characteristics of the induction motor; and the Norfolk & Western locomotives have been designed to approximate very closely steam locomotive characteristics which are necessary to make practicable the use of heavy electric locomotives for long train, heavy tonnage service, such as is found on the Norfolk & Western.

*For a description of the Elkhorn grade electrification, including a description of the locomotives, see the *Railway Age Gazette* issue of June 4, page 1153.

GATEWAY CAR - ALPHABETICAL ORDER				WAY CAR - STATION ORDER			
BLOCK 51				BLOCK 85			
Winnipeg and Beyond							
Acheson	Alta.	Belgonie	Sask.	Waukesha	Wis.	First Out	
Alix	"	Bering	"	Duplainville	"		
Ansell	"	Bigger	"	Templeton	"		
Ardrossan	"	Bender	"	Colgate	"		
Abernethy	Sask.	Blucher	"	St. Huberts Spur	"		
Adair	"	Bounty	"	Rugby Jet.	"		
Adanac	"	Bredenbury	"	Ackerville	"		
Alameda	"	Broadview	"	Schleisingerville	"		
Albion	"	Broadview	"	Cedar Lake	"		
Albia	"	Brora	"	Allenton	"		
Amazon	"	Bucleugh	"	Marsh	"		
Anglia	"	Bulyea	"	Theresa	"		
Antler	"	Burrows	"	Lemira	"		
Arcole	"	Balsarres	"	Eyon	"		
Armilla	"	Bangor	"	Hamilton	"		
Asquith	"	Battleford	"	Boland	"	Last Out	

Fig. 2—Sample Pages from Stower's Book

shipping bill while the caller marks it in chalk on the box. Freight for destinations not shown in the book is refused by the receiving clerk. The truckers then take the freight to the runs and cars indicated by the chalk marks.

Another list is prepared for the use of the stowers, showing all points for which freight may be loaded in each car, the stations being shown in alphabetical order for "gateway" and in station order for way cars. A separate sheet is prepared for each car. These lists for each run are bound separately into books for the use of the stowers in charge of those runs and show only the stations for which he can load. When freight is brought to a run by a trucker the stower disregards entirely the previous chalk marks. Noting the destination on the box he refers to his book to satisfy himself that this freight belongs

Date <u>6/21/15</u>	
CONSIGNEE	<u>Tom Jones</u>
DESTINATION	<u>Abbeysford Wis</u>
SHIPMENT MARKED FOR	<u>92</u>
SHIPMENT SHOULD LOAD	<u>54</u>
TOOK UP WITH FOREMAN AND SHIPMENT FORWARDED TO PROPER CAR.	
<u>J. Matuska</u> STOWER.	

Fig. 3—Stower's Report on Errors

in his run and determines the car in which it belongs as well as the position in the car, if a way car. If he cannot find the station in his book, he refuses to accept the freight and fills out all but the fourth line in the slip shown in Fig. 3, sending it with the freight to the foreman, who investigates and designates where it should go.

In this way there are two entirely independent checks on the loading of each piece of freight. While it is possible for both the receiving clerk and the stower to make errors with the same box, this is not usual and the stowers catch from 8 to 10 errors

Hearing on Advances in Western Passenger Fares

Roads Present Testimony to Interstate Commerce Commission Why Passenger Revenues Should Be Increased

Examiner Thurtell of the Interstate Commerce Commission began a hearing at the Hotel La Salle, Chicago, on Tuesday, July 6, on advances in passenger fares in the territory west and southwest of Chicago to the Rocky mountains, sought by 46 roads. The tariffs were filed by the roads early in the year and were suspended by the commission under Investigation and Suspension Docket 600. It is expected that it will take about two weeks in all to hear both sides, the carriers presenting their testimony first.

The railways' case is being handled by two committees of attorneys, one for the roads in the Northwest, and the other for the Southwest. The committee for the Northwest consists of C. C. Wright, general solicitor of the Chicago & Northwestern, chairman; O. W. Dynes, commerce counsel, Chicago, Milwaukee & St. Paul; E. C. Lindley, general solicitor, Great Northern; R. B. Scott, interstate commerce attorney, Chicago, Burlington & Quincy; H. A. Scandrett, interstate commerce attorney, Union Pacific; and Charles Donnelly, assistant general counsel, Northern Pacific.

The Southwestern committee consists of S. T. Bledsoe, chairman, assistant general counsel, Atchison, Topeka & Santa Fe; H. G. Herbel, general attorney, Missouri Pacific; W. T. Hughes, assistant general attorney, Chicago, Rock Island & Pacific; E. T. Miller, general attorney, St. Louis & San Francisco; and C. S. Burg, interstate commerce attorney, Missouri, Kansas & Texas.

The railroads are opposed by a committee of State Commissioners, headed by P. W. Dougherty, of the South Dakota Railroad Commission, who was delegated by the protesting State Commissions to conduct the case, assisted by A. E. Helm of the Kansas Public Utilities Commission.

Mr. Wright made an opening statement on behalf of the roads in part as follows:

OPENING STATEMENT OF C. C. WRIGHT

"The proposed advance in passenger fares, covers the territory from Chicago west and southwest to the Rocky mountains, including Wisconsin, the northern peninsula of Michigan, Minnesota, Iowa, Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Nebraska, North and South Dakota. It also includes the interstate rates from Illinois west.

"Of that territory, Wisconsin, Michigan, Illinois, Iowa, Missouri, Minnesota, Nebraska, Kansas and Oklahoma now have rates adjusted on a basis of 2 cents per passenger mile. North and South Dakota are upon the basis of $2\frac{1}{2}$ cents per passenger mile. Arkansas, Louisiana and Texas are upon the basis of 3 cents. The territory west of the states described, viz, Montana, Wyoming, Colorado and New Mexico, has rates practically on a basis of 3 cents per mile. The advance in the passenger rates in the states named necessarily includes an advance in rates from and to that territory from districts in which no advance is proposed.

"The lines operating in Trunk Line and Central Passenger Association territory, that is, from Chicago and St. Louis east to the Atlantic Coast, have generally advanced their rates to the basis of $2\frac{1}{2}$ cents per passenger mile, with mileage books at the rate of $2\frac{1}{4}$ cents per mile. In the territory involved in the present proceeding, which lies east of the Missouri river and west of the Missouri river on and north of the Union Pacific in Kansas, the rates under suspension are upon the same basis, with mileage books at $2\frac{1}{4}$ cents per mile. In the territory south of the Union Pacific in Kansas and west of the Missouri river, the proposed rates are upon the basis of 3 cents, with mileage books at $2\frac{1}{2}$ cents. The passenger rates have been advanced by the carriers under the conviction that the earnings from the passenger business are not sufficient to provide the necessary passenger service and yield a fair return upon the property devoted

to that service. It is believed the evidence will demonstrate, that the passenger service is not paying a fair share of the expenses of the maintenance of the roads, and that the evidence will show that the ratio of profit and the net rate of return from the passenger business, are materially less than the return from the freight business.

"The carriers will follow substantially the same lines as in the recent freight advance case. It was stipulated that the testimony taken in that case in relation to the general financial needs of the carriers, may be treated as part of the evidence in this case. The carriers have taken the same roads which were involved in the composite showing and added thereto the Union Pacific, Great Northern, Northern Pacific, Duluth, South Shore & Atlantic, Toledo, Peoria & Western and Texas Midland, and eliminated the Chicago & Eastern Illinois, whose interstate rates were already advanced by permission of the commission.

"The operated line covered includes a little over 120,000 miles. Not all of the mileage included lies within the territory where the advance is sought. Lines like the Union Pacific, Santa Fe, Great Northern, Northern Pacific and some others, now maintain a $2\frac{1}{2}$ -cent or 3-cent basis on the larger portion of their mileage. Different groups of roads have been considered together and the composite results of operation shown, as was done in the freight case, for the purpose of eliminating the effect of rates on portions of the lines which lie outside the territory involved.

"The results of passenger operation for the last 14 years will be presented to the commission, divided into two periods of 7 years each, giving the results for each year, both as to the entire systems interested in the proceeding and as to the group which will be presented.

"It will be shown that the passenger revenue on these roads in 1914 was approximately \$271,000,000. Not all of this is affected by the advance. It is impossible to determine exactly what may be the effect upon the revenue in the territory involved, owing to the fact that under the proposed rates mileage books will be sold at less than the regular rate. It is believed that the advance will not amount to more than 8 or 9 per cent of the revenue in the territory in question, or in round figures, from \$20,000,000 to \$25,000,000.

"The carriers expect to show that the net operating income of those involved, during the last 7 years, has been materially less per mile of road than for the 7 years prior. It will be shown, that this is true, notwithstanding an increase in the volume of business and in property investment. This, of course, results in a materially higher operating ratio and a less net rate of return than has been maintained heretofore.

"Comparisons will also be made to present the conditions at the present time with those in 1910. It will be shown that this increase in expenses is largely due to the increase in cost of labor and rate of taxation, and that the economies which have been effected and the increased volume of business have not been sufficient to meet the increasing costs of operation.

"Taking the lines together, it will be shown that under any of the bases of division of expenses, as between passenger and freight, the return upon property devoted to passenger service does not amount to 3 per cent upon the value of the property devoted to such service.

"In the present case the carriers will treat the passenger rates as a whole, without an attempt to make definite separation of expenses as between state and interstate business. Information will be furnished, however, as to the proportion of the business which is state and interstate, the length of haul on each class of business and other matters of that kind affecting the passenger traffic. It is believed by the carriers that it is impractic-

cable to maintain state and interstate passenger rates upon any substantially different basis. This belief is based on the thought that to maintain any substantially different basis of passenger rates on interstate business would not only be discriminatory, but would be impractical from an operating standpoint."

The first witness for the railroads was L. E. Wettling, who has had charge of the compilation of the fundamental statistical exhibits.

STATISTICAL EXHIBITS

Mr. Wettling filed and gave testimony in explanation of a statistical exhibit of 217 pages, giving the results of operation, traffic statistics, etc., for the 46 roads or systems involved in the case for each year from 1901 to 1914, inclusive, with comparisons of the periods 1901-1907 and 1908-1914. The figures were given for the individual roads, for all the roads combined, and for the roads combined into 7 groups. A large number of the exhibits were like those presented by Mr. Wettling in the freight advance case, which were described in the *Railway Age Gazette* of March 12, except that only 41 roads were included in that case.

The 46 roads operated 120,790 miles of line in 1914. Their net cost of road and equipment was \$6,433,968,625 and the net operating income for the year was 4.24 per cent on that amount, or equivalent to 7 per cent on a value of \$3,898,830,406 or \$32,278 per mile. For the period 1901-1907 the net operating income was \$2,509 per mile. For the period 1908-1914 it was only \$2,394 per mile. For the first period this was 5.43 per cent of the cost of road and equipment. For the second period the return was 4.74 per cent. In 1914 the net cost of road and equipment had increased 64.04 per cent, as compared with 1901. In the same time operating revenue had increased 105.85 per cent and the ratio of operating revenue to cost of road and equipment had increased from 14.21 per cent to 17.84 per cent. Operating expenses meanwhile had increased 137.96 per cent and the operating ratio from 65.94 to 76.22, while the net operating income had increased only 43.71 per cent. The cost of road and equipment per mile of line owned increased from \$48,878 in the first period to 54,907 in the second period.

The total increase in capitalization, 1914 over 1901, was \$2,858,553,071. In 1901, 46.42 per cent of the total was represented by stock and 53.58 per cent by bonds. In 1914 the proportion was 40.71 per cent of stock and 59.29 per cent bonds. From July 1, 1907, to June 30, 1914, the 46 roads expended \$936,818,405 for additions and betterments, of which \$390,435,682 was for equipment.

For the first period gross operating revenues per mile averaged \$7,713, of which \$3,003 was paid for labor, \$240 for taxes and \$1,958 for material and other items, leaving a balance of \$2,509 per mile available for interest, dividends and surplus. For the second period, while gross operating revenues had increased to \$9,160 per mile \$3,849 was paid for labor, \$379 for taxes and \$2,536 for material and other items, leaving a balance of \$2,394 available for interest, dividends and surplus.

One exhibit showed that the requirements in the next seven years for refunding or refinancing maturing obligations now outstanding would amount to \$538,591,699 for 33 operating systems of which \$100,764,614 will mature in 1915.

A large number of exhibits were devoted to maintenance expenses. For the first period total maintenance averaged 25.59 per cent of operating revenue and 4.6 per cent of the cost of road and equipment. For the second period the average was 27.76 per cent of operating revenue and 5.3 per cent of cost of road and equipment. For maintenance of way and structures the averages were 13.86 per cent of operating revenue and 2.49 per cent of road and equipment for the first period and 13.54 and 2.59 per cent respectively, for the second period. Maintenance of equipment had taken 11.73 and 2.11 per cent, respectively, for the first period and 14.22 and 2.71 per cent for the second period. While the

proportion of maintenance of way and structures charged to passenger service had decreased from .577 cent per passenger mile in the first period to .5084 cent in the second period, the cost of maintenance of equipment in passenger service increased from .2983 cent per passenger mile for the first period to .324 cent for the second period.

Several exhibits were devoted to the increases in taxes and in expenditures for labor. In 1914 the 46 roads paid \$28,025,956 more for taxes than they would have paid at the 1901 rate, and \$101,806,957 more for labor than they would have paid at the 1900 rates.

From 1900 to 1914 the average daily compensation, including general officers, increased steadily from \$2.00 to \$2.52, and excluding, general officers, from \$1.96 to \$2.48. In 1901, 37.77 cents out of each dollar of revenue was paid for labor; in 1914, 42.98 cents. In 1901, out of each dollar 3.17 cents was paid in taxes; in 1914, 4.97 cents. Labor costs per train mile showed a steady increase, with the exception of only one year, from 66.14 cents in 1901 to 103.98 cents in 1914. Total labor costs per car mile showed an increase from 4.05 cents in 1901 to 5.48 cents in 1914.

For the period 1901-1907 locomotive repairs, renewals, depreciation and charges to profit and loss per locomotive mile averaged 7.215 cents. For the period 1908-1914 the average was 10.689 cents. Repairs and renewals per locomotive mile were 6.983 cents in the first period and 9.399 cents in the second period, while charges to depreciation and profit and loss per locomotive mile were .232 cent in the first period and 1.290 cents in the second period.

One of the exhibits was a chart showing graphically the disposition of each dollar of revenue paid to the 46 roads by the public. In 1901 operating expenses, including taxes, took 65.94 cents, leaving a balance of 34.06 cents available for interest, dividends and surplus. Labor consumed 37.77 cents, taxes 3.17 cents and material and other items 25 cents. In 1914 operating expenses and taxes took 76.22 cents of each dollar, leaving 23.78 cents for interest, dividends and surplus. Labor consumed 42.98 cents, taxes 4.97 cents and material and other items 28.27 cents. Operating expenses were divided between freight and passenger service on six different bases. Basis 6, an average of the results obtained by the other bases, assigned 57.93 per cent of the maintenance of way and structure expenses to freight and 42.07 per cent to passenger, and 67.22 per cent of total operating expenses to freight and 32.78 per cent to passenger.

The average revenue per passenger mile for the period 1901-1907 was 2.13 cents and for the period 1908-1914 was 2.07 cents. In 1901 it was 2.18 cents and in 1914 it was 2.09. Several exhibits were devoted to passenger traffic statistics for 30 states and two Canadian provinces for 40 roads for 1914. The average passenger mileage per mile of line was 107,322, of which 53,294 was intrastate and 54,028 was interstate. The total passenger revenue was \$246,432,097, of which \$123,611,446 was intrastate and \$122,820,650 was interstate. The average haul was 44.8 miles, but the average haul intrastate was only 28.67 miles as against 100.63 miles interstate. Because of the shorter average haul in intrastate business, out of a total of 263,327,957 revenue passengers, 204,312,678 were intrastate and 59,015,279 interstate. The number of passengers carried one mile was 11,796,186,229, made up of 5,857,738,762 intrastate and 5,938,447,467 interstate. The average revenue per passenger mile was 2.089 cents, on intrastate traffic 2.110 cents, and on interstate traffic 2.068 cents. The revenue per passenger mile ranged from 1.569 cents in Illinois to 7.606 in Nevada for intrastate traffic and from 1.872 cents in Wisconsin to 2.708 in British Columbia for interstate traffic. The average revenue per train mile was \$1.0770, ranging from 5.71 cents in Nevada to \$1.4893 in Tennessee, and the average revenue per car mile was 26.74 cents, ranging from 5.71 cents in Nevada to 35.75 cents in Oregon. The total passenger train mileage was 228,803,538,

including mixed train mileage, and the total car miles of cars carrying passengers was 921,682,764.

Total failure of predictions made in 1907, when passenger fares in many states were reduced to 2 cents per mile, that the lower fares would be more than offset by the stimulus to travel, was also described in figures by Mr. Wettling. He presented statistics showing that the return on property devoted to passenger service is only 2.37 per cent, while many roads operate at an actual deficit.

"The reductions to 2 cents per mile in passenger fares," said Mr. Wettling, "brought no stimulus to travel such as was anticipated. The mileage traveled by passengers for each mile of road in 1901 was 62,757. This had grown by 1914 to 107,255, a gain of 70.91 per cent. In the seven years ending with 1907, when the rates were reduced, the increase in travel was from 62,757 passenger miles per mile of road in 1901 to 95,235 in 1907, a gain of 51.75 per cent. In the seven years after the rates were reduced the gain was from 99,040 passenger miles per mile of line in 1908 to 107,255 in 1914, a gain of only a little over 8 per cent, compared with the 51.75 per cent gain in the seven years before the rates were forced down.

"On top of this failure of the growth in travel to hold its pace, there was, resulting from the rate reductions, a gradual decline in the average revenue, both for hauling the ton one mile and for carrying the passenger one mile. The average revenue per ton mile in the first seven years from 1901 to 1907 was 8.63 mills, which declined in the second seven years to an average of 8.58 mills and amounted in 1914 to only 8.42 mills. The average revenue per passenger mile in the first seven years was 2.13 cents and in the second 2.07 cents.

"Efforts at efficiency, to offset the adverse factors of rising costs and falling rates, although they have brought conspicuous results have not been adequate. With larger power and equipment and denser traffic, the tons carried per train on these railroads rose from 241 in 1901 to 387 in 1914, but the tons per car, in spite of the larger and heavier equipment, rose only from 10.10 tons to 12.27 in the same time. The number of passengers per train rose from 37.22 in 1901 to 51.82 in 1914 and the passengers per car rose in the same time from 7.56 to 9.31. All of this represents greater efficiency in handling traffic, in spite of which the earning power has declined.

"In providing the service demanded by the public, there has been a steady gain in number, size and value of equipment. On June 30, 1906, there was a total of 11,959 passenger cars owned or leased by 42 of these railroads, of which 11,899 were wooden cars, 60 were steel underframe and none were all-steel. The average value of all was \$5,740 and the average weight 71,307 pounds. On June 30, 1914, there were in service 16,958 cars, of which 13,030 were wooden, 1,636 were steel underframe and 2,292 were all-steel. The average value had risen to \$7,400 and the average weight to 85,291 pounds. The average value of the all-steel cars was \$12,343 and their average weight 121,170 pounds. On June 30, 1914, there were 167 passenger train cars, including Pullmans, owned or leased for every 1,000 miles of road, against 139 in 1906. There were in service June 30, 1914, 21,331 locomotives against 15,691, June 30, 1906. Of these there were in the passenger service in 1914, 5,108 locomotives with an average weight of 116.85 tons against only 3,978 in 1906 with an average weight of only 87.42 tons.

"As the result of decreased rates and higher expenses, the profit from passenger service is excessively small and on some of the roads, especially in the Southwest, the passenger service is operated at a deficit. This has been determined by a separation of operating costs between freight and passenger service. In 1914, 67.22 per cent of all operating expenses were due to freight service and 32.78 per cent to passenger. The average ratio of expenses to revenue in both

services was 76.22 per cent. The ratio in the freight service was 72.51 per cent, while in the passenger service the ratio of expense to revenue was 85.16 per cent.

"Both services combined earned a net return equalling 4.24 per cent on the value of the property. In the freight service alone the return was 5.15 per cent while the passenger service earned only 2.37 per cent on the value of the property devoted to passenger traffic on all of these 46 railroads as a whole."

The replies of the various roads to the series of 18 questions bearing on the reasonableness of existing passenger fares which were submitted by the commission some time ago, were filed at the opening of the hearing.

Mr. Wettling was to be followed on the witness stand by E. E. MacLeod, chairman of the Western Passenger Association, E. L. Bevington, secretary of the Transcontinental Passenger Association, W. J. Cannon, assistant general passenger agent of the Chicago, Milwaukee & St. Paul, and H. H. Butler, assistant general passenger agent of the Missouri Pacific.

CAFÉ DAY COACH

The Pennsylvania Railroad has equipped, and put in service, an all-steel cafe day coach, provided with a broiler buffet from which meals will be served. This car will be tried out as an experiment, and if it is found to meet a sufficient demand on the part of the traveling public, others of like character may be



The Kitchen of the Cafe Coach

placed in operation. It will not be used, however, to supplant dining cars.

The new car is intended for use on trains where a dining car is not warranted. The buffet occupies eight feet of space at one end of the car and is similar to those installed in broiler-buffet Pullman cars, but is of an improved type, alcohol broilers being

used instead of coal fires. Meals will be served on tables placed between the seats, with the outer ends resting on the arms. Both single and double tables are provided, the latter being used where two seats are turned to face each other. With a double table, a party of four can eat together. No extra fare will be charged for riding in the car, as it will be in the regular service as an ordinary day coach.

The car has a seating capacity of 70, and except for the buffet it is exactly like the steel day coaches used by the Pennsylvania. A supplementary use for this car will be to serve breakfasts in



Interior of the Pennsylvania Railroad Cafe Coach

sleeping cars on trains where no buffets or dining cars are provided. The new car has been placed in service between Kane, Pa., and Erie, Pa., on trains Nos. 39 and 54, which are through trains between Philadelphia and Erie.

NEW DELAWARE & HUDSON TERMINAL AT ALBANY, N. Y.

The Delaware & Hudson has recently completed and moved into a new office building and freight house in Albany, N. Y., which is of unusually fine appearance for a structure of this kind and is situated in a very convenient location. The entire project is an example of co-operation between the municipality and the railroad to their mutual advantage.

The building occupies a portion of the site of Beverwyck, the original Dutch settlement which covered an area of about 8 acres between Broadway and the river at the foot of Main street. Resisting the trend of modern advancement, this district retained its century-old characteristics, with ancient buildings, many falling into decay, on narrow and crooked streets, and had long been an eyesore to the citizens of Albany. The matter was finally taken up by the local Chamber of Commerce, which prevailed upon the city administration to extend the scheme of river front improvement which had already been undertaken, to include the creation of a civic center in what was the most unsightly section of the city. The Delaware & Hudson, whose main tracks occupied a narrow strip of right of way adjacent to the river had already begun the purchase of some property in this district. The company had a freight house at Livingston avenue, five blocks north, and another at Church street, ten blocks south, both of which

had become inadequate. They were also located too far from the business center for convenience. The plan finally determined on by the road provided for a new freight terminal of adequate size in the heart of the business center. It was also desired to raise the main passenger tracks to the level of those of the Union station located two blocks north and to connect them to the present station tracks. At the present time the Delaware & Hudson trains depart from tracks adjacent to but considerably below the main station tracks. This change in grade will also avoid trouble with occasional high water in the Hudson river. While the office building and freight house are now completed, the station tracks have not yet been raised.

Because of the common interest involved it was necessary for the city to co-operate with the railway company in the exchange of property and it was finally agreed that the railway would be granted permission to elevate its tracks and extend its terminal facilities by the construction of a new freight house and yard on condition that the office building be of such a character as to harmonize with the plans outlined by the city for the remainder of the district.

The plan agreed upon is shown in the accompanying general



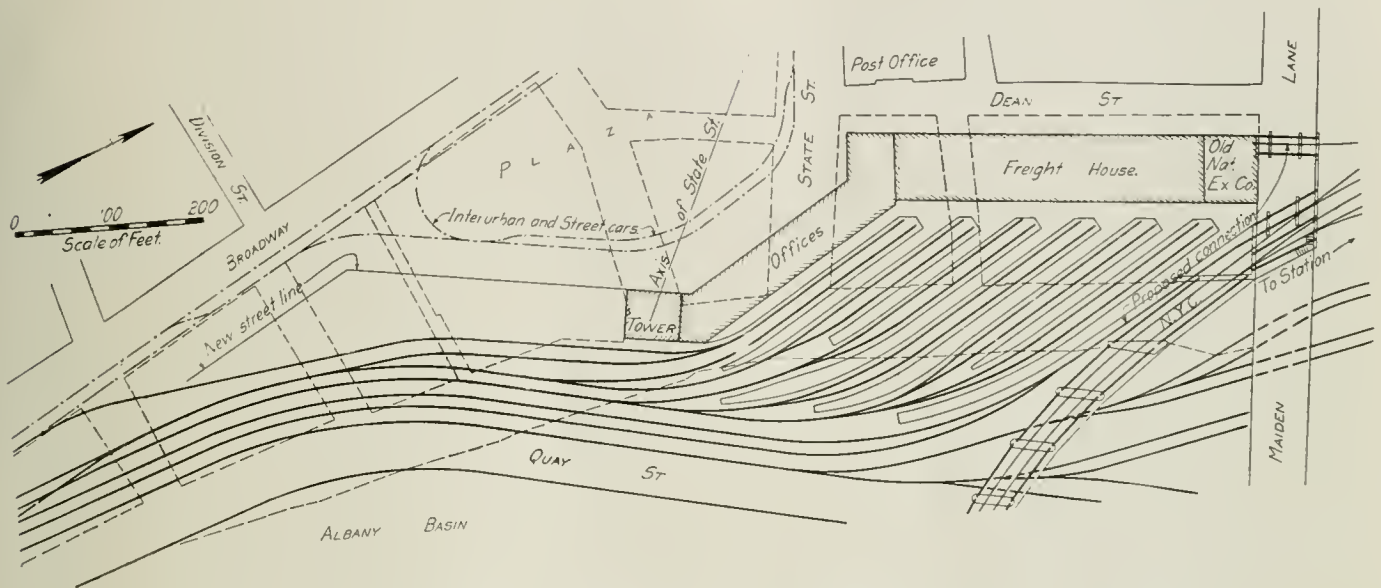
New D. & H. Office Building from the City Side

layout. The building occupies an irregular area between the tracks and the plaza, an open space roughly triangular in shape, bounded on the west by Broadway, with its axis approximately on the center line of State street, an avenue 100 ft. wide, which connects the plaza with the state capitol grounds four blocks west. Just south of the building is a pedestrian subway leading from the plaza east underneath the tracks to Quay street, abutting on Albany basin, an artificial body of water 200 ft. wide, separated from the Hudson river by the municipal recreation pier.

The building, which was designed by Marcus T. Reynolds, architect, Albany, consists of a tower 52 ft. by 62 ft., 13 stories in height, joined on the north by a four-story wing 260 ft. long by 50 ft. wide. To the north of this, and facing on Dean street, is the freight house. Flemish Gothic in design, the building is of imposing appearance and has an unusually fine setting, with the axis of the tower on the center line of State street facing the State capitol. It is also conspicuous from the river side, being the first building of importance to meet the eyes of travelers approaching the city on river steamers, or by trains crossing the river bridge just north of the building. The exterior walls are of Plymouth seam-faced granite, laid in random ashlar and

trimmed with Gothic details of synthetic stone. This synthetic or artificial stone for the trim was made by a special patented process using sand molds and has an excellent finish. The material is well adapted to the use of elaborate details. The roof is covered with heavy slate of variegated colors, the lower course being 1 in. thick and graded to the customary size at

total area of 128,000 sq. ft. An open arcade facing west on the first story permits passage under cover throughout the length of the building, and facing on this arcade and the plaza beyond are seven shops which may be rented out for various purposes, one being occupied by the city ticket office of the Delaware & Hudson. A well in the center of the tower, isolated by fireproof



General Layout of Delaware & Hudson Terminal at Albany

the ridge. The tower is crowned with a copper covered spire 70 ft. in height, bearing a weather vane representing Hendrick Hudson's ship "De Halve Maen."

With the exception of the first floor, the tower and its wings are used entirely for the general offices of the road, having a

walls and doors, contains two elevators and a stairway. Another stairway and elevator are located midway in the length of the wing. One unusual feature of the tower, combining utility and architectural enhancement is a turret-shaped pilaster located in the northwest corner, which contains a winding stair-



Office Building and Freight House from the River Side

way. Being protected by fireproof doors and small fireproof windows, it will afford an unusually efficient fire escape.

The entire building is supported on Raymond concrete piles. The tower is of fireproof steel-skeleton construction, while the wing and the freight house are of reinforced concrete flat slab construction. There is no basement except under the north end of the wing, which is occupied by the heating plant, consisting of three Mills sectional safety boilers. A Custodis radial brick chimney of 42 in. inside diameter, extending only a short distance above the roof, is enclosed above the basement in a fireproof ventilating flue.

The freight house consists of a new three-story portion 317 ft. by 70 ft., designed to take one additional floor in the future, and an old 4-story brick building 73 ft. by 63 ft. on the north, facing on Maiden Lane, formerly owned and occupied by the National Express Company, and now remodeled for use in conjunction with the new building. The first floor is used as an ordinary freight house, the second for storage and the third for offices for the freight clerks, while the upper floors of the old express building will be used for division offices. The new portion consists of 14 bays, 23 ft. 2 in. center to center of columns, with one double rolling door 11 ft. 6 in. wide to each bay, on both the street and the track sides. There are four stairways, one to every third bay, isolated by fire walls and fire-resisting doors. Adjacent to two of these stairways there are freight elevators with 8 ft. by 9 ft. platforms, while next to each of the other two are 8 ft. by 9 ft. platform scales equipped with Springfield automatic weighers of 10,000 lb. capacity. All three floors of the freight house are equipped with automatic sprinklers. Openings leading into adjoining portions of the building are protected by automatic fire doors. The floors throughout the office building and the new freight house are of concrete. The first and second floors of the freight house are illuminated by ceiling outlets, one in the center of each panel, equipped with 100-watt incandescent lamps and reflectors, while over each freight door is a 100-watt lamp, set with the axis of lamp and reflector horizontal.

The layout of the tracks and platform is shown in the accompanying drawing. Twelve house tracks with a total capacity of 100 cars, are located in pairs 12 ft. center to center, on a skew with the face of the building. Platforms between each pair of tracks are 12 ft. wide and connect to a head platform 17 ft. wide along the face of the house. In order to work out with a future arrangement of the main tracks at a higher grade, the house tracks are on a 1½ per cent grade descending toward the house, which is protected against runaway cars by heavy concrete bumping posts. The platforms are entirely of timber construction supported on small concrete pedestals, because it was thought undesirable to use permanent construction at this time on the filled ground which they occupy. It is proposed to replace them by permanent structures when renewal becomes necessary.

In addition to the new freight house facilities a new team yard has been provided some distance south of the station along Church street, from Pruyn street to Ferry street, a distance of about 1,300 ft., which will give eventually a capacity of about 150 cars. Plans are also under way for an express building on Maiden Lane for the United Traction Company, which operates the street cars in Albany, and serves also as a terminal transfer between the Delaware & Hudson and two interurban lines—the Albany Southern and the Schenectady Railway.

All work on the entire building was under contract to J. Henry Miller, Inc., Baltimore, Md., the contract price being \$610,000. The total cost of the terminal work to date, exclusive of real estate, is about \$750,000. The work on the building was prosecuted with unusual speed. Preliminary work was commenced in April, 1914, and the entire office building was ready for occupancy in April, 1915. All work is under the direction of James McMartin, chief engineer of the Delaware & Hudson, with Otis F. Rowland, assistant engineer in immediate charge.

PRESENT WELFARE WORK OF FRENCH RAILROADS

By WALTER S. HART

Despite the enormous financial losses sustained by French railroads because of the war and the consequent reduction in commercial tonnage and passenger traffic, these railroads have continued their usual welfare work in the interest of their employees and have, indeed, increased it surprisingly in certain directions.

This fact is indicated in a recently issued report of the Paris-Lyons-Mediterranean Railway. In view of the facts that the railroad is under the control of the war department and that it has suffered tremendous war losses on every hand, some of these expenses might have been cut down by the board of directors. The railroad, however, seems to have shouldered all it could and to have helped freely in the united effort of the French people to keep going in war time. Even new homes for employees in conformance with plans made before the war, have been completed. The report does not call any particular attention to the work, but barely outlines the facts. The board of directors voted the usual sum to provide pensions for its 80,000 employees—a little over \$5,000,000 this year. The sum set aside for various kinds of welfare work totaled over \$6,500,000.

During the first few months of the war more than \$280,000 of the total was spent to aid the 12,000 younger employees who went to the front as soldiers, these men having served less than six months on the railroad and being subject to enrollment as soldiers and not as railroad employees engaged in military transportation. These soldiers were paid one-half their salaries and, when they had families to support, the railroad continued half of their salaries, and when possible gave the women employment as ticket sellers or clerks. In addition, such employees received their usual end of the year bonus, and their time as soldiers was counted as company service time towards promotions and participation in pensions.

The welfare work for the year 1914 is subdivided as follows:

Allowances to large families.....	\$450,000
Allowances to co-operative societies.....	30,000
Gifts to the treasury of pensions.....	4,450,000
Special pensions	593,000
To schools, orphans, apprentice shops, sanitariums.....	88,000
Salaries and half salaries to the sick.....	471,000
Medical supplies and care of sick.....	175,000
Hot drinks and mineral waters to employees.....	15,000
Interest on free loans.....	1,500

Among the interesting details of the general welfare work of the road, which is typical of all the French railroads, is its care of orphans of employees. In addition to the above sums, the company found homes for 188 of its own orphans and made a contribution to the national organization which cares for the 870 orphans of the railroads of France, this number having been grievously increased, because of the many deaths of soldiers at the front during the past few months. The company also provided for the schooling of 444 boys and girls of employees.

Further, this company provided homes to the number of 1,388 in the districts on its lines where rent is high or else in the country where modern houses are not available.

Note is also made of the satisfactory results of the system of loans without interest to employees, begun in 1899. During the past year \$86,000 was loaned to 2,887 employees who found themselves in urgent need of ready money, and in 1913 \$100,000 was loaned to 3,294 employees. Since 1899 the company has loaned \$1,100,000 to 32,959 employees, and during that period of 15 years has lost but \$1,300 through failures to refund.

A final paragraph of the report states that the company gave employment to some of the Belgian railroad men driven out of their own country. It also started an employment agency for the refugees from the invaded regions of northern France and found work on its own lines for 1,200 persons. At the same time it granted reduced fares to those moving to new homes.

*Our special European correspondent.

The American Society for Testing Materials

An Abstract of the Proceedings of the Eighteenth Annual Meeting; Some of the More Important Specifications

As mentioned in last week's issue the eighteenth annual convention of the American Society for Testing Materials was held at the Hotel Traymore, Atlantic City, June 22-26. President A. W. Gibbs, chief mechanical engineer of the Pennsylvania Railroad, presiding. The address of the president and a paper by C. D. Young, describing the test department of the Pennsylvania Railroad, were published in last week's issue. The following officers were elected for the coming year: President, Mansfield Merriman; vice-president, W. H. Bixby; members of the executive committee, J. H. Gibboney, W. K. Hatt, J. A. Mathews and Edward Orton, Jr.

Proposed standard specifications for iron and steel chain were referred to letter ballot for adoption. These specifications differ slightly from the specifications of the Master Car Builders' Association, but members of that association who are members of the committee of the American Society for Testing Materials feel confident that the M. C. B. Association will revise its specifications to conform to those proposed by the committee. Revised standard specifications for malleable iron castings were also referred to letter ballot of the society for adoption as standard.

A paper on the Fusibility of Coal Ash was presented by A. C. Fieldner, A. E. Hall and A. L. Feild. A study was made of the principal causes for variations in the softening temperatures of coal ash as indicated by the deformation of Seger cones molded from the pulverized ash. Comparative tests were made on a series of 18 types of coal ash in six different furnaces which are in more or less common use for determining the degree of fusibility of silicate mixtures.

BATTERY ZINCS: SOME CAUSES OF DEFECTIVE SERVICE

The following is taken from a paper on this subject by Robert Job and F. F. White:

The serviceability of the zinc element of a gravity cell, such as is commonly used in railway service, is generally considered to depend mainly upon its composition, and it is specified usually that the percentage of iron shall be a minimum, say, not exceeding 0.10 per cent, lead not to exceed 0.50 per cent and not less than 2 per cent of mercury.

A recent investigation has been of interest in proving the radical influence which the details of the method of manufacture exert upon the practical value of the metal in service. In the course of routine tests, two shipments of zinc were received and on analysis were found to have the following composition:

	Shipment A.	Shipment B.
Mercury, per cent.....	2.49	2.26
Lead, per cent.....	0.17	0.17
Iron, per cent.....	0.15	0.10

These results were within the specification limits, or nearly so, and the shipments were approved. It developed in service, however, that shipment A was far superior to shipment B. The zincs in the latter lot, after comparatively short service, became coated with copper which protected the zinc from the action of the electrolyte, and in consequence the cell became "dead" when but little of the zinc had been dissolved.

In view of the satisfactory average analysis of the zincs, it was felt that the difference in service was probably due to characteristics other than composition, and an investigation was made of each of the components of the cell. The copper sulphate contained 0.75 per cent of iron. This amount was the maximum permitted by the specifications, but the same copper sulphate gave good results when used with zincs of shipment A. It was decided then that the difference in the zincs was probably physical, and in order to develop possible variations in structure, transverse sections were taken from several samples in each shipment, and were polished and etched lightly.

The etchings and subsequent microscopic examination showed marked difference. The good samples were fine grained and of uniform structure, clear to the outside surface of the zincs, whereas the others were coarse grained, indicating pouring into molds at a high temperature. Also, a distinct band of bright metal was seen around the contour of the defective sections. The natural inference was that the outside metal contained little mercury, and in order to determine this we took borings from each section around the surface to a depth of 1/16 in., and found the mercury content for a specimen representing shipment A, to be 2.49 per cent, and that for one representing shipment B, 0.64 per cent. These results showed the condition clearly and indicated the main cause of failure of shipment B.

It is a well-known fact that mercury volatilizes to a considerable extent when added to molten zinc, unless suitable precautions are taken; consequently it is necessary not only to avoid overheating the bath of metal, but also to keep the molds cooled. Evidently in the case of shipment B this latter practice had not been followed, and hence the proportion of mercury upon the surface of the zincs was extremely low and evidently insufficient to protect the zincs from local action.

The foundry practice necessary to produce well-mixed, sound and serviceable battery zincs is not difficult, but it is particularly essential that overheating of the metal be avoided, either in the melting pot or in the mold, and that after addition of the mercury the bath be kept carefully stirred in order to avoid segregation.

Acknowledgment is made of the assistance of H. W. Lewis, signal engineer of the Lehigh Valley, in noting the characteristics of the shipments in service, and for help rendered in carrying out the investigation.

PROPOSED STANDARD SPECIFICATIONS FOR QUENCHED HIGH-CARBON
STEEL SPLICE BARS

1. The steel shall be made by the open-hearth process.
2. The splice bars shall be punched, slotted and, in the case of special designs, shaped at a temperature not less than 750 deg. C., and subsequently quenched.
3. The steel shall conform to the following requirements as to chemical composition:

Carbon	not over 0.60	per cent
Manganese	" " 0.80	" "
Phosphorus	" " 0.04	" "

4. An analysis to determine the percentages of carbon, manganese, phosphorus and sulphur shall be made by the manufacturer from a test ingot taken during the pouring of each melt, a copy of which shall be given to the purchaser or his representative. This analysis shall conform to the requirements specified in Section 3. Drillings for analysis shall be taken not less than 18 in. beneath the surface of the test ingot.

5 Analyses may be made by the purchaser from finished splice bars representing each melt, in which case an excess of 25 per cent above the requirement as to phosphorus specified in Section 3 shall be allowed.

6. The splice bars shall conform to the following minimum requirements as to tensile properties:

Tensile strength, lb. per sq. in.	100,000
Yield point,	65,000
Elongation in 2 in., per cent.	10

7. The bend test specimen specified in Section 8 shall bend cold through 90 deg around a pin, the diameter of which is equal to three times the thickness of the specimen, without cracking on the outside of the bent portion.

5 Tension and bend test specimens shall be taken from the finished bars. Tension test specimens shall be of the form and dimensions shown in the illustration. Bend test specimens may

dimensions of the elliptical shoulders under the head of the bolt of 1/32 in. from the specified size will be permitted. A taper of the shoulder of 1/32 in. will be permitted.

12. The finished bolts and nuts shall be free from injurious defects and shall have a workmanlike finish.

13. A letter or brand indicating the manufacturer shall be pressed on the head of the bolt when it is formed.

14. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the bolts and nuts ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the bolts and nuts are being furnished in accordance with these specifications. All tests (except check analyses) and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as to not interfere unnecessarily with the operation of the works.

15. (a) Unless otherwise specified, any rejection based on tests made in accordance with Section 5 shall be reported within five working days from the receipt of samples.

(b) Bolts and nuts which show injurious defects subsequent to their acceptance at the manufacturer's works will be rejected, and the manufacturer shall be notified.

16. Samples tested in accordance with Section 5, which represent rejected bolts and nuts, shall be preserved for two weeks from the date of the test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

This report was referred to letter ballot.

PROPOSED STANDARD SPECIFICATIONS FOR QUENCHED ALLOY-STEEL TRACK BOLTS

1. (a) The steel for the bolts shall be made by the open-hearth or electric process.

(b) The steel for the nuts shall be made by the Bessemer or open-hearth process.

2. The bolts shall enter the quenching medium at a temperature of not less than 790 deg. C. The threads may be rolled either hot or cold.

3. The steel for the bolts shall conform to the following requirement as to chemical composition:

Phosphorus.....not over 0.035 per cent

4. An analysis to determine the percentages of carbon, manganese, phosphorus and sulphur and any other elements used to obtain the physical properties specified in Sections 6 and 7 shall be made by the manufacturer from a test ingot taken during the pouring of each melt, a copy of which shall be given to the purchaser or his representative. This analysis shall conform to the requirement specified in Section 3. Drillings for analysis shall be taken not less than 1/8 in. beneath the surface of the test ingot.

5. Analyses may be made by the purchaser from finished bolts representing each melt, in which case an excess of 25 per cent above the requirement as to phosphorus specified in Section 3 shall be allowed.

6. (a) The bolts shall conform to the following minimum requirements as to tensile properties:

Tensile strength, lb. per sq. in.....	110,000
Yield point, lb. per sq. in.....	85,000
Elongation in 2 in., per cent.....	17

The rest of the five specifications are the same as for Heat-Treated Carbon Steel Track Bolts.

SPECIFICATIONS FOR SPRINGS, ALLOY STEEL FORGINGS AND AXLES

The Committee on Steel submitted proposed tentative specifications for silico-manganese steel bars for automobile and railway springs, for chrome-vanadium steel bars for automobile and railway springs, for helical and elliptical railway springs, for alloy steel forgings and for quenched-and-tempered alloy steel axles and other car and locomotive forgings. The latter are as follows:

1. (a) These specifications cover the various classes of alloy

steel forgings now commonly used in locomotive and car construction.

(b) The purposes for which these classes are frequently used are as follows:

Class K, for forgings for main and side rods, straps, piston rods, and all other forgings which are to be machined with milling cutters or complicated forming tools;

Class L, for forgings for driving and trailing-truck axles, crank pins, and other parts not requiring the use of milling cutters or complicated forming tools.

2. The steel may be made by the open-hearth or any other process approved by the purchaser.

3. A sufficient discard shall be made from each ingot to secure freedom from injurious piping and undue segregation.

4. For test purposes, a prolongation shall be left on each forging, unless otherwise specified by the purchaser.

5. (a) Unless otherwise specified by the purchaser, all forgings over 7 in. in diameter shall be hored, and all axles, shafts and similar forgings shall be rough-turned all over. The boring and rough-turning shall be done before quenching.

(b) If boring is specified, the diameter of the hole shall be at least 20 per cent of the maximum outside diameter or thickness of the forging, exclusive of collars and flanges.

6. For quenching and tempering, the forgings shall be allowed to become cold after forging. They shall then be uniformly reheated to the proper temperature to refine the grain (a group thus reheated being known as a "quenching charge"), and quenched in some medium under substantially uniform conditions for each quenching charge. Finally, they shall be uniformly reheated to the proper temperature for tempering or "drawing back" (a group thus reheated being known as a "tempering charge"), and allowed to cool uniformly.

7. The steel shall conform to the following requirements as to chemical composition:

	Acid.	Basic.
Phosphorus	not over 0.05	not over 0.04 per cent
Sulphur	not over 0.05	not over 0.05 per cent

The composition of alloy steel, other than phosphorus and sulphur, shall be agreed upon by the manufacturer and the purchaser.

8. An analysis to determine the percentages of carbon and the elements specified in Section 7 shall be made by the manufacturer from a test ingot taken during the pouring of each melt, a copy of which shall be given to the purchaser or his representative. This analysis shall conform to the requirements specified in Section 7.

9. Analyses may be made by the purchaser from a forging representing each melt, which shall conform to the requirements specified in Section 7. Drillings for analysis may be taken from the forging or from a full-size prolongation of the same, at any point midway between the center and surface of solid forgings, and at any point midway between the inner and outer surfaces of the wall of bored forgings; or turnings may be taken from a test specimen.

In addition to the complete analysis, a phosphorus determination may be made by the purchaser from each broken tension test specimen, and this determination shall conform to the requirement for phosphorus specified in Section 7.

10. (a) The forgings shall conform to the requirements as to tensile properties specified in Table 1.

(b) The classification by size of the forging shall be determined by the specified diameter or thickness which governs the size of the prolongation from which the test specimen is taken.

(c) The elastic limit shall be determined by means of an extensometer.

(d) Tests of forgings shall be made only after final treatment.

11. If specified by the purchaser, bend tests shall be made as follows:

(a) For the first and second classes by size, the test specimen shall bend cold through 180 deg. around a 1 in. flat man-

drel having a rounded edge of $\frac{1}{2}$ -in. radius, without cracking on the outside of the bent portion.

(b) For the third and fourth classes by size, the test specimen shall bend cold through 180 deg. around a $1\frac{1}{2}$ -in. flat mandrel having a rounded edge of $\frac{3}{4}$ -in. radius, without cracking on the outside of the bent portion.

12. Unless otherwise specified by the purchaser, all forgings shall be subjected to an impact proof test. The details of this test shall be agreed upon by the manufacturer and the purchaser.

13. (a) Tension and bend test specimens shall be taken from a full-size prolongation of any forging. For forgings with large ends or collars the prolongation may be of the same cross-section as that of the forging back of the large end or collar. Specimens may be taken from the forging itself with a hollow drill, if approved by the purchaser.

(b) The axis of the specimen shall be located at any point midway between the center and surface of solid forgings, and at any point midway between the inner and outer surfaces of the wall of bored forgings, and shall be parallel to the axis of

fied by the purchaser. Axles, shafts and similar forgings, unless otherwise specified, shall be rough-turned all over with an allowance of $\frac{1}{8}$ in. on the surface for finishing. In centering, 60-deg. centers with clearance drilled for points shall be used.

17. The forgings shall be free from injurious defects and shall have a workmanlike finish.

18. Identification marks shall be legibly stamped on each forging and on each test specimen. The purchaser shall indicate the location of such identification marks.

19. (a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the forgings ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the forgings are being furnished in accordance with these specifications. Tests and inspection at the place of manufacture shall be made prior to shipment.

(b) The purchaser may make the tests to govern the acceptance or rejection of the forgings in his own laboratory or

TABLE I—TENSILE PROPERTIES (CLASSES K AND L)

For Forgings whose Maximum Outside Diameter or Thickness is not over 10 in. when Solid, and not over 20 in. when Bored

Class	Size	Tensile Strength, lb. per sq. in.	Elastic Limit, min., lb. per sq. in.	Elongation in 2 in., min., per cent	Reduction of Area, min., per cent
K Alloy Steel, Quenched and Tempered	Up to 2 in. in outside diameter or thickness, 1-in. max. wall.....	95,000—115,000	70,000	20	50
	Over 2 to 4 in. in outside diameter or thickness, 2-in. max. wall.....	90,000—110,000	65,000	20	50
	Over 4 to 7 in. in outside diameter or thickness, $3\frac{1}{2}$ -in. max. wall.....	90,000—110,000	65,000	20	50
	Over 7 to 10 in. in outside diameter or thickness, 5-in. max. wall.....	90,000—110,000	65,000	20	50
	Outside diameter or thickness not over 20 in., 5 to 8-in. wall.....	85,000—105,000	60,000	20	50
L Alloy Steel, Quenched and Tempered	Up to 2 in. in outside diameter or thickness, 1-in. max. wall.....	105,000—125,000	80,000	20	50
	Over 2 to 4 in. in outside diameter or thickness, 2-in. max. wall.....	100,000—120,000	75,000	20	50
	Over 4 to 7 in. in outside diameter or thickness, $3\frac{1}{2}$ -in. max. wall.....	100,000—120,000	75,000	20	50
	Over 7 to 10 in. in outside diameter or thickness, 5-in. max. wall.....	100,000—120,000	75,000	18	45
	Outside diameter or thickness not over 20 in., 5 to 8-in. wall.....	95,000—115,000	70,000	18	45

the forging in the direction in which the metal is most drawn out.

(c) Tension test specimens shall be of the form and dimensions shown in the illustration.

(d) Bend test specimens shall be $\frac{1}{2}$ in. square in section with corners rounded to a radius not over $\frac{1}{16}$ in., and need not exceed 6 in. in length.

14. (a) One tension and, if specified by the purchaser, one bend test shall be made from each tempering charge. If more than one quenching charge is represented in a tempering charge, one tension and, if specified, one bend test shall be made from each quenching charge. If more than one melt is represented in a quenching charge, one tension and, if specified, one bend test shall be made from each melt.

(b) If more than one class of forgings by size is represented in any lot, one tension and, if specified, one bend test from a forging of each class by size shall be made as specified in Sections 10, 11 and 13.

(c) If any test specimen shows defective machining or develops flaws, it may be discarded and another specimen substituted.

(d) If the percentage of elongation of any tension test specimen is less than that specified in Section 10 (a) and any part of the fracture is more than $\frac{3}{4}$ in. from the center of the gage length, as indicated by scribe scratches marked on the specimen before testing, a retest shall be allowed.

15. (a) If the results of the physical tests of any test lot do not conform to the requirements specified, the manufacturer may retemper or requench and temper such lot, but not more than three additional times unless authorized by the purchaser, and retests shall be made as specified in Section 14.

(b) If the fracture of any tension test specimen shows over 15 per cent crystalline, a second test shall be made. If the fracture of the second specimen shows over 15 per cent crystalline, the forgings represented by such specimen shall be retempered or requenched and tempered.

16. The forgings shall conform to the sizes and shapes speci-

elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(c) Tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

20. (a) Unless otherwise specified, any rejection based on tests made in accordance with Section 19 (b) shall be reported within five working days from the receipt of samples.

(b) Forgings which show injurious defects while being finished by the purchaser will be rejected, and the manufacturer shall be notified.

21. Samples tested in accordance with Section 19 (b), which represent rejected forgings, shall be preserved for two weeks from the date of the test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

FINISHING TEMPERATURES OF RAILS

In a recent paper by G. K. Burgess, J. J. Crowe, H. S. Rawdon and R. G. Waltenburg, which was issued by the Bureau of Standards under the title "Observations on Finishing Temperatures and Properties of Rails" (*Railway Age Gazette*, June 26, 1914) the standard specifications for steel rails adopted by the American Society for Testing Materials are criticized, in a general condemnation of the use of shrinkage allowance as the basis of temperature determination.

2. In that the shrinkage permitted is too great.

The committee took these criticisms under consideration, and presents a report.

Shrinkage Allowance vs. Pyrometer Control

Theoretically the determination of the finishing temperature of a bar of steel, because of the sensitiveness of the measuring apparatus, should be much more exact than measuring the variation in the change of length of a bar in cooling. There are, however, two reasons why the cruder means is preferable.

1. It is much easier to enforce. The mill must set the saws at such a distance apart in the case of gang saws, or at such distance from the stop in the case of a single saw, that when rails

are cold they will be within the close tolerances for length prescribed by the specifications. The penalty for not observing this is the milling of every rail to length, and the penalty is so severe in a modern rail mill that there is no question that the proper adjustment of the hot length will be provided. The measurement of temperatures of rails by pyrometer is a much more complicated proposition. Carrying the identity of each hot rail as to its observed temperature through the mill and out to the finishing shed where it can be rejected where necessary, would be a difficult and expensive procedure.

2. The pyrometer measures the temperature at the particular portion of the bar that is under observation. For a simple section this does not vary greatly, but in a complex section, like a T rail, there is a wide variation in the temperature of the various parts.

The Amount of Shrinkage

The authors of the paper have taken the maximum shrinkage allowed in the specifications of the society, and by dividing by the coefficient of shrinkage established by their experiments, have arrived at a temperature which they claim could be used in rolling rails, and yet keep within the requirements of the specifications. Such a method of arriving at rolling temperatures is not admissible in the case of unbalanced sections. The shrinkage allowance necessary for rails is a function, not only of the average temperature, but also of the section. The flanges of a thin-base section cool much more rapidly than the other parts of the section, and in cooling first, they become more rigid than the remainder of the section. When cut by the saws the cooler base and hotter head are of the same length, but as the head has a greater range to cool through, its shrinkage would be greater and cold length less than the base. This is corrected by the cambering rolls, which stretch the head to such length as will compensate for its greater shrinkage.

The shrinkage allowance necessary for any rail is not the shrinkage allowance based on the average temperature of the rail, nor the temperature of the head or base, such as observed in the Bureau of Standards' experiments; but the shrinkage allowance in sawing, which is necessary for any rail, is the amount of shrinkage of the portion which cools and becomes rigid first.

In view of the importance of the subject, it seems very desirable to secure some data as to the effect of the variation in the finishing temperature on the quality of the rail. While there is a large amount of literature bearing on the subject, actual dependable data regarding the quality of the rails are very scarce. M. H. Wickhorst reported on a series of tests made on Bessemer rails, the finishing temperatures of which measured on the heads varied from 940 to 1,030 deg. C., and more recently he reported on a similar series of tests made on open-hearth rails. The rails were subjected to drop tests, bend tests, tension tests, transverse tests of base, and the structure was examined under the microscope.

As a result of the tests on Bessemer steel rails, Mr. Wickhorst reported "that the ductility and deflection in the drop test were influenced little, if any, by the temperature. The number of blows that it took to break the rails in the drop test was uninfluenced by the temperature of rolling. The yield point and tensile strength in the tension tests were influenced little, if any. The elongation in the tension test decreased some as the temperature increased. The influence of temperature showed most prominently in the tension test, in the reduction of area, which decreased as the temperature of rolling increased. The size of the grain, as shown by the microscope, increased as the temperature increased."

His conclusions on the open-hearth series, which were rolled at temperatures between 695 and 850 deg. C., were as follows:

"It may be said that the results in the drop tests, slow bending tests and transverse tests of the base, were about the same for the different finishing temperatures, varied by holding the rail bar between rolls before final finishing. In the tensile tests the results were also about the same, except that the lower

finishing temperatures showed a little greater elongation and reduction of area. The lower finishing temperatures also showed a somewhat finer grain structure."

In all of the information as to actual tests which the committee was able to obtain, there is lacking anything which points to such decided differences in the quality of rails rolled at varying temperatures, as theoretical considerations have led some to expect. The differences are so slight that it seems hardly justifiable to go to any great expense in determining finishing temperatures any more accurately than is possible with the shrinkage clause, which on account of its easy application is by far the most convenient means of checking the finishing temperature.

CHANGES IN DUES

At the opening of the fifth session the secretary presented a report from the joint executive committee composed of the incoming and outgoing officers, recommending that the dues of members be increased from \$10 to \$15 per year; those of juniors from \$5 to \$7.50 and those of members in perpetuity from \$200 to \$300. It was voted to accept the report and refer the suggestion to letter ballot.

MICROGRAPHIC DETERMINATION OF DECARBURIZATION OF HEAT-TREATED STEELS

The report called attention to the possibility of detecting the amount and depth of decarburization of the surface and stated, in conclusion, that surface decarburization frequently exists in heat-treated steel parts, due either to the mill practice or to the heat treatment itself. From whatever cause, it should be investigated by the metallurgist and its extent ascertained. The microscope is undoubtedly the most efficient means of accomplishing this purpose in hypo-eutectoid steels. When the exact cause and extent have been determined, means may be provided for correcting it—at least to a certain extent. In the grinding operation, however, there sometimes lies the opportunity of entirely removing its deleterious effects by a judicious determination of the grinding limits, and in this the metallurgist should play a more conspicuous part than he has in the past.

RELATIONS BETWEEN MAXIMUM STRENGTH AND HARDNESS

This paper showed that there is a close relationship between the hardness of a steel and the maximum strength; and that this relationship exists whether the same maximum strength be obtained from different steels by a difference in the heat-treatment to which they are subjected or whether the hardness is different because of difference in the steels themselves. In this it appears that there is no relationship between the chemical composition and the hardness, but only between the hardness and the maximum strength.

Discussion.—In the brief discussion that followed attention was called to the desirability that there should be found to be some relationship between the hardness and the limit of elasticity as this is really the quality with which the designer is most concerned. It is exceedingly desirable that some quick method should be found for determining the elastic limit of materials and that, without mutilation. It was shown that this might be done for any specific steel treated in a definite manner, where the limit of elasticity was known from other means and that the hardness test might thus be made to indicate the elastic limit of another piece similarly treated.

SOME NEGLECTED PHENOMENA IN THE HEAT-TREATMENT OF STEEL

The two points to which attention was particularly called in this paper were that, in the heating of a piece of steel to a point above its temperature of saturation, there was a pause in the rate of heating as the temperature of the piece was passing through the saturation temperature, and further that with constant furnace temperatures, the higher temperatures were reached by the pieces in a shorter time than the lower ones. For example, a temperature of 1,200 deg. F. was reached in a shorter time than one of 1,000 deg. and one of 1,000 deg. in a shorter time still, while to reach 1,100 deg. took the longest of all. The

explanation of this is that the absorption of heat varies as the difference between the fourth powers of the temperatures of the furnace and the piece being heated and that this difference increases as the furnace temperature increases, so that the absorption of heat is correspondingly more rapid. The seeming exception in the case of the rise to 1,400 deg. is explained on the ground of the phenomenon of lag in passing through the temperature of saturation, which is at about 1,350 deg., and therefore close to 1,400, where the difference of the fourth power is small, resulting in a slow increase of temperature at that point.

Discussion.—The discussion called attention to the practice of specifications calling for a slow heating and a rapid cooling as though the two practices were in opposition to each other, but it was explained that, in heating a piece, it was put under tension and that if the work were to be done rapidly, cracks would be developed, while in the case of cooling the surfaces were put in compression and there was not the same danger.

INTERNAL STRESSES DEVELOPED BY DIFFERENT QUENCHING MEDIUMS, AND THEIR EFFECTS

It was shown that the quenching power of a liquid depends largely on the latent heat of vaporization, and refutes the views commonly held that it depends upon the initial temperature or the heat conductivity of the medium. The addition of salt to increase the quenching power of water is also proved fallacious, and the experiments of Le Chatelier that the conductivity for heat is no measure of the cooling power of a liquid are confirmed.

Mercury has a heat conductivity of over ten times that of water, but both of these able physicists demonstrate that it is decidedly weaker as a cooling medium. Le Chatelier considers that the specific heat of the cooling medium governs the cooling speed—and this is confirmed by Benedicts—providing the temperature of the body is low, but the latent heat of vaporization is the controlling factor when the temperature of the body is high. This theory is tenable considering the large amount of heat which can be carried off by a relatively small weight of vapor, and accounts for the efficiency of water as a quenching medium.

Water is the oldest known cooling medium for quenching steel. Subsequently, various animal and vegetable oils were employed, and many of the artisans using them are still under the belief that carbon is added to the steel by these liquids and the properties thereby improved. In this country mineral oil, because of its low cost, has almost entirely displaced the animal and vegetable oils, and for many years was used almost exclusively for quenching spring plates and large objects. Water, however, possesses manifest advantages of cheapness, cleanliness, freedom from odor, freedom from fire hazard, and above all, efficiency. It is true that a higher elastic limit, tensile strength and elastic ratio for a corresponding elongation and reduction of area, or a higher reduction of area and elongation for a corresponding elastic limit, can be obtained on a water-quenched steel than can be secured by the methods of oil quenching generally practiced. Opposing these manifest advantages is the danger from fractures as the result of the lag in the temperature of the steel.

The results of these experiments are as follows:

1. That the tensile properties of water-quenched steel are superior to those obtained by quenching in any other of the usual quenching mediums.
2. The internal stresses induced in a water-quenched object are of much greater magnitude than those developed by quenching in any other of the usual quenching mediums.
3. They confirm the laboratory experiments of Doctor Benedicts, that the efficiency of the quenching mediums is not dependent to a marked extent on the initial temperature of the cooling mediums.
4. With but few exceptions, which can no doubt be explained by some inequality in the steel, the induced internal stresses are affected by the initial temperature, except in the case of water.
5. Internal stresses induced by quenching in water are independent of the initial temperature.

6. The small difference between the temperature of the cooling mediums, before and after quenching, confirms Doctor Benedicts' explanation that large quantities of heat are carried off by the latent heat of vaporization.

7. Light oils have a greater quenching speed than heavy oils but not markedly so. A good tempering oil, however, should be free from tar and should not become thick from the precipitation of the burnt tar.

THE EFFECT OF FINER GRINDING UPON THE PHYSICAL PROPERTIES OF PORTLAND CEMENT

The following is from a paper on this subject by P. H. Bates. The question of the finer grinding and the addition of more SO_3 to Portland cement is frequently discussed, and the consensus of opinion seems to be that further investigation is needed. Ten commercial cements either had more SO_3 added to them, were ground finer, or were both ground finer and had more SO_3 added. From the four groups of ten cements each, the customary physical tests and small specimens were made. In addition cylinders of 1:1½:4½ concrete were made, and expansion bars of neat and 1:3 standard sand mortars. Some of the neat tension briquettes were also examined microscopically for relative amounts of hydration.

The results show that the time of set is affected somewhat by each of the above treatments, finer grinding tending to produce a quicker set, and the addition of more SO_3 a quicker initial but slower final set. The addition of SO_3 to the coarser-ground cements does not materially affect the strength; finer grinding produces considerable increase; while the addition of SO_3 to the finer-ground cements tends to produce results very slightly less than those obtained when they contain the normal amount. Expansion measurements show that the addition of SO_3 to the coarse cements produces a large increase in length of neat cements; to finer-ground cements the increase is not so great. Finer grinding alone does not materially affect the expansion due to hydration; the expansion of the mortar bars is not materially affected by the use of the different cements.

All conclusions made in this paper are deduced from results obtained from specimens tested at the end of 90 days. Specimens have been made to be tested at the end of six months, one year, and two later periods, and consequently the present conclusions may have to be materially modified.

STANDARD TESTS FOR LUBRICANTS

The committee has very carefully reconsidered its report of last year, which was referred back to it by the Society.

For the determination of viscosity, the committee reaffirms its recommendation of last year to the Society that the Saybolt Standard Universal Viscosimeter be the standard. The very careful investigation of Dr. C. W. Waidner of the Bureau of Standards, showing that the Saybolt instrument possesses as great accuracy as any other viscosimeter used for the determination of the viscosity of lubricants, confirms the previous opinion of the committee. The Saybolt viscosimeter is the instrument in practically universal use in the United States for the determination of the viscosity of lubricants, and possesses many other advantages covered by the committee's report of last year.

On the question of an alternate instrument for viscosity, the committee after very careful consideration has concluded that the adoption of an alternate instrument would entirely destroy the value of a standard instrument. The committee realizes, however, that there are many who for years past have used other instruments than the Saybolt and will probably continue to do so, and in order not to work undue hardship in these cases, the committee is now submitting, and will submit from time to time, conversion tables for converting readings on various viscosimeters into readings on the Saybolt Standard Universal Viscosimeter.

The committee recommends that the proposed Standard Tests for Lubricants covering viscosity, specific gravity, free acid, and cloud and pour tests, be referred to letter ballot of the society.

PAINTS USED IN HAVRE DE GRACE BRIDGE TESTS

The special sub-committee, to which was referred the motion made at the last annual meeting of the society charging it to renew its efforts to obtain such additional information as would enable the committee to describe the composition of the several paints of the Havre de Grace bridge tests more satisfactorily to the engineering profession, than could be interpreted from the committee's published analyses, and also to compile a brief résumé of the methods and conditions of the test, reports as follows:

Under date of November 20, 1914, a circular letter was sent to each of the manufacturers who furnished paints for the Havre de Grace bridge tests. This letter referred to the continued demand for fuller information as to the composition of the paints, and for an identification of the manufacturers' names with the paints tested. Two inquiries were made of each manufacturer, namely: (1) "Would you object to the committee reporting to the Society that panels and section Nos. — were painted with paint furnished by you?"; and (2) "It is our plan to publish a brief description of your paint, such description to be based either upon the analysis which we have made, or upon information received from you. Would the following description of your paint be satisfactory?"

The letter also requested "that if the enclosed description is not satisfactory, please send one that is," adding that information of value to engineers was desired. Furthermore, there was enclosed to each manufacturer a blue-print "log," giving the record of the particular paint as applied, with a statement that copy of this had been sent originally upon completion of the painting of the bridge, and that such record was to be published by the committee.

The receipt of this letter was acknowledged by all but two of the contributing manufacturers. Of those who acknowledged the receipt of the letter, the manufacturers of nine paints were willing to have their names published in connection with the paints. The manufacturers of six paints were unwilling, and the manufacturers of two paints did not reply to this specific inquiry. The manufacturers of seven paints accepted the sub-committee's description without suggesting modifications. Ten suggested modifications.

The objections of the manufacturers of six paints to the publication of their names in connection with the paints makes it impossible for the sub-committee in good faith to publish any information relating thereto.

Satisfactory replies to the original circular letter asking for contributions to defray the expenses of the test having been received from a sufficient number of manufacturers to warrant the inauguration of the test, costs were figured on an area basis and a second circular letter sent to those who had agreed to enter the competition, the most important point involved being the following questions propounded, covering the composition and proportioning of the materials of each paint:

- Pigment; .
- Volatile thinner;
- Vehicle or liquid non-volatile matter, particular information being desired as to the following:
 1. Saponifiable oils, that is, linseed, etc.;
 2. Resinous matter, that is, resins and gums;
 3. Bituminous matter, that is, asphaltum, pitch, etc.;
- Mineral matter such as lead, manganese, lime, etc., other than that present as pigment.

Unfortunately these questions were regarded as too searching by many paint manufacturers on the ground that if answered they would disclose trade secrets and methods of manufacture, since the committee had stated that in formulating the above list of questions the information sought was not intended to include trade secrets or particular methods of treatment or manufacture of the constituents of the paints.

In view of the attitude of the manufacturers, and to avoid the complete jeopardizing of the proposed tests, the above questions were specifically withdrawn and only such information as the manufacturers were willing to submit was asked for. This, coupled with that to be derived from the duplicate analyses

of each paint by the committee, comprised all the data accumulated whereon to base descriptions of the paints such as are desired by the large engineering membership of the society.

It must be understood that the committee fully recognized, as soon as the manufacturers refused the fullest information regarding their paint products, that a considerable part of the anticipated value of these tests would not be realized. Appreciating as time went on during the annual inspections, that the action of certain paints might be more intelligently interpreted with fuller detailed information not in the possession of the committee and not to be derived from a study of the most complete analyses but probably within the knowledge of the manufacturers, the unsatisfactory conditions imposed through the manufacturers' refusal to answer the original questions became so apparent that informal attempts were made from time to time to sound the manufacturers regarding the possibility of their meeting the committee's wishes. But with the development of the tests, it became more and more apparent that such information as desired by the committee could only have been obtained as originally proposed at the time of inauguration of the tests.

The test logs of the several paints give detailed information regarding the conduct of the tests which, as originally stated, was aimed to be "eminently fair to each competitor and to the paints themselves." The annual inspections were carefully carried out, all ratings being with the same scale, and detailed examination of yearly reports will demonstrate the surprising concordance of these with conditions likely to exist.

No attempt has been made in the reports on the Havre de Grace bridge tests to give full information as to the prices of the paints used, although it is recognized that engineers must consider price in figuring the cost of protection against rust.

SPECIFICATIONS FOR YELLOW-PINE BRIDGE AND TRESTLE TIMBERS

[These proposed revised standard specifications are to be applied to solid members and not to composite members.]

General Requirements:

1. Except as noted, all timber shall be cut from sound trees and sawed standard size; close-grained and solid; free from defects such as injurious ring shakes and crooked grain; unsound knots; knots in groups; decay; large pitch pockets, or other defects that will materially impair its strength.

2. (a) Dense southern yellow pine shall show on either end an average of at least six annual rings per inch and at least one-third summer wood, or else the greater number of the rings shall show at least one-third summer wood, all as measured over the third, fourth, and fifth inches on a radial line from the pith. Wide-ringed material excluded by this rule will be acceptable, provided that the amount of summer wood as above measured shall be at least one-half.

(b) The contrast in color between summer wood and spring wood shall be sharp and the summer wood shall be dark in color, except in pieces having considerably above the minimum requirement for summer wood.

(c) In cases where timbers do not contain the pith, and it is impossible to locate it with any degree of accuracy, the same inspection shall be made over 3 in. on an approximate radial line beginning at the edge nearest the pith in timbers over 3 in. in thickness and on the second inch (on the piece) nearest to the pith in timbers 3 in. or less in thickness.

(d) In dimension material containing the pith but not a 5-in. radial line, which is less than 2 in. by 8 in. in section or less than 8 in. in width, that does not show over 16 sq. in. on the cross-section, the inspection shall apply to the second inch from the pith. In larger material that does not show a 5-in. radial line the inspection shall apply to the 3 in. farthest from the pith.

(e) The radial line chosen shall be representative. In case of disagreement between purchaser and seller the average summer wood and number of rings shall be the average of the two radial lines chosen.

3. Sound southern yellow pine shall include pieces of southern pine without any ring or summer wood requirement.

4. Rough timbers sawed to standard size shall mean that they shall not be over $\frac{1}{4}$ in. scant from actual size specified. For in

stance, a 12-in. by 12-in. timber shall measure not less than $11\frac{3}{4}$ in. by $11\frac{3}{4}$ in.

5. Standard dressing means that not more than $\frac{1}{4}$ in. shall be allowed for dressing each surface. For instance, a 12-in. by 12-in. timber shall, after dressing four sides, not measure less than $11\frac{1}{2}$ in. by $11\frac{1}{2}$ in.

II. Stringers

6. (a) Dense southern yellow pine shall show not less than 80 per cent of heart on each of the four sides, measured across the sides anywhere in the length of the piece; loose knots, or knots greater than $1\frac{1}{2}$ in. in diameter, will not be permitted at points within 4 in. of the edges of the piece.

(b) Sound southern yellow pine shall be square-edged, except it may have 1 in. wane on one corner. Knots shall not exceed in their largest diameter one-fourth the width of the face of the stick in which they occur. Ring shakes extending not over one-eighth of the length of the piece are admissible.

III. Caps and Sills

7. (a) Dense southern yellow pine shall show 85 per cent of heart on each of the four sides, measured across the sides anywhere in the length of the piece, and shall be free from knots over $2\frac{1}{2}$ in. in diameter. Knots shall not be in groups.

(b) Sound southern yellow pine shall be square-edged, except that it may have 1 in. wane on one corner, or $\frac{1}{2}$ in. wane on two corners. Knots shall not exceed in their largest diameter one-fourth the width of the face of the stick in which they occur. Ring shakes extending not over one-eighth the length of the piece.

IV. Posts

8. (a) Dense southern yellow pine shall show not less than 75 per cent of heart, measured across the face anywhere on the length of the piece, and shall be free from knots over $2\frac{1}{2}$ in. in diameter. Knots shall not be in groups.

(b) Sound southern yellow pine shall be square-edged, except it may have 1 in. wane on one corner, or $\frac{1}{2}$ in. wane on two corners. Knots shall not exceed in their largest diameter one-fourth the width of the face of the stick in which they occur. Ring shakes shall not extend over one-eighth of the length of the piece.

V. Longitudinal Struts or Girts

9. (a) Dense southern yellow pine shall show one face all heart; the other face and two sides shall show not less than 85 per cent of heart, measured across the face or side anywhere in the piece, and shall be free from knots $1\frac{1}{2}$ in. or over in diameter.

(b) Sound southern yellow pine shall be square-edged and sound, and shall be free from knots $1\frac{1}{2}$ in. or over in diameter.

VI. Longitudinal X-Braces, Sash Braces and Sway Braces.

10. (a) Dense southern yellow pine shall show not less than 80 per cent of heart on two faces and four square edges, and shall be free from knots over $1\frac{1}{2}$ in. in diameter.

(b) Sound southern yellow pine shall be square-edged and sound, and shall be free from knots $2\frac{1}{2}$ in. or over in diameter.

PROPOSED TENTATIVE SPECIFICATIONS FOR SOUTHERN YELLOW-PINE PILES AND POLES TO BE CREOSOTED

1. The specifications as to strength shall agree with the requirements that will be finally adopted by the Society under the Standard Classification of Structural Timber stipulating the number of rings per inch or some substitute therefor. (Included in this section will also be a list of the allowable defects, etc.)

2. All piles or telegraph poles shall show 40 per cent sapwood in cross-section, or there shall be a ring of sapwood not less than 1 in. in thickness all around the heartwood.

3. (a) Piles and poles shall be cut from sound live trees, of straight grain and regular taper; without crooks exceeding one-fourth the diameter of the stick at the middle of the crook when peeled. They shall be free from rot, red heart, holes or rotten knots, shakes and felling checks.

(b) All piles and poles shall have the bark and inner skin carefully removed when the tree is felled; all limbs and knots trimmed flush and butts cut square.

4. The minimum diameter of piles after peeling shall be as follows:

Length	Butts, In.	Tops, In.
36 ft. and under	14	10
38 ft. and under 50 ft.	14	9
50 ft. and over	15	9

No pile with butt diameter over 18 in., nor top diameter over $13\frac{1}{2}$ in., will be accepted. The length of each pile is to be legibly marked on the butt with white or black paint.

PROPOSED TENTATIVE SPECIFICATIONS FOR SOUTHERN YELLOW-PINE TIMBER TO BE CREOSOTED

1. The specifications as to strength shall agree with the requirements that will be finally adopted by the society under the Standard Classification of Structural Timber, covering the number of rings per inch or some substitute therefor. (Included in this section will also be a list of the allowable defects, etc.)

2. All pieces shall show at least 30 per cent sapwood in cross-section. This is based on a minimum treatment of 12 lb. of creosote per cubic foot of timber.

3. In bridge stringers knots greater than $1\frac{1}{2}$ in. in diameter shall be at least 4 in. from the edges of the stick. There shall be no knots more than 4 in. in greatest diameter in any part of the stick.

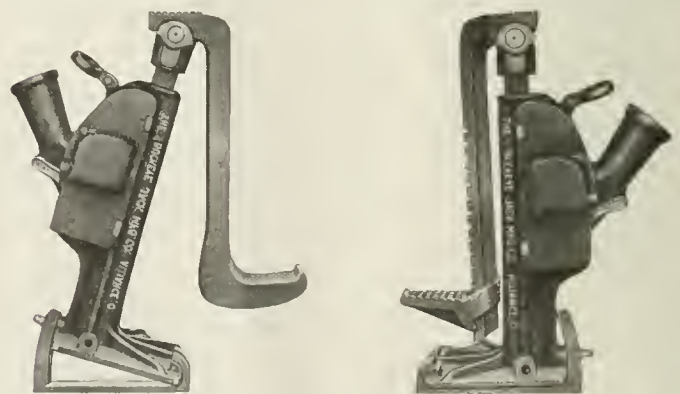
4. Caps, sills, posts and sawed poles must be free from knots more than $2\frac{1}{2}$ in. in diameter.

5. Longitudinal bracing, cross-arms and similar pieces having small cross-section shall have no knots more than 1 in. in diameter.

6. Track ties shall show at least 20 per cent sapwood in cross-section. This is based on a minimum full-cell treatment of 8 lb. creosote per cubic foot of timber.

EMERGENCY JACKS

The jacks shown in the illustration include several features which are especially valuable in equipment designed for emergency use. These are the swivel top, to which is pivoted an auxiliary hook for low lifting operations and an auxiliary heel plate which enables the operator to use the jack at an angle without blocking up. An adjustable auxiliary lift is shown on one of the jacks, which may be quickly adjusted to the load without sacrificing a portion of the lifting range of the jack. The foot of the jack is so designed that the auxiliary heel plate may be applied in two positions at right angles to



Jacks with Adjustable Heel Plates and Low Lifting Hooks

each other, thus permitting the operation of the jack tilted either sideways or forward. The heel plate provides a substantial footing for the tool in any position without the necessity of special blocking. When so desired it may be removed and the jack operated upon its own base.

These jacks have recently been added to the line of the Buckeye Jack Manufacturing Company, Alliance, Ohio. In designing them special attention was given to the elimination of unnecessary parts in order that the number of repair parts required may be kept at a minimum. The parts are easily assembled, and repairs may be made by the ordinary shop labor.

General News Department

The Chicago & Alton has increased the working time at its shops at Bloomington, Ill., from eight to nine hours a day.

In the Federal Court at Charleston, W. Va., July 2, the government filed suit against the Chesapeake & Ohio for 21 violations of the hours-of-service law, the charges relating to the operation of freight trains on the Coal River branch.

The Carolina, Clinchfield & Ohio is now open for regular passenger and freight business to Elkhorn City, Ky., 35 miles north of the former northern terminus at Dante, Va. Through passenger trains began running on the first of July.

The Interstate Commerce Commission, Department of Valuation, has modified its valuation order No. 9, fixing the compensation of the railways for the movement of outfit cars used by the federal valuation parties so as to provide a minimum charge of \$2 per movement.

During the month of June the Norfolk & Western dumped 853,845 tons of coal over its coal piers at Lambert's Point, Norfolk, establishing a new high record. The record for the previous month was 716,002 tons, which was the previous high record, exceeding that of 694,000 tons established in September, 1914.

The Southern Pacific announces that the Panama-Pacific Exposition has awarded to it the grand prize, which will consist of a medal and a diploma covering track, equipment and shop products, and the company's safety first exhibition in the Transportation building; and also the traffic promotion exhibit in the company's own building.

In the state court at Columbia, S. C., July 2, the Southern Railway and other carriers secured a temporary injunction restraining the state tax commissioners, and other state officers, from collecting the three-mill annual license tax imposed on the railroads, insofar as the assessment is based on income from interstate commerce. The court will give a hearing on July 15.

Patrick W. Mulligan, crossing watchman of the Pennsylvania at Norristown, Pa., who received from President Wilson a medal, awarded in accordance with the Act of Congress, in recognition of his heroism in saving a little child who was in danger of being run over by a locomotive, has received a second medal, one from the Carnegie Hero Fund.

The Pennsylvania Public Service Commission has prepared a report showing that there are 151 tunnels in operation in that state. These tunnels aggregate 31 miles in length, the longest being at Greentree on the Wabash-Pittsburgh, which is 4,716 ft. long. Others are at Gallitzin, on the Pennsylvania, 4,716 ft.; Mahanoy, Philadelphia & Reading, 3,406 ft.; and Big Savage, Western Maryland, 3,296 ft. The Gallitzin and Mahanoy tunnels have electric ventilating apparatus.

J. A. McCrea, general manager of the Long Island, says that it is only by the rarest chance that there was not a series of disastrous accidents to automobiles at grade crossings on that road during the week ending June 28. Every day he receives reports to the effect that the crossing gates at this or that place have been broken by drivers who thought more of speed than of safety. In that one week there were a dozen or more such cases. Mr. McCrea has issued a list of these "near accidents."

The San Pedro, Los Angeles & Salt Lake has issued to its employees a special bulletin on trespassing, urging them to begin a campaign of agitation in their individual circles of influence to arouse the public to a realization of the dangers of trespassing. The bulletin says: "The Salt Lake route is a safe road to ride upon. In the last eight years no passengers have been killed in train accidents. It is a very unsafe road to walk upon. During the same period 101 trespassers have been killed."

Upon the recent retirement of William McNab, principal assistant engineer, Grand Trunk, from the board of direction

of the American Railway Engineering Association after a continuous service of 11 years, he was elected an honorary member of the governing board and appropriate resolutions were passed in appreciation of his long service in various important positions, including that of president. These resolutions have been incorporated in an elaborate book which has been prepared for presentation to Mr. McNab.

In the United States District Court at New York City, July 7, Judge Grubb and a jury decided in favor of the New York, New Haven & Hartford Railroad in the suit for \$25,000 damages brought by Florence Clarke, a widow of George L. Clarke, engineer of the Boston Express, who was killed in the Westport derailment, October 3, 1912. Mrs. Clarke contended that the wreck was due to the bad condition of the track. Counsel for the New Haven convinced the jury that it was Engineer Clarke's failure to obey the stop signals set against the train that resulted in the wreck. All the other suits for loss of life have been settled by the road. It has also paid \$450,000 to claimants for personal injuries.

A remarkable record has just been made by the maintenance of way department of the Lehigh Valley in the loading of rails. Two work trains, equipped with every sort of a loading device from a locomotive crane to a ditching machine, in one day loaded from alongside the tracks 171,988 feet of 90-lb. relaying rail, with joints complete. This amount of work equals 2,303.41 tons or 16 track miles, believed to be the greatest amount of rail ever loaded on one division in one day. The cost of this work amounted to 15.7 cents a ton. A few days later on the Seneca division of the same road one work train loaded 149,466 feet of 90-lb. rail with joints complete, an even greater record. This equals 14.15 track miles or 2,001.78 tons of rail; cost per ton 15.6 cents.

President Fairfax Harrison, of the Southern Railway, has signalized the close of the company's fiscal year by sending to all officers and employees the following message: "We are closing today a fiscal year which has been full of anxiety and difficulty, but through team work and loyal self-sacrifices and effort by the entire organization, we have come out of it sound and full of courage for the future. This result has not been due to any one man or to any group of men, but to the co-operation of every man who has recognized the problem and given us in our common duty the best that was in him. I send my personal thanks then to everyone of you. The fight is not yet over, but the spirit of the past ten months is bound to see us through. Meanwhile, I want you to know my pride in you and in what has been done already."

J. E. Sexton, general manager of the Eureka & Palisade, the narrow gauge railroad running trains three times a week between Palisade, Nev., and Eureka, 84 miles, who has complained, without avail, to the postoffice department because the government hires the mails carried by a mule team—taking 33 hours to traverse the 84 miles, when his train runs through in ten hours—has written an open letter to the presidents of the Southern Pacific and the Atchison, Topeka & Santa Fe to enlist their assistance. In this letter he begins by protesting, as a stockholder, against the granting of free transportation by these roads to the employees of the California State Railroad Commission, which free transportation he says, is contrary to the provisions of the constitution of that state. The commission has 200 employees and they travel all over the state on many errands, having nothing to do with railroad business, their investigations having to do with water companies, light companies and other kinds of public utilities. From this general protest against the over-reaching practices of government, Mr. Sexton goes on to restate his grievance against the postoffice department. With this our readers have already been made acquainted. The gist of the complaint is that the government is working against its own interest when, following the technicalities of the law, it employs a slow mule team to carry mail which could be carried much more quickly

by the steam locomotive. Referring to the postmaster general and his action under the constitution, Mr. Sexton says: "If the constitution was formed to establish justice, insure domestic tranquillity and guarantee to every person the equal protection of the law, the postmaster general is yet ignorant of the fact, but I will venture the opinion that if the inhibition complained of militated against a man because he was a member of a labor organization, there would be no tranquillity around his official roost at Washington until some action was taken."

Summary of Revenues and Expenses of Large Steam Roads

The following figures were compiled by the Interstate Commerce Commission from monthly reports of operating revenues and expenses of large steam roads for April, 1915. No reports

Accident Record—Correction

An officer of the Baltimore & Ohio writes that the number of trespassers killed in the derailment at Belmont, Ohio, May 14, reported in the Railway Age Gazette, June 18, page 1414, was two, not eight.

Efficiency on the New Haven

The efficiency bureau of the New York, New Haven & Hartford, since June 1, 1914, has made improvements in the view for wayfarers on the highway at 250 grade crossings; and a large number of crossings had been improved before that date.

At about 40 stations on the road, some near New York and some near Boston, red or white stripes have been painted on the platforms, on the side adjacent to the track to warn pas-

FOR THE MONTH OF APRIL

Item	United States			Eastern District			Southern District			Western District		
	Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated	
		1915	1914*		1915	1914*		1915	1914*		1915	1914*
Average number of miles operated	228,736.02	...	...	58,823.22	...	...	42,367.16	...	...	127,545.64	...	...
Revenues:												
Freight	\$161,998,973	\$708	\$715	\$75,301,759	\$1,280	\$1,233	\$26,597,178	\$628	\$652	\$60,100,036	\$471	\$495
Passenger	47,083,876	206	226	20,787,406	354	381	6,437,497	152	179	19,859,073	155	170
Mail	4,745,337	21		1,725,434	29		626,401	15	15	2,393,502	19	
Express	5,756,315	25	74	2,631,225	45	135	878,815	21	22	2,246,275	18	54
All other transportation	6,692,957	29		3,733,072	64		626,941	15	16	2,332,944	18	
Incidental	4,544,845	20	22	2,304,435	39	43	631,097	15	16	1,609,313	13	13
Joint Facility—Cr.	289,367	1	1	138,949	2	2	60,693	1	1	90,135	1	?
Joint Facility—Dr.	—114,240	...	...	—71,728	1	...	—21,677	—1	...	—20,835	...	...
Railway operating revenues	\$230,997,430	\$1,010	\$1,038	\$106,550,052	\$1,812	\$1,794	\$35,836,945	\$846	\$901	\$88,610,433	\$695	\$733
Expenses:												
Maint. of way and structures	\$31,655,184	\$138	\$145	\$12,927,218	\$220	\$223	\$5,036,576	\$119	\$125	\$13,691,390	\$108	\$115
Maintenance of equipment	40,608,848	177	189	19,512,988	332	343	6,497,033	153	178	14,598,827	115	121
Traffic	4,942,055	22	22	1,868,147	32	32	886,999	21	22	2,186,909	17	17
Transportation	80,366,312	351	389	37,865,900	644	704	11,893,336	281	323	30,607,076	240	264
Miscellaneous operations	1,762,977	8	10	783,474	13	21	179,284	4	5	800,219	6	7
General	6,307,607	28	28	2,747,807	46	47	992,276	24	25	2,567,524	20	21
Transportat'n for Investm't—Cr.	—511,599	—2	—1	—81,816	—1	...	—76,561	—2	...	—353,222	—3	—1
Railway operating expenses	\$165,131,384	\$722	\$782	\$75,623,718	\$1,286	\$1,370	\$25,408,943	\$600	\$678	\$64,098,723	\$503	\$544
Net revenue from railway operations	\$65,866,046	\$288	\$256	\$30,926,334	\$526	\$424	\$10,428,002	\$246	\$223	\$24,511,710	\$192	\$189
Railway tax accruals	\$11,106,959	\$49	\$50	\$4,692,664	\$80	\$81	\$1,540,684	\$36	\$38	\$4,873,611	\$38	\$40
Uncollectible railway revenues	49,880	...	...	17,138	...	...	9,760	...	...	22,992	...	...
Railway operating income	\$54,709,207	\$239	\$206	\$26,316,542	\$446	\$343	\$8,877,558	\$210	\$185	\$19,615,107	\$154	\$149

FOR THE TEN MONTHS ENDING WITH APRIL

Item	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*

Average number of miles operated	228,432.08	...	...	58,776.53	...	...	42,308.22	...	...	127,347.33	...	...
Revenues:												
Freight	\$1,654,171,380	\$7,241	\$7,768	\$720,826,067	\$12,264	\$13,126	\$254,908,669	\$6,025	\$6,734	\$678,436,644	\$5,328	\$5,608
Passenger	524,174,515	2,295	2,544	229,837,106	3,910	4,197	72,349,898	1,710	1,995	221,987,511	1,743	1,955
Mail	47,572,112	208		17,305,351	295		6,269,348	148	148	23,997,413	189	
Express	56,785,732	249	802	25,419,154	432	1,471	8,549,844	202	230	22,816,734	179	580
All other transportation	68,677,904	301		38,058,980	648		5,637,639	133	151	24,981,285	196	
Incidental	48,255,601	211	226	24,974,784	425	442	6,089,608	144	160	17,191,209	135	147
Joint Facility—Cr.	2,922,823	13	13	1,321,882	22	21	580,041	14	14	1,020,900	8	9
Joint Facility—Dr.	—1,044,373	—5	—4	—657,477	—11	—8	—137,530	—3	—3	—249,366	—2	—2
Railway operating revenues	\$2,401,516,694	\$10,513	\$11,349	\$1,057,085,847	\$17,985	\$19,249	\$354,247,517	\$8,373	\$9,429	\$990,182,330	\$7,776	\$8,297
Expenses:												
Maint. of way and structures	\$297,808,893	\$1,304	\$1,482	\$125,645,129	\$2,138	\$2,407	\$48,428,216	\$1,145	\$1,244	\$123,735,548	\$972	\$1,087
Maintenance of equipment	418,347,393	1,832	1,982	197,385,994	3,358	3,666	67,952,843	1,606	1,778	153,008,556	1,201	1,263
Traffic	49,405,892	216	231	18,808,789	320	349	9,218,413	218	222	21,378,690	168	179
Transportation	857,076,295	3,752	4,149	398,390,941	6,778	7,562	123,543,524	2,920	3,278	335,141,830	2,632	2,844
Miscellaneous operations	19,008,489	83	108	8,905,629	152	210	1,840,001	43	49	8,262,859	65	79
General	61,740,039	270	279	26,312,120	448	453	9,903,529	234	246	25,524,390	200	210
Transportat'n for Investm't—Cr.	—5,445,554	—24	—11	—632,140	—11	...	—1,106,858	—26	—3	—3,706,556	—29	—19
Railway operating expenses	\$1,697,941,447	\$7,433	\$8,220	\$774,816,462	\$13,183	\$14,737	\$259,779,668	\$6,140	\$6,814	\$663,345,317	\$5,209	\$5,543
Net revenue from railway operations	\$703,574,247	\$3,080	\$3,129	\$282,269,385	\$4,802	\$4,512	\$94,467,849	\$2,233	\$2,615	\$326,837,013	\$2,567	\$2,654
Railway tax accruals	\$111,305,078	\$487	\$500	\$45,989,038	\$782	\$800	\$15,526,059	\$367	\$376	\$49,789,981	\$391	\$401
Uncollectible railway revenues	448,219	2	...	155,956	3	...	79,103	2	...	213,160	2	...
Railway operating income	\$591,820,950	\$2,591	\$2,629	\$236,124,391	\$4,017	\$3,712	\$78,862,687	\$1,864	\$2,239	\$276,833,872	\$2,174	\$2,253

*Because of changes in accounting classifications, consolidations of companies, etc., comparative averages are approximate only

are included for roads whose operating revenues for the year ended June 30, 1914, did not reach \$1,000,000. The figures are compiled as rendered and should not be considered final, inasmuch as scrutiny of the reports may lead to their modification before acceptance.

sengers to keep back. The stripe is 3 in. wide and about 30 in. from the edge of the platform.

The standard clearance diagram of the company, designed to prevent the erection of any structure or the placing of any material too near the tracks has been the subject of investigation

throughout the company's territory and a strict enforcement of the regulations has been provided for. In this connection the proper care of baggage trucks and other things at stations has been attended to, and new rules have been prescribed for the safe operation of hand cars, velocipedes and motor cars.

The division efficiency committees meet every month and by means of interlocking committees useful ideas brought out on any division are made available throughout the company's lines. The yards and the larger stations are to be supplied with first-aid cabinets.

The Mutual Magazine

This is the title of a new monthly periodical which has been started by "The Mutual Beneficial Association of Pennsylvania Railroad Employees," an organization which has been organized for the purposes indicated in the title, and which has an insurance department. It has a large membership already. Its insurance feature seems to be popular notwithstanding the existence of the well-known relief association maintained by the railroad company and the promise of pensions to all employees who are honorably retired at the age of 70. At Philadelphia and at Harrisburg the members of the association secure discounts at stores by co-operative buying. The editor of the magazine is N. F. Dougherty, 1841 Filbert street, Philadelphia, and the president of the association is George W. Brown.

The Alaskan Government Railway

Secretary Lane has received a report saying that construction work has been begun on the government railway in Alaska, and that a headquarters has been established at Ship Creek, Cook's Inlet. About 2,000 men are engaged in making wagon roads, which will be necessary to facilitate railway construction.

President Wilson has ordered the reservation of a tract 200 miles long and five to ten miles wide, along the proposed railroad line, to provide a supply of timber for use in the construction of the track, this land, however, being open to settlement, nevertheless.

The General Land office at Seward announces that there will be an auction sale of town sites along the route of the railway on July 9.

A Resume of the Mail Pay Question

The Committee on Railway Mail Pay, Ralph Peters, New York, chairman, has issued a booklet entitled "What the Railway Mail Pay Problem Means to the Railroads," summarizing the facts relating to this controversy, and copies of it have been sent to all members of Congress, state and federal regulative commissions, and many other persons in public life. The Moon bill, as here analyzed, is shown to amount to an almost complete delegation of the rate-making power, as far as the transportation of the mails is concerned, to the postmaster general, who would be vested, under its terms, with authority to make the rates anything he might choose, "not exceeding" certain specified sums. He could reduce the rates without restriction and could also dictate, in almost every respect, the character and extent of service the railroads would be required to render. The railroads would be compelled to perform such service as the postmaster general might demand, at such rates as he might choose to pay, under penalty of \$5,000 a day for each refusal.

The committee restates its position as follows:

1. The mails should be weighed, and the pay be readjusted, at least once a year instead of once in four years.

2. The railroads should be paid for the use and operation of apartment post office cars—for which the present law allows no pay.

3. The railroads should be paid for, or relieved from, the duty of carrying the mails between railroad stations and post offices.

The railroad presidents at their recent meeting in New York City approved the suggestion of the committee that the ultimate solution of the problem would lie in reference of the matter to the Interstate Commerce Commission, with full power.

Boston Terminal Commission

The Massachusetts legislature has provided for the appointment of a commission, to serve without pay, to investigate the subject of terminal facilities and the improvement of facilities for the transportation of freight in the Metropolitan district (Boston). The members are chosen partly by the legislature and partly by the governor of the state and the mayor of Boston. They are Charles M. Spofford, consulting engineer and head of the department of civil and sanitary engineering of the Massachusetts Institute of Technology; Luke D. Mullen; Senators James F. Cavanagh and Martin Hays; Representatives H. A. Wilson, F. P. Greenwood and Robert Robinson, and F. H. Prince and W. H. Coolidge appointed by the mayor. One specific feature in the committee's work will be to determine what proportion of the cost of improvements or developments should be borne by the state, what the city of Boston and what by public service corporations.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Hartman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.
- AMERICAN RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Association. Annual meeting, October, 1915.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday of each month, Pittsburgh.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.
- SALT LAKE TRANSPORTATION CLUB.—R. F. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, July 15, 1915, Atlanta. Annual meeting, January, 1916.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.—HARRY S. FOX, Toledo, Ohio. Regular meetings, 1st Saturday in month, Bood's House, Toledo.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Genl. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. V. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Maintenance			Operating expenses				Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total.	Way and structures.	Of equipment.	Trans- portation.	Miscellaneous.	Traffic.	General.	Total.				
Alabama & Vicksburg	143	\$81,878	\$32,100	\$113,978	\$15,103	\$30,816	\$3,684	\$1,958	\$3,684	\$5,272	\$103,006	\$22,282	\$8,750	\$13,532	\$10,841
Alabama Great Southern	309	296,005	81,556	377,561	46,219	91,027	10,754	2,721	10,754	7,921	395,228	106,177	15,152	\$7,899	\$7,899
Ann Arbor	294	143,147	38,213	181,360	24,288	19,871	5,477	422	5,477	7,635	132,866	160,643	15,580	50,587	10,012
Arizona Eastern	367	182,474	31,816	214,290	31,225	22,569	2,395	936	2,395	11,640	118,664	107,031	12,460	94,489	—12,255
Atchafalaya	8,514	5,330,554	1,999,440	7,329,994	1,009,156	1,344,339	239,718	2,271,888	2,271,888	185,681	5,034,558	3,046,509	397,331	2,646,300	260,842
Atlanta & West Point	93	44,310	34,857	79,167	10,744	19,372	5,278	2,944	5,278	5,739	71,741	20,445	5,525	14,877	6,477
Atlanta, Birmingham & Atlantic	630	142,198	36,814	179,012	20,412	41,858	13,331	.....	13,331	10,122	193,282	11,131	13,100	3,209	—18,789
Atlantic & St. Lawrence	107	58,117	28,438	86,555	36,251	15,980	3,056	.....	3,056	2,962	90,653	7,933	10,800	—2,867	—10,470
Atlantic Coast Line	471	1,785,562	565,979	2,351,541	376,909	456,143	51,584	958,853	51,584	70,266	1,919,647	677,303	112,000	565,171	—62,368
Baltimore & Ohio—System	4,516	6,595,936	1,089,635	7,685,571	686,985	1,304,449	154,644	2,756,861	154,644	215,321	5,162,801	3,113,405	278,135	2,834,156	1,288,189
Baltimore & Ohio—Terminal	79	.....	349	349	14,118	15,677	889	1,367	889	4,458	82,714	41,639	17,654	23,985	18,644
Bangor & Aroostook	631	216,233	47,955	264,188	43,069	28,156	2,625	3,326	2,625	11,592	178,149	103,148	12,525	90,893	—20,942
Belt Ry. Co. of Chicago	24	.....	47,955	47,955	23,574	20,001	597	.....	597	5,948	125,186	110,348	14,547	56,001	—7,596
Bessmer & Lake Erie	205	947,623	24,074	971,697	98,421	164,355	10,197	208,638	10,197	11,740	429,437	534,785	16,779	98,001	281,895
Bingham & Garfield	27	158,896	2,815	161,711	18,150	16,415	1,051	64	1,051	2,981	68,875	93,540	4,252	89,288	—729
Buffalo & Susquehanna R. R. Corporation	253	106,075	5,978	112,053	21,671	41,536	931	32,658	931	5,053	101,850	12,931	2,600	10,331	31,947
Buffalo & Susquehanna Railway	91	12,767	6,040	18,807	4,113	5,207	1,044	.....	1,044	2,286	22,257	—920	1,600	—2,520	6,126
Buffalo, Rochester & Pittsburgh	586	686,812	83,801	770,613	116,831	158,967	10,715	882	10,715	22,406	567,516	237,841	20,000	217,804	139,819
Canadian Pacific Lines in Maine	233	52,812	16,221	69,033	21,755	12,045	4,831	.....	4,831	3,288	77,462	718	8,000	—7,282	15,278
Carolina, Clinchfield & Ohio	248	160,012	13,523	173,535	21,575	22,633	8,185	.....	8,185	11,440	98,964	78,554	7,500	71,000	—9,376
Carolina, Clinchfield & Ohio of S. C.	18	8,896	872	9,768	10,059	72	1,768	.....	1,768	1,367	7,259	2,800	.....	2,800	—525
Central of Georgia	1,924	530,458	228,403	758,861	85,157	153,166	37,139	1,576	37,139	34,853	667,928	190,228	51,923	137,332	88,046
Central of New Jersey	678	1,917,075	469,933	2,387,008	252,404	485,377	26,138	12,494	26,138	56,381	1,673,486	850,555	117,447	731,108	122,842
Central New England	304	341,678	32,837	374,515	68,876	26,627	1,963	.....	1,963	5,324	224,054	166,120	12,600	154,120	89,301
Charleston & Western Carolina	341	102,831	21,529	124,360	26,593	14,412	2,763	.....	2,763	4,659	98,364	32,004	5,000	27,004	23,016
Chesapeake & Ohio Lines	2,372	2,846,147	464,361	3,310,508	476,901	724,385	51,730	1,093,345	51,730	75,968	2,436,794	1,086,316	115,009	970,645	295,261
Chicago & Alton	1,033	749,900	291,104	1,041,004	114,218	241,152	32,174	402,978	32,174	28,695	851,881	290,337	43,002	246,988	117,441
Chicago & Erie	270	413,190	42,891	456,081	75,642	66,313	7,566	215,245	7,566	12,444	389,402	110,583	30,900	90,079	107,940
Chicago & North Western	8,108	4,068,491	1,530,857	5,600,348	915,340	922,506	80,202	2,347,493	80,202	148,036	4,459,144	1,836,036	375,000	1,459,720	592,656
Chicago, Burlington & Quincy	9,367	4,705,936	1,498,112	6,204,048	1,459,097	1,269,651	144,598	2,183,914	144,598	167,762	5,317,609	1,639,812	331,300	1,308,512	404,299
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	57,501	11,638	69,139	10,734	10,770	1,428	.....	1,428	1,181	65,251	14,846	2,870	11,976	11,06
Chicago Great Western	1,427	756,571	229,999	986,570	108,531	206,129	45,844	402,978	45,844	24,285	879,066	208,464	47,150	161,092	14,006
Chicago, Indianapolis & Louisville	618	374,481	151,562	526,043	77,665	80,473	20,723	148	20,723	16,996	403,355	108,878	27,474	131,419	38,373
Chicago Junction	24	.....	1,535,554	1,535,554	234,446	188,963	954	.....	954	5,685	137,354	30,489	1,858	28,340	—14,934
Chicago, Milwaukee & St. Paul	10,071	5,136,371	1,449,771	6,586,142	724,446	1,250,645	144,660	2,797,470	144,660	162,284	5,179,907	2,064,289	369,823	1,689,633	—140,944
Chicago, Peoria & St. Louis	255	84,776	40,662	125,438	22,547	29,043	5,559	51,736	5,559	5,226	114,111	—846	5,700	—6,546	—958
Chicago, Rock Island & Gulf	477	137,339	43,562	180,901	40,070	32,479	10,148	89,722	10,148	18,287	152,827	15,282	8,097	7,102	3,205
Chicago, Rock Island & Pacific	7,852	3,403,285	1,355,637	4,758,922	770,381	964,792	247,375	478,833	247,375	136,936	4,062,359	1,075,842	277,884	278,628	344,876
Chicago, St. Paul, Minneapolis & Omaha	1,753	830,243	352,631	1,182,874	178,346	188,863	28,918	502,835	28,918	35,951	949,438	336,455	76,672	238,853	239,419
Chicago, Terre Haute & Southeastern	374	133,057	14,497	147,554	21,127	36,927	3,623	755	3,623	9,767	120,599	30,855	12,500	18,355	20,751
Cincinnati, Hamilton & Dayton	1,003	663,400	115,332	778,732	170,449	200,384	26,896	362,664	26,896	19,125	775,533	94,431	28,650	65,551	36,222
Cincinnati, New Orleans & Tex. Pac.	337	661,371	119,159	780,530	83,801	168,389	20,698	260,008	20,698	18,473	551,692	280,110	31,000	248,864	25,222
Cincinnati Northern	246	106,259	12,855	119,114	124,024	30,862	2,546	.....	2,546	4,044	196,009	18,016	5,500	12,514	12,117
Cleveland, Cincinnati, Chicago & St. L.	2,381	1,998,039	680,445	2,678,484	392,110	570,773	68,010	1,098,551	68,010	69,256	2,167,676	737,024	123,000	608,660	423,367
Colorado Midland	338	84,985	13,125	98,110	26,062	26,062	6,722	926	6,722	5,391	114,660	—9,286	10,000	—19,286	9,885
Cumberland Valley	164	168,312	49,724	218,036	45,850	26,628	4,093	73,377	4,093	8,781	159,731	69,636	5,794	63,842	—23,577
Delaware & Hudson Co.—R. R. Dept.	881	1,593,673	190,874	1,784,547	139,309	303,623	24,909	635,899	24,909	61,380	1,177,828	701,581	58,500	643,081	12,521
Delaware, Lackawanna & Western	959	2,663,891	668,198	3,332,089	475,054	476,913	80,100	1,168,666	80,100	76,135	2,282,783	1,430,482	186,600	1,243,873	196,993
Detroit & Mackinac	400	57,103	21,490	78,593	15,536	16,899	1,794	.....	1,794	3,058	68,766	15,163	7,503	7,659	—8,567
Detroit & Toledo Shore Line	79	119,720	.....	119,720	13,224	8,773	1,624	.....	1,624	2,218	61,162	58,882	5,045	53,837	19,160
Detroit, Grand Haven & Milwaukee	191	135,000	44,000	179,000	36,671	37,268	5,988	602	5,988	4,984	200,352	3,686	3,360	320	15,646
Duluth & Iron Range	273	718,481	745,851	1,464,332	71,329	98,037	1,045	528	1,045	9,782	264,641	481,210	37,068	444,141	210,332
Duluth, Missabe & Northern	369	1,249,684	24,212	1,273,896	116,658	98,507	1,975	956	1,975	9,200	388,100	82,115	63,981	828,134	57,980
El Paso & Southwestern Co.	1,027	536,828	114,400	651,228	104,382	93,812	18,708	7,168	18,708	23,453	423,424	270,046	34,889	235,146	—18,614
Elgin, Joliet & Eastern	777	753,789	7	753,796	115,075	115,075	6,291	.....	6,291	23,167	479,216	321,997	40,890	281,097	80,931
Erie	1,988	3,518,354	728,913	4,247,267	459,627	1,168,200	93,850	1,656,314	93,850	101,548	3,501,704	1,180,142	168,654	1,010,155	—357,944
Florida East Coast	745	457,483	123,782	581,265	65,614	52,054	8,020	4,425	8,020	18,482	311,791	344,352	16,533	327,810	90,765
Fort Worth & Denver City	454	245,005	93,716	338,721	51,527	68,005	6,256	2,374	6,256	15,189	273,733	89,271	12,621	76,651	39,492
Georgia	307	127,542	55,597	183,139	22,354	19,805	1,139	920	1,139	4,813	178,041	20,764	3,137	17,606	—2,620
Grand Rapids & Indiana	575	269,964	109,659	379,623	59,461	78,207	10,002	172,783	10,002	15,412	335,951	71,823	21,513	50,309	—18,265
Grand Trunk Western	347	419,000	121,000	540,000	92,078	127,730	17,156	244,977	17,156	9,905	497,504	78,877	35,920	42,951	38,433
Great Northern	8,077	3,336,982	916,841	4,253,823	988,610	557,238	92,360	1,383,817	92,360	111,629	3,195,246	1,606,487	552,741	1,050,382	162,197
Gulf & Ship Island	308	97,678	25,113	122,791	131,991	30,159	2,474	308	2,474	7,069	93,150	36,841	7,419	29,333	7,730
Hocking Valley	351	416,024	62,076	478,100	51,876	51,271	8,545	167,638	8,545	13,429	320,787	197,788	34,050	103,739	50,267

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Maintenance		Operating expenses			Net operating revenue (or loss).	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) last year.		
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Trans- portation.	Miscel- laneous.					General.	Total.
Lake Erie & Western.....	900	\$383,375	\$57,832	\$441,207	\$66,930	\$98,994	\$11,909	\$175,843	.....	\$12,232	\$365,908	\$97,657	\$34,000	\$73,577	\$27,048
Lehigh & Hudson River.....	97	156,734	9,503	166,237	25,013	18,121	1,568	53,325	.....	3,850	101,876	65,744	4,150	61,594	710
Lehigh & New England.....	296	251,027	1,055	266,006	36,949	39,784	3,080	63,238	.....	4,890	147,940	118,066	5,104	112,962	3,794
Lehigh Valley.....	1,443	3,304,188	333,900	3,638,088	455,012	600,864	88,181	1,256,441	\$11,598	71,841	2,482,637	1,362,633	142,500	1,219,746	108,487
Long Island.....	398	329,001	703,518	1,032,519	137,713	128,061	10,632	472,713	6,344	27,729	753,392	424,053	76,169	347,682	753
Louisiana & Arkansas.....	279	134,471	13,184	151,655	26,546	23,388	3,164	33,217	.....	4,080	90,396	61,269	7,500	53,765	10,460
Louisiana Ry. & Navigation.....	331	138,557	28,671	176,368	36,741	19,441	5,835	64,721	.....	5,356	132,095	44,843	11,500	33,343	4,923
Louisville & Nashville.....	5,034	2,963,392	852,494	4,163,886	815,674	785,193	110,386	1,322,617	21,695	102,567	3,213,020	1,029,348	200,710	828,247	226,705
Louisville, Henderson & St. Louis.....	200	64,904	31,240	102,854	27,962	16,197	4,618	36,038	.....	3,658	88,473	14,381	3,800	10,565	13,684
Maine Central.....	1,219	582,317	239,056	821,373	144,570	150,653	11,041	329,508	1,287	23,317	665,261	223,119	53,121	169,992	37,536
Michigan Central.....	1,800	1,807,414	706,406	2,513,820	360,999	465,530	60,647	1,053,219	42,361	63,822	2,045,768	768,964	121,000	647,810	189,741
Midland Valley.....	380	62,833	29,438	92,271	24,170	18,511	2,153	35,760	.....	3,141	88,736	60,612	4,749	57,675	14,492
Minneapolis & St. Louis.....	1,646	534,061	137,711	671,772	96,629	59,887	17,725	271,880	90	20,505	466,717	252,861	30,422	222,349	114,333
Minneapolis, St. Paul & Sault Ste. Marie.....	4,104	1,484,999	391,691	1,876,690	356,119	358,265	51,913	774,237	14,146	46,871	1,567,716	484,011	86,460	397,551	56,250
Missouri & North Arkansas.....	365	57,330	23,835	81,165	24,296	25,947	2,588	47,609	.....	5,834	106,273	18,637	5,269	23,933	15,458
Missouri, Oklahoma & Gulf.....	334	631,311	15,311	646,622	23,117	29,643	4,754	44,343	72	20,074	122,003	40,295	5,128	45,400	16,905
Monongahela.....	75	101,919	1,777	103,696	15,926	14,205	347	21,840	.....	2,478	54,796	50,906	1,810	49,096	2,519
Nashville, Chattanooga & St. Louis.....	1,231	610,955	198,543	809,498	122,977	167,429	40,284	344,511	6,479	33,297	714,871	170,755	26,000	144,471	24,103
Nevada Northern.....	165	136,338	10,416	146,754	19,165	13,589	576	26,931	120	5,117	65,498	84,680	5,004	79,675	24,337
New Orleans & North Eastern.....	204	210,122	40,828	250,950	25,953	59,459	9,449	91,741	5,598	10,743	202,944	75,328	15,000	60,328	3,353
New Orleans Great Northern.....	283	101,706	23,254	124,960	15,875	24,701	2,832	39,431	133	6,882	89,834	47,031	3,001	43,994	5,783
New Orleans, Texas & Mexico.....	286	83,656	20,506	104,162	16,412	37,921	3,757	45,547	.....	10,281	113,917	3,182	1,502	1,684	12,697
New York Central Railroad.....	5,979	9,111,234	3,618,065	12,729,299	1,692,585	2,736,793	219,635	4,703,641	187,427	333,408	9,883,488	4,905,250	795,884	4,109,689	.....
New York, Chicago & St. Louis.....	568	779,319	105,115	884,434	103,547	179,658	41,855	417,629	5,469	21,460	769,618	152,752	30,000	122,552	62,164
New York, New Haven & Hartford.....	2,003	2,917,949	2,221,729	5,139,678	706,493	803,090	48,527	1,995,594	49,359	139,968	3,830,422	1,924,386	185,000	1,738,272	477,371
New York, Ontario & Western.....	568	489,598	108,171	597,769	100,677	116,707	8,715	275,175	.....	16,187	517,462	195,738	20,150	175,587	21,399
New York, Philadelphia & Norfolk.....	112	283,020	35,255	318,275	25,999	71,176	4,622	142,498	4,341	10,538	239,174	86,614	6,500	80,114	17,060
New York, Susquehanna & Western.....	140	209,269	48,717	257,986	24,286	31,758	1,992	101,199	.....	4,965	164,201	113,065	13,208	99,860	37,756
Norfolk & Western.....	2,043	3,465,372	393,331	3,858,703	401,353	563,014	721,297	50,882	8,289	78,346	2,475,757	1,534,777	168,000	1,366,558	202,186
Norfolk & Southern.....	909	199,887	78,068	277,955	46,201	50,708	7,432	135,317	64	18,687	238,399	40,764	11,750	29,012	24,460
Northern Pacific.....	6,503	3,182,194	1,022,225	4,204,419	928,724	1,412,215	117,522	4,149,627	73,357	89,588	2,984,390	1,665,671	324,608	1,340,773	41,198
Oregon Short Line.....	2,181	980,467	347,339	1,327,806	241,860	221,447	32,810	367,152	23,027	24,181	940,371	54,551	115,243	426,168	171,570
Oregon-Washington R. R. & Nav. Co.....	35	711,297	355,887	1,067,184	166,708	164,201	37,792	405,194	12,585	69,446	891,914	337,590	102,448	235,509	35,399
Pennsylvania Company.....	1,757	3,457,618	765,914	4,223,532	631,931	806,082	79,106	1,616,596	3,382	124,903	3,290,000	1,403,335	238,628	1,149,701	226,466
Pennsylvania Railroad.....	4,512	11,009,777	3,132,878	14,142,655	2,004,421	3,084,639	181,782	5,247,810	215,258	403,913	11,136,923	4,402,155	639,028	3,762,413	652,301
Philadelphia, Baltimore & Washington.....	717	903,069	677,818	1,580,887	237,570	337,855	24,164	703,033	24	49,147	1,351,793	419,620	53,895	365,402	31,015
Pittsburgh & Lake Erie.....	2,25	1,219,531	126,601	1,346,132	133,393	226,661	22,082	310,412	3,520	28,062	724,130	677,558	49,500	628,058	253,325
Pittsburgh, Cincinnati, Chic. & St. Louis.....	1,479	2,171,596	636,140	2,807,736	506,987	619,255	63,941	1,171,550	24,695	81,689	2,468,588	1,316,418	162,379	549,875	212,123
Richmond, Fredericksburg & Potomac.....	58	174,295	79,912	254,207	24,140	29,359	3,641	86,887	5,641	6,927	156,959	136,420	9,686	126,699	10,577
Rutland.....	468	181,913	87,061	268,974	37,024	46,874	8,011	112,164	1,027	5,491	210,529	95,840	16,874	78,874	29,402
St. Joseph & Grand Island.....	258	86,779	24,246	111,025	17,704	20,649	4,845	46,700	.....	4,550	94,448	25,203	7,620	17,501	28,414
St. Louis & San Francisco.....	4,740	2,267,636	774,462	3,042,098	485,245	552,122	67,935	1,051,461	.....	85,795	2,188,973	1,080,477	117,491	961,023	670,741
St. Louis Merchants' Bridge Terminal.....	9	180	141,433	19,220	7,941	779	.....	68,067	.....	5,993	101,499	39,034	5,540	93,953	9,633
St. Louis Southwestern of Texas.....	943	397,397	80,950	509,324	18,909	89,470	25,587	133,082	3,210	25,014	315,126	194,398	37,583	156,798	57,168
San Antonio & Aransas Pass.....	810	177,444	61,384	238,828	509,324	18,909	25,587	133,082	.....	12,176	284,116	27,280	14,077	14,645	65,136
San Antonio & Aransas Pass.....	724	166,370	70,032	236,402	258,636	66,022	6,619	138,885	.....	12,176	284,116	27,280	14,077	14,645	65,136
San Antonio & Aransas Pass.....	1,132	539,686	246,024	785,710	85,689	97,914	27,883	253,300	18,072	18,829	516,375	340,314	46,034	294,259	20,816
Seaboard.....	3,123	1,298,557	333,590	1,632,147	186,164	253,766	61,477	638,734	7,883	54,874	1,202,897	559,419	86,001	472,625	73,948
Southern.....	7,022	3,211,777	1,230,932	4,442,709	491,631	638,289	153,046	1,781,794	30,220	160,225	3,360,144	1,556,787	217,432	1,337,535	381,638
Southern Railway System.....	6,517	4,414,844	2,684,842	7,099,686	1,055,187	1,640,496	166,062	2,581,670	162,928	2,697	7,860	2,698,234	351,886	2,345,240	26,495
Tennessee Central.....	294	84,830	32,490	117,320	13,248	15,885	4,812	45,128	.....	7,470	98,300	26,461	4,481	21,974	8,661
Terminal R. R. Ass'n of St. Louis.....	35	212	212	424	27,036	17,693	.....	7,534	.....	4,140	11,547	10,021	28,170	72,851	36,474
Texas & Pacific.....	1,944	917,191	292,978	1,210,169	189,673	240,875	38,655	633,794	10,719	40,000	1,173,506	14			

Traffic News

At Jackson, Miss., June 30, the state court denied the right of the railroads to charge ten cents additional fare to passengers who fail to buy tickets before entering the train.

The Chesapeake & Ohio recently issued what is believed to be the most valuable railroad ticket ever sold. It was for the "Richmond Blues," covering their journey to the Pacific coast, one ticket providing for the movement of 185 men, and the value being \$17,800.

The western roads are not requiring passengers to declare the value of their baggage, as had been planned, and have postponed consideration of the Cummins law and the question of what action should be taken under it in connection with baggage. Meanwhile the carriers are assuming unlimited liabilities on all passengers' baggage.

The "Sandy Hook route" of the Central of New Jersey, from New York City to Long Branch and other New Jersey seacoast towns consists in part of a steamboat route, 20 miles long, the northern terminus of which is in Manhattan and the southern at Atlantic Highlands on the southern shore of New York Bay. This week a rival company has put on a ferryboat, bought from the City of New York, to run three times a day between these termini and to carry passengers at ten cents each, or one-sixth the fare charged on the railroad company's boats. The new line offers to make a specialty of automobiles, which will be carried at 25 cents for each foot of wheel base.

The United States Geological Survey has just issued a guide book (Bulletin 612) describing the Overland route from the Missouri river to the Pacific coast. This is the first of a series of four such books designed to afford the transcontinental traveler an intimate acquaintance with the country through which he passes. The next volume to be issued will describe the Northern Pacific route and will be published in a few days. The books describing the Santa Fe route and the Shasta and coast routes will follow soon. In these books the route is followed from station to station and the country along the way described and explained from many points of view, historical, geological, agricultural and mining. In the preparation of the book on the Overland route much information already in the possession of the Geological Survey has been utilized, but to supplement this material three geologists last year made a field examination of the entire route, while special topographic surveys for the accompanying maps were made by engineers. The route is covered by a series of 29 maps, and the book is also illustrated with half tone plates of some of the most striking views and objects to be seen on the journey. It includes 244 pages and may be obtained from the superintendent of documents at Washington.

Courtesy Over the Telephone

Don't fail to answer the 'phone just as soon as called. You cannot accomplish much work in another line while knowing that someone is calling you on the 'phone.

Don't fail to give the name of your office when answering the 'phone, as it saves the time of the party at other end.

Don't fail to give exchange the number you want very plainly.

Don't fail to have the number that you want, on the tip of your tongue when calling the exchange, as to delay her means that she is delayed in answering someone else. Possibly this someone else will sometimes be you.

Don't fail to have a pad or a memo paper nearby when taking car number, etc., over the 'phone. To jot these down takes no more time and sometimes saves a "call back," or guess work.

Don't fail to be courteous in answering the 'phone. Even though you might be a "Prince of a fellow" the party at the other end—may be a stranger—will not understand that your gruffness is a "habit" and not an intention. Courtesy costs nothing and pays big dividends.

Don't get angry when you get the wrong number. If you think the average operator has much time to loaf or that it is impossible for her to make a mistake just go to one of the telephone exchanges. One look will convince you that you are wrong.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Transcontinental Rates to Willamette Valley Points

H. S. Gile & Company et al. v. Southern Pacific et al. Opinion by the commission:

The commission finds that the through transcontinental carload and less-than-carload commodity rates to the Willamette Valley and points south of Portland, Ore., made by adding to the rates to Portland the local class rates from Portland to destination, are not preferential to points between Portland and Tacoma, but that they are unreasonable to the extent that they exceed the class rates fixed in *Railroad Commission of Oregon v. Southern Pacific* (24 I. C. C., 273), and an order is entered to that effect. (34 I. C. C., 319.)

Proportional Class Rates to Iowa Points

Opinion by the commission:

The commission grants authority to establish the same scale of proportional class rates as authorized by fourth section order No. 3,743, issued as a supplemental report to the *Interior Iowa Cities case* (29 I. C. C., 536), to apply west of the Mississippi river on traffic moving between certain additional interior Iowa cities on the Chicago, Rock Island & Pacific, and the Muscatine North and South, between Burlington and Muscatine, Iowa, and points east of the Indiana-Illinois state line. (34 I. C. C., 278.)

Rates on Lumber from South Pittsburgh, Tenn.

Hoskew Lumber Company v. Nashville, Chattanooga & St. Louis et al. Opinion by Commissioner McChord:

The commission finds that the rates on lumber from South Pittsburgh, Tenn., to Ohio river crossings, of 17 cents a hundred pounds, and to Mississippi river crossings, of 22 cents, are not shown to be unreasonable or discriminatory against South Pittsburgh in favor of Chattanooga, Tenn. The tariff under which the shipments in question moved, however, named a rate of 13 cents. As the intention of the framers is not controlling with respect to the meaning of a tariff, and as the tariff is to be construed according to its language, it is found that the complainant was overcharged on shipments which were assessed charges in excess of 13 cents. (34 I. C. C., 333.)

East Bound Transcontinental Cotton Rates

Opinion by Commissioner Clements:

The commission finds that the carriers have not justified a proposed withdrawal of compression in transit arrangements on cotton from southern California and Arizona producing points to St. Louis, New Orleans, Galveston, Tex., and intermediate territory east of El Paso. Certain proposed increases in rates are held to be justified in part. (34 I. C. C., 248.)

Decision Under the Panama Canal Act

Opinion by Commissioner McChord:

The commission in this case grants the joint application of the Duluth, South Shore & Atlantic, the Grand Rapids & Indiana and the Michigan Central to continue their joint interest in and operation of the Mackinac Transportation Company, owning ferryboats plying between St. Ignace, Mich., and Mackinaw City, Mich. (34 I. C. C., 229.)

Storage in Transit on Apples at Indianapolis

Indianapolis Chamber of Commerce v. Cleveland, Cincinnati, Chicago & St. Louis et al. Opinion by Commissioner Harlan:

The refusal of the lines serving Indianapolis to permit at that point storage in transit on apples is not found to result in undue preference in favor of Chicago, St. Louis, and other western points, at which points storage in transit is permitted by the western lines. (34 I. C. C., 267.)

Transit Rates on Logs and Staves at Alexandria, La.

Opinion by Commissioner Clark:

The commission finds that Morgan's Louisiana & Texas and the Louisiana Western have not justified a proposed withdrawal of their net transit rates on logs, rough staves and stave bolts when manufactured at points in Louisiana and reshipped via respondents' lines beyond the state. The carriers did not show that the present rates were unremunerative or that the resulting increased rates would be reasonable. (34 I. C. C., 169.)

Rates on Plaster from Grand Rapids

Grand Rapids Plaster Company v. Lake Shore & Michigan Southern et al. Opinion by Commissioner Clark:

The present carload rates and minimum carload weights on plaster and other gypsum products from Grand Rapids, Mich., to points in northern Illinois and southern Wisconsin are held to be discriminatory as compared with the rates and minimum weights on those commodities from Fort Dodge, Ia., and defendants are required to remove the discrimination. It is also held, however, that there is no discrimination against Grand Rapids and in favor of Fort Dodge in that defendants make deliveries of plaster and other gypsum products from both points to team and industrial tracks in the Chicago switching district. (34 I. C. C., 202.)

Rates on Flour from Inman, Kan.

Enns Milling Company v. Chicago, Rock Island & Pacific et al. Opinion by Commissioner Hurlan:

The commission finds that the rates on flour, bran and shorts from Inman, Kan., to various destinations in southwestern Missouri are unreasonable, in that the difference between them and the rates prevailing under "higher Kansas City rate basis" is too great, this basis meaning in effect that the rates from Kansas grain fields to points in southwestern Missouri will be determined by the rates applicable to Kansas City, either from the Kansas grain fields or the southwestern Missouri destinations, whichever rates are higher. It is ordered that the rates be not in excess of 14½ cents on flour and 13 cents on bran and shorts, these rates being 1½ cents a 100 lb. higher than the rates prevailing under the "higher Kansas City rate basis." This case originally related also to a fourth section application, but the lower rates from Hutchinson and McPherson, Kan., having since been withdrawn, the Fourth Section application is denied. (34 I. C. C., 197.)

Imported Wood Pulp Rates from Boston, Mass.

Moore & Thompson Paper Company et al. v. Boston & Maine. Opinion by the commission:

The commission finds that the rates on imported wood pulp from Boston, Mass., to various New England points are not unreasonable or discriminatory. The allegation of discrimination was based on the fact that the rates on domestic pulp are less than the rates on the imported pulp. It was shown, however, that the rates on the domestic pulp from Boston to these points of destination were but paper rates. It was also shown that the imported pulp had a higher value per car because of a larger percentage of water contained in domestic pulp; that the expense of loading imported pulp is borne by the carrier, whereas domestic pulp is loaded by the shipper, and that the carriers have an inbound haul of the pulp wood used to manufacture domestic pulp which they do not have in the case of imported pulp. (34 I. C. C., 323.)

Furniture Rates from Grand Rapids

Furniture Manufacturers' Association of Grand Rapids v. Ann Arbor et al. Opinion by Commissioner Hurlan:

The commission finds that the rates of \$2.52 per 100 lb. on mixed carloads of furniture shipped from Grand Rapids, Mich., and of \$2.45 from Rockford, Ill., to Pacific coast terminals are not unreasonable or discriminatory. The industry at Grand Rapids has become specialized; and no manufacturer undertakes to produce a complete line of furniture. To take care of this trade condition a practice has grown up of shipping mixed carloads of furniture from a number of factories intended for one consignee. The car may be loaded and shipped by a manufacturer at Grand Rapids, to whose warehouse the goods of other manufacturers are brought for that purpose, or the goods

of several manufacturers may be sent for loading to the car-loading department of the furniture and manufacturers' association. This association, which maintains assembling and loading facilities, is operated without profit and for the benefit of the furniture manufacturers of Grand Rapids and their customers. Goods are handled also for some of the factories located outside of Grand Rapids, such as Holland and Zeeland, and to these manufacturers a charge for the service of 10 cents per 100 lb. is made. In addition to mixed carloads, which, although billed to one consignee, may embrace goods for several consignees, many so-called pool cars, containing goods from several dealers intended for several consignees, are consigned to transfer companies, warehouses and distributing agencies on the coast. (34 I. C. C., 262.)

Charges for Disposal of Slag

In re charges for transportation and disposal of waste materials at Pittsburgh and other cities. Opinion by Commissioner Daniels:

Eleven carriers operating in Ohio, Pennsylvania and West Virginia have filed with the commission a tariff establishing a charge of 20 cents per net ton for the disposal of slag, flue dust, clean ashes or refuse molding sand, and a charge of 35 cents a net ton on ashes (mixed with other refuse), brickbats, dirt and other refuse material. The carriers have for a long time taken free all the slag which the mills gave them, for the reason that it furnished a useful material for the making of fills and for ballasting and sub-ballasting tracks. They still use large quantities of slag, but their construction work has so decreased, and the supply of slag given to them for disposal so increased, that the slag has become a burden to them, and they have even had to buy land on which to dump it.

The commission sees no reason why this disposal service should be performed gratuitously by the carriers. It appears, however, that the tariffs under consideration do not meet the requirements of section 6 of the act in that they do not designate the specific points at which disposal is made of the slag in question. The tariff should indicate that—

the carriers will receive carloads of refuse on any industrial or private side track connected therewith, or on any main track, and will haul this refuse to some convenient point on its line or the line of a connecting carrier for wasting at a charge of . . . cents per net ton

The tariffs might also indicate whether or not a definite consignment and bill of lading should be made; in whom title of the slag vests; and when and where transfer of such title, if any, is effected. The tariffs as they stand at present do not conform with section 6 of the act and must be ordered cancelled.

Commissioner Hall dissents, noting that the carriage of the slag and other refuse lacks many of the attributes of transportation by a common carrier. (34 I. C. C., 337.)

New Mexico Class and Commodity Rates

State Corporation Commission of New Mexico v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Clements:

Complaint is made against the reasonableness of the class and commodity rates into New Mexico from Kansas City, and all points on and east of the Missouri river, including St. Louis, Chicago and the great lakes region, to, but not including, eastern seaboard territory. The paramount issue arises under the fourth section, the principal violation being that rates from Kansas City, St. Louis and Chicago are lower to El Paso than to New Mexico points directly intermediate.

The contention that the El Paso rates are depressed by the action of the carriers in equalizing the rates to El Paso to the basis applied to Laredo and Eagle Pass in order that all these Rio Grande crossings may be placed on a parity in their competition with each other for traffic into Mexico, and the contention that low rates are demanded by the competition of the water and rail routes from the eastern seaboard and from Europe to consuming markets in Mexico via Tampico and Vera Cruz are not held by the commission to constitute sufficient grounds for fourth section relief at El Paso. It is held, however, that the competition of the water and rail routes from the markets of production on the eastern seaboard to El Paso via Galveston and other gulf ports does constitute a sufficient basis for relief as to commodity rates from Kansas City, St. Louis and Chicago in those cases in which the El Paso rates are thereby actually affected and de-

pressed below a reasonable basis. In *Commodity Rates to Pacific Coast Terminals* (32 I. C. C. 611) the carriers operating west from the Missouri river, in those cases in which they were compelled by the competition of the water lines from the eastern seaboard, were allowed to maintain a rate to the Pacific coast of not less than 75 cents a 100 lb., and to continue higher rates to intermediate points, provided the intermediate rate in no case exceeded 75 cents. It is held in this case that the maximum rate, below which relief should be granted, and which will in cases in which relief is granted be the maximum rate from Kansas City and St. Louis to intermediate points, should be 65 cents.

On those commodities on which the lowest rates from the Atlantic seaboard to El Paso are 65 cents or more no relief will be granted to the carriers operating from Kansas City and St. Louis to El Paso. As to those commodities on which the lowest rates from the eastern seaboard are less than 65 cents the carriers from Kansas City and St. Louis may meet those rates provided the intermediate rates do not exceed 65 cents. In those instances in which the lowest rates from the eastern seaboard to El Paso are less than 65 cents and the petitioners desire to maintain even lower rates from Kansas City and St. Louis to El Paso than apply from the eastern seaboard they may do so provided the intermediate rates do not exceed the rates to El Paso by more than the difference between the rates from New York to El Paso and 65 cents; the net result of this last being that by whatever amount the carriers voluntarily reduce the El Paso rates below what is required by the water-and-rail competition they must likewise reduce the intermediate rates below 65 cents. In all cases where relief is denied under the fourth section the carriers may correct the discrimination existing against intermediate points by increasing the rate to the more distant point; by decreasing the rates to the intermediate points; or by simultaneous increases and reductions.

The case also relates to the reasonableness of rates to intermediate points. It is found that the present class rates from Kansas City are in many cases unreasonable and a scale of maximum rates is prescribed, the first class rate being set at \$1.55 to Tucumcari and Clovis; \$1.70 to Roswell, Carlsbad, Vaughn, Pastura, Alamogordo, Las Vegas, Albuquerque, Santa Fe, Belen and Rincon; \$2.00 to Deming; \$2.10 to Silver City, and \$2.25 to Gallup and Lordsburg, and other classes in proportion. The class rates to Raton are not found unreasonable. Maximum differentials ranging from 30 cents on first class to 8 cents on class E are prescribed over these Kansas City rates for shipments from St. Louis, and differentials ranging from 50 cents on first class and 13 cents on class E for shipments from Chicago.

Findings are made also relative to the commodity rates on the principal commodities moving into New Mexico. The rates on these commodities to Raton are not found unreasonable. Maximum rates are prescribed from Kansas City to Albuquerque as follows: Agricultural implements, 80 cents; beer, 65 cents; canned goods, 65 cents; emigrant movables, 55 cents; furniture, n. o. s., \$1.19; packing-house products, 80 cents; building and roofing paper, 70 cents; cast-iron and wrought-iron pipe, 65 cents; stoves, 85 cents; sugar and sirup, 60 cents; wire and nails, 70 cents. It is held that the rates to Las Vegas, Santa Fe, Belen, Rincon, Roswell, Carlsbad, Pastura and Alamogordo should not exceed these rates. To Deming, Silver City, Gallup, Lordsburg and other points to which class rates are prescribed the commodity rates established shall bear the same relation to the commodity rates prescribed to Albuquerque as the class rates to those points bear to the class rates to Albuquerque. The commodity rates from St. Louis and Chicago to all New Mexico points must not exceed those from Kansas City by more than 10 cents and 20 cents a 100 lb. respectively. The commission does not attempt to deal with other commodity rates which may be established in the future nor does it attempt to prescribe reasonable commodity rates to points other than those to which rates are herein prescribed. The fourth section requirements will set the maximum rates to main-line points directly intermediate to those to which rates are herein fixed. To branch-line points the carriers will be expected to line up their rates in reasonable relation to the class and commodity rates.

The rate on hay from the Pecos Valley to Fort Worth and other points to which at present a 30-cent rate is effective must not exceed 28 cents in the future.

The present rates on lumber to Pecos Valley points are found unreasonable to the extent that they exceed 30 cents from Santa Fe mills in Texas and Louisiana, 33 cents from mills on

connecting lines in Texas and 35 cents from mills on connecting lines in Louisiana and Arkansas.

The commission does not believe that the rates on traffic from the Pacific coast regions, including those on lumber and sugar, should be reduced. (34 I. C. C. 292.)

STATE COMMISSIONS

The West Virginia Public Service Commission, on application of the Baltimore & Ohio, has granted the road permission to accept coupons from mileage books which have been bought in other states on a basis of $2\frac{1}{4}$ cents a mile, provided the passenger proffers it in lieu of a ticket and is satisfied to pay the extra quarter cent. Persons living in other states coming into West Virginia frequently have tendered their mileage coupons instead of tickets, expressing the preference to pay the extra quarter cent rather than take the trouble to get a ticket at the West Virginia stations.

The New York State Public Service Commission, Second district, holds that it has not the power to permit a raise in passenger rates above a maximum set by the legislature. The decision is in the case of the Ulster & Delaware, which desired to increase its mileage book rate from two to three cents a mile. Chairman Vansantvoord wrote the opinion, which was concurred in by Commissioners Hodson and Irvine. In an extended review of all the statutory sections involved the opinion fails to find that the commission, either expressly or impliedly, has been granted such power. Commissioners Emmet and Carr dissented. Mr. Emmet held that, as the power to lower rates irrespective of legislative enactment is expressly granted by the Public Service Commission law, the power to raise rates is implied beyond reasonable doubt. The decision will probably be carried to the court of last resort.

COURT NEWS

Interstate Commerce in Intoxicating Liquors

In *Rossi v. Pennsylvania*, a case which arose before the passing of the Webb-Kenyon act of 1913, the United States Supreme Court holds that the Wilson act does not authorize the punishment of a liquor dealer in Ohio for soliciting orders for liquor in Lawrence County, Pennsylvania, where he had no liquor license, and delivering the goods there, since the Wilson act does not subject liquors transported in interstate commerce to state regulation until after their arrival at destination and delivery to consignee or purchaser.

Kansas Mutual Demurrage Law Held Void

The United States Supreme Court has declared invalid the Kansas "reciprocal" or "mutual" demurrage statute, providing that a railroad failing to furnish cars upon proper application shall pay to the party applying \$5 a day damages, and all actual damages, with reasonable attorney fees, and that a shipper shall pay \$5 a day for failure to load cars within 48 hours, for the reason that the act allows attorney's fees in favor of one class of litigants but not of the other, thus denying the latter the equal protection of the laws guaranteed by the Fourteenth Amendment. (*Atchison, Topeka & Santa Fe v. Vosburg*.)

State Statute Requiring Cars to Be Furnished Upheld

The United States Supreme Court affirms a decision of the Illinois Supreme Court (257 Ill., 80) awarding damages for the failure of the Illinois Central to furnish coal cars at the Mulberry Hill Coal Company's mine, located on the defendant's line, pursuant to the plaintiff's requirements and demands, as required by the Illinois act of 1874. The court approved the construction of the statute given by the state court, which was as follows: "The only requirement of the statute, as applied in this case or any other case, is, that the railroad corporation shall furnish cars, within a reasonable time after they are required, to transport the property offered for transportation, and what would be a reasonable time in any case would depend upon all the circumstances and conditions existing, including the requirements of the interstate commerce carried on by the corporation." It holds that the statute is not, as contended, a direct burden upon interstate commerce, and therefore repugnant

to the commerce clause, irrespective of congressional action. Decided June 14.

Reduction of Coal Rate to Nashville—Discrimination in Switching

In an action against the L. & N., the Nashville, Chattanooga & St. Louis, the Tennessee Central, the Illinois Central and the Nashville Terminal, the United States Supreme Court has reduced the \$1 rate on coal from Kentucky mines to Nashville to 80 cents. It based its finding on a comparison of the coal rates from the Kentucky mines to Nashville, Memphis and St. Louis, and of the Nashville coal earnings with those on all other traffic over the other roads entering that city. It also took into consideration that the carrying capacity of the cars had been much increased, resulting in a doubling of the earning capacity of fully loaded trains.

It also held that the practice of the companies to charge \$3 a car for switching *non-competitive* business between industries within the terminal limits and in conjunction with the Tennessee Central was discriminatory. The plaintiff contended that the practice was designed to prevent the switching of coal between the Tennessee Central and private industries, located on sidings and reached through the terminals. Its effect was to furnish switching service to each other on *all* business, and to the Tennessee Central on all except coal and competitive business. The order of the commission requiring the companies to cease the discrimination and to maintain "a practice which will permit the interswitching of such shipments from and to the lines of each and every defendant" (including Tennessee Central) was sustained. What would be a proper practice and the charge therefor were matters not decided.

Government Loses Suit Against the Reading

In the United States court at Philadelphia, July 3, a decision by Judge McPherson was handed down to the effect that the Reading group of corporations, the Central Railroad of New Jersey, the Lehigh Coal & Navigation and subsidiary and allied companies, are not leagued together in an unlawful combination and therefore do not unduly restrain commerce in the production, sale or transportation of anthracite coal. The court, however, suggests that the Lehigh & Wilkes-Barre Coal Company be divorced from the Central of New Jersey. The Reading ownership of the Central is not disturbed. The court called attention to certain other objections of a minor nature, which, however, did not affect the general decision.

The decision holds that there was no violation by the Reading companies of the commodities clause of the Interstate Commerce law.

The decision refused to declare that the Reading company, the Philadelphia & Reading Railway and the Philadelphia & Reading Coal and Iron Company were, either separately or individually, a combination in violation of the anti-trust law.

The court expressed regret at the delay in the decision of the case, giving as a reason the necessity of awaiting the decision of the Supreme Court in the government's suit against the Lackawanna. The decision was concurred in by Judges Buffington and Hunt.

The court finds that the evidence does not support the charge that the transportation of anthracite at the rates now and for a long time past in force has been enormously profitable.

As to the commodities clause, the court finds that under the facts presented in the Reading case the question is not decided by the recent decision in the Lackawanna case, which rests entirely on the construction of a certain agreement that was there attacked. After reviewing the evidence upon this subject the court decides that the commodities clause has not been violated by the Reading companies.

It is expected that the government will appeal the case.

Approval of Leases by Public Utility Commission

In refusing a writ of mandamus to the West Jersey & Seashore to compel the New Jersey board of public utility commissioners to approve a lease proposed to be made by the company of its railroad and franchises to the Pennsylvania, the New Jersey Court of Errors and Appeals, affirming the decision of the

Supreme Court, 85 N. J., Law 468, holds that the primary purpose of the requirement in the public utilities act, in regard to proposed leases is to provide a method for preventing the making of leases embracing provisions inimical to the interests of the state or omitting provisions which are requisite for the protection of those interests. The power of approval or refusal to approve conferred upon the board is discretionary in its character; and, this being so, the Supreme Court cannot substitute its own judgment for that of the board and compel it by mandamus to grant or withhold its approval. *West Jersey & Seashore v. Board* (N. J.), 94 Atl., 57.

Injuries to Animals on Track

In an action for the killing of a mule struck by a train, it is held by the Mississippi Supreme Court that the failure of the company to equip the locomotive with an electric headlight, as required by law, did not make the company liable, it not being shown that the presence of such a headlight would have prevented the mule from running in front of the fast moving train 30 or 40 ft. ahead of the engine, as appeared to have been the case. *Illinois Central v. Calhoun* (Miss.), 68 So., 442.

Damages for Blocking View by Embankment Not Recoverable

Damages were sought, under the Massachusetts statute providing that all damages caused by laying out, making and maintaining a railroad, or by taking land or materials therefor, may be recovered, for injury resulting from the cutting off of the plaintiff's view from his property by the location of a railroad embankment in front of it. The embankment was beyond a public way and intervening property of other owners, about 150 ft. away, and about the same height as the plaintiff's door, and did not in any way interfere with his light or air or access to the highway. It was held that the interference with the view from the plaintiff's house and estate, which was the sole ground on which damages were sought, related to matters too remote and speculative, and was not sufficiently special and peculiar to the plaintiff to warrant a recovery. No decision, so far as the court was aware, has ever gone so far as to hold that damages might be recovered for invasion of purely aesthetic elements of value. *Howell v. New Haven* (Mass.), 108 N. E., 934.

Adequate Return—Intrastate Commerce—"Unreasonable" and "Confiscatory" Rates

In deciding that a rate on slack, nut, and pea coal from Pittsburg, Kan., to Concordia, Kan., composed by adding the Kansas local distance rate of 20 cents a ton from Abilene to Concordia to the carrier's voluntary rate of \$1 from Pittsburg to Abilene, and involving only intrastate commerce, is not unreasonable, unjust, or oppressive, the Kansas Supreme Court cited the three recent cases of *Northern Pacific v. North Dakota* and *Minneapolis, St. P. & S. S. M. v. North Dakota*, 236 U. S. 585; and *Norfolk & Western v. West Virginia*, 236 U. S. 605, all decided March 8, 1915, on the subject of adequate rates. In the first of these, Mr. Justice Hughes says: "Frequently, attacks upon state rates have raised the question as to the profitability of the entire intrastate business under the state's business requirements. But the decisions in this class of cases furnish no ground for saying that the state may set apart a commodity or a special class of traffic and impose upon it any rate it pleases, provided only that the return from the entire intrastate business is adequate." The Kansas court says that it is too soon to say how far-reaching these decisions may be, but that the new doctrine is no doubt controlling; and whatever has been said in decisions and textbooks to the effect that a state or a state commission could establish a rate not in itself compensatory, provided the mass of state rates was profitable, may as well be discarded.

The court also sustained the railroads' contention that the word "unreasonable" in the statute is not synonymous with "confiscatory." A rate may not be confiscatory, and yet be inequitable in that it does not yield a fair compensation, which would include cost of moving the traffic, wear and tear of tracks and equipment, and a fair profit for the service rendered. This is also the view of the Texas courts on a statute much like the Kansas one. *Union Pacific v. Public Utilities Commission* (Kan.), 148 Pac. 667.

Railway Officers

Executive, Financial, Legal and Accounting

A. C. Hamilton, vice-president and general counsel of the Texas-Mexican at Laredo, Tex., has resigned.

F. S. Wynn, secretary of the Southern Railway at New York has been elected secretary also of the Mobile & Ohio, succeeding A. W. Mackintosh, resigned.

S. S. Russell, special agent of the auditing department of the Central Vermont at St. Albans, Vt., has been appointed claim agent, with office at St. Albans, and the office of special agent has been abolished.

F. W. Kirtland, freight traffic manager of the Florida East Coast at St. Augustine, Fla., has been appointed assistant to vice-president, with headquarters at St. Augustine, and the position of freight traffic manager has been abolished.

The following officers of the Morris & Essex were elected recently: Adrian H. Larkin, chairman of the board; J. O. H. Pitney, of Newark, N. J., president; E. E. Loomis, vice-president; Henry V. Poor, secretary; E. C. Stanley, Jr., assistant secretary; R. B. Schofield, treasurer, and W. D. Dunley, assistant treasurer.

The officers of the Monongahela Railway recently formed by the consolidation of the Monogahela Railroad and the Buckhannon & Northern are as follows: J. M. Schoonmaker, president, Pittsburgh, Pa.; J. J. Turner, vice-president, Pittsburgh; Lewis Neilson, secretary, Philadelphia; T. H. B. McKnight, treasurer, Pittsburgh; C. K. Elder, auditor, Brownsville; G. B. Obey, general superintendent, Brownsville; D. K. Orr, chief engineer, Brownsville, and J. C. Grooms, real estate agent, Pittsburgh.

Operating

F. N. Hibbits, superintendent of motive power of the Lehigh Valley at South Bethlehem, Pa., has resigned to go to the Baldwin Locomotive Works.

J. H. Owen, transportation clerk of the Florida East Coast at St. Augustine, Fla., has been appointed superintendent of transportation, with headquarters at St. Augustine.

G. B. Obey, superintendent of the Monongahela Railroad has been appointed general superintendent of the Monongahela Railway which was formed recently by the consolidation of the Monongahela Railroad and the Buckhannon & Northern. Mr. Obey entered the service of the Pittsburgh & Lake Erie as a train dispatcher in 1889, and in 1899 was promoted to chief train dispatcher. Two years later he was appointed superintendent of the Youghiogheny and Monongahela divisions of the same road, with headquarters at Pittsburgh, Pa. In 1905, he left the service of the Pittsburgh & Lake Erie to become superintendent of the Monongahela Railroad, with office at Brownsville, Pa., which position he held at the time of his recent appointment as general superintendent of the Monongahela Railway, with headquarters at Brownsville, as above noted.



G. B. Obey

D. S. Farley, superintendent of the Kansas City division of the Atchison, Topeka & Santa Fe at Kansas City, Mo., has been transferred to Amarillo, Tex. C. L. Mason, trainmaster of the eastern division at Emporia, Kan., has been appointed superintendent at Kansas City, Mo., succeeding Mr. Farley. H. R. Lake has been appointed trainmaster at Emporia, Kan., succeeding Mr. Mason.

Edward T. Whiter, whose appointment as assistant general manager of the Pennsylvania Lines West of Pittsburgh, with headquarters at Pittsburgh, Pa., has already been announced in these columns, was born at Steubenville, Ohio, on March 26, 1864. He was educated in the public schools of that place and entered railway service on March 1, 1881, with the Pennsylvania, as telegraph operator, and served consecutively as train dispatcher, assistant trainmaster and trainmaster until January 1, 1903, on which date he was appointed superintendent of the Eastern division. On January 1, 1913, he was appointed general superintendent of the Northwest system, from which position he is now promoted to assistant general manager of the Pennsylvania Lines West of Pittsburgh. Mr. Whiter's entire career has been with the Pennsylvania.



E. T. Whiter

Isaac Wheeler Geer, whose appointment as general superintendent of the Central system of the Pennsylvania Lines West of Pittsburgh, with headquarters at Toledo, Ohio, has been announced, was born at Plainfield, Conn., on February 1, 1873. He was graduated from Yale university in June, 1895, and entered railway service as rodman with the Pennsylvania in September of the same year. In November, 1897, he was transferred to the maintenance of way department of the Erie and Ashtabula division as assistant on the engineer corps. In February, 1898, he was promoted to assistant engineer, and in March, 1900, was made engineer of maintenance of way on the same division. He was then transferred to the Pittsburgh division in the same capacity in December, 1902, in which position he remained until January, 1904, when he was appointed superintendent of the Terre Haute & Logansport and the Logansport & Toledo railways, which were at that time affiliated with the Pennsylvania Lines. In November, 1906, he was transferred to the Logansport division, and in January, 1913, he was transferred to the Cleveland & Pittsburgh division from which position he is now promoted.



I. W. Geer

Samuel B. Robertson, superintendent of the Erie and Ashtabula division of the Pennsylvania Lines West of Pittsburgh, at Newcastle, Pa., has been transferred in the same capacity to the Cleveland and Pittsburgh division, with headquarters at Cleve-

land, Ohio, succeeding I. W. Geer, promoted. W. M. Wardrop, superintendent of the Western division, at Ft. Wayne, Ind., succeeds Mr. Robertson. Otto Schroll, superintendent of the Toledo division, with headquarters at Toledo, Ohio, succeeds Mr. Wardrop. Paul Jones, superintendent of the Zanesville division, with headquarters at Zanesville, Ohio, succeeds Mr. Schroll. F. J. Stimson, division engineer of the Grand Rapids & Indiana, has been appointed superintendent at Zanesville, Ohio, succeeding Mr. Jones.

Traffic

Thomas E. Bond has been appointed chief of the tariff bureau of the Elgin, Joliet & Eatsern, with headquarters at Chicago.

Charles E. Brown has been appointed commercial agent of the Cleveland, Cincinnati, Chicago & St. Louis, at Los Angeles, Cal., and J. X. Kimberger has been appointed commercial agent at Seattle, Wash.

F. B. Humston, district passenger agent of the Chicago, Indianapolis & Louisville, at Indianapolis, Ind., has been appointed division freight agent, with headquarters at Indianapolis. Frank V. Martin, city passenger agent at Indianapolis, succeeds Mr. Humston. A. J. O'Reilly, general agent at Indianapolis has retired from active service because of ill health, but will be retained by the company in an advisory capacity.

R. A. Ebe, assistant general livestock agent of the Baltimore & Ohio at Pittsburgh, Pa., has been appointed general livestock agent, succeeding the late Ben Wilson, and the position of assistant general livestock agent has been abolished. W. J. O'Toole, secretary to the general livestock agent has been appointed assistant to general livestock agent; F. Fowler, division freight agent at Parkersburg, W. Va., has been appointed assistant to general freight agent, both with headquarters at Baltimore, Md., and H. H. Marsh, commercial freight agent at Wheeling, W. Va., has been appointed division freight agent, with office at Parkersburg.

Engineering and Rolling Stock

W. H. Oliver, division engineer of the Atchison, Topeka & Santa Fe, at Needles, Cal., has been transferred in the same capacity to San Bernardino, Cal.

C. E. Brooks, acting superintendent of motive power of the Grand Trunk Pacific at Transcona, Man., advises that J. F. Moffatt has not been appointed locomotive foreman as had been announced in circular No. 50, which was noticed in this column on July 2.

OBITUARY

Frank H. Chamberlain, claims adjuster for the Atchison, Topeka & Santa Fe, with headquarters at Guthrie, Okla., died at Battle Creek, Mich., on June 21.

Samuel Thorne, a director of the Great Northern, the Colorado & Southern and other Hill roads, died on July 5, of heart disease, on board the yacht of James J. Hill of the Great Northern, on the St. John's river, Quebec, Canada.

Charles L. Haydock, assistant engineer of the Missouri Pacific, at St. Louis, Mo., was drowned recently at Leavenworth Junction, Kan., while superintending the making of willow mattresses to prevent the river from undermining the tracks. He was 31 years old.

GERMAN RAILWAYMEN JOIN THE COLORS.—A report from Holland says that 400,000 German railwaymen will shortly be called to the colors. In order to replace the men a great number of women are now being instructed in railway work.

RAILWAY EXTENSION IN CHILE.—The directors of the government railways have decided to build a branch connecting the Longitudinal Railway with the port of Iquique; the estimated expenditure is \$110,000. It will be necessary for this money to be secured from the profits of one of the railways or included in the budget for the coming year. The only railway actually producing net earnings at the present time is the Arica La Paz. The government railways are preparing plans for the repair of roads that lead to the railway stations along the Central Railway at an estimated expenditure of \$282,000.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE MISSOURI, OKLAHOMA & GULF is figuring on 6 Mikado type locomotives.

THE EUREKA NEVADA has ordered one Prairie type locomotive from the H. K. Porter Company.

RUSSIAN GOVERNMENT.—The H. K. Porter Co. is said to be working on 22 72-ton and 11 67-ton locomotives for the Russian government. This item has not been confirmed.

THE TEXAS & PACIFIC, reported in the *Railway Age Gazette* of May 28 as being in the market for 10 switching and 6 freight locomotives, is also reported to be in the market for 6 passenger locomotives.

THE RICHMOND, FREDERICKSBURG & POTOMAC has issued inquiries for 6 superheater Pacific type locomotives, to have 26 by 28 in. cylinders, a tractive effort of 47,000 lb. and a total weight of 285,000 lb.

THE DETROIT, TOLEDO & Ironton has ordered 2 Consolidation type locomotives from the American Locomotive Company. These locomotives will have 21 by 28 in. cylinders, 56-in. driving wheels and a total weight of 106,000 lb.

THE MONTGOMERY RAILROAD has ordered 3 superheater Mikado type locomotives from the American Locomotive Company. These locomotives will have 27 by 32 in. cylinders, 57-in. driving wheels, and a total weight of 325,000 lb.

CAR BUILDING

THE LEHIGH VALLEY has ordered 20 milk cars from the Standard Steel Car Company.

THE CHICAGO GREAT WESTERN is reported to be in the market for 1,500 steel underframes.

THE DETROIT, TOLEDO & Ironton has ordered 200 box cars from the American Car & Foundry Company.

THE BALTIMORE & OHIO is reported to be in the market for 2,000 hopper cars. This item has not been confirmed.

THE TEXAS & PACIFIC, which was reported in an unconfirmed item in the *Railway Age Gazette*, June 4, as inquiring for 500 coal cars, is in the market for 400 50-ton gondola cars.

THE HAWAIIAN CENTRAL, which was reported in the *Railway Age Gazette* of May 28, as inquiring for 600 freight cars, is reported to have ordered these cars from the Standard Steel Car Company. This item has not been confirmed.

THE BRITISH GOVERNMENT was reported in the *Railway Age Gazette* of June 25 as having given the Canadian Car & Foundry Company a large order for box cars. It is now said that this order includes 1,200 Belgian type steel frame box cars, 24 ft. in length and of 26 ton capacity.

THE RUSSIAN GOVERNMENT was reported in the *Railway Age Gazette* of May 21 as having placed orders for 22,000 cars as follows: Pressed Steel Car Company, 7,000; Seattle Car & Foundry Company, 7,000; Eastern Car Company, New Glasgow, N. S., 2,000; Nova Scotia Car Company, Halifax, N. S., 2,000; American Car & Foundry Company, 2,000, and Canadian Car & Foundry Company, 2,000. On some of these orders the car builders and the Russian government were at first unable to agree as to the terms of payment. Contracts have now been definitely closed, however, for the following orders: Pressed Steel Car Company, 4,800 50-ton coal cars (the Russian government having the option of increasing this to 5,000 if desired) and 2,000 40-ton box cars; Eastern Car Company, 2,000 40-ton box cars, and the American Car & Foundry Company, 4,100 box cars, a total with these three

companies of 12,900 cars. The Seattle Car & Foundry Company has an order, or is negotiating for 8,500 four-wheel freight cars. Orders for 2,000 cars remain to be placed, the Nova Scotia Car Company having rejected its order.

IRON AND STEEL

THE GREAT NORTHERN has ordered 125 tons of steel for seven track scales from the American Bridge Company.

THE SAN PEDRO, LOS ANGELES & SALT LAKE has ordered 8,000 tons of rails from the Colorado Fuel & Iron Company.

THE ATCHISON, TOPEKA & SANTA FE has ordered 375 tons of steel from the American Bridge Company for an elevator at Argentine, Kan.

THE AMERICAN CAR & FOUNDRY COMPANY has ordered 322 tons of steel from the American Bridge Company for a yard crane runway and a car shop addition at Chicago.

THE CHICAGO, ROCK ISLAND & PACIFIC has ordered 17,000 tons of rails from the Illinois Steel Company, and 3,000 tons from the Algoma Steel Corporation. The rails will all be 100 lb.

THE NEW YORK PUBLIC SERVICE COMMISSION, First district, has awarded a general contract to the Newman & Carey Company, for 6,400 tons of steel for Section No. 1 of the Nostrand avenue subway, Brooklyn.

MACHINERY AND TOOLS

THE YAZOO SOUTHWESTERN, Walter C. Murphy, president, Yazoo City, Miss., is reported in the market for repair and machine shop equipment.

SIGNALING

The Public Utilities Commission of Ohio has ordered the installation of interlocking signals in Lima, at the crossing of the Pennsylvania Lines, the Cincinnati, Hamilton & Dayton and the Lake Erie & Western. The work is to be done by the Pennsylvania and shares of the cost charged to the other companies in proportion to the functions installed on the tracks of each company. The commission orders that the cost of operation shall be allotted, fifty per cent to the Pennsylvania and fifty to the other two roads; but when the two roads last named shall have separated their interests then each of the three roads is to pay one-third of the whole. The installation must be finished by October 1.

GERMAN SOUTH-WEST AFRICA RAILWAYS.—The damaged railway lines in German South-West Africa occupied by the Union forces are so far restored that through communications has been established between Lüderitzbucht and Karibib. An extension of the Upington line to Kalkfontein, north of Warmbad, is expected at an early date, thus linking up the German lines with the Union system.

RAILWAY IN YUNNAN PROVINCE OF CHINA.—Renewed activity is reported in regard to a railway from Mengtze, Yunnan Province, China, to the Ko-chiu tin mines. The Chinese capitalists concerned in the tin mines and in the railway undertaking have recently employed two French engineers in connection with the enterprise. The original plans and the actual location of the line were made by American engineers, who resigned several months ago because of the prospect at that time that nothing definite was likely to be accomplished because of unrest and uncertainty in China and later because of war conditions in Europe. The plans call for 60-centimeter (23.6 in.) gage track, and the rolling stock needed is estimated at 8 locomotives, 100 freight cars and 15 passenger cars. French interests are said to have an immense advantage in obtaining this business, not only because of the dominance of French interests in the district and the influence of French engineers, but also because of the discriminating duties on goods coming into China from Indo-China and into the latter from France and because of favors extended French interests by the railway from Indo-China to Yunnan fu.

Supply Trade News

The Schroeder Headlight Company, Evansville, Ind., is reported to have an order from the Russian government for 400 headlights.

The Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., by a vote of its stockholders has changed its name to the Scullin Steel Company.

The American Brake Shoe & Foundry Company has secured an order for 52,000 brake shoes for the cars which the Pressed Steel Car Company is now building for the Russian government.

The American Steel Export Company was incorporated in Delaware on June 29, with a capital of \$200,000, to promote the sale abroad of products of the Cambria Steel Company.

Thomas R. Cook, formerly assistant engineer of motive power of the Pennsylvania Lines West, has been appointed chief engineer of the Willard Storage Battery Company, Cleveland, Ohio.

D. P. Lamoreux has been appointed to take charge of the railway and car material department of the Johnson Lumber Company, Milwaukee, Wis., with headquarters in the McCormick building, Chicago.

W. L. Jefferies, Jr., has been appointed representative of the Union Spring & Manufacturing Company, New Kensington, Pa., with office in the Mutual building, Richmond, Va., succeeding W. F. La Bonta, deceased.

The Condit Electrical Manufacturing Company, Boston, Mass., and the Luminous Unit Company, St. Louis, Mo., will hereafter, by arrangement with the Thomas G. Grier Co., Chicago, be represented exclusively by the Electrical Sales Engineers, Inc., Chicago. This is a new company with the following officers: Paul W. Koch, president and general manager; Fred B. Duncan, vice-president, and Alfred O. Dicker, secretary and treasurer. Mr. Koch was formerly manager of the Thomas G. Grier Co.; Mr. Duncan, formerly sales engineer of the George Cutter Co., South Bend, Ind., and Mr. Dicker was formerly illuminating engineer of the Commonwealth Edison Company, Chicago.

Fairbanks, Morse & Company, New York, have acquired the business of the Neil Machinery Company, and will take over the following agencies heretofore controlled by the latter: Lees Bradner Company, Cleveland, Ohio; Kern Machine Tool Company, Hamilton, Ohio; Springfield Machine Tool Company, Springfield, Ohio; Colburn Machine Tool Company, Franklin, Pa., and Bridgeford Machine Tool Company, Rochester, N. Y. George E. Neil, formerly manager of the Neil Machinery Company, has been appointed manager of the machine tool department of the New York office of Fairbanks, Morse & Company, and W. V. Gould, for many years with the Jones & Lamson Machine Company, Springfield, Vt., has also become associated with that department.

The Westinghouse Electric & Manufacturing Company plan has been declared operative. Stockholders of record July 17 will have the privilege of subscribing for new convertible 5 per cent bonds at 105 in a ratio of 45 per cent of the holdings of stock. The first payment on the new bonds will be \$250 for \$1,000 bond on August 13, the other payment being \$820.83 on December 1. The second payment includes an adjustment of interest. The new issue of bonds will be convertible into common stock at par up to December 31, 1916. If all the new issue of bonds is subscribed for by stockholders, the proceeds will be used to retire the existing issue of bonds at 105. If only a portion of the bonds are subscribed for by stockholders, the old issue will be paid off to the extent of the new money received and the new convertibles exchanged for the balance. If none of the new bonds are subscribed for, they will be exchanged for the old issue recently deposited with the Guaranty Trust Company.

The American Car & Foundry Company

The earnings of the American Car & Foundry Company in the fiscal year ending April 30, 1915, were \$3,615,054. From this there was deducted \$1,284,118 for renewals, replacements, re-

pairs, new patterns, etc., leaving net earnings of \$2,330,936. Dividends of \$2,100,000 (7 per cent) were paid on preferred stock, and of \$600,000 (2 per cent) on common stock, making a total of \$2,700,000. The total surplus on April 30 was \$25,694,076. The general balance sheet of the company on April 30 was as follows:

ASSETS.	
Property and plant account:	
Cost to April 30, 1914.....	\$66,108,223
Additions to plants during year.....	57,424
Reservation for steel car plants.....	616,886
Materials on hand	4,974,004
Current assets:	
Accounts and notes receivable.....	11,587,622
Stocks and bonds of other companies.....	847,711
Bank certificates of deposit.....	3,500,000
Cash	3,659,855
	\$91,351,725
LIABILITIES.	
Preferred stock	\$30,000,000
Common stock	30,000,000
Current liabilities:	
Audited vouchers and payrolls.....	2,569,948
Dividends (payable July 1).....	675,000
Reserve accounts	2,412,701
Surplus	25,694,076
	\$91,351,725

TRADE PUBLICATIONS

WELLS, FARGO & COMPANY.—This company has issued a booklet of 44 pages, giving a large amount of information as to how to reach the various points of interest in San Francisco in connection with the Panama-Pacific Exposition.

HEADLIGHTS.—The Esterline Company, Indianapolis, Ind., has recently issued catalog 364, descriptive of Golden Glow incandescent headlights. These headlights are very largely used on street car and interurban railway lines, and in steam and electric locomotive service.

STEEL POLES.—The Carbo Steel Post Company, Chicago, has issued a 20-page booklet describing Carbo steel poles for telephone, telegraph and signal lines. The booklet is illustrated with several typical designs of these poles, and contains considerable data regarding their construction and capacity.

COAL STORAGE SYSTEM.—Bulletin No. 221 recently issued by the Link-Belt Company, Chicago, is a four-page leaflet descriptive of the Link-Belt patented circular storage system. The leaflet describes the system in detail, names its several advantages and contains illustrations of typical installations.

WOOD BLOCK FLOORS.—The Ayer & Lord Tie Company, Chicago, has recently issued a booklet on that company's interior creosoted wood block floors. The booklet discusses the several advantages of this type of flooring material and contains several illustrations of wood block floors laid in different kinds of shops.

GAS ENGINES.—Bulletin No. 34-X, issued by the Chicago Pneumatic Tool Company, Chicago, is devoted to the Class A-G "Giant" gas and gasoline engines made by that company. Bulletin No. 34-U contains instructions for installing and operating "Chicago Pneumatic" Class N-SO fuel oil driven compressors.

AIR COMPRESSORS.—Form No. 3,031, recently issued by the Ingersoll-Rand Company, New York, is devoted to the Ingersoll-Rogler Class FR-1 steam driven single stage straight line air compressors sold by that company. The company has also recently issued Form No. 4,034, relative to the Leyner-Ingersoll water drill.

OXYGEN.—In a pamphlet entitled "Production of Pure Oxygen and Hydrogen," the International Oxygen Company, Newark, N. J., gives a description of its system of producing oxygen by water electrolysis. Several installations of this system are illustrated. The purity of the gases produced by this method is shown to be especially high.

SPECIFICATIONS FOR TELEGRAPH POLES.—The W. F. Goltra Tie Company, Cleveland, has issued a booklet containing general information and specifications for chestnut and cedar poles for telegraph, telephone and electric light lines. This book also contains a considerable amount of information regarding the weights, original costs and costs of setting poles of various timbers and lengths.

Railway Construction

ALABAMA GREAT SOUTHERN.—New second main track between York, Ala., and Cuba, 6.5 miles, was placed in service July 1, on the Alabama Great Southern, providing with the exception of a single track gauntlet between Toomsaba and Russell, Miss., of seven miles, continuous double track from York to Meridian, Miss., all of recent construction. This track is used jointly by trains of the Alabama Great Southern and the Southern Railway.

BUFFALO, LOCKPORT & ROCHESTER.—See Rochester Connecting.

CHERRY RIVER & SOUTHERN.—An officer writes that this company already has considerable of the right-of-way bought, and in about 90 days expects to secure through condemnation proceedings the right-of-way through the Gauley Coal Land Company on about 23.5 miles. The projected route is from a point on the Baltimore & Ohio at the mouth of Cherry river, where it flows into Gauley river at Curtin, Nicholas county, W. Va., thence down the south side of Gauley river, via Brooks Bridge to the mouth of Hominy creek, thence up Hominy creek to the mouth of Mouse creek, and up Mouse creek to its head waters, passing through Shawver's Gap to Eleven Mile branch of Angling creek and down Eleven Mile branch and Angling creek to Meadow river, thence up the east or north side of Meadow river to the Nicholas, Greenbrier and Fayette county lines, about 42.5 miles. Construction work will be started as soon as the right-of-way is secured. The maximum grades will be 3 per cent compensated down to 1½ per cent, and the maximum curvature will be 30 deg. There will be three steel bridges on the line; two of 400 ft. each, and one of 125 ft. The company expects to develop a traffic in lumber, timber products, coal and other general commodities. H. L. Kirtley, president; E. H. Venable, chief engineer, Charleston, W. Va.

EAST GEORGIA (Electric).—A charter has been granted this company in Georgia with \$212,000 capital and headquarters at Savannah. The plans call for building an interurban electric or steam railway from Glenville, Ga., north via Hagan to Adabelle, about 30 miles, with a short branch from Hagan to Claxton. H. P. Talmage, G. J. Baldwin and E. Leffler are incorporators. (April 1, p. 811.)

LINVILLE RIVER.—A contract has been given to W. S. Whiting, Elizabethton, Tenn., to build a branch from Montezuma, N. C., northeast to Pascoe, 12 miles. The company now operates a line from Pincola northwest via Montezuma to Cranberry, 14 miles.

RADFORD-WILLIS SOUTHERN.—A contract is reported let to the Williams Brothers Construction Company, Roanoke, Va., for building from Radford, Va., southeast along Little river and Indian creek to Willis, about 25 miles. J. L. Vaughan, president; W. L. Castle, secretary and assistant treasurer. (February 26, p. 390.)

ROCHESTER CONNECTING.—Application has been made to the New York Public Service Commission, Second district, for a certificate of public convenience and necessity to build 2.5 miles of line in the outskirts of Rochester, N. Y. The Rochester Connecting recites in its petition its connection with the Buffalo, Lockport & Rochester, which now operates an electric line, and is also interested in the proposal to build a new international bridge across the Niagara river and to connect it with the B. L. & R. by a new line from Niagara Falls to Lockport. The eastern end of the B. L. & R., through the proposed Rochester Connecting is to be connected with the Pennsylvania and Erie systems at Rochester. The project is backed by electrical traction men of western New York, including E. G. Connette, president of the International Railway, Buffalo.

TENNESSEE RAILWAY.—A contract is reported let to J. C. Rodes & Company, Franklin, Tenn., for work on an extension of 11 miles towards Petros. On the completion of this contract there will remain about five miles yet to be built to complete the line from Oneida to Petros.

Railway Financial News

BUCKHANNON & NORTHERN.—See Monongahela Railway.

CHICAGO, ROCK ISLAND & PACIFIC.—N. L. Amster has filed a supplementary or amended petition for intervention covering all of Federal Judge Carpenter's recent orders in the Chicago, Rock Island Pacific receivership.

DELAWARE, LACKAWANNA & WESTERN.—An independent board of directors has been elected by the stockholders of the Morris & Essex, which is leased to the Delaware, Lackawanna & Western and which heretofore had a board of directors composed of officers or directors of the Lackawanna. J. O. H. Pitney, of Newark, has been made president; Adrian H. Larkin, chairman of the board; E. E. Loomis remains vice-president, and Henry V. Poor has been made secretary. The executive committee consists of Mr. Larkin, John R. Hardin, George C. Van Tuyl, Jr., Dunlevey Milbank and J. O. H. Pitney.

The following announcement has been made in regard to the steps that have been taken to comply with the Supreme Court's decision in the commodities clause case, commented on editorially in the *Railway Age Gazette* last week.

"Steps were taken to comply promptly with the recent rulings of the United States Supreme Court.

"The board authorized the officers of the company to execute a new contract which should conform to all matters questioned by the Supreme Court as either illegal or objectionable.

"The only directors of the coal company who are directors of the railroad, namely: W. H. Truesdale and George F. Baker, Jr., resigned from the board, and C. D. Norton and T. J. Mumford were elected in their places.

"E. E. Loomis, president of the coal company, tendered to the board his resignation to be accepted as soon as his successor can be selected, and arrangements were made to procure separate office accommodations without delay."

An extra dividend of 50 per cent has been declared by the Delaware, Lackawanna & Western Coal Company.

EL PASO & SOUTHWESTERN.—The Arizona Corporation Commission has approved the issue of \$16,000,000 bonds, the proceeds to be used to buy new equipment and make additions and betterments and to provide for refunding. All the lines belonging to the company in Arizona, some of which now are not operated directly, will be merged and brought under one operating organization.

KANSAS CITY, MEXICO & ORIENT.—The three receivers who were appointed in 1912 have been formally discharged. The operation of the property was taken over about a year ago by a new company.

MISSOURI PACIFIC.—The plan of readjustment without receivership which three committees, representing the 5 per cent first and refunding mortgage bonds, the 40-year 4 per cent gold loan bonds and the Missouri Pacific stock respectively, have been working on, was announced on Wednesday afternoon. Kuhn, Loeb & Co., New York, are made readjustment managers. The plan calls for the raising of \$41,419,792 cash through the subscription by stockholders of \$50 cash for each share of Missouri Pacific stock held. This \$41,419,792 cash is to be used to pay the \$24,845,000 notes which were due June 1 and were extended for one year, to pay \$3,861,000 maturing equipment trust obligations of the Missouri Pacific and of the St. Louis, Iron Mountain & Southern, and to pay floating indebtedness, interest, some immediately needed improvements, and to provide working capital. Common stockholders are to receive in exchange for each \$50 cash and the share of stock given up \$50 in new general mortgage 4 per cent bonds and \$100 in new common stock. Underlying mortgages with bonds outstanding aggregating \$128,460,620 are to remain undisturbed. There are to be issued the \$82,839,585 new common stock—just sufficient to make the payment to old stockholders mentioned above; \$46,923,150 new first and refunding mortgage 5 per cent bonds; \$44,399,292 new general mortgage 4 per cent bonds, of which, as mentioned above, \$41,419,792 will go

to stockholders in exchange for the cash and the remainder will be used, as noted below, in exchange for outstanding bonds; \$76,751,635 new convertible 5 per cent preferred stock, cumulative after June 30, 1918, and convertible into common stock at par. The holders of the \$14,904,000 consolidated first mortgage 6 per cent bonds will be asked to accept in exchange \$16,394,400 (110 per cent) new first and refunding mortgage 5 per cent bonds; holders of the \$14,375,000 collateral trust 5 per cent bonds, due 1917, will be asked to accept \$14,375,000 new first and refunding 5's in exchange, and holders of the outstanding \$9,636,000 collateral trust 5 per cent bonds, due 1920, will be asked to accept \$9,636,000 new first and refunding mortgage 5 per cent bonds in exchange. Holders of the \$37,255,000 gold loan 4 per cent bonds will be asked to accept a like amount of new 5 per cent preferred stock, as will also the holders of \$29,806,000 first and refunding 5's and \$650,000 outstanding Lexington division 5's in exchange. Holders of the \$3,459,000 Central branch 4 per cent bonds and of the \$2,500,000 Central branch Union Pacific 4 per cent bonds will be asked to accept half of the face value of their bonds in new general mortgage 4 per cent bonds and the other half in new 5 per cent preferred stock. Holders of the \$520,000 Leroy & Caney Valley first 5's, of the \$1,024,000 Kansas City Northwestern 5's and of the \$500,000 Boonville, St. Louis & Southern 5 per cent bonds are asked to take a like amount of new preferred stock in exchange. Holders of the St. Louis, Iron Mountain & Southern \$4,175,000 first and refunding mortgage 6 per cent bonds are asked to take \$4,383,750 (105 per cent) in new first and refunding mortgage 5 per cent bonds, and the holders of \$393,000 Little Rock Junction first consolidated 6's guaranteed by the Iron Mountain, and of the \$1,741,000 Texas & Pacific notes endorsed by the Iron Mountain, are asked to take a like amount of new first and refunding 5's. Holders of the few thousand dollars (\$45,135) outstanding St. Louis, Iron Mountain & Southern stock are asked to take a like amount of new preferred. This plan reduces the interest bearing securities outstanding by \$60,552,558, or from \$39,996 per mile to \$31,357. On the basis of the earnings and expenses for the fiscal year ended June 30, 1915 (last two months estimated) there should be a balance of \$2,373,514. After the payment of all fixed charges this would amount to 3 per cent on the new preferred stock.

MONONGAHELA RAILROAD.—See Monongahela Railway.

MONONGAHELA RAILWAY.—The Monongahela Railroad and the Buckhannon & Northern have been consolidated and taken over by a new company, the Monongahela Railway. Both roads were previously controlled by the New York Central and the Pennsylvania, and the new company is likewise controlled jointly by these companies.

MORRIS & ESSEX.—See Delaware, Lackawanna & Western.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—Brown Brothers & Co., New York, are offering \$1,500,000 Nashville, Chattanooga & St. Louis first consolidated 5 per cent bonds at 105, yielding about 4½ per cent on the investment. These bonds are part of a total authorized issue of \$20,000,000 bonds of 1888-1928. Out of this authorized issue there is outstanding, including the present issue, \$9,108,000. The mortgage securing these bonds is a first lien on the main line from Chattanooga, Tenn., to Hickman, Ky., 322 miles, and on 276 miles of branch lines and is a second mortgage on 142 miles additional main line.

BRITISH WOMEN RAILWAY EMPLOYEES.—Press despatches from London report that the women now being employed in fairly large numbers on the various railroads of England will henceforth be eligible to membership in the National Union of Railwaymen.

CAMPAIGN NOTES FROM GERMAN SOUTH WEST AFRICA.—On the entry of the British forces at Windhoek, the capital of German South West Africa, great quantities of railway material were found to have been buried and this was subsequently recovered. The troops found 10 engines with their essential parts removed. The Provost-Marshal issued a notice calling on the inhabitants to restore any government property in their possession, and as a consequence civilians are now returning large quantities of railway stores, which they allege were sold or given to them.

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GENERAL NEWS SECTION.

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*Illustrated.

In the hearing regarding advances in western passenger fares at Chicago this week, those opposing the advances raised a question as to whether the railways are not wasting money by furnishing a much-duplicated and too luxurious passenger service. The implication was that if this is the case the roads should increase their net earnings by eliminating the wastes rather than by advancing their rates. This is a good theory, but it is not an appropriate one to emanate, as it did, from persons connected with the various regulating commissions. The main reason why the service is so much duplicated is that there is too much competition between railways; and the reason for this, as has been pointed out hundreds of times, is that the laws prohibit the roads from making agreements or arrangements to limit competition. If the regulators want competition reduced let them direct their lectures toward those who make fool laws to compel fool competition, not to the victims of these forms of folly. As to the lavish expenditures on passenger terminals—and some of them are lavish—can the wise men who are now deprecating them suggest any means of getting public opinion and city councils to quit demanding them? The worst example of such lavish expenditure in the United States today is the new union terminal at Kansas City. The railways spent so much on it principally because the people and city council of Kansas City held them up in every way that they could. The passenger service of the railways of the United States is too luxurious and expensive; but if the railways of the west should make a concerted effort to reduce its luxury and costliness, the outcry that would be promptly raised against them would be led by the same stentorian friends of the people and members of the state railroad commissions who are now opposing advances in passenger rates.

Professor Moulton, of the University of Chicago, estimates in an article in the Journal of Political Economy, an abstract of which is published elsewhere in this issue, that when completed the Erie barge canal and connected waterways will have cost the state of New York for the through route from Buffalo to New York City \$340,000 a mile. The purpose of the public in developing this waterway was to "reduce the cost of transportation." The original appropriation for the improvements now under way was \$101,000,000. The state engineer estimates that to complete them \$27,000,000 more will be required. "All things considered," says Professor Moulton, "if the history of this and other projects may serve as a guide, we need not be at all surprised if the total cost actually reaches \$135,000,000." This, however, makes no allowance for "the indispensable terminal facilities, such as docks, wharves, freight depots and transshipping machinery," the provision of which will add enormously to the cost. The four railways directly competing with the Erie canal are the Erie, the New York Central, the Lehigh Valley and the Lackawanna. Their outstanding capitalizations per operated mile are as follows: Erie, \$208,843; New York Central, \$164,222; Lehigh Valley, \$108,363; Lackawanna, \$44,424. The Erie is one of the highest capitalized roads in the United States; and, according to Professor Moulton's estimate, the cost of developing this waterway from Buffalo to New York City will be 63 per cent greater than the average capitalization per mile of the Erie. This is one way to "reduce the cost of transportation." If the part of the bill which the public pays as well as the part which the shippers pay, be included the cost of transportation on the Erie canal will be very much greater than on any of the competing railways. The expenditure of money on waterway development with such results is not economies or business. It is simply indefensible waste of the public's money for the benefit of the politicians who pass the legislation and the shippers who are expected to use the waterways.

SECOND-QUALITY STATION AGENTS

ON a certain prominent railway a circular recently mailed to all station agents brought the following results:

Number sent out	345
Blanks returned properly filled out.....	168
Blanks returned improperly filled out.....	65
Blanks returned with station name lacking.....	71
Stations failing to reply.....	41

345

The officer who issued the circular says that as a rule ten to twenty per cent of replies to such circulars fail to show the name of the station, and in many cases the agent's name is also omitted; and he asks what would happen if there were a similar percentage of inefficiency in the train service, the track maintenance work or in the motive power and car department. "Why," says the officer, "should the station service be lacking in the essential element of correctness?"

As to why the service "should" be so lacking the answer is quite simple, though it is not often put in words. It is that this service is made secondary and subordinate to the other three departments mentioned. Judging by acts and facts, not by theories or book-regulations, it is a fair conclusion that railway managers are tolerably well satisfied that this is a reasonable situation: train operation, track maintenance, etc., first class; station work, especially at small stations, second class. The situation is looked upon as reasonable, on the ground that nothing better can be afforded. Those other matters affect safety and cannot be neglected; station work is less important than safety and cannot be allotted so much money or so much care. The public does not want to have its money spent that way. Other elements, including competition, come in. The passenger conductor should be a better man than the agent at the small station, because he has to deal with many more people. The small waiting room can be neglected, when the passenger cars cannot, because passengers spend much more time in the cars.

If our friend were to change his question and make it "Why is the station agent slipshod in his habits," he could get a ready answer from his nearest division superintendent; who, very likely, would say, "Because we do not make him cultivate better habits. With every dollar needed in several different directions it is not deemed wise to allot any larger proportion to the station service."

But the lesson of this circular is a serious one, nevertheless. A lack in "the essential element of correctness" indicates, not a mere detail, but a fundamental fault. Three far-reaching difficulties trouble the superintendent on the majority of roads, and their most troublesome manifestation is in the station service: (1) the man is too remote from his boss; (2) the better class of men are promoted (or resign) too frequently; (3) the pay (except for members of labor unions) is too low. These three reasons for weakness, more fully stated, include (1) the need of more thorough supervision and instruction (often a better quality of supervision); (2) men are too frequently changed, not only because the best ones are needed elsewhere, but because so many of poor quality have to be dismissed—this because of lack of care in selecting and the failure to provide under-studies; (3) with under-pay must be included overwork.

The foregoing outline of what, to the superintendent, should be an important subject is not presented in this place with a view of entering upon its general discussion. To most of the readers of the *Railway Age Gazette* who have duties in this direction, a discussion would, no doubt, seem superfluous. They know the situation very well, already. It not only should be, but is, an important subject. They have studied it many times. Still, the paragraph with which we began, as well as the criticisms of the service by public, serve as a reminder that the problem is unsettled.

A word may be permitted concerning the last one of the three points. Better pay would, as a rule, be a good lever with which to raise the quality of station service. But increasing the pay does not always improve the man. A horizontal advance is depended on sometimes for an improvement which does not materialize. The true and rational procedure is to have station super-

visors who will elevate the standards of service and requirements. Where the pay is too low a firm, intelligent and continued policy in this direction will force the salaries upward. Many station supervisors should be much bigger men than they are—or more courageous.

THE CAR "SPOTTING" DECISION

IF we understand correctly, the decision of this week in the car "spotting" case, the Interstate Commerce Commission has reversed itself regarding this matter and, incidentally, extinguished the main theory advanced by its special counsel, Louis D. Brandeis, in the Five Per Cent case.

While the application of the eastern lines for a general advance in freight rates was pending last year the commission, in an opinion rendered by Commissioner Harlan in the Industrial Railways case, said: "Under the common law . . . the delivery of carload freight to a shipper having a private siding is made by shunting the car upon the switch clear of the main tracks. All services upon the siding beyond that point, in placing a car for loading or unloading at a particular spot convenient to the shipper, are what may be called volunteered services in the sense that they are in addition to the main line haul, and in excess of any obligation of service by the carrier at common law." The implication that the carrier ought to make a special charge when in addition to shunting a car upon a switch, it placed it for loading or unloading, seemed clear. Mr. Brandeis so understood the commission, and based his argument against a general advance in rates largely on the ground that the carriers could and ought to derive large additional revenues from the general imposition of charges for "spotting" cars.

The references to this subject by the commission and its counsel, led the press and public to believe that the railways were dissipating their revenues, and drew down upon them a large amount of denunciation. In its original decision last July in the Five Per Cent case, the commission referred to its opinion in the industrial railways case in such a way as to give the impression that it still regarded a general charge for the "spotting" of cars as a means by which the carriers could secure a large part of the additional revenues they needed.

In conformity to what they understood to be the commission's views and wishes, the railways filed tariffs fixing charges for the "spotting" of cars. They were not especially enthusiastic about these tariffs. They doubted the fairness or expediency of making a special charge for placing a car at a convenient place on a shipper's siding when no extra charge was made for putting a car on a team track. They were unwilling, however, to incur the odium of apparently refusing to carry out a policy which they understood to be favored by the commission.

Now, after all the denunciation of the railways for profuse dissipation of their revenues, and after the intimation by the commission that "all services upon the siding beyond . . . placing the car for loading or unloading" are . . . in excess of any obligation of services by the carrier," the commission rules that the placing of cars on industry sidings for loading or unloading is part of the line haul, and that no extra charge can be made for it. In consequence, the "spotting" tariffs are set aside. Of course, the commission holds that the railways should make an extra charge for switching cars within a shipper's plant. There never was any real difference of opinion on that subject.

That the commission has been inconsistent is clear. But this is not entirely to its discredit. It went too far in its expressions regarding car "spotting" in the industrial railways case, and Mr. Brandeis subsequently went further still. Having found that it went too far, it shows good sense and courage in now backing up.

However, the incident holds a lesson which should not be lost upon those, whether on the commission or off it, who set out to reform the transportation industry. This lesson is that it is not safe to formulate and promulgate a theory regarding what

is being or ought to be done, with the expectation of subsequently finding facts which will support the theory. This is what was done concerning the matter in question. In practical affairs it is far safer to get your facts first, and formulate your theory afterward. If this were done more frequently in connection with the regulation of railways, many things that are now left undone would be done, and many things that are now done would be left undone.

THE TREND OF RAILWAY AFFAIRS IN TWO EIGHT-YEAR PERIODS

THE *Railway Age Gazette* in recent issues (June 4 and June 11) has called attention to the fact that there are now in the hands of receivers in this country about 30,500 miles of railways, having a total capitalization of approximately \$1,816,000,000. Many persons, conceding that the carriers are not as prosperous as could be wished, attribute their unsatisfactory condition largely to the effects of the war in Europe, and argue that they should not be given special consideration and relief because, as is argued, they are merely suffering along with other business concerns.

In our issue for November 27, 1914, we published an editorial entitled "What Is the Matter with the Railways and Regulation?" showing that the troubles of the railways originated long before the war began, and were in the main due to fundamental economic tendencies. In the editorial referred to, statistics for the two seven-year periods, 1899-1906 and 1906-1913, were presented, which demonstrated that the entire trend of affairs in the transportation business was different in the latter

increased 58 per cent, freight traffic per mile 59 per cent, and gross operating revenue per mile almost 55 per cent. The average annual wage per employee increased less than 8 per cent. Operating expenses per mile increased 56 per cent, and net operating revenue per mile almost 53 per cent. Taxes per mile increased less than 42 per cent, and in consequence net operating income per mile increased almost 54 per cent. The investment in road and equipment per mile increased only 3.88 per cent, and the percentage of net operating income on property investment advanced from 3.64 per cent to 5.39 per cent. The increase in the percentage of operating income on property investment was 48 per cent.

All these figures contrast very sharply with the corresponding figures for the period, 1906-1914. In this second period passenger traffic per mile increased less than 26 per cent. Freight traffic per mile increased less than 19 per cent. There were declines in both the average passenger and the average freight rates, and the increase in operating revenues per mile was only 21 per cent. The average annual wage per employee advanced almost 33 per cent, and in consequence the increase in operating expenses per mile was almost 33½ per cent, being far greater in proportion than the increase in either the passenger or the freight traffic handled. Net operating revenue per mile actually decreased three per cent, while taxes per mile increased 69 per cent. The increase in investment in road and equipment per mile was 20 per cent, while there was a decrease of over 10½ per cent in net operating income per mile of road. In consequence there was a decrease of almost 26 per cent in the percentage of operating income on property investment, the decline being from 5.39 in 1906 to 3.99 in 1914.

TREND OF RAILWAY AFFAIRS IN THE LAST TWO EIGHT-YEAR PERIODS

Item	Amount			Amount of increase		Per cent of increase	
	1898	1906	1914	1906 over 1898	1914 over 1906	1906 over 1898	1914 over 1906
Passenger-miles per mile of line.....	72,462	114,529	144,278	42,067	29,749	58.05	25.98
Average rate per passenger mile (cents).....	1.973	2.003	1.982	.030	d .021	1.52	d 1.05
Ton-miles per mile of line.....	617,810	982,461	1,176,923	364,591	194,522	59.01	19.80
Average rate per ton-mile (cents).....	.753	.748	.733	d .005	d .015	d 0.66	d 2.01
Investment in road and equipment per mile of line.....	57,395	59,624	71,551	2,229	11,927	3.88	20.00
Gross operating revenue per mile operated.....	6,755	10,460	12,667	3,705	2,207	54.85	21.10
Average annual wage per employee.....	566	d 611	810	45	199	7.95	32.57
Operating expenses per mile operated.....	4,430	6,912	9,226	2,482	2,314	56.03	33.48
Net operating revenue per mile operated.....	2,325	3,548	3,441	1,223	d 107	52.60	d 3.02
Average taxes per mile operated.....	237	336	568	99	232	41.77	69.05
Average operating income per mile operated.....	2,088	3,212	2,873	1,124	d 339	53.83	d 10.55
Per cent operating income on property investment.....	3.64	5.39	3.99	1.75	d 1.40	48.08	d 25.97

a Based on compensation adjusted to include the returns of the Southern Pacific Company, whose records were destroyed by fire. d Decrease.

period from what it was in the former. Both were periods of increasing gross earnings, but in the former the various influences at work caused total earnings to increase much faster than expenses and fixed charges, while in the latter the influences operating combined to make expenses and fixed charges increase much faster than earnings. The resultant was that in the period 1899-1906 the net return on investment substantially increased, while in the period 1906-1913, in spite of the fact that in 1913 the gross earnings were the largest in history, there was a decline in net return on investment.

The Bureau of Railway Economics at our request recently has compiled for us exactly similar statistics for the eight-year periods, 1898-1906 and 1906-1914. These statistics, while no more significant than those for the two last seven-year periods, are much more striking. In the fiscal year ended on June 30, 1914, contrary to the experience in the fiscal year 1913, there was a substantial decline in railway earnings and traffic. Therefore, while the figures for 1913 show how under present conditions the railways fare when their business is increasing, those for 1914 show how, under present conditions, they fare when it falls off. The fiscal year 1914 ended a month before the war in Europe began. Therefore, the results in that year, striking as are the figures for them, were not affected by the war.

The statistics for the two eight-year periods are presented in the accompanying table, and the attention of every thoughtful and public spirited student and business man is invited to them. It will be seen that in 1898-1906 passenger traffic per mile in-

To sum up, there was an increase in investment per mile in the first eight-year period of less than 4 per cent, and an increase of almost 54 per cent in net operating income with which to pay a return on it. In the second eight-year period there was an increase in investment per mile of 20 per cent, and a decrease in net operating income per mile with which to pay a return on it of 10½ per cent. Perhaps the figures regarding the actual increase and decrease in net operating income per mile in the two periods will convey the idea even more forcibly than the percentages of increase and decrease. The actual increase in net operating income per mile between 1898 and 1906 was \$1,124, while the actual decrease in net operating income per mile between 1906 and 1914 was \$339.

There is no difficulty in locating the principal causes of the decline in net operating income in the second period. They were the increase in the average annual wage per employee of almost 33 per cent, and in taxes per mile of 69 per cent. These advances in wages and taxes, together with the decrease of over one per cent in the average passenger rate, and of over two per cent in the average freight rate, were quite sufficient to have caused the railway companies much trouble. When, in addition to suffering such a loss in net operating income, it was necessary for the roads, in order to provide the improved service which the public demanded to make an increase in property investment per mile of 20 per cent, or five times as great as the investment per mile made in the preceding eight years, their embarrassment was bound to be great. The most

efficient management conceivable could not save any class of business concerns from being embarrassed by the operation of such a combination of adverse influences.

The Interstate Commerce Commission already has frankly recognized the unfavorable situation to which this conspiracy of causes, all operating to the same end, has reduced the eastern railways. It is only reasonable to expect that it will do likewise as respects the middle western railways in their rate cases. But the roads need more than relatively small increases in rates. They also need help in stopping the increases of expenses, and especially those which are entirely unnecessary.

A great many unnecessary increases of expenses have been forced on them by regulating bodies. If the legislative committees of the labor unions had got their way there would have been much more of this sort of thing at the recent sessions of the state legislatures. There will be a continuance of efforts by short-sighted people to put additional burdens on the carriers. The only way the success of these can be prevented is to create a strong and lasting public sentiment against them. The managements of the railways should go on doing all they can to create such a public sentiment, but in this work they need and should have the vigorous co-operation of business interests of all kinds. They should also have the co-operation of all classes of workingmen, for in the long run whatever unnecessarily increases railway expenses will be felt adversely by every class in the community.

NEW BOOKS

Experiences in Efficiency. By Benjamin A. Franklin. Size 5 in. by 7½ in.; 167 pages. Bound in cloth. Published by the Engineering Magazine Company, New York. Price \$1.

It is stated in the introduction to this book that it "is offered in answer to a many-voiced inquiry for specific examples of efficiency methods." Most of the chapters originally appeared in the *Engineering Magazine*, but they have been adapted and rearranged in a logical sequence. "Experiences in Efficiency" is not a book on scientific management, for it treats of the introduction of individual efficiency methods in various plants rather than of the introduction of an entire efficiency system in one plant. In each case considered the underlying conditions are briefly described and the success of the efficiency method carefully discussed. Naturally several of the chapters treat of the labor problem, very careful attention being given to the necessity for fair play to the employees, for careful inspection and for a proper incentive. Chapters also deal with clerical labor, proper routing methods and an efficient system of cost accounting.

Human Nature and the Railroads. By Ivy L. Lee. E. S. Nash & Co., Philadelphia. 129 pages. Price \$1.

Under this title Ivy Lee, who up to a few months ago was special assistant to the president of the Pennsylvania Railroad in charge of publicity, has brought together ten lectures delivered before various associations, chambers of commerce, etc. All of the lectures deal with the relations between the public and the railroads, and all deal with this question in a frank, clear, "human" way. Mr. Lee has had unusual opportunities to get an inside view of how one of the greatest railroad corporations in the United States is run, and also, through his relations with the press, an opportunity to hear the other side of the story. In some ways he was able to view broad questions in a broader way even than could the executive officers of a railroad who might be, of course, engaged in the attempt to solve one particular phase of these questions. The titles of the various lectures give a good idea of the scope of the book: *Human Nature and the Railroads*, *The Railroad Man's Burden*, *Training the Railroad Man*, *Telling the Railroad Story*, *Why Should We Make the Railroads Safe*, *Publicity—A Cure for Railroad Evils*, *Regulation Hampering Good Manners*, *Do We Want Government Ownership*, *The Need for Faith in Men*, *The People's Part in Solving the Railroad Problem*.

Letters to the Editor

REDUCING LOSSES DUE TO PILFERING

HAILEYVILLE, Okla.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

If a man has made up his mind to break into a car of merchandise or flour he will first ascertain the location of the car and then the best time to enter it to avoid being caught. Observing the cards and chalk marks on the outside of the cars will show him the exact commodities they contain in almost every case, and their destination as well. After securing this information he only waits an opportune time to do the job; he may get on the train that takes out the car he is after and do his pilfering on the way, or he may telephone his confederates at other places that certain cars will go out in certain trains and they will be on the lookout for them.

Merchandise, as well as other cars, are generally carded and chalk-marked thus—"Merchandise (or whatever the load may be) for 1071 Train 103" and so on. What better guide for his work does the thief want than this advertisement? Why is it necessary to mark cars in this manner? They can be just as well handled by the conductors, yardmasters, foremen and yard clerks by the switch lists and way bills and the public will not know what the cars contain. Of course, where cars contain explosives they will have to be so marked.

Again, the seals now being used are of very little protection, none at all if a man wants to pilfer a car. By the use of a pocket knife some seals can be pulled apart and replaced and the average man will not know that they have been disturbed. To protect the merchandise and other commodities which are being daily stolen it would seem that substantial locks could be used for the through cars, the combination of the locks to be only given by wire to the agents at destination; or, locks of different design could be used, and the keys shipped by express to the agents at destination. The local cars could be handled under locks, the keys of which would be kept by the conductor. When cars are set out, the agent would have locks to protect them while standing loaded at his station. The method to be adopted in case of an accident would be the same as now—chop the car open if the occasion demands; if it has to be repaired by access to the inside have the key sent to the repair point by express, or if a combination lock, wire the agent at destination for the combination. The delay would not amount to much. It would require a large number of locks, and the first cost would be something. However, the seals now employed are only used once and thrown away. The locks could be used until they were lost or worn out. Thousands of dollars worth of property is stolen on the railroads every week, and it appears that some practicable method of protecting the freight in transit could be put in effect. If the practice of advertising the contents of the cars were discontinued this would reduce pilfering.

J. L. Coss.

Dispatcher, Chicago, Rock Island & Pacific.

RAILWAY EXTENSION IN CHINA.—The Chinese government proposes to construct railway lines outside the Great Wall. The termini of the proposed lines are the several places which will be opened as trade ports, such as Chifeng, Taonanfu, Dolonor, etc. The first line is from Peking to Jehol, a distance of 140 miles, with a line from Jehol to Chifeng of 130 miles, and another one of 170 miles from Chingchow to Chifeng. The other lines are from Kalgan to Dolonor of 150 miles, and from Dolonor to Chifeng of 200 miles. These lines will be connected with the Peking-Mukden and the Peking-Kalgan railways. The scheme is under the consideration of the Ministry of Communications.

Seaboard Air Line Mountain Type Locomotives

Replace Pacific Type in Through Passenger Service on Heavy Grades; Comparison with Others of Same Type

The Seaboard Air Line has recently received 10 Mountain type locomotives from the American Locomotive Company. They are in service between Richmond, Va., and Columbia, S. C., replacing an equal number of Pacific type superheater locomotives having 23-in. by 28-in. cylinders, 72-in. drivers, 195-lb. boiler pressure, a total engine weight of 223,000 lb., and exerting 34,200 lb. tractive effort.

The Mountain type locomotives have a total weight, including the tender, of 499,000 lb., and develop a tractive effort of 47,800 lb.; the Pacific type engines have a total weight, engine and tender, of 397,300 lb. With an increase in weight of 25.8 per cent, an increase of 39.8 per cent in tractive effort was obtained, combined with a higher boiler capacity. According to the American Locomotive Company's method of determining boiler capacity, the engines of the Pacific type have 86 per cent boilers, while those of the Mountain type have 98 per cent boilers.

Through passenger trains consisting of from 10 to 13 steel

the Mountain type engines. The new locomotives have also given a very satisfactory performance in starting trains at stations where the grades are heavy. At certain stations, with the Pacific type engines it was necessary with 10 or more cars to take the slack a number of times, and occasionally to back the train off the hard pull. With the Mountain type the latter expedient has never been resorted to, and it is exceptional to have to take the slack in starting.

This locomotive design was developed as a part of the program of the Seaboard Air Line in reducing operating costs. The successful operation of the engines is of special interest because of the fact that it adds another road to those which are using this type of locomotive for heavy passenger service.

The accompanying table shows the principal data for a number of Mountain type locomotives in comparison with the Seaboard engines.

In working out the design there were included a 34-unit super-

COMPARISON OF FIVE MOUNTAIN TYPE LOCOMOTIVES

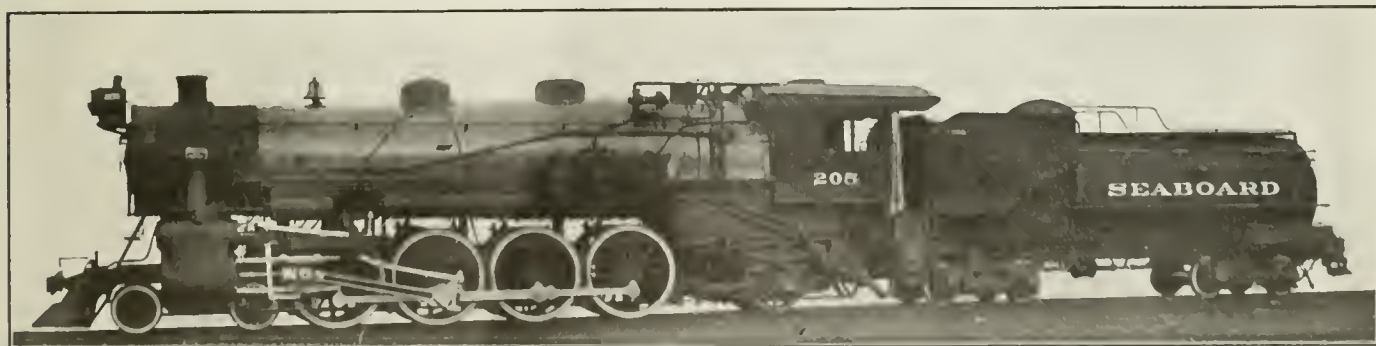
	Tractive effort, lb.	Weight, total, lb.	Weight on drivers, lb.	Diameter drivers, in.	Cylinders, diam. and stroke, in.	Steam pressure, lb.	Boiler, smallest outside diam., in.	Heating surface					Grate area, sq. ft.
								Tubes and flues, sq. ft.	Firebox, sq. ft.	Total, sq. ft.	Super-heater, sq. ft.	Equivalent, sq. ft.	
Rock Island	50,000	333,000	224,000	69	28 by 28	185	78	3,805	312	4,117	944	5,533	62.7
Chesapeake & Ohio ..	58,000	330,000	239,000	62	29 by 28	180	83 $\frac{3}{4}$	3,795	337	4,132	845	5,399	66.7
Great Northern	61,900	326,000	218,000	62	28 by 32	180	82	4,200	340	4,540	1,075	6,153	78
Seaboard Air Line ..	47,800	316,000	210,500	69	27 by 28	190	76 $\frac{1}{2}$	3,396	319	3,715	865	5,012	66.7
Missouri Pacific ...	50,400	296,000	208,000	63	28 by 28	170	75 $\frac{3}{4}$	3,165	285	3,450	761	4,592	56.5

cars, are being hauled by the new locomotives, the regular trains being made up of 10 cars. The engines are assigned to runs from Richmond to Raleigh, 160 miles, on which there are several grades of 1.2 per cent, 2 $\frac{1}{2}$ miles long; and from Raleigh to Columbia, 207 miles, on which there are grades of 1.25 per cent, 3 $\frac{1}{2}$ miles long. The introduction of the Mountain type engines was because of the inability of the locomotives of the Pacific type to maintain a sufficient speed up the grades with 10 or more steel cars to avoid the necessity of exceeding the maximum

heater, a 44 $\frac{3}{4}$ -in. combustion chamber, Security firebrick arch, long main driving box, Cole outside bearing trailing truck, Woodard engine truck, and radial buffer. The table which follows gives the principal dimensions and data:

General Data

Gage	4 ft. 8 $\frac{1}{2}$ in.
Service	Passenger
Fuel	Bit. coal
Tractive effort	47,800 lb.
Weight in working order	316,000 lb.
Weight on drivers	210,500 lb.



Mountain Type Locomotive Used in Heavy Passenger Service on the Seaboard Air Line

speed limit of 50 miles per hour on other parts of the run. The Pacific type locomotives, when hauling 11 cars, would drop back to speeds as low as 18 or 20 miles an hour before reaching the top of the heaviest grades, while those of the Mountain type will maintain a much higher speed with the same train. On some occasions they have hauled 12 cars, maintaining a speed of 35 miles an hour up the grades.

Records of the fuel consumption of the Mountain and Pacific type locomotives, with the same weight of train, show for the Mountain type, 12 lb. per car mile, and for the Pacific type, 13.5 lb. per car mile. This is a saving of 11 per cent in favor of

Weight on leading truck	53,000 lb.
Weight on trailing truck	52,500 lb.
Weight of engine and tender in working order	499,000 lb.
Wheel base, driving	18 ft.
Wheel base, total	38 ft. 11 in.
Wheel base, engine and tender	76 ft. 8 $\frac{1}{2}$ in.

Ratios

Weight on drivers : tractive effort	4.40
Total weight : tractive effort	6.60
Tractive effort : diam. drivers : equivalent heating surface*	658.10
Equivalent heating surface* : grate area	75.10
Firebox heating surface* : equivalent heating surface* per cent.	6.37
Weight on drivers : equivalent heating surface*	42.10
Total weight : equivalent heating surface*	63.20
Volume both cylinders	18.55 cu. ft.
Equivalent heating surface* : vol. cylinders	470.20
Grate area : vol. cylinders	3.59

Cylinders

Kind	Simple
Diameter and stroke	27 in. by 28 in.

Valves

Kind	Piston
Greatest travel	7 in.
Outside lap	1-4 in.
Inside clearance	3/16 in.
Lead in full gear	3/8 in.

Wheels

Driving, diameter over tires	69 in.
Driving, thickness of tires	7 in.
Driving journals, main, diameter and length	11 1/2 in. by 21 in.
Driving journals, others, diameter and length	10 in. by 12 in.
Engine truck wheels, diameter	33 in.
Engine truck, journals	7 in. by 12 in.
Trailing truck wheels, diameter	42 in.
Trailing truck, journals	9 in. by 14 in.

Boiler

Style	E. W. T.
Working pressure	190 lb. per sq. in.
Outside diameter of first ring	76 1/2 in.
Firebox, length and width	114 1/8 in. by 84 1/4 in.
Firebox plates, thickness	3/8 in. and 5/8 in.
Firebox, water space	5 in. and 5 1/2 in.
Tubes, number and outside diameter	193—2 1/2 in.
Flues, number and outside diameter	34—5 1/2 in.
Tubes and flues, length	20 ft.
Heating surface, tubes and flues	3,396 sq. ft.
Heating surface, firebox	319 sq. ft.
Heating surface, total	3,715 sq. ft.
Superheater heating surface	865 sq. ft.
Equivalent heating surface*	5,012 sq. ft.
Grate area	56.5 sq. ft.
Smokestack, diameter	19 in.
Smokestack, height above rail	180 in.

Tender

Tank	Vanderbilt
Weight	183,000 lb.
Wheels, diameter	33 in.
Journals, diameter and length	6 in. by 11 in.
Water capacity	9,000 gal.
Coal capacity	17 tons

*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

CO-OPERATION IN YARD OPERATION

By H. H. LARSON

Yardmaster, Union Pacific, Council Bluffs Transfer, Ia.

The successful operation of a terminal yard depends on the yardmaster, and to get results he must fit himself to conditions that are peculiar to the problems that surround him. He must first learn to enjoy his work, get into the real game of it and subordinate everything to it. Co-operation with all departments is the essential feature, and if the yardmaster is in perfect harmony with all the different department heads, his work will be less arduous.

The yardmaster is comparable to the merchant and should treat all whom he serves as his customers, dealing with them honestly and faithfully. To have and to hold the respect of his co-workers and patrons he must be a man of his word. The freight house is usually the biggest customer and should be served promptly and regularly, as a few moments' delay in switching will run up into hours and dollars to a large force of men. Where the drop truck system is used, the loss in time to the platform force can be reduced to a minimum if the switching is handled promptly. Dilatory switching service performed for the car department will result in delay to cars, but the prompt handling of material will save delay to equipment and dollars in labor. To get full value from each crew, the motive power must be in good shape and out in time; and to expect such service the round house, in return, must have its coal promptly and supplies handled quickly. By keeping in close touch with this department, many serious delays can be averted.

The industrial feature of terminal operation is frequently a trying proposition. The public expects prompt service. Some patrons are unreasonable and the ready excuse for presenting claims requires no little diplomacy to forestall. The man in charge should make himself personally acquainted with as many of his patrons as possible, interesting himself in their welfare, and finding out what they expect and want.

A regular and set schedule can, no doubt, be arranged with patrons which will be satisfactory to all concerned and if the

arrangement is maintained, trouble from this source will be eliminated. Conditions may arise that will disarrange this schedule, but by reaching the complainer before he gets to you, the complaint can possibly be forestalled and delay and expense to him saved.

The irregular patron and team track man should be treated with utmost courtesy and with liberal information and due consideration, as one may secure a regular customer for his road. Irregular runs and special service should be discouraged as the practice is expensive and may disturb other patrons, but if necessary to save a patron from loss or damage the service should be performed.

Economical operation can only be attained by having an efficient organization. Learn to handle men and make them work for you. Win their confidence, encourage suggestions and make them feel that they are a part of the machinery and not merely tools. The most humble employee is worthy of your consideration and many differences can be adjusted by showing your interest in the case. Each employee should be encouraged to learn every detail in his own department and then, if occasion demands he may fill in, where needed.

The system of interchange in all large terminals is similar, the main object of all is to get rid of the cars, and to save per dem and responsibility for delay and claims. To create a free interchange, the important question is keeping the transfer tracks open. Switch engines, being the most expensive item, must not be delayed waiting for cars. Bills or proper data for handling should in all cases accompany the cars. The mechanical inspection and seal records should be made promptly and meanwhile the bills should be checked up, tags made out and cars carded without delay. If a car is found without proper data, the delivering road should be immediately called and disposition requested, thereby saving delay and rehandling.

The most important function in terminal yard operation is for the man in charge to know exactly what is going on daily. In our terminal a complete yard check is made each morning, showing the number and initial of every car, loaded or empty, good or bad order and destination; if any cars are found without disposition, immediate action is taken to secure the data for moving them.

The universal interchange bureau in vogue here, eliminates the delay in mailing and makes complete up-to-date records possible. The bureau consists of an interchange clerk representing each road who assemble daily at one of the freight offices, check up each other's interchange, make proper corrections and complete each day's work.

The common practice in furnishing cars for shippers is to call on the routing road for empties, which often consumes several days. Delay to shippers and unnecessary rehandling of cars to and from connections can frequently be avoided by picking up a car and having it inspected for purpose required and applied on the order.

Some terminals are distributing points for grain, lumber and fruit, and have facilities such as storage and inspection yards for this purpose. Terminals that have no separate storage yards should have assigned tracks for the storage of hold grain, and this information conveyed to the grain exchange inspectors. The inspectors are then in a position to make prompt inspections, which means quick release of cars. Certain tracks should be assigned for the fruit distributors and located where they will be convenient for vehicles and ice men, in case cars have to be iced on track. A fixed hour should be maintained for receiving diversions or disposition and the track pulled regularly after this hour to facilitate the movement of the cars, to connecting lines or destination.

Co-operation with the other fellow will help any situation and a movement in this direction has been accomplished here by the formation of an organization known as the General Yardmasters' Terminal Association. The association meets once each month to discuss the problems of handling terminal traffic and cultivate good fellowship and much good has resulted therefrom. The

policy outlined has resulted in reducing delay to a minimum, saving in per diem and satisfied patrons.

A daily comparison of business handled, fair and impartial treatment toward co-workers and employees has enabled us to increase the cars handled per engine, 65 per cent in seven years.

CLASSIFICATION OF FREIGHT LOSS AND DAMAGE PAYMENTS

The very great increase in the amounts paid by the railroads of America for freight losses during the past ten years, has now become familiar knowledge. The report of the committees of the American Railway Association, recommending measures for improving the efficiency of the work of the transportation department in this respect was noticed in the *Railway Age Gazette* May 21, page 1088, and again May 28, page 1127, in connection with the proceedings of the spring meeting of the association, where mention was made of the fact that during the fiscal year ending June 30, 1914, the total payments on this account were

ending December 31, 1914. The total here shown is \$32,375,618. The figures do not include the payments of roads having annual revenues of less than \$1,000,000. In the reprint here given the table is divided into two parts, ten of the sixteen classes being in the upper part and the other six in the lower. The seventeenth column (letter q), as shown, represents a sum to be deducted from the aggregate of the preceding columns.

This statement presents the aggregate of the losses and damages on 180 roads operating 227,884 miles of road; the total represents 1.117 per cent of the total operating revenues of these roads; 1.551 per cent of the total operating expenses, and 1.625 per cent of the total freight revenues.

The committee in its report presents an analysis of the statistics which appear in the table, giving therewith reasons for the different recommendations embodied in the resolutions offered for the approval of the association (printed May 28). Some 18 per cent of the total loss is of entire packages. Unlocated losses amount to nearly 24 per cent of the whole. Rough handling of cars, representing carelessness outdoors, accounts

CAUSES OF LOSSES AND DAMAGE TO FREIGHT, PAID FOR BY CLASS 1 RAILROADS, TWELVE MONTHS ENDING DECEMBER 31, 1914

CAUSES	ROBBERY		Concealed Loss	UNLOCATED LOSS		Fire	Wrecks	Concealed Damage	Defective Equipment	Errors of Employees
	Of Entire Package	Other		Of Entire Package	Other					
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
COMMODITIES										
1. Boots and Shoes	\$98,509.75	\$205,109.88	\$128,249.09	\$252,633.81	\$109,840.09	\$35,274.77	\$22,594.71	\$7,945.55	\$1,721.39	\$24,867.02
2. Clothing, Dry Goods and Notions	187,833.80	478,736.61	355,792.81	490,561.74	193,628.10	54,729.14	68,387.50	79,043.24	30,150.31	74,323.02
3. Butter and Cheese	15,135.06	9,754.34	2,307.69	120,130.44	16,902.92	3,315.66	12,085.90	2,101.22	6,328.04	9,708.64
4. Eggs	5,244.27	2,033.37	1,958.44	66,596.08	10,783.23	1,944.19	21,685.15	20,271.62	17,754.31	10,643.14
5. Fresh Fruits and Vegetables	12,925.45	32,187.19	5,510.00	184,839.77	69,301.84	13,869.95	136,378.34	8,732.75	54,090.78	130,521.54
6. Live Stock	1,168.74	652.48	178.46	31,984.35	29,264.08	35,120.81	194,727.68	2,432.67	42,178.69	79,334.77
7. Meats and Packing House Products	27,312.64	32,460.23	8,560.08	219,945.25	44,325.44	3,826.91	187,925.69	3,570.59	17,180.13	32,276.88
8. Poultry, Game and Fish	4,170.13	7,208.60	1,580.57	27,340.13	10,432.32	269.35	18,869.89	1,939.78	3,841.45	15,306.85
9. Grain	8,760.79	21,826.10	9,250.15	73,554.41	634,128.54	25,576.52	217,637.72	6,319.65	1,560,213.94	41,800.72
10. Flour and Other Mill Products	8,158.56	3,550.26	5,158.85	128,844.62	52,995.53	13,086.58	43,241.86	5,123.34	685,366.39	80,026.40
11. Sugar	5,960.52	4,540.53	1,566.14	94,051.42	42,431.52	10,458.18	13,199.47	2,406.92	160,143.35	8,000.69
12. Groceries	27,265.68	64,780.40	14,737.52	422,388.58	160,135.38	21,922.61	53,023.90	10,512.98	78,925.80	32,792.19
13. Wines, Liquors and Beers	48,924.38	84,275.71	11,991.73	211,854.58	96,656.20	24,490.86	24,490.86	10,831.87	3,906.61	14,751.13
14. Tobacco and Tobacco Products	58,196.58	81,840.79	15,179.27	269,061.08	61,277.29	4,356.99	31,950.53	13,041.45	17,997.53	17,452.11
15. Cotton	3,136.65	1,667.44	530.48	160,023.73	10,994.53	176,978.09	5,264.55	680.10	7,479.21	43,513.17
16. Furniture (new)	4,607.37	2,635.29	6,061.76	167,307.88	18,677.42	23,447.44	38,185.35	185,635.80	22,569.08	17,132.66
17. Household Goods	5,579.22	11,377.24	5,748.81	106,085.06	17,361.56	15,495.44	23,844.80	71,706.52	11,647.39	16,034.14
18. Products of Cement, Clay and Stone	1,501.14	1,607.25	3,071.83	35,683.29	12,282.31	5,665.61	29,299.39	46,243.88	60,078.96	11,428.74
19. Glass and Glassware	1,542.21	3,092.56	4,028.01	46,737.19	7,766.80	3,059.64	25,203.57	111,262.06	3,785.04	6,118.49
20. Stoves	785.03	1,413.04	1,280.68	51,264.39	7,513.49	2,844.47	9,955.27	21,892.15	8,649.77	4,482.11
21. Iron and Steel Castings and Bars	5,792.13	4,969.19	4,135.02	184,723.95	33,343.89	12,888.45	40,160.19	13,643.56	47,651.12	20,305.85
22. Vehicles	8,794.99	25,479.17	2,687.43	43,128.39	13,628.51	23,683.19	85,068.55	11,502.74	5,523.02	16,756.50
23. Agricultural Implements	1,299.70	4,736.84	1,754.92	54,133.92	15,612.17	6,700.37	28,114.86	3,475.20	1,463.06	3,869.81
24. All Other Commodities	122,174.75	198,816.22	97,559.67	1,713,038.28	843,758.35	284,091.14	790,417.61	268,400.34	654,895.38	357,630.05
GRAND TOTAL	\$659,159.52	\$1,284,250.67	\$688,879.71	\$5,158,318.94	\$2,522,271.57	\$780,250.46	\$2,096,673.25	\$914,518.10	\$3,506,545.95	\$1,019,136.10
Ratio of amount paid account of each cause to total payments	2.06%	3.90%	2.12%	15.92%	7.70%	2.44%	6.47%	2.82%	10.83%	3.14%

CAUSES	Rough Handling of Cars	Improper Refrigeration and Ventilation	Improper Handling, Loading or Stowing and Improper Packing and Packages of Freight	Delays	Unlocated Damage	Forfeitures Under Penalty Statutes	Amount Recovered from Sale of Refused and Unclaimed Freight—Credit	Total	Ratio of Amount Paid on Each Commodity to Total Payments on All Commodities
	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	
COMMODITIES									
1. Boots and Shoes	\$7,104.12	.....	\$7,066.00	\$10,991.76	\$22,021.37	\$59.35	\$25,168.09	\$912,420.63	2.81%
2. Clothing, Dry Goods and Notions	43,407.42	.....	48,149.31	49,605.35	107,317.33	341.44	71,802.49	2,194,096.03	6.77%
3. Butter and Cheese	27,738.46	\$40,010.72	14,232.72	29,574.12	59,124.06	.....	90,548.12	333,561.87	9.00%
4. Eggs	211,901.90	38,837.39	31,297.69	20,480.43	327,477.26	4.21	102,565.55	686,347.27	2.12%
5. Fresh Fruits and Vegetables	396,446.83	656,531.35	84,233.60	516,722.11	498,501.59	1,340.22	114,299.95	2,687,339.38	8.30%
6. Live Stock	430,612.43	368.39	48,490.20	867,713.38	473,277.34	75.08	26,923.63	2,211,655.92	6.81%
7. Meats and Packing House Products	40,397.85	178,275.43	27,591.56	149,903.57	89,032.72	350.56	31,201.82	1,031,633.61	3.16%
8. Poultry, Game and Fish	19,269.28	41,505.35	5,717.01	62,885.76	40,950.29	5.90	12,901.96	248,446.98	.76%
9. Grain	33,777.74	668.62	24,419.34	139,023.68	72,176.14	773.93	148,650.45	2,718,077.58	8.95%
10. Flour and Other Mill Products	105,602.98	.....	57,736.12	18,431.28	362,016.25	.....	125,405.39	1,394,578.04	4.30%
11. Sugar	49,902.84	.....	31,019.57	12,471.91	95,703.06	.....	143.66	405,559.88	1.25%
12. Groceries	182,178.48	13,759.08	81,888.23	21,024.22	312,410.30	622.76	78,720.21	1,434,687.68	4.43%
13. Wines, Liquors and Beers	72,128.00	17,913.50	24,449.51	7,845.44	111,174.28	349.16	8,774.54	740,832.78	2.28%
14. Tobacco and Tobacco Products	11,514.60	.....	10,761.66	9,918.64	32,983.87	187.73	22,261.99	618,538.23	1.89%
15. Cotton	2,804.72	.....	9,329.73	15,962.25	29,776.22	273.95	73,190.70	404,211.05	1.24%
16. Furniture (new)	406,337.40	.....	137,050.08	5,427.09	642,697.40	478.25	36,819.06	1,626,390.70	5.92%
17. Household Goods	257,178.45	.....	68,032.14	3,691.75	406,164.16	890.09	12,040.99	1,011,605.76	3.12%
18. Products of Cement, Clay and Stone	343,084.59	.....	41,481.09	6,963.52	317,480.87	140.20	2,232.72	903,881.95	2.72%
19. Glass and Glassware	188,945.47	.....	64,189.12	5,465.37	251,569.89	24.70	4,555.40	698,614.60	3.16%
20. Stoves	141,463.19	.....	39,207.61	2,171.63	234,562.31	47.44	9,606.88	516,895.74	1.59%
21. Iron and Steel Castings and Bars	111,127.09	.....	40,721.61	4,926.24	175,614.90	333.47	28,037.58	676,490.42	2.09%
22. Vehicles	99,182.78	.....	28,244.99	2,682.14	139,921.47	.....	13,912.39	492,377.48	1.52%
23. Agricultural Implements	40,876.40	.....	14,305.10	2,427.57	81,616.32	76.00	5,328.99	256,335.55	.70%
24. All Other Commodities	1,137,488.76	47,215.65	404,947.91	215,534.06	1,893,123.85	5,908.11	\$38,867.69	\$1,186,132.44	25.28%
GRAND TOTAL	\$1,243,481.76	\$1,035,685.50	\$1,346,061.95	\$1,187,345.17	\$6,767,634.95	\$12,561.12	\$1,955,157.17	\$32,375,617.55	100%
Ratio of amount paid account of each cause to total payments	13.41%	3.10%	4.15%	6.75%	20.90%	.04%	6.03%	100%	

\$36,380,285, which sum is equal to 1.597 per cent of the freight revenue. This sum represents all of the reports made to the association, which include some Canadian roads. For the United States alone the total was \$33,671,219. The total in 1904 was \$17,002,602; in 1905, \$19,782,692; in 1910, \$21,941,232; in 1912, \$25,005,705; in 1913, \$30,885,454.

In connection with this report the committee presented a statement, reproduced herewith, giving, in considerable detail, as shown by the records of the Interstate Commerce Commission, payments made by class 1 roads during the twelve months

for over 13 per cent; and improper handling, etc., neglect or recklessness, mostly indoors, amounted to 4 per cent. In short, every one of the sixteen items, against each one of the 24 classes of commodities, has a very definite interest for some particular class of employees; and many of them, of course, for two or more classes.

Besides the matters dealt with in the resolutions printed last week, the committee on packing, marking and handling of freight has a number of other recommendations in hand and probably will take measures to have them put into effect at an early date.

It is proposed that where fibre board boxes do not come up to the standard of strength and security, the freight rate shall be made 50 per cent higher than the regular tariff. It will be proposed that liquids in glass or earthenware be not received, except in very small containers, say those of one quart capacity. Some articles ought not to be received in fibre containers, and a list of these will be presented to the classification committee. Boxes containing wine, liquor, shoes, hats and clothing ought to be completely strapped with wood or iron or wire and a recommendation to this effect is likely to be adopted.

This committee has under consideration regulations for the proper loading of cement, plaster, sewer pipe, newsprint paper in rolls, and drain tile; also rules for the removal and disposition of refuse; for fixing a closing hour for the receipt of freight; and for loading and handling carload freight.

THE COST OF THE ERIE BARGE CANAL*

By H. G. MOULTON

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The latest report of the state engineer and surveyor of New York¹ contains an account of the progress that has been made on the New York barge-canal system to date, and some revised estimates of the probable eventual cost of the undertaking. Canals have notoriously cost far more in the building than the original hopeful estimates. Such has been the almost universal experience, except in Germany, where faulty preliminary estimates have been comparatively rare. The experience in New York has followed the general rule. By act of the legislature and a referendum vote in 1903 the State of New York appropriated \$101,000,000 for the rehabilitation of the state canal system. The law provided that the new Erie canal should be 12 instead of 7 feet deep and that the locks should be 28 feet wide and 328 feet long.

According to this [state engineer's] estimate the canal construction work involved would cost approximately \$84,000,000. The balance of the appropriation was designed to cover damages, engineering, incidental expenses, and contingencies. It was also estimated that \$2,000,000 would be realized by the sale of abandoned canal lands, . . . where the line of the present canal was deviated from in the course of the new construction. This amount it was estimated would be turned back into the canal fund for the general uses of the appropriation, thus making the estimated total cost of the canal \$103,000,000, of which \$2,000,000 would be recovered.²

Let us see how these expectations have been fulfilled.

A series of wholly unexpected events have occurred which have rendered the foregoing estimates quite inadequate. The first of these came in 1906 when the legislature amended the original law so as to increase the width of the locks from 28 feet to 45 feet. This has added \$2,500,000 to the cost of construction without increasing the appropriation. Several smaller amendments passed by the legislature have added \$250,000 to this amount.

A second unanticipated expense has been due to delays in settlement with railroads whose lines have been crossed by new canal lines. This has required changes in railroad grades and alignments and the construction of new bridges. The advent of the Democratic state administration in 1911 resulted in throwing the question of the legality of the already consummated agreements with the railroads into the courts. "After three years of litigation the court of appeals has upheld the settlements made prior to 1911. This litigation, however, made it necessary to cancel several of the existing contracts for the reason that it was not possible to provide the contractors with the entire site of their contracts." Other contracts, also, became involved; and, to make a long story short, the state engineer now believes that the litigation damage claims and added expenses due to "re-surveying, readvertising, and the movement of heavy machinery" have increased the total outlays on this account by \$5,000,000.

A third cause of additional expense has been two unexpected

breaks in the line of the canal east of Rochester, one in 1911 and one in 1912. On these \$400,000 has already been expended, and the engineer estimates that permanent repairs will entail an additional outlay of \$250,000.

Fourthly, the rebuilding of public highways destroyed by construction operations on the canal has cost the state to date over \$1,250,000.

Fifthly, services rendered by the state departments of controller and claims and by the appraiser have added \$710,000 to the total. The original estimate made no allowance for these items.

Sixthly, "no provision was made in the 1903 estimate which at all adequately provided for the enormous damage claims" filed by private property holders. There have been filed up to the present time land damage claims to the amount of \$19,000,000; water-power damage claims to the amount of \$38,000,000; railroad-crossing claims to the amount of \$8,700,000; and damage claims by contractors to the amount of \$7,000,000; making a total in round numbers of \$72,700,000. The state engineer adds, however, that "many of these claims are very excessive and it is reasonable to assume that no just awards will reach much over one-third of the total sum claimed." This is a grudging admission of at least \$25,000,000 for claims thus far presented. The court awards, delayed as they have been, have already amounted to over \$10,000,000.

Finally, the incidental expense were grossly underestimated. "The necessity of maintaining navigation on the old canal while building the enlarged channel on the same site, as is the case in many sections, presented a number of unexpected and expensive difficulties. Injunctions on the part of property-owners which delayed work or made necessary the readjustment of plans have also added to the expense." The total charge for engineering, including the charges for consulting engineers, has amounted to \$9,100,000—much in excess of the anticipations. The straight construction costs have also been substantially increased, owing to "the increased cost of materials, particularly with reference to concrete, the eight-hour labor law, and the workmen's compensation law, both pieces of legislation passed subsequently to the making of the estimate in 1903."

The net result is that with only 85 per cent of the construction work on the canal completed, the appropriation of \$101,000,000 is overdrawn. "The state is at this moment obligated to an expenditure of \$1,500,000 more than is available in the appropriation." Unless an additional appropriation is made no section of the canal will be available for through traffic by large barges as the work remaining to be done is so located that the completed sections could be utilized for local traffic only.

The state engineer now estimates that to complete the project an additional sum of \$27,000,000 will be required. Perhaps this estimate is proportionately as wide of the ultimate mark as the previous ones. In particular the damage claims may much exceed the estimate of the engineer. All things considered, if the history of this and other projects may serve as a guide we need not be at all surprised if the total cost eventually reaches \$135,000,000.

Parenthetically, it is worth noting that engineers originally hoped that the project would be completed and ready for use with the opening of navigation in the spring of 1915. It is now the hope of the department that, if the additional appropriation required is granted at once, two sections of the canal, from Troy to Whitehall and from Waterford to Otsego—roughly half the distance—will be ready for local traffic by the opening of navigation in 1916. It would appear, therefore, that it will be at least three years yet before the undertaking as a whole is completed.

To return to the question of cost, it will be of interest to reduce the foregoing figures to a mileage basis. The project in New York is a system of canals rather than a single line, and is composed of the Erie, Champlain, Oswego, and Cayuga and Seneca branches. The appropriation of \$101,000,000 was for the first three branches; while a separate appropriation of \$7,000,000 was made in 1909 for the Cayuga and Seneca branch, which is 27.5

*Abstract of an article published in the *Journal of Political Economy*, May, 1915. Reprinted by permission.

¹Barge Canal Bulletin, January, 1915 (published monthly at Albany, N. Y.).

²Ibid., p. 3.

miles in length. The lengths of the Erie, Champlain, and Oswego branches are 323, 61.5, and 22.8 miles, respectively, giving a total of 407.3 miles for the main system. The average cost per mile has therefore been approximately \$330,000 ($\$135,000 \div 407.3$). Since the canal connects with the Hudson river, however, it makes possible a continuous water route from Buffalo to New York City. Spreading the same cost over this longer distance reduces the average to approximately \$260,000 per mile. This is exclusive of the cost of necessary improvements on the Hudson, particularly the construction of a large dam and locks near Troy.

All of the foregoing costs, it should be observed, are merely for the acquisition of canal sites, and for the construction of the channel, locks, etc. They make no allowance for the indispensable terminal facilities, such as docks, wharves, freight depots, and transshipping machinery. This failure to provide (originally) for these terminal facilities affords an excellent illustration of the utterly haphazard fashion in which public works are undertaken in this country. Campaign orators, chambers of commerce, specially interested shipping associations, waterway conventions, and state and national commissions had for many years portrayed the wonderful possibilities of water transportation and fanned the enthusiasm of the public to a white heat, before there was even so much as a reference to the terminal question. Indeed, it was not until 1909 that it made its belated appearance, in a government report, six years after the decision to rehabilitate the old Erie Canal.

The United States Bureau of Corporations was delegated to make an exhaustive report on the subject and in 1909 the state of New York appointed a Barge Canal Terminal Commission for the purpose of investigating the terminal situation in New York with a view to making an appropriation. After an extensive investigation costing \$10,000, the commission came to the important, though obvious, conclusion that "it is just as necessary that there shall be frequent, convenient, well-established, thoroughly equipped, and wisely managed depots all along the canals and waterways, where canal-borne freight may be received, cared for, and shipped away, as it is necessary that the railroads shall have their freight depots. It was found that a good waterway terminal has four prime factors: adequate wharves; warehouse space; transshipping machinery; and belt-line railway connections between the water routes and adjacent railways and local industries. Henceforth, the development of these necessary terminal facilities had to be included in estimating the total cost of the undertaking.

In 1911 the legislature, acting upon the commission's report, appropriated \$19,800,000 for the purpose of constructing terminals for the barge-canal system. This was approved by a referendum vote of the people in November of that year. Provision was made in this appropriation for New York and Buffalo at the terminal of the route, and for about fifty intermediate towns. Whether the sum appropriated is the usual underestimate remains to be seen, of course, but there is little reason for believing that the amount is at all adequate. Study of the report inclines one to believe that while the provision of the necessary docks and wharves has received pretty careful consideration, the matter of transshipping machinery, storage depots, and belt-railway connections has been slighted not a little. Even in the case of the docks and wharves these preliminary cost estimates may well prove far from adequate. There will doubtless be the "unanticipated" claims-department charges, appraiser's expenses, controller's fees, "incidental outlays" of many kinds, and, particularly, the customary heavy damage claims with the litigation expenses connected therewith.

Indeed, it is a certainty that further appropriations will be required for terminals, since the 1911 appropriation did not take into consideration or definitely provide for terminals along the Hudson river between Albany and New York. The state engineer has already called attention to the early need of an additional appropriation for this section of the route.

Finally, the appropriation that has already been made for terminals in New York City is clearly inadequate for the needs

there. The city itself in 1911 outlined a project, independent of the state, which calls for an initial expenditure of \$12,000,000 on terminal facilities. Whether this plan has been given up the writer is unable to ascertain; but at any rate it is a clear indication of the probable needs in the metropolis.

It would obviously be a mere guess on the part of the writer to state the probable ultimate cost of providing the terminal facilities that will be required. Not being averse to prophecy, however, I may hazard an estimate of \$40,000,000 on this account. Something like a grand total of \$175,000,000 may, therefore, prove to be the ultimate expenditure of New York in rehabilitating her canal system.³ This estimate would raise the figures of average cost per mile that were given above from \$260,000 to more than \$340,000, for the through distance from Buffalo to New York City. For purposes of comparison it may be added that the capitalization of the railroads of the United States averages approximately \$60,000 per mile.⁴

It has been seen that the question of terminals did not appear until several years after the barge-canal system in New York was approved. In a similar way the state has gone ahead building the canal without knowing what depth of channel is either desirable or necessary. It now appears that quite as serviceable a canal might have been provided at perhaps only a fraction of the present cost.

The depth of the new Erie canal at the locks is to be 12 feet. No good reason has ever been given for this particular depth. Perhaps the most common statement has been that the failure of the old canal to retain its former tonnage was due to the inadequate depth of the 7-foot channel. Another and perhaps more important argument has been that if the canal were made of ample depth boats could pass through the canal to and from the various lake ports without breaking bulk. But in this connection there was no investigation as to the practicability of lake and canal transportation by the same boats. As usual, investigation could be left until afterward.

At last, in 1911, the Barge Canal Terminal Commission recommended that it was important that a study be made of the best type of boat for use on the canal, but the advice passed unheeded. Just recently, again, the state engineer has urged that "one of the matters that should receive the early attention of the state is that relating to the size of boats for navigation upon the opening of the barge canal." It is apparent, therefore, that even yet there is no definite knowledge as to what is the most feasible boat for the canal or what its draft should be.

A great depth of channel is not required for economical barge transportation. For instance, the fleets of coal barges on the Ohio and lower Mississippi rivers, of which so much has been written, have to be content with a depth of 6 feet and even less for the greater part of each year. On the Rhine in Germany, barges of 2,000 tons capacity regularly ascend the river as far as Mannheim, where the low mean channel depth is only 6.52 feet. Between Mannheim and Strasburg, the head of navigation on the Rhine, the low mean depth is but 3.91 feet, but barges of 800 tons burden reach the latter port. In fact, the greater part of the vast canal traffic of Europe is carried on canals with a depth of less than 7 feet.

Evidently, the failure of the old Erie canal was not primarily due to its inadequate depth. Evidently, also (even assuming canal transportation is economical), a great part of the present outlays in New York is but a needless sinking of state funds. While the greater width may have been required, the extra depth appears to have been almost, if not quite, superfluous. It will be interesting to see, however, if other localities do not cheerfully go and do likewise.

³There is to be added to this estimate the \$7,000,000 appropriated for the Cayuga and Seneca branches.

⁴It has elsewhere been shown by the writer that the low transportation rates on the barge canal that are promised will be possible only because the state will charge no tolls on its waterways. The entire interest on the bonded indebtedness and even the cost of maintenance and upkeep of the canal are to be paid out of annual taxes. The canal rates, therefore, will merely cover direct haulage charges. But this shifting of a great part of the expense to the taxpayers does not lessen the cost as a whole. And if the inclusive cost is considered, it is easily shown that the entire undertaking will prove an enormous economic loss to the state. (See *Waterways versus Railways*.)

Hearing on Advances in Western Passenger Fares

Railway Officers Show Reduction of State Passenger Fares Has Not Brought Compensating Increase in Travel

Testimony on behalf of the western railroads at the hearing before Examiner H. E. Thurtell, of the Interstate Commerce Commission, at Chicago, in support of their application for advances in interstate passenger fares in the territory between Chicago and the Rocky mountains was concluded on Monday, July 12, and the hearing during the rest of this week has been devoted to testimony on behalf of the protesting state railway commissions. It was expected that the hearing would be completed by the end of the week.

L. E. Wettling, who presented most of the statistical testimony for the carriers, completed his direct testimony on July 8. Clifford Thorne, chairman of the Iowa Railroad Commission, asked a number of questions in an effort to get the witness to admit that the standard of maintenance had been higher during the period 1908-1914 than during the period 1901-1907, and that during the second period permanent improvements had been charged to operating expenses, as allowed in some cases by the accounting rules of the Interstate Commerce Commission, to such an extent that the net operating income was considerably less than it would have been without such expenditures. Mr. Thorne asserted that if the same standard of maintenance had been continued during the last seven years, as during the preceding seven years the roads would have shown a net operating income \$300,000,000 greater. Mr. Wettling said that some of the expenditures of this character represented deferred maintenance. Mr. Thorne also insisted that the commission give a ruling on his request for a statement of the amount of increased revenue which each of the roads involved would receive from the advance if allowed. The carriers had presented a rough estimate of the total advance, and C. C. Wright, chairman of the lawyers' committee representing the roads, said they would rest on that estimate, that it would be impossible to get an exact statement for each road.

A. E. Helm, counsel for the Kansas Public Utilities Commission, started a controversy by insisting that the carriers submit a division of their expenses between state and interstate business. Attorneys for the railroads attempted to put Mr. Helm on record as to whether he claimed that the state business cost more or less than the interstate business, but he declined to commit himself, saying the roads had usually contended in state cases that the cost of intrastate business was higher. Mr. Wright said that while in certain cases the roads had presented evidence to overcome the presumption that the cost of state and interstate business is the same, in this case they would rest on that presumption. Mr. Helm insisted that his request be submitted to the commission for a ruling. He then cross-examined Mr. Wettling on his exhibits to show that for all of the roads in the case, and for a number of the groups of roads, the increase in taxes in the second period over the first period was greater than the decrease in net operating income, and said that, therefore, the roads ought to "get after" the tax commissions rather than ask for an advance in rates.

SOUTHWESTERN ROADS

H. H. Butler, assistant general passenger agent of the Missouri Pacific, testified on behalf of the railways in the southwest, that have filed tariffs publishing interstate rates on the basis of 3 cents a mile in the territory west of the Missouri river and south of the Union Pacific line in Kansas. His testimony was largely devoted to showing the losses caused by the reductions of passenger fares to 2 cents a mile in 1907, and the failure of anything like a compensating growth in traffic to result.

"Comparing 1907, the last year under 3 cent fares, with 1914, the last under the 2 cent fares," he said, "the Missouri Pacific suffered a decrease in passenger revenue of 28 per cent. In

the same time the number of passengers increased 9.1 per cent. The average increase in revenues to the railways, in other words, has not kept up, although expenses due to wage increases, etc., have more than kept up with the growth of business. The argument for reduction was that travel would be increased, but this was not well founded. Comparing the Missouri Pacific figures from 1901 to 1907, seven years under 3-cent fares, its passenger revenue increased 57.7 per cent. Comparing 1908 with 1914, seven years under 2-cent fares in Kansas and Nebraska, and part of the time in Missouri, the increase in passenger revenue was only 10.9 per cent. Comparing 1907, the last 3-cent year, with 1908, the first 2-cent year, there was a loss in passengers carried one mile of 1.6 per cent, but a drop in passenger revenue of 10.4 per cent.

"This appears to prove," he said, "that a general reduction in base rates per mile in passenger fares in any territory will not cause a corresponding increase in the number of passengers handled and the revenue received. It has been the experience in this territory that people travel only when they have good reasons to travel, and this is substantiated by the fact that the public, after 2-cent fares were established, was as insistent that excursion rates be granted at reductions from 2-cent fares, as they had been previously that special reductions be granted from the 3-cent fare. Since these 2-cent fares were enforced, repeated efforts have been made by the southwestern lines to secure relief, in most instances thus far without avail. Before 1907, fares in Arkansas, Missouri, Kansas and Oklahoma were 3 cents per mile, but during 1907 the rates were changed to 2 cents by state action. The roads in Missouri, Arkansas and Oklahoma appealed to the United States courts on the basis of confiscation; injunctions were granted and the fares were restored to the old basis. The cases of Arkansas and Missouri went to the United States Supreme Court, and by a decision in 1913 were dismissed. The Oklahoma case was postponed awaiting decision in the other two cases. The intrastate fares in all three states were restored to 2 cents in 1913.

"When the 2-cent fares were restored, the interstate fares remained at 3 cents. Complaint was entered with the Interstate Commerce Commission against this by the Missouri, Oklahoma and Arkansas Commissions, but after a hearing the Interstate Commission decided that 3 cents through these states was not unreasonable.

"Since the Supreme Court decision dismissing the Arkansas and Missouri cases the roads have sought to increase the state fares. In Arkansas they have succeeded. After refusal of relief by the legislature in 1914, two roads secured perpetual injunctions against the Arkansas 2-cent fare from the United States courts, and the other three have secured a temporary injunction. In Missouri and Kansas all lines are now before the railroad commissions asking restoration of 3 cents. In Oklahoma the lines are now in the United States court asking an injunction against the Oklahoma 2-cent law.

"How little western roads can expect from 2-cent fares may be seen by comparison with the New York, New Haven & Hartford, one of the lines of heaviest passenger traffic in the country. The New Haven, operating in densely settled New England, earns \$15,957 per mile in passenger revenue and \$1.91 per train mile. Western roads earn only \$2,941 per mile passenger revenue and only \$1.31 per train mile. Yet, in the recent eastern rate case, the Interstate Commerce Commission found that passenger earnings of the New Haven did not contribute to taxes and interest, but that expenses of the passenger service consumed approximately 100 per cent of the passenger train revenue.

"It is proposed to advance the rates to 2 1/2 cents interstate east

of the Missouri river and west of the Missouri on, and north of the Union Pacific in Kansas. South of that line the proposed rate is 3 cents per mile.

"Comparisons of traffic conditions justify the higher rate in the southwest. Taking the 1910 census, the population north of this line was 40.8 per square mile against 28.2 south of the line. Population density south, therefore, was only 69 per cent of that north. Taking the revenues of four representative roads north against four south of the line, the southern roads earn only 78.6 per cent as much per mile of road as those north and handled only 74.4 per cent of the number of revenue passengers per mile of road. Furthermore, it should not be overlooked that the railways in Arkansas, Oklahoma and Missouri, south of the line mentioned, have successfully defended their 3-cent fares for interstate purposes before the Interstate Commerce Commission."

F. A. Jones, chairman of the Corporation Commission of Arizona, cross-examined Mr. Butler at length on what he considered the discrimination against Arizona and New Mexico, to which points rates are advanced by the amount of the increase up to El Paso, whereas no advances are made in the rates to California nor to points in the intermountain states, with a few exceptions. Mr. Butler said that the California rates were not advanced because they had not been reduced at the time other rates were reduced which are now being restored to their former basis. The purpose of the present tariffs is to restore rates which were reduced on account of the effect of the reductions of intrastate fares in a number of states to 2 cents a mile. Mr. Jones also asked a number of questions to show what he considered the discrimination in lower rates from Kansas City to Utah than from Kansas City to points in New Mexico and Arizona, where the mileages were about the same. For example, he said the suspended tariffs provide a rate of \$44.40 from Kansas City to Williams, Ariz., 1,268 miles, or 3½ cents a mile, and at the same time carry a rate from Kansas City to Salt Lake City, 1,268 miles, of \$31.95, or 2½ cents a mile. He thought that the roads ought to make lower rates through Arizona and New Mexico than through the mountains, because of the more favorable transportation conditions. Mr. Butler pointed out that the density of traffic was greater to Salt Lake City, but said that the real reason for the difference was that the lowest factor west of El Paso would be the local rate of four cents a mile in Arizona and New Mexico. Mr. Jones thought that this was penalizing the states that have not made low intrastate rates. Mr. Butler also explained that it was the intention to advance rates to Montana, Utah and Idaho points, but that the tariffs had not been completed when the suspension order was issued, and so their preparation had been postponed.

Mr. Helm made a point of the fact that in many instances the tariffs provide for a discontinuance of the practice of meeting the short line rates in the rates via longer routes. Mr. Butler said that to some extent the roads were going out of the business of meeting short line rates at points where it has been discovered that the longer lines could not get the business even by meeting the rates by the shorter line, but not where there is any chance to get business by meeting the lower rates. Examiner W. V. King, who sat with Examiner Thurtell, said he noticed that all of the roads reported a loss in the dining car service, and asked whether it is proposed to make up for the loss in the passenger fares. Mr. Butler said dining car service is a necessary part of the passenger service.

WESTERN AND NORTHWESTERN ROADS

Mr. Butler was followed by W. J. Cannon, assistant general passenger agent of the Chicago, Milwaukee & St. Paul, who testified on behalf of the lines east of the Missouri river and north of the Union Pacific line in Kansas, that are proposing an advance from 2 to 2½ cents a mile. Mr. Cannon gave comparisons between western railways and eastern railways, which have already been allowed an advance to 2½ cents a mile, to show the disadvantages under which the western lines operate, saying that although the west taken as a whole, with the high fares of the states beyond the Rockies, shows a slightly higher

revenue for carrying a passenger one mile, the states covered by the present application for advances have the lowest maximum fares in the country.

He presented the following figures comparing the territory west of Chicago with New England; the trunk line territory, between Buffalo, Pittsburgh and the Atlantic; and the central territory, between Chicago, St. Louis, Buffalo and Pittsburgh.

	New England	Trunk Line	Central	Western
Population per square mile.....	105.7	136.7	89.8	24.9
Population per mile of railroad....	827	750	444	244
Average passenger train revenue per mile of line	\$8,913	\$7,676	\$4,110	\$2,849
Average number passenger miles per mile of line	431,387	357,779	169,743	112,782
Average receipts per passenger mile	1.777c	1.755c	1.917c	2.037c
Average receipts per passenger train mile	\$1.71160	\$1.46420	\$1.32070	\$1.39034

"Western railroads thus enjoy only from about one-half to one-quarter the population per mile of railroad enjoyed by eastern roads," he said. "Their average receipts per passenger mile are higher than in the other territories, it is true, but this is because the western territory includes roads having mileage in Montana, Idaho, Colorado, Wyoming, Washington, Oregon, British Columbia and Manitoba, all on the basis of 3 cents per mile where the traffic is exceedingly sparse and in North and South Dakota, where it is 2½ cents per mile. If we take New England as 100 per cent, the ratios in other territories are as follows:

	New England	Trunk Line	Central	Western
Passenger train revenue per mile....	100	86	46	32
Average number passenger miles per mile of line	100	83	39	26

"In spite of this more favorable situation for eastern roads, interstate fares in central territory are on a 2½ cent per mile basis. Fares in the trunk line territory vary from 2 to 3 cents per mile, and in New England from 2½ to 4½ cents, while in Illinois, Wisconsin, Minnesota, Iowa, Nebraska, Missouri and Kansas maximum fares are 2 cents per mile, both state and interstate.

"Experience has proved that the institution of reductions for tourist fares, etc., has generally stimulated travel and, as a large percentage of the traffic is carried in regular trains, the railways can afford to make such reductions. Tourist fares of all kinds are open to the public and necessarily reduce the average rate per passenger mile. Homeseekers' fares which apply to round trip tickets have been made for many years. Experience shows that the 'bargain principle' of granting such concessions on certain days is a factor of consequence in accomplishing the desired result.

"Mileage tickets with 2,000 coupons, each good for a mile, are sold for \$40. The proportion of travel upon these mileage tickets, mostly used by commercial travelers, is much smaller than is usually supposed. The proportion that such mileage honored bears to the total passenger traffic ranges, in fact, only from 1½ to 3½ per cent, showing that this form of transportation is a very small proportion of the total."

Reduction in passenger train schedules and the elimination of some of the luxuries of travel, which railway officials at the hearing claimed were universally demanded by the American public, were suggested by Examiner King in questioning Mr. Cannon. Mr. King produced a mass of newspaper articles and excerpts from the technical press, which described the present elaborateness of American passenger travel in schedules and equipment.

"Do you know the cost of hauling an observation car?" asked Mr. King.

"I do not," replied Mr. Cannon, "as that is an operating question, but the figure would be such a minute fraction of a cent per passenger mile that you would have to run your finger a long way to find the decimal point."

"Do you know the cost of hauling club cars?"

Mr. Cannon said he did not know.

The examiner then went through a long list of the special features in cars and accommodations afforded travelers, em-

phasizing the cost and seeking to draw an admission from the witness that the unprofitableness of passenger service was due to this.

"How many railroads operate between Chicago and St. Paul," asked the examiner.

"Seven," replied Mr. Cannon. The witness stated that these roads probably had an average of two through trains a day each between these points.

"Could not half of these trains be taken off?" asked the examiner.

"These trains do not only serve the terminals," said Mr. Cannon; "there are many prosperous towns local to each road and intermediate to the terminals which must have the passenger service. These trains also serve territory beyond the terminals, both to the West all the way to the coast, and east of Chicago. We have tried to reduce the passenger service, and when we did, it was not very popular with the public."

"These articles," said the examiner, "also call attention to the gilded stairs and marble hallways of the new passenger stations. Is not this wasteful?"

"Well, we might allow the old Union station to stand in Chicago," interjected one of the railway attorneys.

"Do you think," the examiner asked the witness, "that the commission should allow an increase in passenger fares while this costly service is being maintained?"

Mr. Cannon stated that question was impossible to answer categorically, but that he considered the passenger service was only what was demanded by the public.

STATES IN WHICH ADVANCE IS PROPOSED MOST PROSPEROUS

Eben E. MacLeod, chairman of the Western Passenger Association, testified that there are but 11 states in the United States that have as low a maximum passenger rate as 2 cents per mile and nine of these are the states covered by the advances now being considered, Illinois, the northern peninsula of Michigan, Wisconsin, Minnesota, Iowa, Nebraska, Missouri, Oklahoma and Kansas. Arkansas and West Virginia have just gone up from a 2-cent fare.

"It must be conceded," he said, "that population per railroad mile, gross passenger earnings per railroad mile and comparative expense per mile are the leading comparative factors, the first two representing traffic density and the other the concrete results. Comparison of these factors will show the railroads in these 9 states have less advantages, less opportunities and a lower maximum fare per mile than in any other equal section of the United States. Comparing them with eight eastern states shows they have a density of population per railroad mile only one-third as great and much less than one-third the passenger earnings per mile, yet the property investment is more nearly equal per mile and the maximum rate per mile averages fully 25 per cent greater in the more densely settled eastern states. All other states in the United States have a population density per mile of 280. The nine states in this territory have 323, but the eight eastern states have 1,036, yet these other states have an average maximum fare per mile of from 2½ cents to 6 cents per mile.

"These nine states are, comparatively, the most prosperous subdivision of agricultural territory in the United States, according to government reports. Yet they enforce lower passenger fares than prevail anywhere else in the union, except in Ohio and Indiana, which also have 2-cent fare laws. In March, 1906, the Ohio legislature enacted its maximum 2 cent per mile law. At the first following sessions of their legislatures, these nine states adopted similar rates, in some by commission orders, but in nearly all cases carrying such heavy penalties as to make it almost mandatory to comply with the enactments and orders. In no state was such compliance voluntary.

"The argument by advocates of reduced fares, aside from political reasons, was that reduced fares would stimulate travel and that the practical effect would be not to reduce but to increase gross and net passenger revenue. The result is a disappointment after an honest and fair trial. It has been proved

conclusively that the increase in travel has been only the natural growth increase; that it has been less than the increase in passenger expenses; that the passenger fare per mile is less than the progressive value of the service; that the present service is not in excess of present public requirements and that the net result of the fare reduction is less revenue for more service.

"It is common knowledge that the reduction in passenger fares resulted from the allegations that the cut would not reduce net revenue, that it was good politics to enact anti-railroad legislation, and that other states had passed such laws. The reduced rates have had a fair and enforced trial since 1907, and considering all conditions the conclusion is necessary that it tends to produce a burden on other traffic."

Mr. Helm objected to the exhibits bearing on the prosperity of the territory, but Examiner Thurtell said the commission had usually admitted such evidence. Mr. Helm said it was necessary for each road to justify its own rates. Mr. Thorne also objected that the figures did not show that the farmers were actually making money and said that the advances in many instances would be paid by the people in other states.

E. L. Bevington, secretary of the Transcontinental Passenger Association, presented figures showing that even if the advance asked is granted, 2½ cents per mile in the West and 3 cents in the Southwest, the actual average earnings per passenger mile would be less, because of the necessity of roads with longer mileage meeting the rate of the shortest line.

"Between Chicago and Kansas City," said Mr. Bevington, "the short line is 451 miles, but the average mileage of all lines competing for traffic between those cities is 508 miles, making the average rate per mile 2.46 cents on the proposed fare, \$12.50. Thus, while the short line, whose mileage is used in the construction of the fare, receives approximately 2½ cents per mile, all other more or less indirect lines receive materially less than 2½ cents for their service between the same points. Between Chicago and St. Paul the average earnings under the proposed fares would be only 2.23 cents per mile; between Chicago and Denver, 2.39 cents, and between St. Paul and Council Bluffs 2.10 cents.

"Roads in the western district carried 39.6 per cent of all passengers carried one mile in the country in 1913 against 47.4 per cent in the eastern district, but the miles of track operated in the West exceeded those in the East by 17 per cent, showing the greater sparseness of travel per mile. Under 3-cent fares travel in this western district increased between 1903 and 1907 about 40 per cent, while between 1908 and 1913, under 2-cent fares, the increase was only 9 per cent, proving the total failure of predictions that lower rates would mean stimulated travel."

Mr. Bevington also presented statistics showing the great increase in expenses brought about by increases in wages and by state legislation, and the large investment in block signals for the purpose of increasing the safety of travel.

OPENING STATEMENT BY CLIFFORD THORNE

At the hearing on Monday morning Mr. Wetling was recalled for further cross-examination, after which Clifford Thorne, chairman of the Iowa Railroad Commission, made an opening statement on behalf of the protesting state railway commissions. He said that the net operating income during the past seven-year period of the northwestern group of railroads amounted to \$1,000,000,000 in round numbers, or \$170,000,000 greater than during any other seven-year period in their history, and that these roads during the past five years have increased their property by over \$750,000,000, a sum which exceeds that of any preceding five-year period by more than \$300,000,000. In the southwestern group the net operating income during the past seven-year period aggregated \$550,000,000, which was more than \$100,000,000 greater than during any other preceding seven-year period in their history. Mr. Thorne also criticized the use by the railroads of the property investment account as a basis for calculating the net returns, saying the commission has unanimously repudiated

it. He also criticized the inclusion in this account of the value of improvements built out of surplus earnings since 1907, saying the commission has unanimously held that railroads cannot rely upon betterments and improvements built out of surplus earnings as a justification for an advance in freight rates. "If it is seriously proposed at this time," he said, "that our federal commission shall reverse itself on this principle, then the carriers must content themselves without a surplus for the purpose of building such improvements in the future. For, so long as private ownership continues, the public will not long consent to be forced by any public tribunal to build railroads for private companies, and then pay those companies a return on what they build." Mr. Thorne also criticized as unsound the comparison of net earnings over a period of years, without allowances for substantial changes in the basic methods of accounting, or substantial changes in the policies of the carriers during the same period. "The most important changes in the rules of accounting prescribed by the Interstate Commerce Commission that have been made during the past 25 years became effective on June 30, 1907," he said. "The said changes affect both the operating expense account and the property investment account. These companies, having the burden of proof, have made no attempt whatever to show the effect of the changes, they have made no attempt to place the two periods compared upon the same basis. We have undertaken to perform that task with some of our exhibits after making proper allowances for any changes in practices and cost of material."

The first witness for the protestants was C. W. Hillman, president of the Mutual Audit Company, who had also been employed as statistician for the western commissioners in the freight rate case. For the purpose of separating freight and passenger expenses, Mr. Hillman presented an analysis of the accounts of the Chicago & North Western, the Chicago, Milwaukee & St. Paul, the Chicago, Rock Island & Pacific, the Atchison, Topeka & Santa Fe and the Missouri, Kansas & Texas, which, he said, "cover both the strong and weak lines and may be considered typical of the results of operation in the territory affected by the proposed advance." He had set up the expenses assignable to passenger business upon six different methods, only one of which, the gross weight basis, did he advocate as being the proper method for the division of the track maintenance accounts as between freight and passenger service. The other methods, he said, were introduced for comparative purposes or by direction of the committee representing the western states. On the gross weight basis, passengers, baggage, express and mail were reduced to a ton-mile basis, and his exhibit showed an operating ratio on passenger business of 68 per cent. The other bases used were the locomotive ton mile basis, the locomotive tractive power basis, the passenger car mile basis, the gross weight and car mile basis, the gross weight and net ton mile basis. Most of the differences between the various methods occur in the maintenance of equipment account, he said.

AMERICAN SHIPBUILDING FOR THE YEAR.—During the fiscal year ended June 30, 1915, there were built in the United States and officially numbered 1,226 vessels, of 215,711 gross tons, compared with 1,291 vessels of 311,578 gross tons, for the same period of 1914. The principal vessels are two colliers built for Panama canal trade, the Achilles and the Ulysses, of 11,081 and 10,910 gross tons, respectively. Other vessels over 5,000 gross tons, are the John D. Rockefeller, a tanker of 8,374 gross tons; the Great Northern and the Northern Pacific of 8,255 gross tons each, built for passenger service on the Pacific coast. The J. A. Moffett, 6,395 gross tons and the Lyman Stewart, 6,054 gross tons, both tankers, were built on the Pacific coast. Only one large sailing vessel was built during the year, the Georgia, a schooner of 1,318 gross tons. In all, 23 vessels of over 1,000 tons each were built, aggregating 123,242 tons.

THE RAILROADS AS A FACTOR IN OUR NATIONAL LIFE*

By HOWARD ELLIOTT

Chairman of the New York, New Haven & Hartford

An interesting and important statement of how the railroads of the country enter into the lives of millions of our citizens is made by computations just completed by the Bureau of Railway Economics. The momentous fact is brought out in these computations that from June 30, 1905, to June 30, 1914, inclusive, \$11,218,686,516 were paid for wages to an average of 1,611,105 men employed during each year of the ten years as follows:

Year	Number of employees	Wages	Gross revenue	Per cent of wages to gross revenue
1914.....	1,695,483	\$1,373,422,472	\$3,047,019,908	45.07
1913.....	1,815,239	1,373,830,589	3,125,135,798	43.96
1912.....	1,716,380	1,252,347,697	2,842,695,382	44.05
1911.....	1,669,809	1,208,466,470	2,789,761,669	43.32
1910.....	1,699,420	1,143,725,306	2,752,634,153	41.55
1909.....	1,502,823	988,323,694	2,419,299,638	40.85
1908.....	1,436,275	1,035,437,528	2,394,780,410	43.24
1907.....	1,672,074	1,072,386,427	2,589,105,578	41.42
1906.....	1,521,355	930,801,653	2,325,765,167	40.02
1905.....	1,382,196	839,944,680	2,082,482,406	40.33

The large proportion of gross earnings paid directly to these millions of our citizens is worthy of special attention.

Those who man the railroads received 40.33 per cent out of every dollar of gross earnings in 1905 and 45.07 in 1914. They perform arduous and responsible duties and should be well paid, but with increases in pay to the men and improved facilities to the public, should come increased pay to the railroads, and this has not been the case until the last year, when some increases in rates have been permitted.

There are possibly 1,500,000 individuals holding the securities, in one form or another, of the American railroads. They and the employees and their families represent at least 12,000,000 people whose daily bread and butter is involved in the success or failure of this great American transportation machine, or about one-eighth of the population. The par of the outstanding capital is \$20,247,301,257 or between one-ninth and one-tenth of the estimated national wealth. In New England the owners and employees of its transportation lines with their families represent at least 700,000 people, or more than one-tenth of the total population. These people are your neighbors and friends and their rights, comforts and feelings must be carefully considered in any discussion as to the best method of solving the New England transportation problem.

A very grave question today is whether under present conditions the railroads can be ready to serve the people when the next great uplift in business comes. It is not only a material question but a social and moral one. Speaking recently of the railroad problem of today, Professor Seligman, of Columbia University, said: "To combine the maintenance of reasonable private profits with the legitimate demands of social progress is the railway problem of today."

Today from one cause or another more than 30,000 miles of railroads with securities of \$1,815,900,000 are in the hands of receivers and several other great railroads are on the ragged edge. In 1896, when times were so very bad, there were about the same number of miles and the same amount of capitalization in the hands of receivers. This, it is needless to say, is not a healthy condition for the country.

Notwithstanding all the complaints made against our railroads the fact remains that they pay the highest wages and sell their transportation at the lowest prices and furnish more per dollar invested than any railroads of any country in the world. We should compliment the railroads for this and be proud of them. Instead, of late years, we have attacked them and have criticised this wonderful transportation machinery while those in other lands have realized that the work of the American railroad builder, owner and employee

*From a recent address at Peterboro, New Hampshire.

has been marvelous; and this in spite of the mistakes incident to the great task of building and rebuilding 250,000 miles of railroad since the Civil War.

The Comptroller of the Currency said in his recent annual report that there were 11,000,000 depositors in savings banks with \$5,000,000,000 to their credit. Much of this large sum is invested by these banks in railroad securities so that those 11,000,000 people have a very vital interest in having the railroad industry sound and profitable. The conservation of this industry is vital to the country, and owners and managers should be helped rather than hindered in their honest efforts to make it more useful and efficient.

Why is it that this piece of machinery which all admit is so necessary to the welfare of the country—which impartial critics think is such a wonderful work—which represents so large a part of the wealth and population of the country and is so closely interwoven with all of our activities, has been looked upon with suspicion and disfavor? Whenever a new railroad has been projected the people have welcomed the promoters and offered all kinds of inducements—but when the road is built they forget that it must be nourished in order to live.

One reason for this suspicion and disfavor, perhaps, is a lack of understanding on the part of the public as to the magnitude of the enterprise and the difficulties of successful administration. Much has been written and said by many to try and explain it. In the last ten years I have sent out over 1,000,000 pamphlets pointing out the facts and others have done similar work.

Another reason for the suspicion and disfavor is that in the struggle to build railroads and to make fortunes in the process, a few men—and only a very few of the thousands of high minded men in the business did things that are not now considered right and proper—and were not right and proper then—but were in accord with the accepted spirit of the times. Similar practices were in vogue in other fields of human endeavor. Railroad men are not more perfect than other business men. They are drawn from all ranks of society and are influenced by the trend of public opinion. In spite of all, however, a great work was done and the railroads, as a whole, are worth today to themselves and to the public, all their capitalization. I believe a fair valuation of the properties, following the principles laid down in various decisions of the Supreme Court of the United States, will show this to be the case. This wonderful machine that serves the country should not be condemned, crippled and rendered unable to prepare for the future because of a limited amount of unwise financing and unsuccessful management in the past.

Let me quote from a writer of the present day. He says:

Let's get down to common sense. The railways have done more toward making America than any other one thing. It is time they had their due and instead of hating them and talking foolish talk about taking them away from their owners the Government should grant them any request within reason.

Another of our problems is that of the proper treatment of capital organizations, or corporations. The great railroads that are such efficient servants of the nation could not have been constructed without them. In 1800 the total number of corporations in this country was 225, and today there are 350,000. They are necessary to carry on the great business of the United States. Because they were a new and untried method of doing the business of the country some errors were made. Men obtained great power, and in their intense desire to be successful some of the owners and managers demanded efficiency without enough consideration of the human unit and profits regardless of the public weal.

This policy created trouble, but owners and managers are awake to the situation today and realize that they must pay close attention to their duty to the public.

Large and strong corporations, wisely managed, are absolutely necessary, and bad ones are gradually being eliminated.

A few strong and ambitious men used the great powers of corporations unwisely, and as a result the country was aroused against them and all sorts of laws were passed in an effort to correct evils, and, as is often the case, some of the remedies were worse than the disease.

There are signs now that we are approaching the time when the country will obtain the full benefit of the corporate form of doing business, without the evils.

Another present-day problem is that of legislation. Because of some mistakes by railroad owners and managers, and by those engaged in other forms of corporate business, the suspicion and disfavor, of which I have spoken, developed, and a class of critics has grown up in this country who have made a living by agitation and by advocating unnecessary legislation.

Probably a large number of the alleged evils would have gradually corrected themselves and the country would be far better off with less instead of more laws. For example, in 1913, 1,395 bills were introduced into the legislatures of the various states and 230 became laws, all relating to the details of practical railroad operation, most of which would be better left to the men trained in the business.

There are about 4,000 legislators, national and state, and during the last sessions of the national and state legislatures 43,403 pages of laws were enacted, covering 20,510 chapters and 151,083 heads or sub-heads.

During this same period there were 28,000 decisions by courts of appeal, and these decisions have the force of statutory law.

With this deluge of legislation affecting all kinds of business it is not surprising that the country staggers and cannot go ahead with constructive work.

A well-known Western lawyer, in a recent address at Peoria, Ill., spoke on this subject, and said:

We need less investigations. *Le*—law.

Everything and everybody is being investigated. This espionage creates great unrest and business disturbance and disorder. It produces equal dissatisfaction among the masses. Every industry is on the grill. These conditions have not lowered the price of commodities nor benefited the people, but they have hurt commerce and industry.

All this is a great waste—waste of time, waste of energy—and what is worse, destruction of confidence: The confidence of the masses is easily shattered, and it is difficult to be restored.

Another great problem before the country is that of the labor organizations. They are a part of our complex social machinery, but they have not yet found their place. In the struggle to create the great railroads and the great corporations the relation of labor to them was not, at times, carefully enough considered. As a result, laboring men united, and little by little the great labor organizations were developed and they now have very large powers. But just as the people took notice of the errors of the capital organizations, or so-called trusts, when they believed that they were ignoring the public welfare and passed the various regulatory measures in an effort to eliminate the bad and retain the good, so will the country in time consider the problem of the labor organizations and correct any errors in them.

The great leaders of capital, as I say, obtained tremendous power which has been curtailed and regulated by law. The time will come when the great unregulated powers now exercised by the leaders of the great labor organizations will be regulated in the same way. I believe the majority of our people feel that when a man earns his living by working for a public service corporation, he enters into a moral contract to do that work upon which the whole people depend until he is mustered out of his place in some orderly manner; that he owes that duty to society just as much as a soldier owes a duty to remain in the army until he is released in a lawful manner. I further believe that sooner or later some plan will be evolved by public opinion that will bring about a satisfactory adjustment of this great and complicated labor problem.

FREIGHT CLAIM ASSOCIATION

The twenty-fourth annual meeting of the Freight Claim Association was held at Hotel La Salle, Chicago, June 16, 17 and 18, President J. W. Newell (C. B. & Q.) in the chair and nearly 200 members present.

The president, in his opening address, reviewed the history of the association from its small beginnings in 1892. Looking to the future he said: "Is it possible for this association, covering the territory that it does and made up of members whose actions are in so many cases controlled by different laws of liability, to undertake to make rules for the settlement of claims between claimants and carriers, unless the association itself undertakes and does make those settlements? The transportation business of this country has so grown that it is no uncommon thing, with long distance shipments, for the laws governing the liability of carriers at point of origin and destination to be diametrically opposite to each other. . . . This association must either confine itself to the apportionment of joint liabilities, and its members must trust each other to make proper adjustments with claimants or must undertake to make all adjustments as between claimants and carriers, as well as apportion between carriers the amounts paid. It is generally recognized that society must protect its weaker members, and I believe that this association should do no less. An apportionment rule based upon the law of averages is not always a fair one. We have in our membership small roads and switching carriers, whose problems must be carefully considered and who must be made to assume their burdens the same as the larger lines; but neither must be persecuted because of its size or geographical location.

"A year ago this association undertook to point out the causes of freight claims and prescribe a course of treatment that would cure the ills. Whether that plan is to be effective depends entirely upon the individual members of this association, though we are attempting to correct conditions largely under control of others. . . . The whole general scheme of receiving, transporting and delivering of freight must be changed. The amount that can be saved must be carefully considered in connection with the amount expended. . . . The association must itself set a good example of efficient and economical operation; and must arrange so that the membership can attend to the association work with a minimum of time and expense. . . ."

The report of the secretary showed an enrollment on May 31 of 450 assessable members, representing over 263,000 miles of rail carriers, in addition to the steamer lines and other transportation companies. Over 40 new members were received. During the year 969 claims were passed to the three arbitration committees and 229 notices of appeal were filed. Majority awards were not reached on 10 claims, which were, accordingly, passed to the appeal committee for decision, and 11 notices of appeal were withdrawn.

The conference committee during the year has done much work of importance. Investigation of claims for concealed loss of and damage to freight, was gone into most minutely and it is hoped that by the next annual meeting new rules may be presented. Special Report Series Circular No. 17 and other matters have been the subject of conferences with representatives of the Interstate Commerce Commission. Statistics gathered show that a large majority of claims are settled very promptly, indicating that the complaints from certain quarters of delays in the settlement of freight claims were evidently based on isolated cases. Understandings have been reached concerning United States postoffice department claims; retention of claim papers when claims are declined; duplicating lost claims and presentation of claims to intermediate carrier.

An amendment to the constitution was adopted, providing that, instead of the nominating committee reporting the names of exactly the number of members necessary to fill the membership of the committees, double the necessary number should be named, the privilege heretofore enjoyed of additional nominations from the floor to still be operative. The committee on methods and

topics and the committee on accounts were abolished and a new committee created to be known as "the committee on methods, accounts and forms." The membership of the committee on cause and prevention was increased from five to nine members.

The rules were amended so as to provide that when a claim is in the course of preparation for arbitration, and additional investigation has been made which would affect the liability of carriers whose arbitration statements have already been submitted each carrier shall have the right of further investigation and one rebuttal brief only; and the right to see all rebuttal statements before the claim is submitted to the secretary.

The provision of the constitution relating to charging out under decisions of the arbitration committee was modified so that the paying carrier may relieve its account under a decision of the arbitration committee by charging arbitrarily only where Rule 255 applies; and from those who do not operate that rule authority must be obtained within thirty days.

A new sub-section was added to Section 20, Article VII, to provide for the relief of accounts of carriers outstanding, after decisions by the appeal committee, in the same manner as relief is provided after decision by an arbitration committee, except that authorities must be issued within ten (instead of thirty) days after receipt of papers.

Additional paragraphs were added to Sections 14 and 20, Article VII, providing that, when papers are lost after a decision has been rendered by the arbitration or appeal committee, carrier or carriers decided against may be debited with their proportion without duplication of papers other than a copy of the award; except that when an interested carrier desires to appeal from the decision of the arbitration committee a duplicate set of papers must be furnished by the carrier losing the originals.

The committee on cause and prevention made its first report. On recommendation of the committee, there was referred to the American Railway Association the subject of establishment of joint inspection bureaus at junction points, it being the expressed view of the association that the principle of joint inspection bureaus and joint records meets with its approval.

In connection with the subject of prevention of loss and damage to perishable freight, the secretary was instructed to ask the traffic associations to consider the advisability of providing in their tariffs more nearly uniform rules under which shippers of fruits and other perishable freight are required to give definite instructions as to icing, ventilating, etc.

In the matter of the alleged growing tendency on the part of some carriers to deliver astray freight without adequate proof of ownership, the association concurred in the opinion of the committee that the present rules of the carriers fully cover and that it is simply a question of enforcing them.

The association took action concurring in the resolution of the A. R. A. committee on packing, marking and handling freight that over and short reports at all common points should be checked at least twice a month.

The following officers were elected for the ensuing eleven months:

President, E. Arnold (Grand Trunk); first vice-president, W. O. Bunker (C. R. I. & P.); second vice-president, F. E. Winburg (A. & W. P.); secretary and treasurer, Warren P. Taylor (R. F. & P.), Richmond, Va.

The chairmen of the arbitration committees are: Committee "A"—H. R. Grochan (C. St. P. M. & O.). Committee "B"—G. C. Arnold (L. V.). Committee "C"—E. A. Jack (Terminal R. R. Ass'n of St. Louis). The chairman of the appeal committee is J. J. Hooper (Southern).

The next annual meeting is to be held at Washington, D. C., May 17, 1916.

LIGHT RAILWAYS IN FRANCE FOR THE WOUNDED.—To facilitate the transport of English wounded in France handy light railways have been laid down in certain districts, along which improvised trolleys can be quickly run to and fro with a minimum of shaking.

Two Important Commerce Commission Decisions

One Relates to Dealings with Industrial Railways. The Other Orders Proposed Spotting Charges Cancelled

The Interstate Commerce Commission on July 12 gave out its findings in the so-called Second Industrial Railways and the Car Spotting Charges cases. The former deals with allowances to and joint arrangements with short lines of railway owned by industries and in the latter the carriers are ordered to cancel the tariffs proposing car spotting charges which were filed in accordance with a suggestion made in the original Industrial Railways case. The opinions in both cases were written by Commissioner Meyer.

THE SECOND INDUSTRIAL RAILWAYS CASE

The following is an abstract of the decision in the so-called *Second Industrial Railways Case* (34 I. C. C., 596). The opinion establishes a set of findings relative to the dealings of the trunk lines with small lines of railway owned or controlled by industries.

Following the original report in the *Industrial Railways Case* (29 I. C. C., 212), the trunk line carriers in official classification territory withdraw from joint rate arrangements formerly in existence with substantially all the industrially owned lines in the territory. The tariffs were to become effective April 1, 1914. Complaints made against these tariffs were entered under the commission's docket 4181, which was the number given to the original *Industrial Railways case*. That proceeding was later consolidated with investigation and suspension docket 414 in which proceeding there were suspended tariffs proposing to cancel allowances to 22 of the industrial lines not involved in the original case. The effective dates of the tariffs under suspension have been extended by the carriers to July 15, 1915.

The commission has now made a careful investigation of the points in issue and by means of a series of questions is in possession of full details as to each of the 47 roads involved.

Because of the varying nature of the operations of the industrial lines, the commission wishes to point out the principles which must guide those desiring to enter into joint rate arrangements. There must be determined with respect to each of the lines, first, whether the instrumentality performing the service is a bona fide common carrier; second, whether the service which it performs between the point of interchange with the trunk line and point of placement on the line of the industrial road is plant service or public transportation; third, whether a charge should be made for such service in addition to the line-haul rate applicable to or from points on the rails of the trunk line at the junction. There is also to be considered the larger economic problem whether part of the money paid to the trunk line carriers for public transportation service is to be used to defray the expense of particular shippers in conveying their traffic to and from the terminals of the trunk line carriers. The *Industrial Railways case* rests largely upon the principle of placing the cost of service where it properly belongs.

In *A. T. & S. F. v. Kansas City Stock Yards Company* (33 I. C. C., 92) it was held that:

The principal test of common carriage is whether there is a bona fide holding out coupled with the ability to carry for hire.

Many of the lines own no cars and in some instances no locomotives, and maintain no stations other than loading and unloading docks within the plant. Their tracks lie wholly on the land of the industry which they serve, and access to them may be obtained only through the permission of the controlling industry. In such circumstances the holding out is not genuine.

If the service in any instance is a plant service the trunk line carriers can not lawfully compensate the shipper itself, or indirectly through its incorporated plant railroad, for the use of its plant tracks or for switching the shipper's cars over them

with its own motive power. *General Electric Company v. N. Y. C. & H. R.* (14 I. C. C., 237), *Solvay Process Company v. D. L. & W.* (14 I. C. C., 246), etc.

If the question here presented were new, if the power were given the commission under the act to fix the rates in the first instance, or if it had the power to compel carriers to extend their rails to the plants and industries of shippers, the problem would be stripped of many of its present difficulties; but the commission has before it a rate structure made by the carriers under which they have extended their rates to the plants of some shippers and not to others. It is the contention of the industrial line shippers that the rate structure as made for many years has extended the line-haul rates to points of placement on spur tracks and that those rates include the operation over such spurs. They say that the carriers have by custom changed the rule of the common law and have accepted the burden of making deliveries off their rights of way. Unquestionably if a new rate structure were being formed, the logical way would be to make a line-haul rate and to fix a separate terminal charge based upon the amount of service performed for each shipper. Even in the present state of the rate structure there must be a point beyond which an additional charge over the line-haul rate can be justified if additional service is in fact rendered.

An investigation made in 1910 by the commission shows that there were at that time 742 industries in official classification territory which performed their own switching, either with power owned by the industry or through an incorporated railroad owned or controlled by the industry. Of this number 594 performed the service without any compensation therefor, while only 148 were paid allowances or divisions by the trunk line. During the intervening years nearly all of such allowances and divisions have been canceled. There remain some industrial lines with which joint rates are continued, while to others they are denied under similar circumstances.

The trunk lines in attempting to apply the principles laid down in the *Industrial Railways case*, have not done so accurately nor altogether consistently. The decision of the Supreme Court in the *Tap Line cases*, and the supplemental report in the *Industrial Railways case* (32 I. C. C., 129) throw additional light upon the situation. In the supplemental report in the *Industrial Railways case*, the findings of the original report were modified so as to permit the trunk lines to arrange, by agreement with such of the industrial lines as are common carriers under the test applied by the Supreme Court in the *Tap Line cases*, for a reasonable compensation for such service in the form of switching charges or divisions of joint rates.

The commission will follow the same course in this case and will require that each line which becomes a party to such an arrangement file a full statement of the arrangement entered into, showing specifically the basis of rates to be applied from points on the industrial lines and the basis of the allowances or divisions thereof granted under the agreement. Such arrangements are not to be made indiscriminately. They are to be arranged in conformity with the suggestions of this report.

While each of the operations is to be treated in accordance with the particular facts relating to it, the lines fall into more or less well-defined groups.

The first group has a very general merchandise and commodity traffic aside from the traffic of the controlling industries. They are of the trunk line type and are as follows:

	Mileage
Algoma Central & Hudson Bay	380
Essex Terminal	15
Chicago & Illinois Western	14
Norwood & St. Lawrence	19
Illinois Terminal	42
Lowville & Beaver River	14

Ludington & Northern.....	15
Kane & Elk.....	15
Toledo, Angola & Western.....	11
Wharton & Northern.....	22
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It will not be necessary to discuss in detail the characteristics of these lines. In some instances the joint rates are made by adding the local rate of the industrially owned line to the rate applicable from the trunk line junction. In other cases the junction point rate is extended back to points on the line, but when the junction rate is applied from points on the industrial line the rate structure in the general territory is based on a blanket system or, at least, a number of points of origin or destination are grouped together. As to these lines, there is no question involved which is within the purview of the commission's jurisdiction. The divisions of the joint rates are a matter of bargaining between the interested carriers. It may be that some of these lines are operating in violation of the commodities clause of section 1 of the act, but proceedings under that clause of the law are under the jurisdiction of the Department of Justice.

In the second group of lines are those extending from lumber mills. The control of these lines is vested in the lumber companies which they serve, and in all respects they fall within the principles laid down in the *Tap Line* cases, except that in that case the tap lines were all located within the producing territory from which the carriers applied a blanket rate to all important markets; whereas it appears here that no large blanket exists and rates on lumber are graded with some regard to distance. On short-haul traffic to many markets in this territory some recognition is given to the two-line hauls involved from points on the tap lines. These principles of rate making should be fully considered by the trunk lines when re-establishing joint rates with the lines here. The principles followed in settling the divisions under the second supplemental report in the *Tap Line* case (31 I. C. C., 490) should be considered in fixing the divisions with these lines.

The third group of lines includes those the physical operations of which are in all respects similar to those recited in such cases as the *General Electric Company v. N. Y. C. & H. R. R. R. Co.*

The only essential difference is that the lines here included have been incorporated and hold themselves to be common carriers. In most instances the incorporated industrial line was first constructed as a system of plant tracks, and in many instances the tracks are still owned by the industry and leased to the incorporated railroad. Usually the plant is located contiguous to the rails of a trunk line. In all of these instances there should be considered very carefully the test applied by the Supreme Court in the *Tap Line* cases, regarding the bona fide character of the common carrier:

It is the right of the public to use the road's facilities and to demand service of it rather than the extent of its business, which is the real criterion determinative of its character.

If a railroad within this group is a common carrier and access to its rails may be had by the public, there is also to be considered whether such a line should be sustained by the shippers it serves or whether the expense of maintenance, operation, and interest on the money invested are to be paid by that part of the public which receives no public service or public use from it. In other words, it may well be that there should be a charge in addition to the line-haul rate for the service upon the tracks of some of the industrial lines within this group.

The fourth group of lines resembles closely the lumber tap lines with the important exception that they haul commodities other than lumber, and thus in some instances fall under the direct inhibition of the commodities clause. As appeared in the *Tap Line* case, so also here, the history of these lines shows instances in which a system of plant tracks was constructed to serve an industry located immediately contiguous to trunk line rails; because of various considerations, including a desire for an adequate car supply and a development of competition which could be used as a weapon to obtain divisions of the joint rate for the industrial line, the plant tracks were incorporated and connected with another trunk line located at a distance from the plant. The

industrial line having thus developed a line haul and the trunk line not contiguous to the plant being desirous of getting the traffic of the plant, it afforded divisions of the locality rate to the industrial line, and thus extended its facilities to the plant. Under such conditions the trunk line which had formerly served the plant lost the traffic or in order to retain it afforded the same division as did the line at a distance from the plant. The remuneration paid by the distant trunk line may not have been excessive for the service performed by the industrial line, but as applied to the short distance movement of cars to and from the contiguous trunk line the same measure of remuneration gave to the industrial line earnings which amounted to substantial returns on the investment not only in the tracks and facilities outside of the plant, but also in the purely plant tracks and sometimes paid for a substantial part of the purely industrial operations. Surely in such instances it can not be said that the rate structure had previously included the service on the plant tracks. It would seem that the proper method to pursue in making the rates to such plants would be to add to the junction point rate for the service extended to the plant from the more distant line and cancel joint arrangements with the contiguous line. The industrial road should not receive from the more distant trunk line connection any compensation as division or allowance which exceeds the amount added to the junction point rate. Thus would be preserved the earlier rate adjustment, the relation between the rates applicable over the competing trunk lines would be equalized, the revenues of the trunk lines would be conserved, and the general rate-paying public would not be burdened with allowances and special services for particular shippers.

In a fifth group the following conditions are shown: An industry has plant tracks which could under no conceivable conditions be considered as having any common-carrier characteristics. In order to give to them such a status, a railroad is incorporated, the tracks of the plant are leased to it, and the trunk line grants trackage rights and even leases its rails to the industrially owned railroad corporation. Thereupon the industrial railroad publishes tariffs, files them with this commission, makes reports, and as a matter of form assumes the appearance of a common carrier subject to the act, and the trunk line affords it divisions out of the rate applicable to the locality for the same service which the industry has previously performed without compensation. The shipper through its incorporated railroad is thus afforded advantages which are denied to other shippers having a smaller volume of traffic. For a trunk line carrier to offer its facilities by lease or trackage rights, to give an undue advantage to a single shipper, is unquestionably such a device as is condemned by the act.

The sixth group is composed of industrial plant tracks which are neither owned nor operated by common carriers and are not dedicated to public use, the ownership and right of use being in the controlling industries which operate them. They ask that allowances be paid them out of the locality basis of rates under section 15 of the act, upon the theory that they are performing a service of transportation which the trunk line is obligated to perform under the rate structure. These cases illustrate the passing of the necessity for that provision of section 15 under which shippers may be compensated by the trunk lines for their facilities used in the handling of their own shipments. This legislative measure was enacted to give this commission a means of eliminating certain unjust discriminations. The gradual elimination of discriminatory practices by other processes leaves this provision of the law to be used as a cloak for various payments which but for it would be looked upon as rebates.

The commission will look to the trunk lines to reform their tariffs and file with this commission whatever arrangements they may make with the industrial lines here in question in the light of this report. An order will be entered directing the cancellation of the tariffs suspended in investigation and suspension docket 414, and the proceedings in docket 4181 will be dismissed without prejudice.

Commissioner Harlan dissents from the conclusions of the com-

mission in this proceeding, and will later file a separate report. (34 I. C. C.)

CAR SPOTTING CHARGES

The commission in the decision under this head (34 I. C. C., 609) refuses to allow the railroads in central freight association and trunk line territories, including also the New Haven, to put in effect tariffs proposing spotting charges in connection with placing cars on private sidings or tracks of industrial plants. These tariffs were filed in compliance with a suggestion in the *Industrial Railways case* (29 I. C. C., 212). They were to have become effective on different dates from April 20 to July 15, 1914, but were suspended. An abstract of the decision follows:

The proposed spotting charge is $5\frac{1}{2}$ cents per ton, minimum \$2 per car, and the service for which the charge is proposed is defined in the suspended tariffs as follows:

"Spotting" service is the service beyond a reasonably convenient point of interchange between road haul or connecting carrier and industrial plant tracks, and includes:

- (a) One placement of a loaded car which the road haul or connecting carrier has transported, or
- (b) The taking out of a loaded car from a particular location in the plant for transportation by road haul or connecting carrier.
- (c) The handling of the empty car in the reverse direction.

The industries to which the charge applies were divided into three lists. The basis of selection varied with different carriers, but in general the industries seem to have been arbitrarily selected.

It does not appear that the terminal facilities of the respondents, exclusive of industry spurs, private sidings, and tracks of industrial plants, are adequate for all the carload freight which they have been accustomed to receive and deliver upon such tracks, and respondents do not show that they could provide such terminal facilities, but some of the protestants testified that if such terminal facilities were provided by the carriers they would not use them.

It is admitted by the carriers that the proposed charge and also the lists of industries are tentative, and that if the tariffs should take effect as filed discrimination would result in that there are many industries not named in the tariffs for which the respondents perform without an additional charge the same spotting service. But while these respondents concede that the proposed tariffs can not be justified, they ask the commission to indicate how far they may go in imposing spotting charges.

It has long been the custom of carriers to receive and deliver carload freight upon spur tracks leading to private industries at convenient points for loading and unloading without imposing any charge for that service in addition to the line-haul rate, and in the *Los Angeles case* (18 I. C. C., 310), the commission held that where this service is merely a substitute for team-track receipt and delivery of carload freight the line-haul rate covers the service for the reason that rates generally in this country have been constructed upon that basis. The order in that case was upheld by the Supreme Court. *Los Angeles case* (234 U. S., 293). The mere size or complexity of the industry is not controlling in determining whether or not the line-haul rate covers the receipt or delivery of freight at the door of the plant.

As existing rates must be deemed to have been constructed to cover the customary placement of cars at factory doors, whether upon an industry spur or private siding, or upon the tracks of an industrial plant, and the outward movement of cars from such tracks, without regard to the size or nature of the plant, to add a charge now to the line-haul rate for that service would be revolutionary.

While the commission has from time to time called the attention of the carriers to the possibility of increased revenues from certain sources, and has suggested that it might be that the carriers ought to make a charge in addition to the line-haul rate for some services in connection with the movement of cars within industrial plants, for which no such additional charge is now made, it has never intended to suggest that an additional charge would be proper for services which by long continued

general custom and usage have been treated as covered by the line-haul rate.

In *General Electric Company v. N. Y. C. & H. R.* (14 I. C. C., 237), it was said that common carriers could not be called upon as a part of their contract of transportation to make deliveries through a network of interior switching tracks constructed as plant facilities to meet the necessities of the industry, but the case did not require a decision of that question. The point actually decided was that the complainant was not entitled to an allowance from the carrier for a service which the carrier was ready and willing to perform, and which the complainant performed because it was not convenient for it to permit the carrier to perform the service.

In the *Industrial Railways case*, the commission also expressed the opinion that the line-haul rate does not cover the movement of cars incident to the receipt and delivery of carload freight at large industrial plants where the movement is through a network of interior tracks, but in that case also the question presented was one of allowances, and the commission did not undertake to determine the number of tracks over which the cars must move prior to their receipt or delivery by the carrier in order to deprive the owner of the property transported of the right to an allowance for the service. It did, however, recognize the fact that the line-haul rate may cover the service of spotting a car at the factory door on a private siding:

Under the common law as construed in the practically unanimous decisions of the courts, a delivery of carload freight to a shipper having a private siding is made by shunting the car upon the switch, clear of the main tracks. All services upon the siding beyond that point, in placing the car for loading or unloading at a particular spot convenient to the shipper, are what may be called volunteered services in the sense that they are in addition to the main-line haul and in excess of any obligation of service by the carrier at common law. Nevertheless, the custom of making deliveries at the warehouse or factory door on private sidings is one of long standing in this country, and under certain language in the act it is possible that the carriers may be required, upon reasonable compensation, to do this spotting, as it is called. We find no authority, however, English or American, that holds or intimates that the line carrier, in connection with the main-line haul, is under any obligation to spot a car at the factory door on a private siding except upon reasonable compensation included in the rate itself or set up in the form of a special charge.

There may be cases in which the spots at which cars are placed for loading and unloading in complex industries are so located that the request for the receipt and delivery of carload freight at such spots could not, in view of general usage, be regarded as reasonable, and where a charge for the spotting service in addition to the line-haul rate might therefore be justified, but the mere fact that an industry is complex, or that it requires an interplant service in addition to the receipt and delivery of carload freight, is not sufficient to justify an additional charge for the placing of cars at the door of the industrial plant for the receipt or delivery of carload freight. The line-haul rate, however, covers only one placement of the car for loading or unloading, and an additional charge should be made for each additional placement of the car for that purpose.

The mere fact that many individual plants are operated together as a single industry does not deprive the industry of the right to such a service in the receipt and delivery of carload freight at each of the several plants as that plant would be entitled to have if it were operated separately, unless the collective operation so far removes the necessity for such a service as to make it unreasonable for the industry to demand the service.

To permit the carriers to add to the line-haul rate a charge for the movement of cars incident to the receipt and delivery of carload freight at industries selected because of their size or complexity, or upon some other basis equally uncertain, while treating a like service at all other industries as covered by the line-haul rate, would result in discrimination of a flagrant character.

Especially ought the tracks of the industrial plant to the extent that they are used by the carrier for a public service

treated as a part of its terminal facilities where the carrier does not show that it would be possible for it to provide the necessary terminal facilities in any other way.

The public interest is served in many ways by permitting the carriers to use the tracks of industrial plants as a part of their terminal facilities. The exclusively owned terminals of the carriers are thereby relieved of a heavy burden under which they would either break down completely or be so congested as to inconvenience shippers who are compelled to receive and deliver their freight in those terminals. The distribution of terminals also tends to prevent the undue concentration of industries and consequent concentration of population, thus aiding the solution of one of our social problems.

With the growth of terminal areas and the consequent increase of terminal expenses, there may be a growing need for a separation of the charges for line hauls from the charges for terminal services, and a graduation of charges for terminal services so that each industry within the terminal area will pay in proportion to the service it receives in addition to the line haul, if such a system should in the future be deemed to be preferable to what now obtains; but before that could be done there would have to be a separation of the cost of the line haul from the cost of the terminal service, and a complete reconstruction of rates.

The respondents have not justified the suspended tariffs, and an order will be entered requiring those tariffs to be canceled. The respondents may, however, file new tariffs providing for spotting charges in those instances in which the terminal services performed exceed the services which under established custom are, or should be, performed for the line-haul rate, in accordance with the views expressed in this report.

Commissioner Harlan dissents from the conclusions of the commission in this proceeding and will later file a separate report.

GENERAL FOREMEN'S CONVENTION

The eleventh annual convention of the International Railway General Foremen's Association was held in the Hotel Sherman, Chicago, July 13-16. The convention was opened with prayer and the association was welcomed to the city by the mayor of Chicago, William Hale Thompson. President Scott presented an interesting address, speaking in favor of closer co-operation between the various mechanical associations as mentioned in President Gaines' address at the Master Mechanics' convention. The secretary reported a membership of 255 and a cash balance of \$70.67.

VALVES AND VALVE GEARING

The size and weight of locomotives have been increased to the apparent limit, and it is now the consensus of opinion, that greater increase in capacity and speed must come from other sources. The possibility of further improvements in steam distribution have been recognized, and at the present time no part of the modern locomotive is the subject of so much study, discussion, and experiment as the valve motion.

It is true that large engines do not develop a drawbar pull at high speed at all proportional to their size, when compared with the smaller engines. This is probably due to the fact that the present valve gears do not take care of the large cylinder volumes now being used, and the cylinder passages are not suitably designed to allow the locomotive to run at high speed at fairly long cut-off. In the last few years, however, important improvements in exhaust nozzles, and exhaust passages, in the saddles have been developed, and this together with the increased capacity derived from superheated steam, has covered up the defects in steam distribution to a certain extent.

All of the present valve gears give a very limited opening for steam admission when working at short cut-off; and the openings for exhaust are equally disadvantageous, for although the opening is large, it is at its maximum very early in the

stroke and gradually decreases until at half stroke, where the piston speed is at its maximum, it is rarely over $\frac{3}{4}$ in. This narrowing of the exhaust port opening accounts for the high back pressure produced. Of course this abnormal back pressure can be overcome to a certain extent by giving the valves exhaust clearance, but this is done at a slight sacrifice in economy when engine is running at slow speed.

The tendency at the present time is to use large cylinders with the assumption that the engine is to be worked at a comparatively short cut-off. This necessitates large steam and exhaust ports, and a valve gear that gives a large port opening for both admission and exhaust. It is a well known fact that the quicker valves move over the ports the more power derived from the steam—possibly due to the loss in power which results from steam condensation when valves move relatively slow over the ports. Hence in the late valve gears an effort has been made to produce a motion which will give quick admission and release of steam. This condition can be brought about, to a certain extent, by a long valve travel.

The most important problem that confronts the motive power department at the present time is to bring about economy in locomotive operation. The valve motion is next in importance to the boiler in determining the efficiency of the locomotive as a whole; hence the vital importance of a proper design, construction, and maintenance of this feature, so that some degree of economy will be attained. Poor steam distribution results in loss of power in the engine, excessive fuel consumption, and an increased cost of repairs. One of the most important items of expense in locomotive operation is the cost of fuel, and the question of steam distribution is a dominant factor in this.

In order that the steam distribution in the cylinder may be as efficient as possible great care must be exercised in the selection of the type and design of the valve to be used. The piston valve possesses some advantage over the flat valve for high duty service in that it is fully balanced, though the slide valve can be quite satisfactorily designed in this respect. In short, it is a matter of choice and convenience of construction and maintenance as to which shall be used, though the tendency of modern practice is toward the general use of piston valves.

There is some doubt as to whether the piston valve is really more economical in steam consumption than the slide valve, and a number of tests have been made, some showing better for one, some showing more economy for the other. In 1904 tests were made by the Master Mechanics' Association to determine the relative leakage of slide and piston valves. The conclusions derived from these tests do not seem to favor either type of valve. The best piston valve showed a leakage of 268.56 lb. per hour, and the best slide valve 348 lb. per hour. The worst case of leakage with piston valves was 2,880 lb. per hour; and of slide valves 2,610 lb. per hour. Without doubt, the question of valve leakage with both slide and piston valves, depends largely upon the condition in which they are allowed to run. If the piston valve was given as much attention in the roundhouse as the slide valve, the former would probably show the least leakage.

Slide Valves.—With large cylinder dimensions and high steam pressures the slide valve becomes unduly large for a proper length of port, and even when well balanced creates an excessive amount of friction when moved on its seat. A slide valve when used on a very long cylinder gives undue cylinder clearance due to the increased length of ports, and the large steam chests necessary cause more or less steam condensation. This probably accounts for the high water rate of engines with very large valves, and steam chests. In pooled service, cut valves and seats are very common on slide valve engines. In fact, it is uncommon for engines to run more than 25,000 miles before the valves need facing.

The chief advantage of the slide valve lies in the fact that it can relieve itself of excess compression by lifting from its seat. Hence it is not necessary to provide means for relieving excess pressure in the cylinders.

In the design of the slide valves the balance is of as much im-

portance as an efficient distribution of steam in the cylinders. If the valves are not properly balanced an enormous stress is imposed upon the valve gear and transmitting rods in the work they are called upon to do. In calculating the dimensions of stems and rods the designer is obliged to consider the work that would have to be performed in case of an accident to the balancing strips and lubricating apparatus.

Piston Valves.—The advantages of the piston valve are as follows:

Increased port area for both admission and exhaust.

Ports in cylinder made very straight and direct.

A simpler, lighter, and cheaper cylinder casting; and a wearing face separate from the cylinder casting that can be cheaply renewed.

Its adaptability to any design of valve gear, since it can be placed above the cylinder, between the frame rails, or in any other position with equal facility.

With inside admission valves the steam passages are better protected from the cold and radiation, and the steam chest heads and packings relieved from all pressure except that of the exhaust steam, which is but a few pounds above that of the atmosphere and so puts, really, very little stress upon these parts.

Accessibility of parts. Peep hole plugs make it possible to get port marks without removing valve chamber heads.

Better balance which makes it easier to handle, and decreases the wear and tear on the motion work.

The relative frictional resistance of the piston valve is much less than the slide valve. (This was proven by tests made on the C. B. & Q.).

The greatest disadvantage under which the piston valve labors is its inability to relieve excess pressure in the cylinder port by lifting, after the manner of the slide valve. Many of the weak features of the piston valve have been eliminated in the recent designs, and where proper care is taken in the maintenance and operation of piston valves they give splendid service.

Piston valve cylinders have considerable advantage over slide valve cylinders. The walls lend themselves more readily to curved lines than do those of the slide valve. (The avoidance of flat walls exposed to steam pressure is one of the most important things to be considered in cylinder work). As piston valves can be made of any desired length the steam ports can be made very short and direct. For this reason also the steam chest should be placed as close to the bore as will allow the barrel flange to be turned for the head casing. The piston valve cylinder and all its appurtenances weigh somewhat less than a first class slide valve and its appurtenances of equal capacities. Piston valves give flexibility to the design because they can be located in almost any position with regard to the cylinders.

As regards the size of piston valve that should be used for large power there is considerable difference of opinion. Exhaustive tests made on the Pennsylvania Railroad showed that the piston valve could be largely standardized, and that a 12-in. diameter of valve was large enough for cylinders up to 27 in. in diameter, when used with superheated steam. The standard 12-in. diameter of valve was then developed, and with only one change in the overall length, it now fits locomotives of 14 different classes on that road.

Valve Gears.—At the present time four general designs of valve gears are used in this country. They are: The Stephenson link motion; the Walschaert valve gear; the Baker valve gear, and the Southern valve gear.

For many years the Stephenson link motion was used almost exclusively in this country, but with the introduction of the very heavy power, for structural reasons, some form of outside valve gear became imperative. The principal advantages of outside valve gears are: Accessibility for lubrication, inspection and repairs; opportunity for heavy cross bracing between the frames; motion can be made more direct, and with fewer wearing parts, and ability to hold their adjustment for a longer length of time.

The disadvantages of the outside valve gears are: Liability of damage from side swipes; rod work, changing of tires, etc.,

made more difficult due to the location of outside valve gears, and slight distortion of the valve events due to up and down movement of the main wheel, and with it the eccentric crank, and back end of the eccentric rod.

Aside from the matter of good steam distribution, there are a number of items that must be considered in the selection of a valve gear for different classes of service. They are as follows: First cost; cost of maintenance and repairs; efficiency and reliability of service; ability to hold adjustment, and ease of handling in the cab.

Three of the most important features to be considered, in the design and construction of an outside valve gear are: Necessity for providing as rigid a support as possible; in the provision for reducing wear to a minimum, and in providing sufficient lubrication at every point.

The advantages to be derived from the high class materials for valve gear parts have been recognized, and at the present time the tendency is to use steel for these parts. The recent Pennsylvania engines have all motion work parts of heat-treated steel. Soft steel is used extensively for transmitting and other valve gear rods, and the jaws are usually case-hardened to give good wearing qualities. Cast steel is only adapted for certain parts, and where used should be annealed. The American Locomotive Company follows the practice of using drop forged motion work parts wherever it is possible to do so. Drop forged motion work parts have the advantage of requiring very little finish, and are strong and durable.

The outside valve gears produce a more uniform steam distribution with a lower percentage of preadmission than the Stephenson link motion. They hold their adjustment, and consequently give a better steam distribution for a longer length of time. Constant lead is the characteristic of all well known outside valve gears. While there is no reliable data available as to the cost of maintenance of the outside valve gears, in comparison with the Stephenson link motion, it is generally considered that the cost of maintenance of the outside gears is from 60 to 75 per cent less than for the Stephenson gear.

The Stephenson gear possesses the peculiarity of being exceedingly sensitive to a close adjustment of all its parts in order that a correct action and proper distribution of the steam may be obtained. It is the most flexible of any in use and can be most readily adapted to irregularities in the running and operation of the engine. At the same time it will get out of adjustment very easily, and requires the utmost care in its design in order that it may work properly. With the link motion in actual service there are three sources of error which cause a variation of the same events for the two ends of the cylinder, and which must be compromised for in some manner. They are: The location of the eccentric rod pins back of the link arc; the angular vibration of the eccentric rods, and the angular vibration of the connecting rod. To a certain extent the latter two compensate the first, but not entirely, and to complete the compensation the hanger stud is set back of the link arc.

In certain class of service the variable lead given by the Stephenson link motion permits the locomotive to accelerate more rapidly and to better adjust itself to different operating conditions than is possible with the valve gears giving a constant lead. Variable lead and flexibility are the characteristics of the gear. An added advantage of the Stephenson motion is that everything is inside where it is well protected from damage by a side swipe. For this reason several roads are still specifying the Stephenson gear for moderate sized switch engines. Switch engines are especially apt to be side swiped in congested yards.

On the other hand, because of the weight and power of modern locomotives, it is almost impossible to get a satisfactory design of the Stephenson link motion between the frames.

[This report also included a very clear description of the

action of the valve, descriptions of the various special valves and valve gears, together with the methods for setting them, descriptions of the various valve and cylinder attachments and the various power reverse gears now in service.—Editor.]

The report is signed by: Walter Smith, chairman (C. & N. W.); C. A. Barnes (C. & W. I.); G. W. Keller (N. & W.); T. M. Dewar (C. & O.); B. F. Harris (So. Pac.); J. Miller (Ill. Cent.); N. J. Shasberger (N. Y. C. West); C. D. Rafferty (K. & M.), and F. Anderson (C. St. P. M. & O.).

PLANT FOR SAND BLASTING STEEL CARS

It has been a difficult problem in connection with the use of steel cars to clean the exterior in a satisfactory manner before painting. The use of acids for this purpose is not entirely satisfactory and this method is also dangerous for the workmen. Where sand blasting has been adopted, however, it seems to have been productive of remarkably good results.

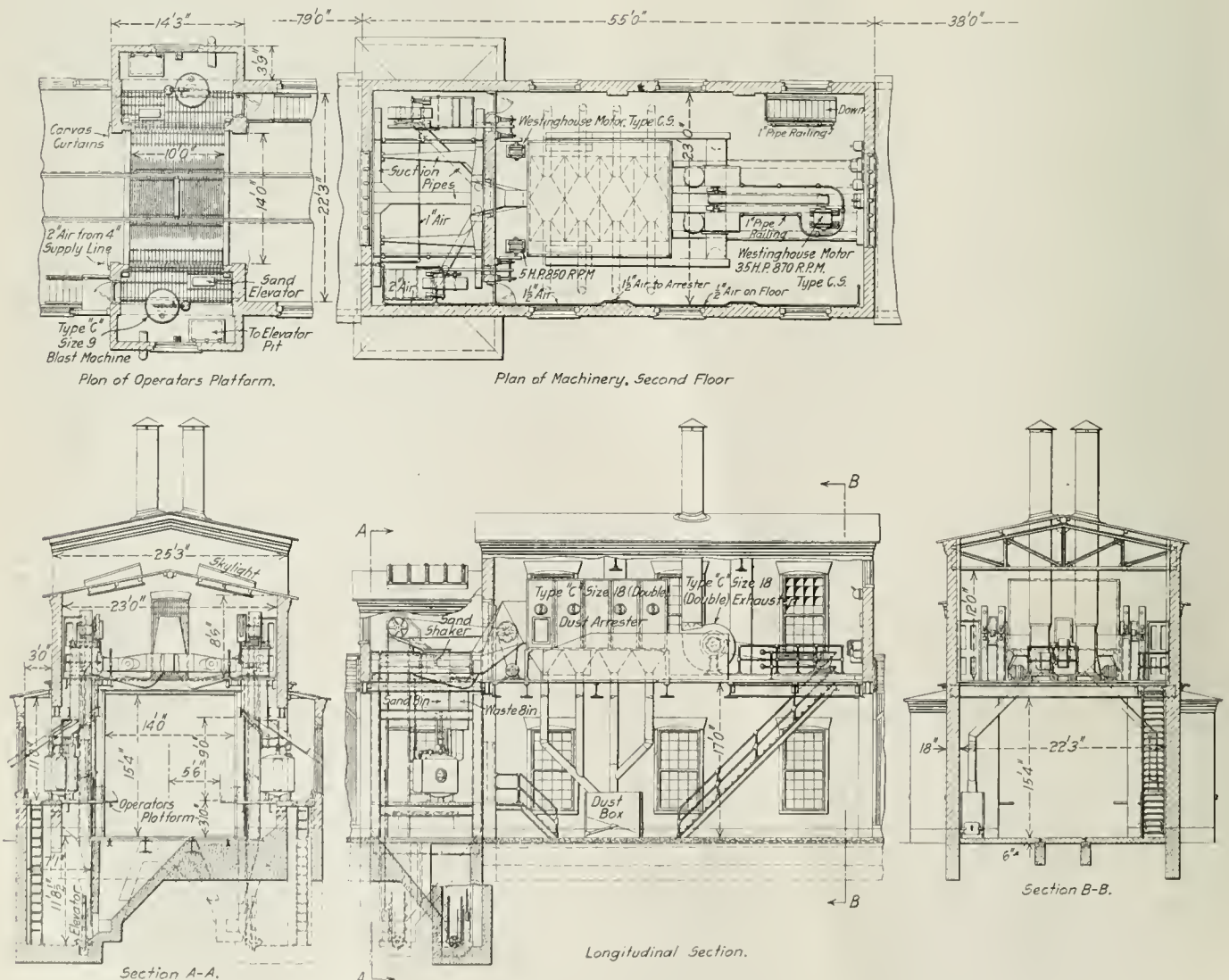
The engravings show side elevation and sectional views of a sand blast installation which is in successful operation on a large system operating a great many steel cars in both passenger and freight service. The installation was designed by the Pangborn Corporation, Hagerstown, Md., who also manufactured and supervised the erecting of the equipment which is known as their model "P" car cleaning installation.

As shown in one of the illustrations the building is 172 ft. long, the main part being 55 ft. long and of brick construction,

while the extensions are of wood and covered with corrugated steel sheathing. All the equipment is contained in the main part of the building; the sand blasting is done in a compartment 12 ft. by 17 ft. by 21 ft., and the dust is confined to this space. The end extensions keep the entire car indoors at all times. Cars are hauled in and out of the building by an electric winch, built by the American Engineering Company, Philadelphia, Pa., and having a capacity of 6,000 lb. at a speed of 50 ft. per minute.

Pits are provided, as shown in one of the sections, beneath the track on which the car stands and are covered with a grating 10 ft. wide. When new sand is necessary it is dumped on this grating and passes down the sloped sides of the pits to the elevators, which are of the bucket type and which carry the new sand as well as that which falls from the sides of the car during the blasting operations, to the sand separators. These sand separators remove any refuse from the sand, the good sand passing into the sand bins and the refuse into the waste bins. From the sand bins the sand goes to the blasting machines which are operated by compressed air, the sand passing from the machine to a hose and nozzle in the hands of the operator who stands on the platform shown. Canvas curtains, as indicated on the drawings are arranged so that the section of the car standing over the grating is entirely enclosed.

The engravings also clearly show the arrangement of the exhaust piping which is designed to remove the dust rapidly from the enclosure when blasting is going on. The exhaust fan is double and is driven by a 35-hp. motor running at 870 r. p. m.



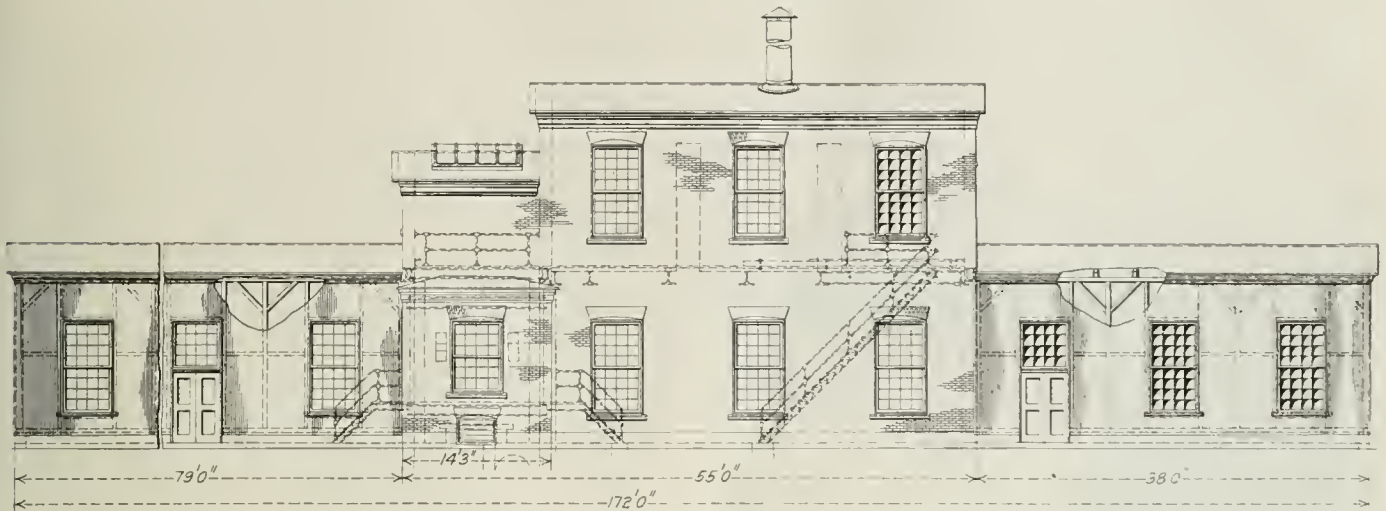
Sectional Views Showing the Arrangement of Machinery for Cleaning Steel Cars by Sand Blasting

The dust-laden air is exhausted into a dry process screen type dust arrester where the dust is completely separated. The dust is then delivered to the dust boxes located on the first floor.

The elevating, separating and blasting machinery is in two

the short end of the gate is loaded with a counterweight of 1,000 lb.

The gate is raised by a push, with little effort, and is lowered by pulling on a rope attached to the light end. When down it is



Side Elevation of the Building for Sand Blasting Steel Cars

units, one on either side of the car so that both sides can be cleaned at once. The sand separators and the elevators are driven by 5-hp. electric motors running at 850 r. p. m.

A SUBSTANTIAL CROSSING BARRIER

The Long Island Railroad, which has tried all sorts of exhortations to curb the spirits of automobilists who approach the railway tracks at reckless speed, has concluded to employ something stronger than words—a gate which cannot be broken down with impunity. At a crossing on the highway leading to Long Beach the company has installed gates, one on each side of the railroad, made of heavy spruce piles or spars 40 ft. long and

fastened by a hook. To lower the gate on the side of the railway farthest from the cabin the attendant must walk across the tracks. When the gate is lowered it is 3 ft. 6 in. above the roadway.

As showing the necessity of adopting such extraordinary means to stop automobile drivers at grade crossings when trains are approaching, the company calls attention to the extraordinary frequency of disasters at its crossings, a fact which has been noted in these columns. In the two weeks ending July 10 there were a dozen cases where drivers ran through crossing gates let down to warn them of approaching trains. With gates of this kind, however, there will be a radical change in conditions; and, in the language of a New York newspaper, motorists going to Long



Highway Crossing Gate Long Island Railroad

about 10 in. in diameter (12 at the butt, 8 at the tip). These gates, shown in the accompanying engraving, are painted with spiral bands of black and white, so that they will attract attention a considerable distance off. The one in the foreground is supported at the left between two stout posts by a 1-in. iron bolt, surrounded by a pipe bushing.

To make the work of raising and lowering as easy as possible,

Beach will no longer be able to get themselves run over by Long Island trains.

BAGDAD RAILWAY—A tunnel over three miles long, near Bagdja, through the Amanus mountains, has been completed, thus connecting the Bagdad Railway on Kiliki plain with Aleppo in North Syria.

THE SELBY SIGNAL FLAG

A compact, complete flagging outfit for the use of train flagmen has been devised by the Selby Signal Flag Company, St. Louis, Mo., and has been used recently on several roads, including the Mobile & Ohio, the Frisco, the Missouri Pacific, the Santa Fe, the Kansas City Southern, the Wabash and the Missouri, Kansas & Texas. It consists of a heavy galvanized sheet steel case divided into three compartments longitudinally. One compartment consists of a circular case containing an all-



Method of Operation with Flag, Fusee or Torpedo

wool flag attached to a wooden staff with ordinary tacks. The base of this staff is fitted with wool packer for holding the staff, either extended when in use or telescoped into the protecting tube when not in use.

The lower portion of the signal handle is divided transversely into two compartments by a wooden partition. One compartment contains three standard 5 and 10 minute fuses and the other 6 standard torpedoes. Each compartment is fitted with a hinged lid which allows only one fusee or torpedo to issue at a time.



Flag Ready for Use. Lower View Shows Extra Supply Case Attached

These two compartments and that for the flag form the handle for the flag when in use. This case is painted a bright target red with flagging instructions printed in target yellow. It bears the standard trade-mark or monogram of the road, and is consecutively numbered for the purpose of identification and charging out. It is provided with a strap, enabling the flagman to carry it over his shoulder, leaving both hands free. The entire case is $3\frac{1}{2}$ in. in diameter, 22 in. in length and weighs $3\frac{1}{2}$ lb.

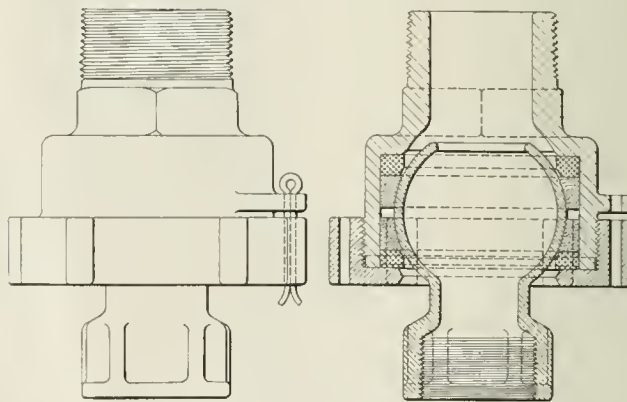
A detachable extra supply case has also been designed to

carry 6 additional fusees and 12 additional torpedoes. This case is attached to the flag handle by folding hooks. When not in use it may be hung on the rear platform of a train. It is intended for use where signals are used frequently and where the flagman does not have an opportunity to go to the baggage car or train box to replenish his supplies.

Among the advantages claimed for this device are, first, that it provides all the signals a flagman may need in a light portable waterproof case which he may carry with him readily to the point of display. There is no opportunity for him to forget to take all the necessary signals in case he starts out under excitement or in a hurry. Second, instead of the fusees being carried only at night, this flag provides them at all times so that they are at hand whenever a flag signal becomes indistinct during unexpected fogs, snow storms, etc. Third, this flag is inseparable from the signal handle, precluding the possibility of the signals being left behind. Fourth, instead of the torpedo straps being broken off by being tied to lanterns and flags and being broken and damaged otherwise, they are protected for effective use when needed, eliminating waste and insuring that the signals are in proper condition when needed.

MAIN RESERVOIR PIPE CONNECTION

The ball joint illustrated herewith was brought out by the Franklin Railway Supply Company, 30 Church street, New York, especially for making pipe connections to the main reservoir. Many engine failures are caused by the breaking of main reservoir pipe connections due to vibration of the pipes, the effect of which is concentrated at the rigid connection in the reservoir. The body of the ball joint is threaded and screwed di-



Main Reservoir Ball Joint Connection

rectly into the reservoir and the end of the pipe is screwed into the ball member, thus relieving the threaded connections of vibration stresses.

The construction of the joint is shown in the engraving. The body is made in the form of a cylindrical casing in which are placed two rubber packing rings and two hard babbitt retaining rings. The packing rings form the joint with the spherical surface of the ball member and are held in position by a gland nut on the casing.

INDIAN FUEL SUPPLIES.—An experiment is being made of carrying coal from the Bengal collieries by rail direct instead of as heretofore by sea via Calcutta for the railways in western India. The idea is to release shipping for jute and other classes of export business which have no alternative means of despatching their goods. One of the results of this policy has been an enormous increase in coal traffic in the western sections of the East Indian Railway; in one week over a quarter of a million tons of coal have been carried, of which just under half was for up-country, this being a record for the line.

Maintenance of Way Section

One large eastern railroad has created the position of supervisor of terminal operation and appointed a man whose duty it is to standardize the operation of the different yards on the road by inaugurating at each of the terminals the good methods of all as far as practicable.

Standardizing Methods of Work

Without such a plan, economies worked out at one point are in danger of being overlooked at others, and other yards will not benefit from them. The same idea is equally applicable to other departments. A comparison of the unit costs of renewing ties, or bridge stringers, for instance, on different divisions of the same system, will frequently show wide variations not due to local conditions. The explanation is that the methods used are not equally efficient, and it is evident that the practices of foremen and supervisors with the better records can be adopted on the divisions with higher unit costs with resultant economy. On some roads the organizations are such that improved methods are quickly introduced all over the lines. On most roads this supervision extends only to the larger problems, and there is no one whose special duty it is to study and compare the minor details of the work, which details are nevertheless highly important in the aggregate. The need for such supervision and ready exchange of methods is constantly becoming greater as larger numbers of less experienced men are being employed.

Railway men are only now beginning to realize the wide variety of uses to which a locomotive crane may be put with economy.

The Field for Locomotive Cranes

It is only within the last four or five years that this type of equipment has come into general use and on only a very few roads are locomotive cranes employed to full advantage today. Many labor saving devices have been designed for certain definite uses and their economy is dependent only on the amount of work of that character to be done. It is the versatility of the locomotive crane that gives it such wide use. This is especially emphasized in the maintenance of way field where this class of equipment has been most widely used. Where, for instance, the picking up of roadway scrap along the line may not alone justify the use of a locomotive crane, the fact that it can be employed at other times in handling excavations, driving piles, loading ties or lumber, handling concrete materials, loading ballast, etc., will frequently justify its purchase for the combined purposes. Also, because of this wide variety of uses, the locomotive crane is no longer regarded on many roads as a special type of equipment to be moved from one division to another for special work, but as many as 40 are employed on individual roads, most of which are assigned to particular divisions. In many cases one or more locomotive cranes are kept busy at single terminals. The adaptability of equipment of this kind to a wide variety of work is limited very largely by the ingenuity of the men in charge. There is so much handling of material and other work of a similar nature to be done at all times, and the economy of mechanical means as compared with manual labor is so generally recognized, that the proper utilization of equipment of this type is largely one of proper management. Thus, a crane employed in loading ballast in the summer can be diverted to the handling of storage coal in the winter. A definite example of their value is afforded on a western road which is contemplating the rearrangement of certain track facilities in an important terminal within the next few years at a point where new coal handling facilities

must be provided at once. To avoid the construction of a permanent coaling station where this proposed rearrangement of tracks may require its early removal, it is proposed to install a locomotive crane feeding a small frame coal storage pocket. When the track changes are finally decided upon and permanent coal handling facilities provided, the locomotive crane can be transferred to other work and the only investment lost will be that for the temporary coal pocket. Some of the most important uses of a locomotive crane are described in an article elsewhere in this issue, the purpose of this article being not only to call attention to the field existing for locomotive cranes, but also to aid in securing the greatest efficiency from those already in service.

Dapping Timber Guard Rails

The dapping of timber guard rails to fit over ties on wooden trestles and on open floor steel bridges to hold the ties in place and to prevent their bunching in case of derailment, seems to be a relic of the old days when it was considered necessary to fashion intricate joints in timber frames involving the cutting and the material reduction of the strength of the various members. Modern tendencies are against this practice. In mill and wooden car construction the dovetail has been superseded almost entirely by metal yokes, hangers and bolts. It is strange, therefore, that only a few railroads have adopted substitutes for the dapped guard rail in spite of the fact that several have been developed. In a number of cases the substitute has taken the form of wood or cast iron spacing blocks between the ties, and in other instances lag screws have been used. The dapped guard rail is a strong device for the purpose intended. Theoretically it is much stronger than the largest lag screw which it would be practicable to use, but its very shape makes it particularly liable to checking and splitting and offers every opportunity for decay, not only of the guard rail itself but of the ties as well. With the increased use of treated lumber the dapped guard rail, which would have to be framed before treatment, is especially undesirable when we consider that no other member of a timber trestle deck requires cutting in advance. It would seem that this detail of a wooden bridge ought to receive more consideration than has been given to it in the past, in view of the fact that some of the substitute devices that have been suggested are cheaper and seem to serve the purpose equally well, if not better.

The operation of the average gravel ballast pit involves a daily expenditure of from \$100 to \$200. As the output is secured only when the steam shovel is working, it is highly important that all avoidable delays to the shovel be eliminated, thereby increasing the amount of material loaded and decreasing the unit cost of loading it.

Track Construction in Gravel Pits

Aside from an efficient pit organization no factor is more important than proper track construction and maintenance. It is usually not difficult to secure authority for sufficient track facilities. The importance of using heavy rail, long turnouts and a relatively high standard of track construction throughout is not so generally realized. Too frequently these tracks are considered in the class of temporary side tracks used only occasionally or for the storing of empty cars, while as a matter of fact, the average pit track is subjected to frequent service under large road engines and heavily loaded cars, and

does not receive the attention given to main tracks. A derailment on such a track ties up the shovel and the pit forces and in turn breaks up the schedules of the trains on the road. The use of heavy rails and fastenings on good ties and the employment of a sufficient force to maintain the tracks properly, will do much to eliminate such derailments and consequent delays and will therefore pay for themselves quickly. The high record output secured without any overtime in the operation of the Chicago, Milwaukee & St. Paul pit at South Beloit, Ill., described in another column, is obtained not only because of an efficient pit organization but also because of the fact that 75-lb. and 85-lb. rails, No. 10 turnouts and other correspondingly high standards of track construction have been used throughout. Money spent by the railroads in such a way will yield large returns in a season.

RAIL SECTIONS AND WHEEL LOADS

It is an open question whether in some respects the construction of track is not failing to keep pace with the loads placed on it. All predictions to the contrary, wheel loads continue to increase. A couple of years ago much attention was attracted to the new Atlantic type locomotives built by the Pennsylvania with a 66,500 lb. load on each driving axle. The Philadelphia & Reading is now building four Atlantic type locomotives for use in fast passenger service with 73,100 lb. on each driving axle, or nearly 10 per cent more than the Pennsylvania locomotives. A comparison of 18 recent designs of Mikado locomotives shows an average load per driving axle of 57,300 lb. All of these locomotives are or soon will be in regular service, and while they represent today the heaviest locomotives of these types, the history of past developments has shown that the heaviest locomotives of one year may not be many years in advance of the average.

In his presidential address before the American Society for Testing Materials last month, A. W. Gibbs, chief mechanical engineer of the Pennsylvania, and chairman of the committee on that road engaged in the preparation of new specifications and in the design of the 125-lb. rail section, made the statement that he believed the time had arrived for a considerable increase in the weight of rail sections. In this he is in agreement with many railway men. At present the 100-lb. rail may be said to be the heaviest standard section on any road, the 101-lb. rails of the Lehigh Valley and the Lackawanna, and the 105-lb. rail of the New York Central being modifications of the original 100-lb. sections. The Central Railroad of New Jersey has laid some 135-lb. rails during the past three or four years on curves subjected to heavy wear, but this action was prompted by a desire to secure a longer life from this rail rather than increased strength. The first radical departure from the 100-lb. rail section may be said to be the 125-lb. section of the Pennsylvania now being rolled for the first time in any considerable quantity. The American Railway Engineering Association at its last convention, also adopted standard sections for weights up to 140 lb., indicating the belief of the Rail Committee that sections heavier than the 100 lb. were desirable.

Some engineers object to the use of heavier rails on the ground that the mechanical department at once takes advantage of this increased strength to design heavier locomotives, losing sight of the fact that the function of the two departments is to co-ordinate their work so that their railroad may operate most economically. If heavier locomotives than those now being employed will reduce the cost of operation and if clearances and other conditions make their use practicable, it is the duty of the engineering department to provide rail and track construction which will carry these loads if this can be done at reasonable expense. It is this pressure from the operating and mechanical departments, evidenced in the form of increased engine or car wheel loads, which is creating the demand for heavier rail sections.

Letters to the Editor

A COMPARISON OF PUMPING COSTS

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In the issue of June 18 there appeared a description of the Missouri Pacific pumping station at Nevada, Mo., which consisted of a brick pump house 42 ft. by 48 ft., a three room frame dwelling for the pumper, 18,000 ft. of 8-in. discharge pipe, and 150 ft. of 10-in. suction pipe and a steel standpipe 24 ft. in diameter by 45 ft. high, for all of which the railroad paid \$31,500. The article described the economy in operation of the fuel oil engine over the steam operated plant. The writer does not question that the fuel oil engine is cheaper, but he does wish to call attention to the fact that the operating cost given for pumping 1,000 gal. of water as 1.73 cents for the fuel oil engine and 3.09 cents for the steam operated plant, is somewhat misleading and apt to give one a wrong impression.

For instance, suppose we assume that the question came up as to the advisability of buying water at a cost of 7 cents a 1,000 gal., or installing one's own pumping plant. If an engineer were to use a report such as shown in this article as a basis to show that it would be cheaper to pump its own water than to purchase it, his deductions would be in error, and the railroad would be making a mistake in installing its own pumping plant on these figures.

In the first place, let us figure what the total cost of each kind of plant would be. The facilities as outlined above cost \$31,500. In addition the first cost of the fuel oil engine plant was given as follows:

40 hp. fuel oil engine.....	\$2,000.00
Two 400-gal. pumps.....	600.00
Foundations	100.00
Pipe and connections.....	200.00
Labor	125.00
	<hr/>
	\$3,025.00
Adding the first cost of the plant.....	<hr/>
	\$31,500.00

Total first cost of fuel oil plant.....\$34,525.00

For the steam operated plant, the additional cost was given as:

45 hp. vertical boiler in place	\$1,200.00
Two 400-gal. pumps.....	600.00
Foundations	200.00
Pipe and fittings.....	200.00
Labor	200.00
Boiler feed	150.00
Heater	200.00
	<hr/>
	\$2,750.00

Adding the first cost of the plant.....31,500.00

Total first cost of the steam plant.....\$34,250.00

The total operating yearly charge for each plant is as follows:

For the fuel oil engine,

Fixed charges:	
Interest at 5 per cent of \$34,525.00.....	\$1,726.00
Depreciation at 5 per cent of \$34,525.00.....	1,726.00
Taxes and insurance at 1 per cent.....	345.00
	<hr/>
	\$3,797.00

Operation (same as in article):	
3,250 gal. of fuel oil at 3 cents.....	\$97.50
114 gal. of lubricating oil at 17 cents.....	24.48
110 gal. of coal oil at 3.518 cents.....	3.98
Labor of maintenance.....	51.00
Minor repair parts.....	20.00
Salary of pumper.....	300.00
	<hr/>
	\$496.96

Operating cost for 6 months.....\$496.96
As the operating cost for six months equals \$496.96 the total operating cost for a year equals \$993.92.

Fixed charges	\$3,797.00
Operation	993.92
	<hr/>

Total operating charge.....\$4,790.92 for fuel oil plant.
For the steam operated plant:

Fixed charges:	
Interest at 5 per cent of \$34,250.....	\$1,712.00
Depreciation at 5 per cent of \$34,250.....	1,712.00
Taxes and insurance, 1 per cent.....	342.00
	<hr/>
	\$3,766.00

Operation (Same as in article):	
152 tons of coal at \$2 per ton.....	\$304.00
Hauling coal 5 miles at \$1 per ton.....	152.00
Supplies	50.00
Repairs	100.00
Salary of pumper.....	300.00
<hr/>	
Operating cost for 6 months.....	\$906.00
Fixed charges	3,766.00
Operation	1,812.00
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Total yearly operating charge.....	\$5,578.00

Thus the total operating charge for a fuel oil plant is \$4,790 and for the steam operated plant is \$5,578, or a difference of \$787.08 per year in favor of the fuel oil engine.

As the capacity of the plant was 5,000,000 gal. per month, or 60,000,000 gal. per year, the cost of pumping 1,000 gal. with the fuel oil engine is \$.0798, or nearly 8 cents per 1,000 gal., instead of 1.73 cents as given in the article, and for the steam plant the cost is \$.093, or 9 cents per 1,000 gal., instead of 3.09 cents as given before.

However, in comparing the cost of pumping the water, or buying it at 7 cents per 1,000 gal., we must not lose sight of the fact that the road would have to furnish the piping and standpipe in any event, so we deduct from the total first cost of the facilities \$31,500, the approximate cost of the piping and standpipe, which we will assume cost \$4,500, leaving a balance of \$27,500. But if we install the pumping plant we still will have to lay the pipe and furnish the standpipe, so our first cost is still \$31,500.

The charges on the expenditure of \$4,500 for the piping and standpipe in connection with purchasing the water are as follows:

Interest at 5 per cent on \$4,500.....	\$225.00
Depreciation at 5 per cent, on \$4,500.....	225.00
<hr/>	
Yearly charge	\$450.00

This yearly charge gives an additional cost per 1,000 gal. equal to $\frac{3}{4}$ of a cent, to be added to the cost of the water purchased, making the total cost $7\frac{3}{4}$ cents per 1,000 gal.

In conclusion, the result plainly shows that (assuming it is possible to purchase water from some company) it is better and cheaper to let the water company furnish the plant and for the road to buy the water, even at a cost of 7 cents per 1,000 gal., plus the additional charge of $\frac{3}{4}$ cent, then it would be for it to install its own plant and pump its own water; for the engineer must not let the idea run away with him that because he sees a creek of good water running near the right of way, and apparently serving no purpose, that it will cost practically nothing to get this water into the tenders or shops as the case may be.

C. F. HERINGTON.

[NOTE.—The above is on the assumption that it is possible to purchase water in adequate quantity and of the proper quality. In all such cases a road should compare the cost of purchasing it with the cost of pumping it itself. In many cases, however, a road has no alternative but to provide its own pumping plant.—EDITOR.]

CANTING RAILS

Rochester, N. Y.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

On page 855 of the issue of April 16, there appeared a short article on the effect of canting the low rail on curves. With the conditions stated in that article, I believe that the effect on the rail, as shown from the photographs, is due more to excessive elevation than to the canting of the rail. The elevation shown for the degree of curvature given is equilibrium elevation for a speed of $36\frac{1}{2}$ miles per hour. While the article stated that many trains stop here and that the speed is slow, a speed of 15 miles per hour would only call for an equilibrium elevation of $\frac{1}{2}$ in.; 20 miles per hour would call for 1 in., and 30 miles per hour, $2\frac{1}{8}$ in. I have seen the same result on rail as is shown here, caused by excessive elevation. It is also possible that the gage shown has some effect on this flowing of the metal. I do not see any reason for having gage $5\frac{3}{8}$ in. wide on a 3 deg 30 min. curve.

It is possible, of course, to overdo the canting of the rail but the rail should be cantied at least enough to permit the wheels

to cover the entire surface of the head. It is just as objectionable to run only on the inside of the head as only on the outside. In this case the metal would flow with the rail insufficiently covered or properly covered. DIVISION ENGINEER.

CLASSIFYING SCRAP RAIL

MONTREAL, Que.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have read with much interest the article by Charles E. Parks on the subject of Accounting for Rail and Ties in the issue of March 12, page 470. Having had considerable experience in the track department of this company, I endorse the statements he makes pertaining to the intricacies of rail and tie accounting, and particularly the suggestion of taking a reliable and accurate inventory of the rail on hand on the different sections at the beginning of each fiscal year.

One source from which a great many discrepancies arise is that the foremen or supervisors frequently report on hand partly worn and relaying rail as scrap, there not being sufficient discrimination between these three qualities. At a later date when called upon to construct an industrial track, either for the company or an industry, it is discovered that a sufficient amount of partly worn or relaying rail is not on hand to do this work. The result is that the supervisor goes over his supply of scrap rail and picks out a sufficient number of good rails from this stock to lay the required siding. In his report of this work he classifies the rail laid as either partly worn by relaying. The consequence is that the amount of scrap rail on hand has to be reduced, requiring an arbitrary adjustment.

In order to avoid this practice more care should be exercised by the supervisor in classifying the rail on his territory. In reporting the different qualities of rail on hand, closer attention should be given to the material classed as scrap. It often happens that many rails are turned over to the scrap heap, which only require the battered ends to be sawed off to make them suitable for relaying purposes.

L. C. FONTAINE,

Office of General Superintendent, Grand Trunk Railway.

TRAINING SECTION LABORERS

HAILEYVILLE, Okla.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The article on motion study in track work in the *Railway Age Gazette* of June 18, is worthy of further consideration by our railway managers. The training of section men is just as important as of any other class of employees and a great deal more so in many instances. If the section man is not taught how to handle his tools he will not be able to give a good day's work and he as well as his fellow laborers are liable to personal injury therefrom. If he does not know how to hold the spike and how to strike it with the maul he may mash his hand or injure another employee by a flying spike. Drilling for such efficiency among the section men as well as with other maintenance laborers is one that has not had the attention which it deserves.

But, on the other hand, would it be profitable? What incentive is there for the men to remain with a road when farmers or others offer them more money for a day's work. If the position could be made attractive and remunerative enough to cause the men to stay with the job we would say that it would be a profitable investment to put good men in the field to instruct them in the manner of handling their tools and doing their work.

It is not reasonable to suppose that a gang of men will turn out as much work and as good work where they have had no training as where they had been schooled along lines in connection with their every day work. A carpenter is taught during his apprenticeship just how to hold a tool and the position to place himself in when doing a certain kind of work with a certain kind of tool. If the foreman wants to take out a rail or put in one and has to take the time to place each man in a certain position to secure the full benefit of his power, how much time has been lost in so doing? The same applies to any other duty on the section.

J. L. COSS,

Despatcher, C. R. & P.

Uses of the Locomotive Crane in Railway Service

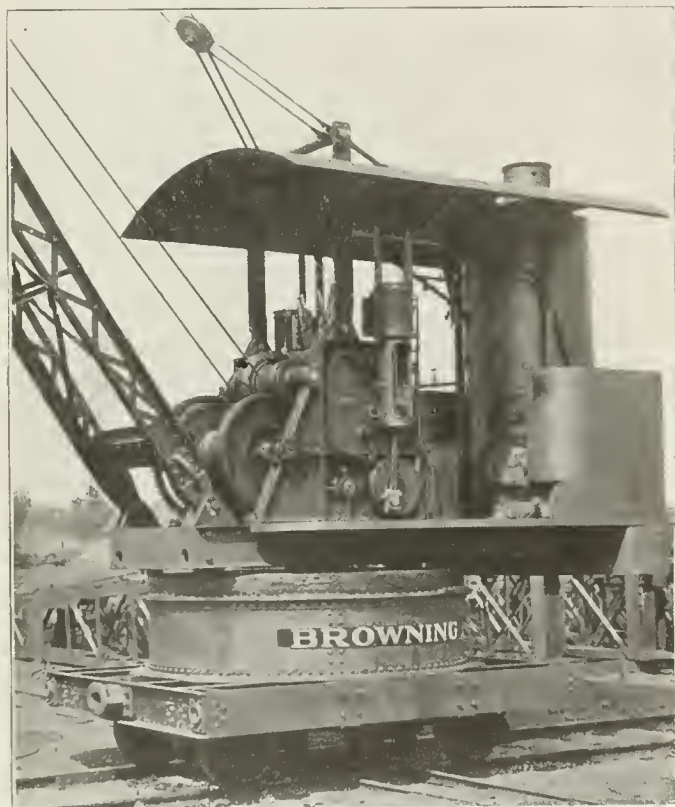
This Machine is Solving Many Problems in the Engineering, Maintenance, Stores and Operating Departments

One of the first extensive uses of a locomotive crane by a railway was on the Erie about 1899, the machine handling coal with a grab bucket from cars to storage piles and from storage to cars for reshipment. From this beginning, its use has spread to practically all of the roads in the country, although the eastern lines were much quicker to adopt it and with the exception of some of the larger roads in the West, as the Chicago, Burlington & Quincy, the Illinois Central and the Southern Pacific, the largest numbers of these cranes in railway service are still in the East. The extent to which they are used at present is indicated by the fact that the Erie owns about 40 machines, the Illinois Central, 31, and the Southern Pacific, 34. A wide variety of

the boiler, engine, boom and all hoisting drums, clutches, brakes, etc., used in propelling the car, slewing the upper structure and operating the various lifting and control lines. The distinguishing features as compared with other types of cranes are the high power, speed of operation and the full circle swing.

Locomotive cranes are ordinarily mounted on standard gage trucks of either four or eight wheels, but for some classes of special service, gantry or portal mountings are provided in order to place the crane directly over the cars in which the material is being loaded or unloaded. While the four-wheel cars were very generally favored a few years ago, the tendency to use cranes frequently for switching cars and to haul them more often in high speed trains has led to the more general adoption of the eight-wheel type. The car body is generally made of steel, and a length of at least 24 ft. is favored to make the car ride easy in trains. The boiler end of the upper structure should not extend beyond the end of the car.

Some roads require a freight car air brake schedule on eight-wheel cranes and in some cases both locomotive and freight car schedules are provided. Steam brakes are more common, how-



A 15-Ton Locomotive Crane Showing Typical Arrangement of Boiler, Engine, Hoisting Drums, Operating Levers and Boom Attachment. The Mounting in This Case Is Special to Allow the Machine to Rotate Over Platforms Close to the Track

uses has been developed for the locomotive crane in addition to the original one of handling coal, one of its important advantages being that it is capable of such ready transformation from one service to another. Recent developments in the attachments for cranes have considerably widened the scope of the crane's usefulness so that ordinarily there is little difficulty in finding sufficient work to keep a locomotive crane busy continuously, the condition under which the greatest economy can naturally be secured.

CONSTRUCTION OF CRANE AND ATTACHMENTS

A locomotive crane is a self-contained machine operated by steam, electricity or an internal combustion engine, although in steam railway service it is almost universally equipped for steam. The car body carries a turntable rack on which are mounted



A 15-Ton Lehigh Valley Crane Mounted on an 8-Wheel Car Equipped with a Bent Boom and a 43-Inch Magnet

ever, and can be applied much cheaper than air. A crane used exclusively in yard work of course has little use for air brakes and if such a crane is hauled occasionally in fast trains it can be moved under the I. C. C. ruling, permitting 15 per cent of the cars in the train to be operated without air brakes. This rule requires, however, that cars not so equipped have brakes applied to the wheels which can be operated from the car. This provision can be met by the application of hand brakes to the four wheels of one truck. The crane may also be shipped as a "long commodity" requiring two cars, in which case if it is chained to a flat or gondola car on which the boom rests it can be handled without brakes.

The standard sizes of locomotive cranes vary ordinarily from 3 to 60 tons. A definite rating, however, should include the radius of operation at which the crane will safely handle the specified load. The reason for this is evident since the same crane might handle 15 tons at 14 ft., 18 tons at 12 ft. and 20 tons at 10 ft., the radius of operation being the horizontal distance between the center of the hoisting hook and the crane center pin. The capacity of a crane is limited for operation at right angles to the track by the gage width. The use of jack beams or outriggers which are provided on some cranes increases the capacity greatly, being estimated in some cases as high as

100 per cent, but "hold down" devices for attaching to the rails are not ordinarily considered of great advantage. One of the manufacturers lists four-wheel cranes without jack beams in 5, 10, 15 and 20-ton sizes, eight-wheel cranes without jack beams in 15, 20, 25, 30, 40 and 60-ton sizes and eight-wheel cranes with jack beams in 20, 25, 30, 40 and 60-ton sizes, all of these ratings being figured for a 12-ft. radius. These cranes have a traveling speed of 4 to 8 miles per hour, can be turned at the rate of 3 to 6 revolutions per minute and have a hoisting capacity of 100 to 250 ft. per minute, with a single line, and 50 to 100 ft. per minute with a heavy load.

Locomotive cranes are ordinarily equipped with vertical boilers, although the horizontal locomotive type is sometimes used in heavy machines. It is desirable that they be of ample size to provide for continuous operation under severe conditions, and also in many cases to provide steam for turbine-generator sets supplying current to magnets or for operating steam hammers in driving piles. Typical sizes of the vertical boilers range between 42 in. and 62 in. in diameter. They are commonly lagged with asbestos or block magnesia and grates can be provided for burning either coal or oil. The manufacturers use various designs of engines, which are required to be high speed and quick

over the end of a high gondola car on the same track. The curved booms have a greater weight, however, and if head room permits, the straight booms are desirable. Special horizontal booms of the cantilever type have been provided in some instances equipped with a trolley for handling material across tracks where the overhead clearance prevents the use of a standard boom.

In handling material of various kinds a bottom block, bucket, or magnet may be used with the same boom. The use of a bottom block or line is ordinarily restricted to the handling of miscellaneous non-metallic material, some form of bucket being employed for bulk material and a magnet for practically any iron or steel product. There are several types of buckets in use, the most common being the clam shell. This is a simple substantial appliance adapted to handling bulk material, such as coal, sand and gravel, and with teeth can be used for light excavating. Scraper buckets are better adapted to handling heavy ore, stone, etc., and when equipped with teeth, for excavating clay, hardpan or other material. The orange peel bucket is essentially an excavator, being particularly adapted for sticky material or for dredging. Skips and tubs are commonly used for handling small amounts of excavated material or for handling



Methods of Driving Piles with a Locomotive Crane

Truss Attachment Supporting Leaders A Steam Hammer Suspended Without Leaders Leaders Supported from Upper End of Boom

acting. Reversible engines are favored, as they allow heavy loads to be lowered slowly. A typical design of double engine is supplied in sizes ranging from 7 in. by 10 in., to 12 in. by 12 in.

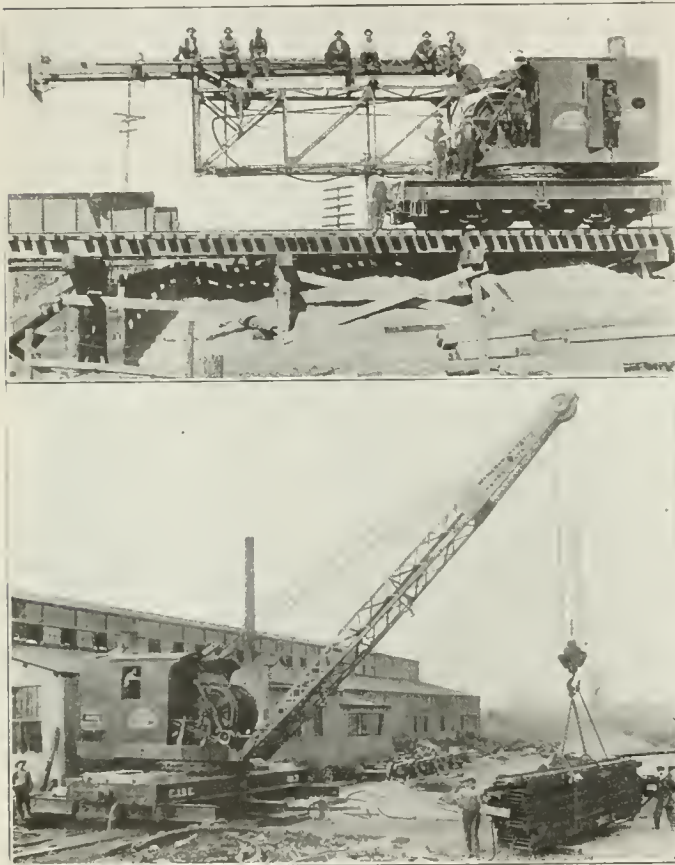
The boom, supported at the lower end on the turntable and at the upper end by lines from the hoisting drums, is ordinarily 25 to 60 ft. in length, although 75 ft. and 85 ft. booms are not uncommon on erecting cranes, and at least one manufacturer has built a boom as long as 115 ft. The shortest boom adapted to the work for which the crane is intended is preferable, since it insures faster speed and less strain on the machinery. The unusually long boom cannot handle the maximum load for which the crane is designed, and if both reach and maximum power are desired, the boom is built with a detachable section. One manufacturer has built a 75-ft. boom in three 25-ft. adjustable lengths in order to give a greater range of power and reach. In general, straight booms are preferable, although a slight curve at the top or a gooseneck extension is frequently used to increase the horizontal reach for high work, this being of particular advantage where it is desirable to handle material onto high piles. Booms curved at the bottom are also of advantage in reaching

concrete into forms. When equipped with a special boom a standard steam shovel bucket can also be used with a locomotive crane.

The lifting magnet was first utilized to any extent in the railway field about 1905. It is designed to be supported by a hook on a line from the end of the boom, allowing it to be attached or removed easily and quickly. The cable supplying the magnet with electric power may be attached to any convenient plug on an adjacent power line if little moving of the crane during the operation of the magnet is required. In many cases, however, a turbine-generator set is installed in the cab of the crane which supplies current both for the magnet and for lighting.

One of the attachments for use with the locomotive crane that has been developed more recently is a supporting truss for pile driver leads. These trusses are pin connected in the same manner as the boom and can readily be exchanged with the boom. Either a drop or steam hammer may be operated in the pendulum leads supported by these trusses and a machine so equipped has the advantage of greater reach and full circle swing as compared with standard pile driving machines. While this

arrangement is very satisfactory, especially where a considerable number of piles are to be driven, in some cases it is somewhat cheaper to attach the leads directly to the upper end of the boom and steady them by a strut to the turntable. This strut may be made telescoping in order to vary the distance of the leaders from the center of the crane, making this arrangement somewhat more flexible and easier to attach than the trusses. The objection to its use, however, is that it cannot be operated where restricted clearances exist as can the truss attachment with which the leaders are arranged to fold down on the truss within the necessary clearance. In some cases steel leaders have been suspended from the end of the boom by lines in order to secure an increased range of action. By this method, piles have been driven as much as 30 ft. below the track on which the crane stood with the boom at a radius of 30 ft. This method of course requires the use of a steam hammer. For



Two of the Uses to Which a Crane Is Being Put by the E. J. & E.
At the Top Equipped with Supporting Truss for Pile
Driving and at the Bottom, Lifting a Load of
I-Beams with Outriggers in Place

simple work a steam hammer can be suspended from the boom without leaders, in which case it may or may not be necessary to brace the piles during driving.

Experience has shown that a reasonably good operator can average one trip a minute with a locomotive crane handling a bucket or magnet. In some cases this average can be raised as high as five trips per minute. The daily cost of operating an eight-wheel machine varies from \$8 to \$9 per 10 hours, including depreciation, 6 per cent interest on the investment and all operating costs. This estimate is figured on 300 working days per year. The cranes are ordinarily operated by one man who also fires the boiler, the number of men on the ground depending of course on the class of work handled. Investigation on the Illinois Central indicates that the average cost of maintenance is about \$600 per crane per year.

SERVICE SECURED FROM CRANES

In general the various standard sizes of cranes can all be used for any work, but in some classes of service there is a preference for certain sizes. One manufacturer finds, for example, that the principal use of the 60-ton crane is for erection



A 60-Ton Erection Crane with a 75-ft. Boom Handling a 132-ft.
Highway Truss Weighing 28 Tons

work, a special long boom being provided for that purpose. The 40, 30 and 25-ton machines are also used for erection work as well as with buckets and magnets where large amounts of material are to be handled. The 20 to 40-ton sizes are usually

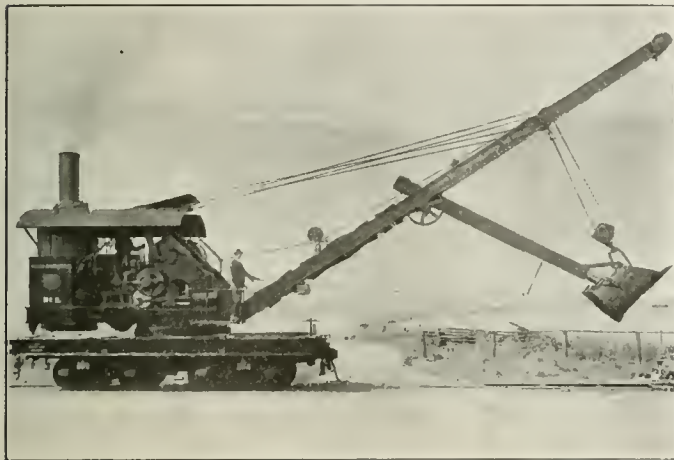


N. Y. C. & St. L. Crane on Cleveland Track Elevation Work
Handling Excavated Material in a Skip

preferred for pile driving and drag line scraper work as a crane of good capacity is required in the first case to hold the weight of the leaders, pile and hammer at the full radius of driving and in the second to withstand the severe strain. The sizes under

20 tons are used for miscellaneous lifting and handling of material where the quantity is not so great. When equipped with a bucket they are well adapted to handle coal, ore, ashes and gravel, with a magnet they move scrap, rails, etc., and with chains and hooks they load or pile ties and timber and handle light construction work. With a steam shovel arm they can be readily used for excavating.

While locomotive cranes are made with standard gage, narrow gage, wide gage and portal mountings, the following discussion of their uses has been limited almost exclusively to standard gage machines, since the special types are limited to certain uses, such as the handling of coal and ore on docks, the han-



A 25-Ton Crane with Special Boom in Use as a Steam Shovel

dling of miscellaneous freight in yards and on piers, and in connection with heavy drag line construction work.

Standard gage cranes on many lines are finding an increased number of applications in construction and bridge work. They are frequently used for the erection of small steel bridges and buildings with resultant economy. In many cases the use of a crane allows a small truss to be riveted up on the ground and set in place at one operation, eliminating the use of falsework, decreasing the time required for the work, and possibly as in the case of track elevation work, greatly reducing or eliminating the interference to traffic. The New York, Chicago & St. Louis has used a number of cranes in its grade separation work at Cleveland, particularly for driving falsework trestles over streets. It is estimated that the cranes have handled this work in one-fourth the time that would have been required for a standard driver, because the crane is lighter and can move more quickly. In addition, it could also be used in placing the caps and stringers, in removing excavation from the street in skips and in placing concrete in the abutments and piers. The Nashville, Chattanooga & St. Louis has used suspended steel leads and a steam hammer, driving about 3,000 piles on one job in this manner. In this case a decided advantage was secured by passing the supporting lines between the ties of an old structure, allowing the driving to be carried on directly under the old track. The Chicago & Western Indiana has found that with its locomotive crane equipped with a truss attachment and leaders, 145 to 150 piles can be driven in 10 hours in a construction trestle, and equally satisfactory results have been secured for permanent work. A steam hammer used in pile driving may be supplied with steam direct from the crane or from an outside source.

A typical instance of the service of a crane in handling earthwork is furnished by a western lumber company which used one of these machines in the construction of a logging road, first for pulling the stumps and clearing the right of way, and then with a steam shovel attachment for making a 13-ft cut through earth, rock and roots, at a cost of about one-fourth that by previous methods. Seven cranes were used in handling the material moved from the excavation for the Grand Central

Terminal, New York City. In this case the solid rock was broken up by blasting into large blocks which in many cases were too large to have been handled in a steam shovel dipper, but were loaded on cars very satisfactorily by the crane. These machines were in service at this place for 8 or 9 years handling an average of 500 tons of rock daily. The Stone & Webster Corporation has used locomotive cranes for pulling 12-in., 35-lb. steel sheet piling after it had been started with a breast derrick using two five-sheave blocks.

In the construction of the approach fill to the hump in the Clearing yard of the Chicago & Western Indiana near Chicago, a sand fill was made by dumping and spreading the material from a construction track which was then pulled up on the new dump by a crane. In this service it was found that a crane with an engineer, a foreman and three men could throw more track in a day than a gang of 50 men in the ordinary way. The track could be thrown either away from or toward the track on which the crane was operating by attaching the line at the top or the bottom of the boom, respectively. The Bessemer & Lake Erie has handled slag from cars to a fill by a clam shell bucket operated by a 35-ton crane with a 50-ft. boom.

In one gravel pit where the operated face extends 15 ft. be-

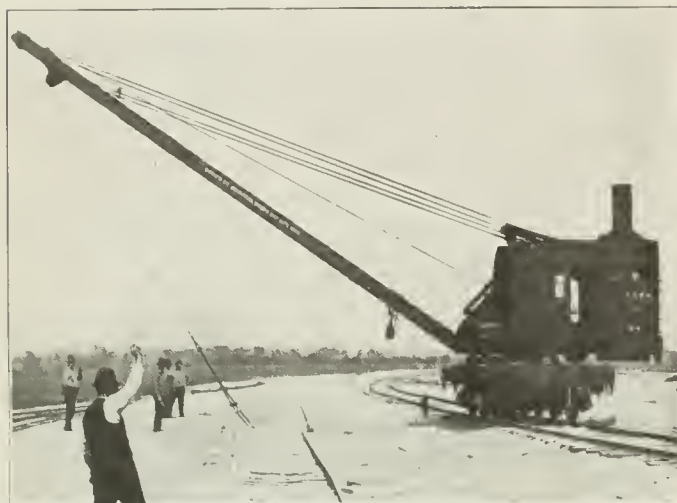


A 35-Ton Crane with a 70-ft. Boom Equipped with a 1 1/2 Yd. Drag Scraper Bucket

low the water in a pond and 35 ft. above it, a 10 ton crane has loaded an average of 10 cars per day, including switching and running $\frac{1}{4}$ mile to set out each two cars loaded. The best record is 20 cars per day, only three men being required at the pit for loading. At another pit, a crane with a 35-ft boom and $1\frac{1}{4}$ -yd clam shell bucket handled 11,750 yd of gravel in one month at a cost of 2-4 cents per yd, also eliminating a switch engine.

The handling of coal by a locomotive crane is very extensively practiced both for filling locomotive tenders direct from cars or from storage and for unloading coal into storage piles and re-loading it into cars. Incidentally, the cranes employed at coaling stations ordinarily handle ashes from the ash pits into cars,

unload sand for drying and handle miscellaneous material. A typical instance of cranes used in this service is furnished by the Central New England which operates several of these machines. The first one purchased has handled an average of 200 tons of coal per day to locomotives, loaded two carloads of cinders, and in addition averaged unloading about six carloads of sand per month and handling about one ton of rough, heavy material daily without approaching the capacity of the machine. In this case the cost of handling coal is about \$0.02 per ton, the machine using about $\frac{1}{3}$ ton of fuel per day. In one instance a St. Louis



A 25-Ton Crane in the Clearing Yard of the Chicago & Western Indiana Throwing Construction Track on New Sand Fill

& San Francisco crane handling 5,000 to 8,000 tons of coal per month to locomotive tenders in addition to stationary engine coal and ashes, required new flues in its boiler. Rather than take the crane out of service, a steam pipe was coupled into the engine from a switching locomotive and the crane was operated continuously while repairs were being made.

For the conditions existing at many coaling stations the cheap-

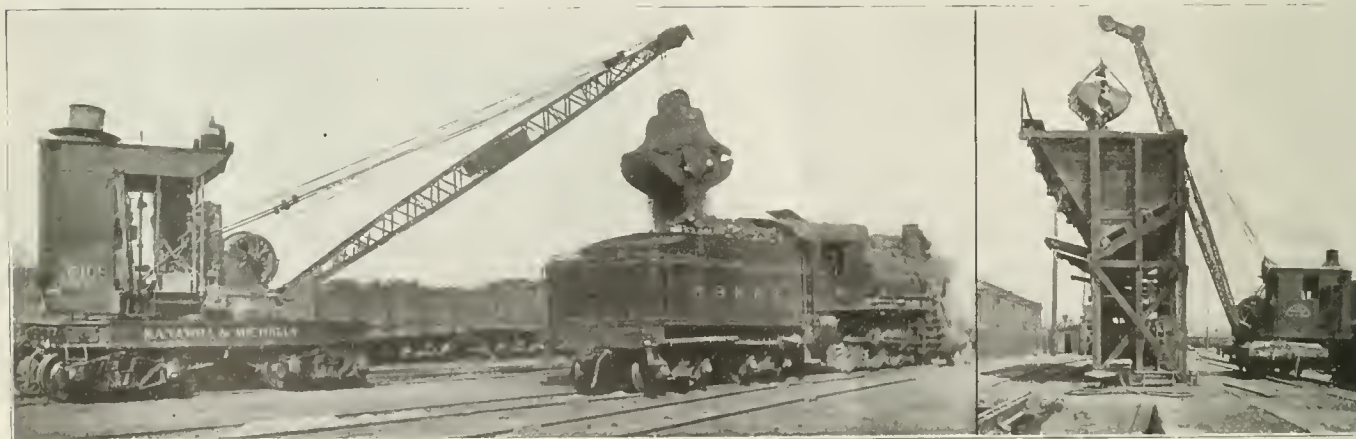
kind have been equipped with cranes mounted on a gantry frame under which the coal cars pass, saving considerable space in the layout. At these stations the bulk of the coal is stored on the ground adjacent to the bins, the latter holding a supply for one or two days at the smaller station. In this way one operator can handle two stations if they are not located too far apart, effecting a saving in the operating cost. A committee report of the International Railway Fuel Association recommends the locomotive crane very highly for temporary or emergency coaling plants, and particularly for small stations, but does not consider it a competitor with the modern coaling plant for large and important points. In this committee report one road



Handling 3,175 Lb. of No. 2 Wrought Iron Scrap by Hand and with a Magnet

is quoted as stating the cost of handling an average of 247 tons per day during the month of July as \$0.0484 per ton and 356 tons per day in December as \$0.0343 per ton.

On the Illinois Central during 1914, 21 cranes were engaged in handling coal for locomotives and in loading cinders. In the year, 706,604 tons, or an average of 33,648 tons of coal per crane were handled, and the unit cost of labor and supplies for this service amounted to \$0.085 per ton. A much better showing would have been made except for the fact that some of the cranes were out



Two Methods of Coaling Locomotives with Cranes. At the Left, Direct from Cars to Tender. At the Right, Filling Small Storage Bins

est and most flexible arrangement is to handle the coal direct from cars or small storage piles into the tenders. A crane with a $1\frac{1}{2}$ -yd. clam shell bucket should be able to load 10 tons into a tender in 7 to 10 min. The advocates of locomotive cranes for this service maintain that there is less breakage when the coal is handled by a crane than when it is chuted from a coaling station of the ordinary type, as it is handled less and does not fall as far. To insure against delays, some roads use cranes to load coal into small bins from which it is spouted directly into the tenders. On the Boston & Maine several stations of this

of service at times for repairs, and the above price includes the cost of handling coal by hand during such times.

The Central of Georgia in unloading coal from cars to ground storage piles and then handling it either to locomotive tenders or to cars for reshipment, has found the total cost of handling to be about \$0.045 per ton. In a paper presented before the International Railway Fuel Association in May, 1914, C. G. Hall of the C. & E. I., stated the cost of storing and reclaiming coal by locomotive cranes as \$0.10 a ton, including the cost of track, interest on the cost of the crane and all operating expenses. In

unloading coal from cars one man should be provided for cleaning up the corners, guiding the bucket, etc., for every 40 to 50 tons of coal per hour handled. Most good buckets will handle more than their rated capacity in slack coal, but few if any can handle the rated capacity in large mine run with little slack or in lump coal. Allowing for the cleaning up, full capacity can be assumed in slack coal and 70 per cent in mine run and large lump. With a 1½-yd. bucket, a reasonably good operator should be able to unload and clean up from 50 to 75 tons per hour, and when handling coal from a stock pile this figure may be increased to as high as 100 tons per hour since less time is required to spot the bucket and a better load is secured.

The cost of handling new and scrap material has been considerably reduced on many roads by the use of locomotive cranes. Probably the most extensive experience in this line is in the handling of scrap. One crane with a magnet on the Chicago & North Western has handled 41 tons of old locomotive grates in 40 min., 56 tons of old track spikes in 33 min., and 44 tons of miscellaneous scrap in 35 min. At one of the Chicago, Rock Island & Pacific scrap docks, a locomotive crane and magnet has handled this material for less than \$0.02 a ton as compared with the former price of \$0.25 to \$0.35 by hand. The Atchison, Topeka & Santa Fe uses four locomotive cranes in its Corwith yard, three being equipped with magnets and one with a clam-shell bucket. The cost for handling scrap with these cranes is \$0.05 a ton. At one scrap yard on the Pennsylvania a crane is handling 400 tons of scrap per day. The cost of this work on the Buffalo, Rochester & Pittsburgh in one specific instance was as follows:

Kind of scrap—	Crane cost	Hand cost
No. 1 wrought iron	\$0.04	\$0.22
Pusbeling, No. 2 wrought iron, and malleable.	0.02	0.10
Cast iron and mixed steel	0.03	0.09
Sheet steel	0.20	0.30

On the Elgin, Joliet & Eastern a crane and magnet is used to unload from cars, the old rails and other maintenance scrap picked up along the line, the labor cost being 90 per cent less than for doing the same work by hand. The machine is able to pick up as high as 10 to 12 rails. In this connection the need for a locomotive crane in a work train to pick up scrap along the line has been felt on some of the heavy tonnage roads. Where traffic is very dense it is difficult for the section forces to bring in heavy scrap to their tool houses, and in addition this work involves serious danger to the men. If the scrap is collected and put in small piles along the track a crane with a magnet operated over the line in a work train can pick it up rapidly.

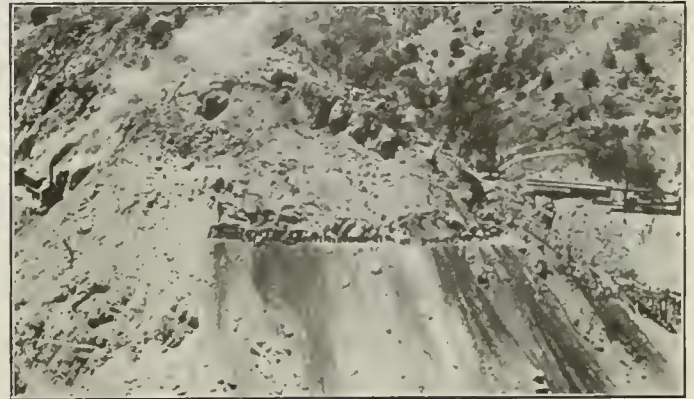
At the Burnside shops of the Illinois Central a 15-ton crane is used to handle scrap, including boilers, bridge steel, rails, locomotive cylinders, etc. A small direct connected steam generator furnishes current for an electro-magnet. This crane is considered to do the work of 18 laborers.

Under some conditions, ties and timber can be very advantageously handled by a crane. The Buffalo, Rochester & Pittsburgh has developed a special tie handling device for use with a crane which reduced the cost of handling ties at its treating plant 40 per cent below the piece-work rates. At one commercial treating plant where 300,000 ties are handled each year and each tie requires four handlings two cranes are used which only work about eight months of the year and are idle at least one-third of that time. A lumber company on the Pacific coast handles an average of 100,000 ft. of lumber daily with a 10-ton crane, loading lighters with 250,000 ft. in less than eight hours with only three men. An incidental advantage of the crane for handling lumber and similar material is that storage piles can be carried much higher, thereby increasing the value of storage space. One company for example, piles ties 24 ft. high with a crane, and another stacks pig iron 18 ft. high. Other miscellaneous uses of cranes include the handling of car wheels at shops and the unloading of bad order cars and the handling of miscellaneous freight in yards and on piers.

A TUNNEL DESTROYED BY FIRE ON THE SOUTHERN PACIFIC

On May 14, a fire in tunnel No. 15 on the Southern Pacific near Tehachapi, Cal., resulted in several rock falls closing the tunnel and interrupting traffic until June 9, when a shoo-fly line was completed around the shoulder of the mountain through which the tunnel passed. This involved the construction of 1,200 ft. of track, 450 ft. of high trestle and a 36,000 cu. yd. cut. The construction was carried on entirely by the railroad company's forces and is an example of efficient and rapid construction under stress of an emergency.

The tunnel passes through a buttress of the mountain con-



Drillers at Work in Advance of the Shovels. Trestle Started

sisting largely of shattered granite and having a maximum height of 130 ft. over the tracks at the middle point. It is 360 ft. long, and was timbered throughout with red wood arches of the segmental type. The cause of the fire is not definitely known. A gang of men were working in the tunnel at the time but had gone outside to allow a train to pass up the 2 per cent grade and upon re-entering at 10:30 a. m., within 10 minutes after the train had passed, the fire was discovered at a place in the lagging of the tunnel near the springing line where the tun-

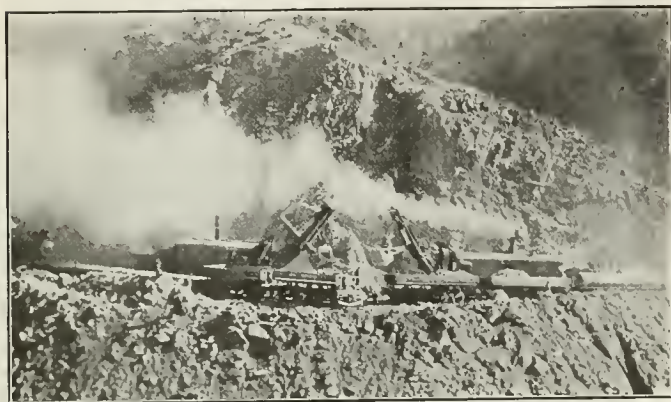


The Trestle Nearing Completion

nel had been opened by the workmen for the purpose of enlarging the section for future concreting. This work had opened up an old backfilling of timbers and lagging that had been packed in a small cave evidently developed during the construction of the tunnel. Every effort was made to quench the fire, but owing to an excessive draft caused by a very heavy wind and inability to reach the seat of the fire back of the lagging, it was reported beyond control at 12:05 p. m. As soon as the timber burned out in the central portion of the tunnel a fall took place, evidenced by a depression of the surface of the ground above the tunnel

Shortly thereafter both portals burned out, causing slides which effectively shut off the bore at each end and smothered the fire.

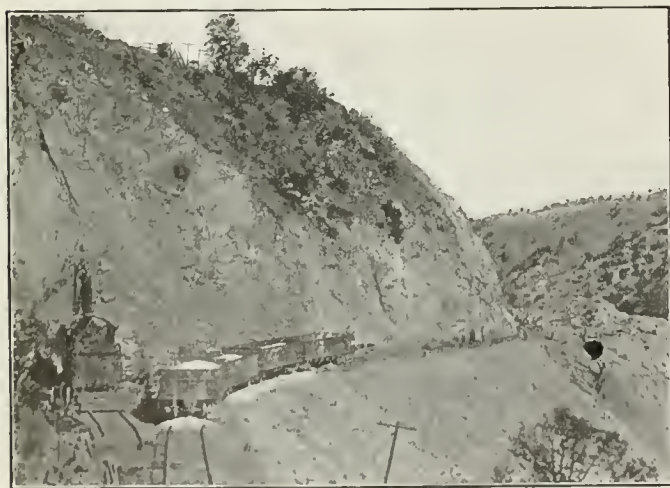
Steam shovels were sent to each end of the tunnel to open up the portals, and disclosed the fact that 100 ft. of the center of the tunnel was completely filled in. On the north end about 166 ft. of the timber was still intact, though badly charred, while at the south end 94 ft. of the tunnel had not caved in, although the lining had been completely burned out. In order to prevent further fire the timbering at the north end was thoroughly drenched, water being thrown as far back into the lining as



Shovels Meeting in the Cut

possible, but this proved ineffective and the fire soon started again. The south end showed further evidence of caving, which made it necessary to withdraw the men from the interior and subsequently further cave-ins took place, closing the entrance for a second time.

Because so large a part of the tunnel had caved in and in view of the fact that the fire could not be controlled, it was evident that the tunnel could not be opened for traffic in less than six weeks. Furthermore, there was no assurance that the fire would not break out again in the old lagged-up cave in which would burn out any new timber that would be put in



Shoo-Fly Completed and the Shovel Standing on the Old Line at the Mouth of Caved Tunnel

during the rush reconstruction. On the other hand it was estimated that a shoo-fly could be constructed around the shoulder of the mountain at a cost of \$40,000 which could be completed within three weeks. Owing to the importance of this line the shoo-fly construction was decided upon.

The actual construction was started at 12 o'clock noon, May 19, on a 450 ft. trestle 90 ft. high at its highest point crossing a canyon and a side hill excavation 64 ft. deep at the center line

and 105 ft. on the uphill slope. Ordinarily a through-cut would have been made at this point, but it was considered possible to handle the material quicker on a bench or "daylight" cut and this type was therefore decided upon. About 125 drillers and powder men were continually employed working day and night shifts. Two 5-cu. yd. Bucyrus steam shovels were used. One started at the south end and worked as rapidly as drillers could get the mountain shot up ahead of them. The steam shovel on the north end could not be used until work on the trestle was finished.

Of the 450 ft. of trestle, 225 ft. was driven with 6-pile construction because it was on a sharp curve and on a side hill embankment. The remaining 225 ft. was frame trestle four stories in height. In all 200,000 ft. B.M. of lumber was used. It was completed in 9 days and 9 hours from the time the material was ordered by telegraph from Oakland, 350 miles from the seat of operations. Eight gangs of carpenters of from 20 to 25 men each were used on the work in two 12-hour shifts.

The completion of the trestle made it possible to bring the second steam shovel in to the south end on Saturday, May 29, and by working with all possible haste with day and night shifts, traffic was restored at 2:10 a. m. June 9, completing the shoo-fly in 19½ days instead of 21 days, as originally estimated. The alinement involves 15 deg. curves with 90-ft. spirals. The track is of 90-lb. rail with full length guard rails, giving a 3-in. flange-way with 4 to 6 tie bars for each 33-ft. rail on the curves to prevent spreading.

Remarkably good time was made when it is considered that steam shovels had to be brought a distance of 400 miles, gangs of carpenters and other laborers organized, compressors installed to run the air drills, power requisitioned and delivered and the trestle material hauled long distances. In order to forestall delays due to possible breakdowns, extra steam shovels and pile drivers were kept ready on the job and all available extra parts for the repair of this equipment were brought to the scene.

We are indebted to W. R. Scott, vice-president and general manager of the Southern Pacific for the details of this performance.

DECREASE IN PRODUCTION AND SHIPMENTS OF PORTLAND CEMENT, 1914

The total production of Portland cement in the United States in 1914, according to the United States Geological Survey, was 88,230,170 barrels, valued at \$81,789,368; the production for 1913 was 92,097,131 barrels, valued at \$92,557,617. The output for 1914 represents a decrease in quantity of 3,866,961 barrels and a decrease in value of \$10,768,249. The value assigned to the production is computed on the basis of 92.7 cents a barrel, the average value of the Portland cement shipped in 1914.

The shipments of Portland cement from the mills in the United States in 1914 amounted to 86,437,956 barrels, valued at \$80,118,475, compared with 88,689,377 barrels, valued at \$89,106,975, shipped in 1913. This represents a decrease in quantity of 2,251,421 barrels, and in value of \$8,988,500. The average factory price per barrel in bulk for the whole country in 1914 was 92.7 cents, compared with \$1.005 in 1913, a decrease of 7.8 cents a barrel.

Among the states, Pennsylvania and Indiana held first and second places respectively in quantities of cement produced, but both suffered an appreciable reduction of output. The greatest decrease in production was in the Pacific coast district and equaled 16.54 per cent, while the greatest reduction in shipment, 12.9 per cent was in the Tennessee, Alabama, Georgia districts. A notable change was the increase in storage. The stock for the entire country at the end of 1914 was 12,893,863 bbl. as against 11,220,328 bbl. for 1913, an increase of 14.92 per cent. The greatest proportional increase in storage was in New York state, 74.66 per cent.

The Economical Operation of a Gravel Ballast Pit

Some of the Provisions Which Must Be Made to Secure the Largest Output at the Lowest Unit Cost

At this season of the year when ballasting work is at its height, the operation of ballast pits is of general interest. Probably the most generally used material for ballast in this country is gravel. We give below two discussions of measures necessary in the operation of gravel pits to secure the lowest unit cost of the ballast loaded on cars.

GOOD TRACK CONDITIONS ESSENTIAL FOR THE ECONOMICAL OPERATION OF A GRAVEL PIT

BY E. KEOUGH

Assistant Engineer, Maintenance of Way, Canadian Pacific, Montreal

It is often the practice in building gravel pit tracks to use the lightest pattern rail for the tracks in the pit. The idea being that these tracks are sidings and subject to the same conditions as are most tracks which are used a few times a day. No greater saving can be made than to see that a heavy pattern rail is used in practically every track in the pit, and if possible, there should be but one pattern used in order to permit repairs to be made promptly. By the more general use of this heavier rail a reduction may be made in the maintenance cost, which is necessarily too high where the lighter rail is used.

With good rail more cars can be handled and they can be moved at a higher rate of speed than if an engineer moves according to the condition of the track. It is too often found that trainmen will take a chance on the lighter tracks with the hope of hauling one or two more cars up a heavy grade in a pit by increasing their speed and the result is a bad delay due to spread track or a broken rail.

Where a pit has a heavy grade leaving for the main line this running track should be made especially good. All curves should be tie plated and if wet gravel is being loaded every third tie on straight track should be plated to insure against the rail spreading. Where the running tracks has curves above two degrees care should be used to see that all curve-worn narrow-ball rails are placed on the inside of the curve to reduce the friction wear. Where derailments occur on sharp curves, it is frequently advisable to close the engine sander on the inside of the curve to decrease the friction as much as possible and to allow the trucks to change their direction readily in moving around it.

By making use of this heavier pattern rail it is possible to lay the loading track by full spiking only every third or fourth tie. It will be found that this track can be moved easily when it is time to throw it to its new position. Since in lining track it is found that it is the ties which bother the most and since movement over this loading track in many places is necessarily slow time can be saved by this construction. Since the friction between the base of the rail and the tie is the greatest holding force there is no danger of the rail spreading as the sand and gravel always provide plenty of friction.

Where there is a good face for the shovel, care should be taken to see that no time is lost in changing trains and it is generally found that two engines can work to better advantage if each engine handles its own cars from the shovel to the storage track, instead of using one engine for spotting and another for hauling.

Where the bank is shallow and much time is consumed in moving the shovel ahead it may be found that a smaller engine can be used to spot the cars by dropping the loads and making its moves at the same time the shovel is ready to move up, or even by leaving one car spotted for the last three or four dippers. It then has the time it takes the shovel crew to load these three or four dippers, and to move up and load

three or four more to do most or all of its switching without delay to the shovel.

The man in charge of a gravel pit should remember above everything else that to get the maximum output from a shovel he must arrange his layout so that the actual delays to the shovel are practically eliminated and to do this track facilities and conditions must be as good as, if not better than in a first class yard since road engines are generally used and are harder to keep on the track than switch engines. In fact all conditions must be such that the only delays obtained are those necessitated by the shovel movements.

To reduce the number of derailments of empty cars, and of trailer or tank wheels to the minimum, all curves should be maintained without superelevation. While this same rule applies to yard tracks or to slow speed curves it is especially important on temporary tracks which are apt to be given a minimum amount of attention. Unless superelevation is properly maintained, derailments will follow because of the irregular surface over which unevenly loaded, swaying cars are hauled.

THE EFFICIENT OPERATION OF A GRAVEL PIT AT SOUTH BELOIT, ILL.

BY G. R. MORRISON

Division Superintendent, Chicago, Milwaukee & St. Paul, Savanna, Ill.

The Beloit gravel pit of the Chicago, Milwaukee & St. Paul is supplying ballast for a large part of the lines of that road, long hauls being justified by the high quality of the gravel and the economical operation of the pit, due to efficient methods which the layout of the pit has made possible. The pit is located at South Beloit, Ill., directly adjacent to the Wisconsin state line and one-half mile south of the main line of the Racine & Southwestern division. It occupies a little more than 50 acres of land and is covered by an average of 3 ft. of sandy clay. As this material can be handled in wet or dry weather, the price per yard for stripping is much below the average.

In order to open the pit the first track was laid in an excavated incline on a 4 per cent grade. When this had reached a point 8 ft. below the ground surface, a steam shovel was put in to dig a trench 20 ft. wide and 8 ft. deep, the full length of the pit, 3,700 ft. A track was laid behind the steam shovel as it advanced so that when the latter had reached the end of the pit it was able to back out immediately and start another cut. Each successive cut of the shovel is made 8 ft. deeper than the preceding one until the pit now has an average face of 35 ft. throughout. The practice of building a track behind the shovel is followed each time. In consequence the shovel can start a new cut within 30 min. after it has finished the old one and the track in the cut just finished is ready for use at once as a loading track. As soon as the track is no longer used for loading it is taken up so that the material may be re-used behind the shovel.

The track layout of the pit includes a loading track and two storage tracks in the pit, a makeup track, an engine track and a repair track. Including the head room at the south end of the pit, the loading track is 4,500 ft. long. Adjacent thereto are two storage tracks each 3,500 ft. long in the pit proper. The makeup, engine and repair tracks are located at the north end near the entrance to the main line. The track on which the trains are made up is 1,650 ft. long. The pit is laid with 75- and 85-lb. rail, using No. 10 turnouts. The tracks are maintained at a high standard, a policy which has been justified by the fact that there have been no accidents of any nature during the entire season of last year and so far this year

For water service an elevated tank has been located where the engines can take water on arriving or departing from the pit. A water tank tub has also been located in the pit to supply water to the shovel. By supplying the steam shovel with an additional tank it is only necessary to take water from the tub at the noon hour so that there is no delay due to taking water or coal for the steam shovel in the 24-hour period. The supply of water in the tanks is maintained entirely by a day pumper.

A 2½ yd. Bucyrus shovel is used, operating day and night. Each shift consists of a steam shovel engineer, a craneman, a fireman, and six laborers. In addition there are three men who assist the car men, looking after car aprons, and closing side and drop bottom doors. The pit gang consists of 40 laborers laying and repairing track, one car foreman, two car laborers days, two car laborers nights, and a pumper. Each shift is under the direction of a conductor who acts as pit foreman. This conductor is assisted by two brakemen who do the spotting and switching. The conductor is given absolute charge of all trains and road crews, while the same brakemen are kept in service as spotters for the entire season. Two large spotting engines are used, one for the day shift and one for the night shift. The pit is laid out in such a way that a spotting engine readily handles full trains of 30 cars at a time.

In the regular operation of the pit the road engines back into the pit with the empty trains, leaving the cars on the storage tracks from which they are taken, 30 cars at a time by the spotting engine for loading. After the cars are loaded they are pulled out of the loading track and pushed onto the makeup track. The road engine assigned to the next trip then backs them out onto the main line. The engine track is so arranged relative to the makeup track that the engines first in are always first out. The roundhouse force looks after the engines while they stand on the engine track.

During the season of 1914, 500,000 cu. yd. of gravel was taken from the pit and it is expected that the output will be increased to 700,000 cu. yd. during the present season. This estimate is based on the fact that an average of 176 cars have been loaded per day since April 1. The road engines used in this service handle 2,000 tons on the division in both directions over 1 per cent grades. The cars are of 100,000 lb. capacity, and there are 485 cars in the hauling service.

The output so far has been delivered to the new double track in Iowa. The road crews run from Beloit to Savanna over the Racine & Southwestern and Chicago & Council Bluffs (Ill.) divisions for delivery of the material to the Iowa division. Notwithstanding the necessary delay in switching empties and loads from the shovel and loaded trains backing out onto the main line and empty trains backing into the pit, during the working hours the loading average is 12 cars per hour. In all 15,000 cars have been handled this season without overtime.

THE METHOD OF OPERATION OF THE BUFORD, WYO., BALLAST PIT OF THE UNION PACIFIC

The ballast pit from which the Union Pacific secures its main supply of gravel is located at Buford, Wyo., 27 miles west of Cheyenne, on the Omaha-Ogden main line. It is at an elevation of about 7,850 ft. above sea level, and five miles east of the summit of the Black Hills range of mountains, which this road crosses at an elevation of about 8,000 ft. at Sherman, Wyo. The present ballast pit was opened in 1901. Prior to that time Sherman gravel was loaded from two pits, one located a short distance east, and the other west of Sherman station on the old line and only a few miles from the present pit. The main line in this vicinity was changed to a new location in 1900-1901, at which time the old pits were abandoned and the present pit opened up just south of the main line at Buford.

Sherman gravel is a disintegrated granite rock, occurring in very extensive beds over an area of many square miles in this vicinity. In color it varies from a light gray tinged with pink to a deep pink or red. The economically workable deposits are not so extensive on account of the occurrence of granite out-

crops or ledges, which are detrimental to the successful operation of a ballast pit. In choosing a location for a pit it is very important that an area be selected where there are few or no granite ledges. These ledges occur in vertical planes, varying in width and in some cases are not apparent or visible on the surface. In locating the present pit investigation was made and test pits put down at intervals over the area desired for the pit, to determine so far as practicable the presence of granite ledges, and developments so far show that the company was very fortunate in deciding on this location.

In general, the present pit is about 1½ miles in length and has a working face of about 4,500 ft. The depth of the working face varies from 20 to 30 ft., the average being about 25 ft. So far in the present pit the ballast loaded has been from the first lift, although a second lift of about 25 ft. in depth was worked successfully for one or two seasons. There seems to be no limit to the depth of the gravel, but, in the vicinity of the present pit it is not practicable to work to a greater depth than reached by the second lift on account of water. There is a light deposit of soil over this gravel deposit varying in depth from 3 to 10 in., but no stripping is necessary, as the amount of soil is not noticeable or injurious.

Following is an outline of the organization employed at this pit for an operating season which usually begins in April or May and ends in September or October, depending on weather conditions, traffic and the total amount of ballast desired for the season:

- 1 Ballast pit foreman,
- 1 Assistant foreman—in charge of track work.
- 1 Powderman—in charge of drilling and blasting
- 1 Blacksmith.
- 1 Timekeeper.
- 3 Machine drill runners.
- 3 Machine drill helpers.
- 1 Steam shovel engineer.
- 1 Steam shovel craneman.
- 1 Steam shovel fireman.
- 6 Steam shovel pitmen.
- 20 Laborers—handling pit trackage.
- 2 Car repair men.
- 4 Car bucklers.
- 1 Work train crew (consisting of conductor, engineer, fireman and two brakemen).

All of the above employees are under the immediate supervision of the ballast pit foreman who is held responsible for the operation and output of the pit, and who is under the general supervision of the division maintenance of way officers.

Before the gravel can be loaded in cars it is necessary to drill and blast it. Holes are drilled to an average depth of 26 ft., three Ingersoll-Rand machine drills being used for this purpose and supplied with steam from a portable boiler moved to convenient locations as the drilling progresses along the working face of the pit. The holes are generally spaced about 20 ft. apart in the direction of the pit and about the same distance back from the edge of the pit bank. Ordinarily, heavy blasting is not required, as it is only necessary to shake or lift the mass slightly, which results in its breaking up in angular pieces in sizes varying from fine material to 1½ in. in size, the average being about ¾ in. in its greatest dimension. Records indicate that it requires about 400 lb. of FFF black blasting powder and 50 lb. of 40 per cent dynamite to break up or loosen 1,000 cu. yd. of gravel.

After blasting the gravel is ready for loading in ballast cars for which purpose a 95-ton Bucyrus steam shovel with a 5-yd. dipper is used, the cars being spotted for loading at the shovel by the work train locomotive and crew. From 20 to 25 empty cars are taken at a time, the engine holding to all of them until they are loaded and placed in the loaded storage yard. This shovel has loaded as high as 140 cars, approximately 4,900 cu. yd. in a 10-hr. working day. The average daily loading for a season is about 100 cars. Sufficient trackage is provided in the pit for the storage and handling of about 300 empty ballast cars and 150 loads besides the necessary working trackage in the vicinity of the shovel and along the pit face. This latter trackage is rearranged as the operation of the pit requires, and is taken care of by the assistant foreman and 20 track laborers. Two tracks are laid the entire length of working face, one of which

is used as a loading track, while the other is being laid immediately behind the shovel as it moves through the pit.

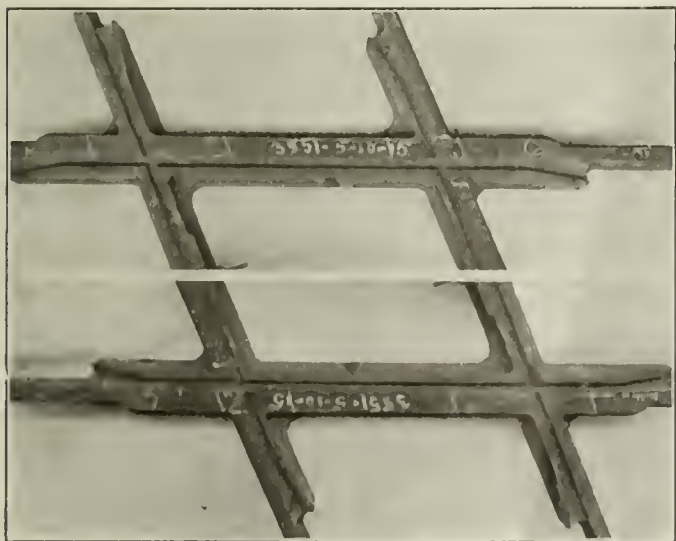
The ballast is billed to destination by the regular agent at Buford in accordance with instructions received from the division engineer's office, and is hauled from the pit in ballast trains and regular revenue freight trains, depending on whether extensive ballasting work, or simply repair work is being done. If extensive ballasting is being done the ballast is handled in full trains to the point where it is to be used, and is there distributed by assigned work trains, the empties being returned promptly to the pit.

All cars are inspected at the pit by the car men, the necessary minor repairs are made, worn brake shoes are replaced, the air equipment is inspected, dump chains are repaired or replaced and the cars are put in good shape for loading. Whatever heavy repairs are necessary are made at some terminal through which the cars pass on their way back to the pit. Detailed daily reports of the pit operation are made and all concerned are furnished a copy.

Since the opening of the pit in its present location in 1901 about 5,000,000 cu. yd. of gravel have been removed and used on the main lines from Omaha to Creston, the top of the Continental divide, a distance of 720 miles, of which 675 miles is double track; and on the line from Denver to Cheyenne, the Julesburg cut-off and other portions of the main lines in Colorado and Kansas. In all approximately 7,500,000 cu. yd. of Sherman gravel has been excavated and used on the Union Pacific for ballast. In addition several thousand cubic yards have been used by towns and cities in this vicinity for paving streets.

REPAIRING MANGANESE CROSSING FROGS BY ELECTRIC WELDING

The use of manganese steel for frogs, crossings and other special track work has reduced the cost of maintenance and renewals materially, but under heavy traffic local wear eventually takes place, particularly at the points, reducing the efficiency long before any appreciable wear has taken place elsewhere. In an effort to increase the life of manganese crossing frogs an experiment was made recently by the Chicago Great Western at its Oelwein shops



A Solid Manganese Crossing Repaired by Electric Welding

in building up the worn points of a frog by the electric welding process. The result is shown in the accompanying photograph, in which the frog appears to be as good as new. The total cost of the repairs was \$49.27, or approximately, 10 per cent of the cost of a new crossing, while with accumulated experience, the work will probably be done for considerably less. The crossing has not been in use a sufficient time since being repaired to de-

termine the wearing qualities of the welded metal, but even if it should not prove equal to that in a new frog, the saving over a complete renewal would still be considerable.

A SOUTH AFRICAN RECORD IN RAILWAY CONSTRUCTION

The railway from Prieska to Upington—a distance of 142 miles—which was authorized by the Union of South Africa Parliament last September, was completed on November 18. In view of the circumstances under which the work was conducted, it will probably equal anything that has been accomplished elsewhere in rapid railway construction at a comparatively small expenditure. The line was built by the railway administration. It is laid with second-hand 60-lb. rails and wooden ties (1,760 to the mile), and the maximum grade, compensated for curvature, is 1.5 per cent. There is one fully equipped station on the line, at Draghoender, and also 12 sidings. The estimated cost was \$11,000 per mile, and it is hoped to come out within the estimate.

The speedy construction of a railway line from Prieska to Upington was considered necessary to facilitate the movement of troops towards the German southwest border and to admit of assistance being rendered in the field with the greater promptitude which rail communication would afford. On August 15 the railway administration received the first intimation that the line had to be constructed and with great expedition. To minimize expense it was decided to utilize second-hand material. The collection of approximately 155 miles of permanent-way material for a work which had not been foreseen or provided for was a large order. Material had to be collected; sidings which had fallen into disuse were repaired, and arrangements made to relay portions of the main lines in need of strengthening, in order to release material for the Upington branch. The material was assembled at De Aar, where it was unloaded, sorted, and reloaded and despatched daily to the end of the track. In view of the many different types of material which were collected, all of which required different fastenings and accessories, the sorting alone was anything but a simple task.

The route of the line had not previously been surveyed, though an engineering inspection had been made by the late Cape government for a distance of 53½ miles. Survey parties were at once formed, and as the survey proceeded the necessary plans were prepared. The survey was commenced on August 24, nine days after instructions were received from the government to construct the line, and the grading was started seven days later. Tracklaying began on September 9 and the terminus on the south bank of the Orange river at Upington was reached on the evening of November 18. This gives an average of two miles per day from the date of commencement of tracklaying, but if the time during which work was at a complete standstill owing to military operations and water difficulties be deducted, the average rate of progress was 2½ miles per day. The maximum mileage completed in any one day was 3½ miles. After the work was properly set going it was carried on day and night.

The disabilities under which the construction staff labored were numerous and formidable. Water between Prieska and Draghoender—53 miles—is scarce, and between Draghoender and Upington practically unobtainable, and such water as was most readily available was generally unsuitable for locomotive purposes. Water for the construction gangs had to be carried long distances, and the supplies for the engines had to be carried in water tanks attached to the trains. To add to the difficulties the water supplies on the De Aar-Prieska line, at De Aar, and at certain watering stations in the vicinity, suddenly and unexpectedly failed, and caused grave concern and some delay to construction material. Water tanks had to be collected in considerable numbers and additional tanks constructed, and water in large quantities had to be conveyed by rail from the Orange

river 70 miles north of De Aar. The position was serious and the water so bad that engine failures were of frequent occurrence. On one or two occasions there were as many as six and seven "dead" engines on the new line, due to failures through bad water. When it was decided to construct the line, the aid of the irrigation department was requisitioned, and great assistance was rendered by that department in putting down boreholes. The exceptional traffic naturally resulted in a much heavier drain on the available water than is ever likely to be experienced under normal conditions.

Shortly after construction work started heavy military traffic had to be handled on the new line, and the number of military and material trains which have been run over this line would have taxed any old-established single-track line to its utmost capacity. About 600 tons of permanent-way material had to be carried over the line daily, the total quantity of track material conveyed approximating 36,000 tons. A further source of difficulty, although not so acute, was the fact that heavy engines could not be utilized on account of the axle loads having to conform to the strength of the bridges on the adjoining section of the old line, and that only a limited number of engines of the class suitable for that line was available.

POINTS FOR SLIP SWITCH INSTALLATION

By W. F. RENCH

Supervisor, Pennsylvania Railroad, Perryville, Md.

As the various parts composing a slip switch are made to the exact dimensions prescribed by a standard plan, the utmost care is necessary in the installation of the parts to attain accuracy in every detail. The linear measurements, particularly for the longer slips, must always be made with a steel tape, and indeed for the nicest work the tape should be one that has been tested for its accuracy. It is not too great a refinement to adjust the measurements for temperature variations. Steel tapes are not infrequently as much as $\frac{1}{2}$ in. in error, and extremes of temperature may balance this error or introduce a further error which in a No. 20 slip nearly 200 ft. long might cause a total error of 4 in., which would of course be inadmissible.

All linear dimensions should be measured along the axis of the slip, a line connecting the theoretical points of the end frogs. It is very useful to sketch this axial line accurately upon the ties for the triple purpose of laying off the detailed linear dimensions, for spacing the switch ties and for lining the ends of the timbers, which for a double slip-crossing will be symmetrical about this line. By multiplying twice the gage by the frog number the distance between theoretical points of the frogs measured along the main track will be obtained, and from this the desired points can be located by carefully squaring across the gage, the main track having been tested for correct alinement and the gage at the two frogs being made exact.

The middle point of the axial line should be marked to fix the middle point of the slip, from which all measurements in both directions will be made to locate the ties and the points of the slip switches. It should be noted that the middle point is the theoretical point of the two movable point frog rails.

The distances between centers of ties are given consecutively, but to attempt to lay off these by successive measurements would introduce cumulative error which at the ends of the slip might amount to several inches, which would be out of the question. The distances from the center of the slip to each tie should be calculated and the location made by continuous measurement along the line previously laid down for the axis of the slip.

As the ties vary in length only between the limits of 11 ft., which is the nominal length of the tie at the middle of the slip, and 13 ft., while the number of ties within these limits for each half varies from 17 for a No. 6 to 55 for a No. 20, the

increments will be nearly uniform and the ends on both sides will be practically in a straight line, and thus no difficulty whatever need be experienced in applying the necessary timber for any slip set. It should be noted that the last short tie has the same relative location with reference to the end frog in the slip that it has in a plain cross-over.

The importance of obtaining a correct alinement for the main tracks in the installation of any switch connection is well known, but the absolute necessity for this precaution in the placing of slip switch work cannot be too strongly stated. While a perfect alinement of the slip ladder is desirable and will follow if the installation is correct in all its details, the essential feature is to preserve the integrity of the main track alinement and the line, if tangent, should be established with the transit and be faithfully followed. To facilitate the attainment of the best possible detailed line the track should be brought to perfect grade and surface immediately upon the completion of the switch tie installation, and before any of the slip members are applied. If the slip is on a curve the method of ordinates should be used in lining first with a 100-ft. string to correct the general line, and then with a 50-ft. string to obtain a fine detail line. This will be a final determination, for, since the timbers having been placed in their exact permanent locations, no shifting or other work causing distortion will be necessary.

As mechanical work cannot in the nature of things be perfect, some detail adjustments may be necessary even after the most faithful adherence to the standard plan in the application of the material. This correction should not be attempted until a final surfacing has been given, as frequently defects that appear as line are really caused by imperfect surface.

But fine work in the installation is unavailing without the means of maintaining the adjustment of the slip members, and to this end heel blocks should be supplied through which the main and turnout rails are bolted together, anti-creeping straps should be applied to the heels of the slip switches and the movable points, anchoring them against movement in either direction, and all tracks leading to the slips should be plentifully equipped with rail anti-creepers.

A better method has been found for securing the adjustable rail braces to the bridle plates. The lag screws which formerly engaged the wooden tie were inclined to work loose. It is now the practice to engage these screws direct with the bridle plates where one inch greater thickness of metal is provided and the braces now remain tight. The seats should be neatly dapped into the ties to exclude moisture as far as possible.

A very distinct error in switch economics, and one which as a rule is not fully appreciated is the placing of an extended layout upon a broken grade. This is particularly disadvantageous when the layout is at the marked depression made by two sharply changing gradients and the effect is most adverse in the case of a slip ladder by reason of its greater length. The ideal location of an interlocking is with a single grade continuous throughout its limits. The saving in maintenance, both to the signal and track forces, through the ideal arrangement is quite measurable. The aesthetic feature is likewise greatly enhanced by such provision.

THE ORLEANS RAILWAY OF FRANCE AT THE BEGINNING OF THE WAR.—From the first day of the war the Orleans railway system passed entirely into the hands of the military authorities, and between August 2 and 5 nearly 1,500 trains carried men to centers of mobilization. From then until August 19 trains took these troops from the centers towards the frontiers, and at the same time transported soldiers from Algiers and Morocco. In this period 57,000 passenger and freight cars were used for the conveyance of 600,000 officers and men, 144,000 horses, 40,000 guns and gun-carriages, etc., and 64,000 cases of supplies of various kinds. This enormous service was carried out with remarkable precision and order and without the smallest accident to military trains.

The Experimental Determination of Stresses in Track

A Description of the Methods Adopted to Secure Measurements Under Actual Traffic and the Results Secured

By C. C. WILLIAMS

Professor of Railway Engineering, University of Kansas

The intensity and distribution of the stresses that occur in a railroad track under actual operation cannot be calculated reliably from theoretical considerations and recourse must be had to experimental tests for such information. Dr. P. H. Dudley, G. Cuénot and others have done much valuable work in this connection and it was with a view to extending their observations somewhat that an investigation of the subject was undertaken in the Railway Engineering department of the University of Kansas, a brief summary of which follows:

The apparatus used consisted of Berry strain gages for ascertaining the stresses in the rails and a device for measuring the deflections specially designed and built for this purpose, which will require a word of description. It consisted essentially of a stylus carrying a 4-H lead attached to the

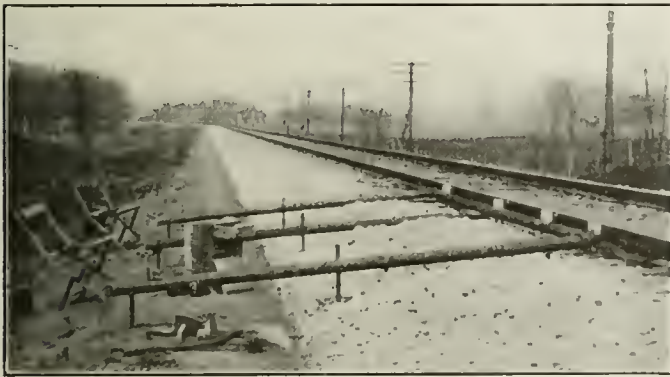


Fig. 1.—A General View of the Apparatus

rail or tie being studied, and a revolving drum carrying a sheet of paper on which the deflection diagram was traced by the stylus. A small electro-magnet was placed immediately below this stylus and so arranged that when the former was energized, it actuated another stylus which made a dot on the sheet of paper below the main deflection diagram. One of the wires to the electro-magnet was bonded to the web of the rail and the other was laid on, but not across the top of the rail, so that when a train wheel passed it pressed the wire against the head of the rail causing the stylus of the electro-magnet to indicate the position of the wheel relative to the deflection diagram. The revolving cylinder, which was turned by means of a cord wound around its base, was supported on a 2½-in. pipe frame that was anchored and held rigid by being clamped to long iron posts driven in the roadbed outside of the ballast. Fig. 1 shows the general arrangement of the apparatus and Fig. 2, the details of the same. The section of pipe parallel to the rail was somewhat more than half the length of the rail so that a recording gage could be placed at the middle, one at the joint and two about equally spaced between. By thus supporting the apparatus entirely outside the ballast, the normal condition of the track was not disturbed and freedom from movement of the support due to passing trains was attained. With the gages in this position, they covered the first half of the rail length for west bound trains and the second half for eastbound trains. For observing the deflection of the ties, the pipe supporting the deflection gages was placed between two ties at right angles to the track, as shown in Fig. 3. One gage was placed at the middle of the tie, one at the end and two between these two.

The Berry strain gage was attached under the rail between two ties by means of a special clamp and was read while

the trains were passing by the aid of powerful field glasses.

The track where most of the observations were made was on a tangent in the main line of the Atchison, Topeka & Santa Fe. The roadbed is on a 10-ft. embankment and is Class A track, with 22 in. of crushed rock balast under the bottom of the ties, 22 ties to the 33-ft., 85-lb. rail. The width of the top of the embankment was 24 ft., allowing a berm of 4 ft. outside the ballast. The ballast was half above and half below the base of the roadbed. Other observations were made at the middle of a 3-deg. curve with similar roadbed and on a tangent yard track on cinder ballast near the depot. Other observations were also made on branch lines with inferior roadbed, but they are not included in this discussion.

The traffic over the above stretch of track consists of 7 passenger and 2 freight trains each way per day. The passenger engines were either of the Atlantic type with 56,000 lb. per axle on the drivers (1,400 Class) or the Pacific type with 55,000 lb. per axle on the drivers and trailer (3,500 Class), the latter being a balanced compound locomotive used in fast passenger service. West bound trains passed the point of observation at speeds varying from 40 to 50 miles per hour, while east bound trains varied from 30 to 40 miles per hour.

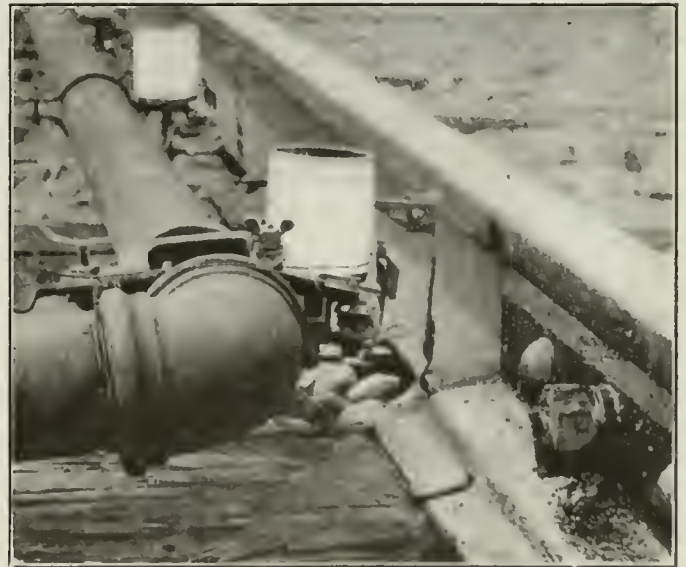


Fig. 2.—A Closer View of the Deflection Recording Apparatus

Without going into detail, a summary of the results of the observations can be briefly stated:

1. Fig. 4 is a record of the deflections under a passenger train drawn by an Atlantic type engine and shows the character of the charts made by the recording apparatus. A is the deformation of the track from the initial straight line and at B may be seen the dots that indicate the position of the wheels, the interpretation of which was sketched in at D afterward.

2. The compression in the head of the rail is greatest under the trailer wheels, owing doubtless to the distance between them and the driving wheels in front and the tender wheels behind.

3. The maximum tension occurred in the head of the rail due to upward moment about 6 to 10 ft. ahead of the truck of the locomotive and between the two trucks of a Pullman car.

4. The compression in the head of the rail is increased and

The Relative Efficiency of Various Ballast Materials

A Discussion of the Different Elements of Cost Which Enter into the Ultimate Expense to a Railroad

By G. W. VAUGHAN

Engineer of Maintenance of Way, New York Central, New York

A definition of efficiency reduced to track terms and applied to ballast might be as follows: "The ratio of continuous smooth track secured to the cost per lineal foot of track in securing it." In this definition the "cost" means the cost of the ballast, cost of transporting, cost of installation, cost of renewals, and the labor cost of surfacing to keep continuous smooth track.

Let "a" = cost of stone ballast per lineal foot of track, which is assumed at \$0.38.

"A" = cost of gravel ballast per lineal foot of track, which is assumed at \$0.22.

"b" = cost of 2 in. stone ballast renewed after three years, per lineal foot of track, figuring that 20 per cent is renewed at that time, which is assumed to cost \$0.076.

"B" = cost per lineal foot of track of gravel ballast renewed after three years, figuring that 33⅓ per cent is renewed at that time, which is assumed to cost \$0.0733.

"c" = cost of keeping continuous smooth track on stone per lineal foot of track for three years, assuming it has to be surfaced three times per year, and that in 10 hours one man can surface 45 lineal feet of track, which is assumed to cost \$0.339.

"C" = cost of keeping continuous smooth surface on gravel per lineal foot of track for three years, assuming it has to be resurfaced eight times per year, and that in 10 hours one man can surface 60 lineal feet of track, which is assumed to cost \$0.079.

Then "x" = continuous smooth track.

"E" = efficiency of gravel ballast.

100 = efficiency of stone ballast.

By definition given above, efficiency = $\frac{\text{continuous smooth track}}{\text{cost per lin. ft. of track}}$

In the case of 2 in. stone ballast:

$$100 = \frac{x}{a + b + c} = \frac{x}{.380 + .076 + .339} = \frac{x}{.795}$$

In the case of medium gravel:

$$E = \frac{x}{A + B + c} = \frac{x}{.220 + .073 + .679} = \frac{x}{.972}$$

Comparing the two

$$100 \div \frac{x}{.795} = E \div \frac{x}{.972} = \frac{100 \times .972}{.795} = \frac{E \times .795}{.972} = 79.5 : .972 E$$

$$E = \frac{79.5}{.972} = 82$$

Therefore, if efficiency of stone ballast is 100, efficiency of medium gravel is 82

Therefore

Stone ballast efficient	100 per cent
¾-in. stone ballast	75 per cent
Coarse gravel	80 per cent
Medium gravel	75 per cent
Fine gravel	60 per cent

From experience we find that the least depth of ballast that should be placed under the ties is as follows:

Stone	12 in.
¾-in. stone	12 in.
Coarse gravel	12 in.
Medium gravel	14 in.
Fine gravel	14 in.
Clean coarse sand and under	16 in.

Any less depth of ballast than above will not hold track in good surface or line under heavy traffic without continual surfacing.

SUB-BALLAST

Where tracks are being ballasted with stone, it is sometimes necessary on account of the condition of the sub-grade, to place

what is known as sub-ballast. When ballasting old tracks with stone where ballast has been used for many years, this sub-ballast is not necessary, but where the sub-grade is wet and is composed of loam or clay, sub-ballast should always be placed previous to ballasting track with stone or gravel. Gravel, sand, cinders, granulated slag or other porous material can be used for this purpose, and the following depths are generally used.

Crushed slag	12 in.
Cinders	12 in.
Sand	12 in.

The lasting qualities of ballast and the percentage required for renewals depends upon the traffic. The following table gives the per cent of renewal at the expiration of a certain number of years.

Stone	3 years.	Percent of renewal	20
¾-in. stone	2 years.	Percent of renewal	20
Coarse gravel	3 years.	Percent of renewal	33⅓
Medium gravel	3 years.	Percent of renewal	33⅓
Fine gravel	3 years.	Percent of renewal	33⅓

The relative cost of raising track on ballast is:

Stone	100 per cent
¾-in. stone	75 per cent
Coarse gravel	75 per cent
Medium gravel	66 per cent
Fine gravel	50 per cent

The relative cost of surfacing track is:

Stone	100 per cent
¾-in. stone	75 per cent
Coarse gravel	75 per cent
Medium gravel	66 per cent
Fine gravel	50 per cent

The relative cost of maintaining surface on various kinds of ballast is:

Stone	100 per cent
¾-in. stone	150 per cent
Coarse gravel	200 per cent
Medium gravel	200 per cent
Fine gravel	200 per cent

Track on gravel ballast can be surfaced at a cost of 25 per cent less than stone but to keep continuous smooth track, winter and summer, it has to be surfaced or shimmed nearly three times as often. The 200 per cent for gravel in comparison with 100 per cent for stone, is obtained as follows:

"a" = cost of surfacing one lineal foot track stone ballast, assumed at \$0.032.

"A" = cost of surfacing one lineal foot track gravel ballast, assumed at \$0.024

"b" = number of surfacings stone ballast track required per year = 3.

"B" = number of surfacings gravel ballast track required per year = 8 (taking into consideration that gravel has to be surfaced after heavy rains and has to be shimmed in winter).

Then

$$100 = \frac{\text{stone}}{\text{gravel}}$$

$$a \times b : A \times B = 100 : X$$

$$0.32 \times 3 : 0.24 \times 8 = 100 : X$$

$$.096 : .192 = 100 : X$$

$$.092 X = 19.2$$

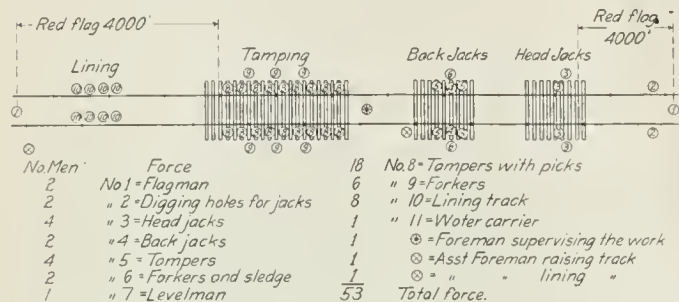
$$X = 200$$

GENERAL METHOD OF RAISING OR BALLASTING TRACK

A gang should be large enough that six racks can be used, three on each side, spaced one-half rail length apart. Ballast stakes should be set so that the desired grade can be obtained with the least amount of lumps and rags. A sighting board and blocks should be used to obtain uniform grade between ballast stakes. A track level should be used so that the proper cross level can be obtained. The table on the following page shows

the number and different classes of men composing the ballast gang and the manner of placing them.

Adjust the sighting board at a grade stake, where the grade changes, or if that is too far ahead, at a grade stake where the line on the sighting board can be clearly seen from the point where the track is to be first lifted. Tap down all loose spikes so that all the ties will be up close to the bottom of the rail. Place the six jacks, three on a side, at the joint, center and joint, and on the sighting side of the track, place on the rail three sighting blocks at the joint, center and joint. The foreman with another sighting block should then go back three or four rail lengths, depending upon his eye-sight, and place his sighting block on the rail. Jacks are then to be worked until the tops of the three sighting blocks on the rail that is being lifted are



Average performance—raising track 4500 per day.

" average " —back-filling 1200 Cu. yds. per day

Distribution of Men in a Ballast Gang

on a line with the top of the foreman's sighting block and the sighting line on the sighting board. At the same time the sighting side is being raised, the opposite rail is to be raised level with the sighting side by the use of three uniform track levels placed at the joint, center and joint. If on a curve, use the low rail for the sighting side and put the desired elevation in the track levels. Some tracks lift different from others and a foreman may find it necessary frequently to use a jack in the quarter in addition to the ones at the joints and centers.

It is proper, if the foreman is experienced, to raise the joints slightly high, tamp the middle tie of the joint, drop the jack and then strike the tie tamped down to the proper level with a large wooden hammer. This means a solid joint tie. It means also that the tie referred to is the only one that should be treated in this manner, for if other ties are treated in this manner, loose ties will result from the practice. The main thing in tamping is to do it evenly and uniformly, both outside of the rail and for 18 in. inside. The center of the tie should not be tamped. The ballast should be simply pushed in so as to fill in to avoid and prevent a pocket for water. The action of traffic will tamp the center of the tie sufficiently and many times more than is necessary.

The method of raising track on a light lift is practically the same as when ballasting track. If the raise is not very great, or if it is being done by a section gang, less jacks are required.

SURFACING TRACK

In surfacing track with the sighting board where the lift is from 1 to 2 in., the general method is the same as when raising track. The height the track is to be raised is determined by the foreman, and the sighting board is set accordingly. The distance that the foreman should be away from the raising block is usually about twice the distance customary when raising track for ballast. When surfacing track on stone ballast the tamping should be done with tamping picks, tamping bars or percussion tamping machines. The ends of the ties should be tamped quickly when the raise is made and then the gang should thoroughly pick or machine tamp for a distance of 3 ft., in from the ends of the ties, care being taken not to knock out the tamping previously done on the opposite side of the ties. The center of the tie should

be lightly pick-tamped on both sides. In surfacing track with gravel ballast, pick-tamping or bar-tamping should be used, following the same general principles, if the lift is not too great. On greater lifts, shovel tamping is the best unless the gravel is very coarse.

For ballasting and surfacing track, we find the following to be the best tools to use for this purpose.

	First lift	Surfacing
2-in. stone	Spade	Tamping picks and mechanical percussion tampers.
¾-in. stone	Spade	Tamping picks and mechanical percussion tampers.
Coarse gravel	Spade	Tamping picks and mechanical percussion tampers.
Medium gravel	Spade	Tamping picks and mechanical percussion tampers.
Fine gravel	Spade	Spade

By using the mechanical percussion tampers, greater efficiency and more permanent track can be obtained at 50 per cent of the expense of track tamped by hand.

LOADING AND HAULING BALLAST

To obtain efficiency, the loading of ballast should be done by mechanical means or gravity. Gravel, sand, etc., should be loaded by steam shovels and crushed stone should be loaded from bins by gravity. All ballast should be hauled and unloaded by special trains, preferably in center dump cars of the Rodger or Hart types, as this puts the ballast where it is wanted. When track is raised, a large proportion of the ballast slides under it by gravity, thereby saving that much hand labor. However, for surfacing track, where there is a very heavy fast passenger traffic it is preferable that ballast be unloaded outside of the rails to avoid discomfort to the passengers caused by the fast trains picking up the stones and dirt from the center of the track.

Track should be lined promptly after it is ballasted, and before filling in. It should also be filled in promptly after lining in order to hold the line. In stone ballast particularly, if the track is not lined promptly after the stone is put under, it becomes set in and no matter how much one lines it the first train or two over it will line it back to its old position, in which event the only remedy is to spike-line the rail. When track is filled in, it should be dressed up to the standard cross-section. In dressing up stone ballast on the shoulder, it is not necessary to place any of this ballast by hand. The men should line the track, and throw the ballast from outside of the ties up on to the ends of the ties. They should then place an ordinary board the proper distance from and below the base of the rail and rake the ballast down to the board with forks or shovels.

Hard stone, that breaks with an angular fracture when crushed and passes through a 2¾ in. round hole in a revolving screen and will lay on a 1¼ in. screen, is considered to be the best ballast for high speed and heavy traffic lines. Coarse gravel ranging from sand to 2 in. pebbles is considered good enough for medium traffic, while sand, fine gravel or cinders is considered ample for lines of ordinary traffic.

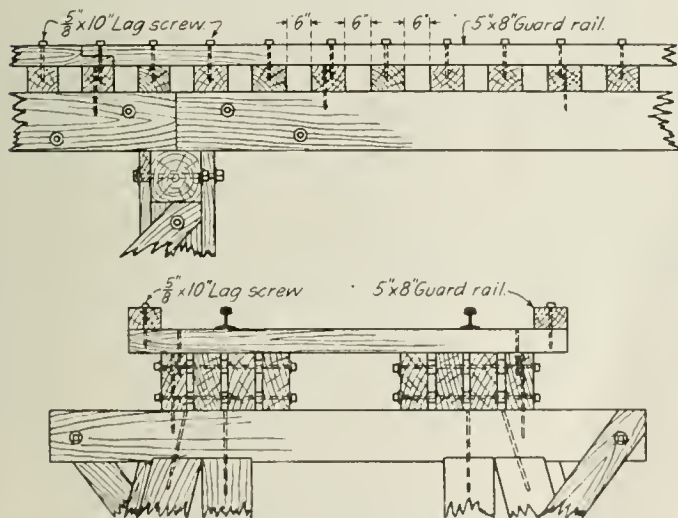
I consider a light raise to be much preferable to heavy raises on fast express lines or lines with heavy freight traffic, owing to the settlement of the track during the winter months, due to the frost heaving the ground, heavy rains, snow, etc. With light raises, track can be kept in better condition with less expense than can be done by putting a large amount of ballast under the track. When a large amount of ballast is placed under the track, the track naturally settles down into the ballast to a greater or less extent and it requires more labor for tamping the track than by making lighter lifts and making them oftener. By making light raises in the track we are able to keep the track from getting centerbound and to keep it in the same riding condition continuously year to year which cannot be done in any other manner.

In regard to classes of labor best suited for work in ballast gangs; any man of good physique, who can understand the language and is willing to obey the orders of the foreman will be the most suitable, regardless of nationality.

FASTENING TIMBER GUARD RAILS WITH LAG SCREWS

At the last convention of the American Railway Engineering Association, the committee on Wooden Bridges and Trestles submitted considerable information concerning the use of lag screws for fastening timber guard rails to the ties on wooden and metal bridges. While the investigation of the committee showed that only a small percentage of the roads use this form of construction, nearly all of those who have tried it were in favor of it. The committee recommended that ties and guard timbers be sized one dimension at the mill and that the customary dapping be omitted, also, that alternate ties be fastened to the stringers and a lag screw be used to fasten the guard timber to each tie. Holes should be bored the full depth and the lags screwed into place.

Because of the interest in this subject evidenced by the work of this committee, we show herewith the standard plan of the Seaboard Air Line, on which road the use of lag screws is standard. In a general way this form of construction has been used to a limited extent for many years. Fully 30 years ago it was the practice of the Queen & Crescent to fasten the guard timbers to the ties with ordinary bolts, but considerable trouble was experienced in preventing the nuts from working off the bolts and also in preventing the bolts themselves from



Use of Lag Screws in Trestle Construction on the Seaboard Air Line

coming out of the guard timbers. With this form of construction it is absolutely essential that every tie be securely fastened to the guard timbers to prevent bunching.

In 1907 it was the standard practice on the Seaboard Air Line to use 7 in. by 8 in. bridge ties with 6 in. by 8 in. guard timbers dapped over the ties and fastened with lag screws. The practice was modified on that year to use a 6 in. by 8 in. by 9 ft. tie and a 5 in. by 8 in. by 18 ft. guard rail without dapping. Reducing the size of these timbers effected a saving of over 400,000 ft. B. M. of timber per year in addition to \$7 per 1,000 ft. B. M. to frame and place the dapped timber. All ties and guard timbers are required to be sized to a uniform thickness, insuring an even bearing. It has also been found that by turning the surfaced side up, decay is retarded to some extent. Every fourth tie is drift bolted to the stringer, enabling the track to be kept in line at a moderate expense.

The action of this form of construction under derailment has been particularly successful. At various times derailed cars have been moved over a trestle without bunching any ties. In one instance where the guard timber on one side was completely demolished very few ties were bunched, as the guard timber on the opposite side was in good condition and the lag screws still

held the ties in place. A recent motor car trip over a portion of the lines in Florida on which there are a large number of trestles, failed to show a single instance of bunched ties.

THE BROWNHOIST-SHABLE DRAG LINE BUCKET

The Brown Hoisting Machinery Company, Cleveland, has recently purchased the patents for and is now manufacturing a new type of drag line bucket originally designed and built by E. R. Shnable, of Shnable & Quinn, contractors, for use on the Calumet-Sag channel of the Chicago Drainage System. This bucket has been used on this work for the past five years in materials consisting of a thin soil covering a glacial conglomerate of sand, gravel and boulders, cemented with clay and very tightly packed; below this is what is termed "marl" hard-pan of the color of bluish clay, full of pieces and ledges of limestone; and at the bottom is solid limestone rock which has to be blasted. This bucket has dug this material successfully, and has stood up under this hard work.

This is a back-dumping bucket, consisting of a shell, a pulling



Dumping Beyond the Normal Radius of the Machine

bail and a combination hoisting bail and back gate. In its digging position the pulling bail is connected to the shell at points located above the center of gravity of the shell. The pulling bail is also connected by means of links to the hoisting bail and back gate in such a way that tension on the drag line forces the gate to close and remain so. When the bucket is suspended on the hoisting bail and the tension on the drag line is released, the back of the shell tips down away from the back gate allowing the load to slide and drop out. The pulling bail is connected to the shell by means of bronze sliding blocks carried in slots in the shell. These slots give to the link connections, between the pulling bail and the back gate, the required motion to permit the bucket to dump when the tension on the drag line is released. Special attention is given to flexibility of the bucket and to the

Making a Physical Valuation of Large Terminals

Important and Practical Points Which Facilitate the Carrying on of This Work in the Field and Office

BY CLAUDE L. VAN AUKEN

Much railway valuation in the past has been from a theoretical, legal or office-record standpoint. The decision of the government to make a physical valuation of all roads has created a new interest among railways in the physical part of valuation work. Many men to whom the work is entirely new have suddenly been plunged into valuation work and, as little of value has been written in detail regarding methods to be followed, there are many costly and haphazard methods in use.

The writer has had several years of railway valuation experience, including both field and office work. Consequently many methods have come under his observation. However, the best that has come to his knowledge is one now used in whole or in part on two of the largest railways running west of Chicago.

ELEMENTARY DETAILS OF THE METHOD

If speed is desired, a field party engaged in yard valuation should consist of 8 men as follows: 1 assistant engineer, 1 instrumentman, 1 rodman, 2 chainmen, 1 building inspector and 2 material men. The general organization is as follows: The instrument man should, with the help of the yard map (blue print), determine on the number or name of each track, including its beginning and end, and should direct the chainmen in measuring the lengths of tracks. He should mark the name or number of each track, its beginning, end and length, for the information of the material men, and also place the same information with soft black pencil on the blue print of the yard. The material men follow, entering this information in the material book, together with all detailed information on ballast, rail, ties, angle bars, bolts, spikes, tie plates, rail braces, bridle rods, frogs, switches, switchstands, crossing plank cattle guards, etc. The rodman accompanies the building inspector taking detailed size, location and other information required for making a valuation of each separate building.

GRADING

On spurs and sidings from the main line it is usually desirable to keep the grading separate for each track, but in yard work this is unnecessary and it is usually combined, including that for the main line, unless those tracks are outside of the yard proper. On all miscellaneous tracks separated from the main yard, the grading should be kept separate for each track. If no records of grading for the yard are available, it will be necessary to take measurements of the earthwork, rip-rap, bank protection, etc. Notes on right of way fencing should be taken with the grading notes. If no records are available on clearing and grubbing, estimates should be made with the help of old employees with personal knowledge of original instruction, or of old inhabitants of the locality familiar with the original condition of the property before the construction of the line.

METHOD OF PROCEDURE

The first thing to be done upon the arrival of the party at a large yard is to chain the main line (or main through yard track to be used as a base line) and establish a system of stationing, preferably the profile stationing. These stations should be clearly marked in a specified manner so that they may be used later in taking grading data, locating buildings, crossovers, turnouts, etc., and also to save chaining in adjacent parallel tracks. All necessary "plusses" should be recorded on the map, on switchstands, etc., by the instrument man as the chaining progresses. The material men follow,

taking notes on main line track material, while the building inspector and helper take measurements and notes on yard buildings, etc.

After the stationing is completed the assistant engineer should inform the instrumentman of the system of numbering tracks that has been decided upon. This numbering should preferably correspond to the construction or map numbering if there is such. If not, the numbers and names used locally by the switchmen and yardmaster should be followed as closely as is consistent with good judgment. If neither of these methods of numbering has previously been established, the assistant engineer should adopt a clear and logical method, using numbers on parallel tracks and descriptive names for miscellaneous tracks. Each track having been assigned a name or number, the instrumentman should determine its limits and mark the turnout or turnouts which the track includes. To do this in the field, place an arrow on the switchpoint leading to the track under consideration, the arrow pointing along the rail in the direction which the turnout

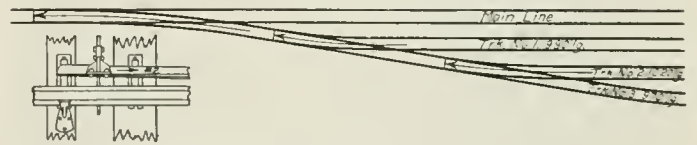


Fig. 1—Method of Marking End of Track Measurements

leaves the track (see Fig. 1). Mark the number of the track immediately in front of the arrow as shown. Proceeding along the marked switch rail in the direction indicated by the arrow one is led directly along the proper track to which has been assigned the number marked immediately in front of the arrow. If the track is not a stub end track, the marking is repeated at the end, the arrow being reversed. The length, point of switch to point of switch is also indicated. Thus it will be seen that the material men, who follow later taking notes, cannot possibly confuse the numbering of tracks or their beginning and end, no matter whether or not they proceed in the same direction as did the chainmen. This method of marking also makes it unnecessary for the material men to closely follow the chainmen and instrumentman and does away with the necessity of the material men carrying a yard map.

At the same time that the instrumentman marks the yard tracks as outlined above, he should mark the yard map in a corresponding manner, using a heavy black pencil. The arrows not only indicate the ends of tracks but also serve to show with which track the turnout material is included; the "tail" of the arrow being extended well beyond the frog and within the lines indicating the rails of the track. This information is reproduced on the office copy of the yard map by putting in the arrows and lettering with a bright colored pigment ink, preferably yellow or white. This information, together with the track material notes, is an accurate and complete record of each track, even to the exact material in any turnout one may select on the map, the material men having designated the switch material as "east" and "west" or "north" and "south," as the occasion may be.

To such a record, changes, such as "additions and deductions," may be applied easily from year to year, without necessarily obliterating the original record. Extensions and changes of alignment may be shown by coloring new work with red pencil, while deductions and the old alignment may

sion, Section 3, Station 12 (Belden), Item 19 (Sidings), Card 5.

It will be noted that on the card for a siding the total length of the track, point of switch to end is shown, the rail is reported for the entire length and that the split switch and frog are also reported. This makes a double entry for rail in the space occupied by the switch and frog. This difference may be taken care of in the section summary by deducting the track equivalent in tons, occupied by a complete switch, from the total tonnage.

In making summaries such as this it is convenient to have at hand tables showing the amounts of material in various standard turnouts, etc. Computing tables such as these, together with information on track, bridge and building standards, are invaluable in a valuation office. Failure to prepare such data leads to hundreds of needless inaccuracies and to much useless repetition of recurring computations. Adequate and convenient files should also be furnished for yard and station maps and both the field map and the corrected office copy should be kept in the file. It may be argued that the filing systems herein outlined are too elaborate and unnecessary, but engineers who have been for years in railway valuation work concede that they are necessary and are using similar systems, thus proving that valuation work not only requires engineering ability, but skill in office work and accounting as well.

It will be noticed that the entire method outlined above lends itself readily to a system of annual reports of additions and deductions to bring the valuation to date. This important feature is overlooked many times and consequently much confusion results in trying to bring up to date a valuation which has been "lumped" or one without detail, by making the proper additions and deductions. For instance, in making a deduction properly, one must know what was previously reported both as to detail and cost, else a sum of money is liable to be deducted from the total for which nothing was ever included in former reports. After years of successful work a properly conducted valuation department becomes useful not only for its valuation reports and records, but also as a general source of information and statistics for the use of other departments, a value which has not as yet been fully realized by other than engineers or those closely connected with the work.

The portion of the instructions for the federal valuation parties (as outlined in the *Railway Age Gazette* of January 8, 1915), which pertains to yard valuation, may be easily applied to the method herein given, as the instructions are primarily to indicate the general data that is to be secured throughout the entire railway system, rather than to state specifically how the work shall be handled in a large terminal yard.

THE SWISS RAILWAYS.—According to the latest figures, the total length of the network of the Swiss Federal lines alone amounts to 1,700 miles—that is of standard gage lines only—to which must be added the narrow gage Brünig Railway, 36 miles in length. There are, besides, the standard lines owned by private companies, of which the chief are the Loetschberg, 65 miles; the Bodensee-Toggenburg line, 38 miles, which was in exceedingly poor financial condition even before the war; the Seetal line, 34 miles, electrified a few years ago, and several smaller lines. There are also the narrow-gage lines, 49 in all, chief of which is the Khaetian Railway system with a total length of 170 miles, with both steam and electric traction; the new Chur-Arosa line, with electric traction, 16 miles; the Montreux-Oberland line; the Bernese Oberland lines, and various others. The rack railways in Switzerland number 15, the most important being the Wengernalp line, 12 miles in length, with an 80 cm. (31½ in.) gage. Of the cable railways, now 47 in number, in Switzerland, the longest is that from Sierre to Montana in the Valais, 3 miles, with a maximum grade of 48.4 per cent

AN EXPERIMENTAL CONCRETE SLAB GRADE CROSSING

By MAC RAE D. CAMPBELL

At the point where the Chicago & North Western crosses Pearson street, Des Plaines, Ill., this street is paved with concrete and it was desirable, if possible, to preserve the same pavement surface in crossing the tracks. With this in view, the experimental concrete slab crossing shown in the accompanying illustration has been recently installed. This scheme was in part the idea of Peter Hoffman, coroner and



The Crossing Completed for One Track

chairman of the Cook County Safety First Commission, who interested the Chicago & North Western in the work. The concrete slabs are about 1 ft. 6 in. wide by 3 ft. long and 5 in. thick. They were manufactured at a local cement products plant at Des Plaines, and consist of a 1-2-3 concrete mixture, in which Wisconsin granite was used as coarse aggregate. Six of the blocks were reinforced (experimentally) at the center with No. 6 American Steel & Wire mesh, the heavy wires running the long way of the block. All blocks were



Preparing to Place the Concrete Crossing

cured by steam for the first 16 hr. and then removed from the steam curing room and stored in a warm room where they were kept thoroughly sprinkled. They were kept in a warm moist temperature until used in the crossing. Blocks were finished with a wood float and all edges rounded with an edging tool having a ¼ in. radius, except where plans called for different provisions, namely, a suitable flangeway along the rails. As shown in one of the photographs, blocks are

kept in alinement by steel angles spiked to the ties. Blocks are set upon a sand cushion and the joints filled with sand. The crossing is 18 ft. wide and extends across two tracks.

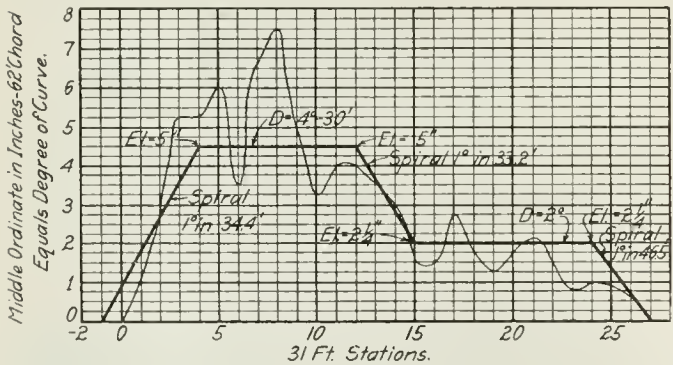
A GRAPHICAL METHOD OF STRING-LINING CURVES

By H. M. Church.
Division Engineer, Baltimore & Ohio, Baltimore, Md.

Some discussion has appeared heretofore in these columns regarding the advantages and results to be obtained by the use of a string for lining track, and the extensive use of various methods which have been tried where curves have not been staked and spiraled previously by an engineering corps. The following method of string lining has been found to be specially practicable and adaptable to use on all curves, simple or compound.

One takes the usual preliminary notes with a 62-ft. chord, noting the middle ordinate which gives the degree of the curve at each station, observing the curvature and elevation at each station and recording this data in the usual engineers field book. On the opposite side of the book, usually ruled like cross section paper, the ordinates of the degrees of curve at each station can be plotted quickly so that the curve will show clearly the points of maximum and minimum variation.

If all the degrees of curvature in inches as originally taken are added, the sum for each particular curve will remain con-



An Example of the Graphical Determination of the Curve Offsets

stant. After reading from the diagram the proposed degree of curve for each station and again adding, the totals should equal the previous sum, and if not, adjustments can be made.

The diagram of the curve will locate quickly the points of the maximum and minimum variation and then an average line for the spiral and curve can be plotted. It has been found in plotting the "Talbot Spiral" in this manner that it becomes a straight line inclining in proportion to the rate of runoff in feet per degree of curve. A similar diagram for elevation using inches as ordinates at each station can be correspondingly figured out to fit the new curve and spiral. This will give data that will permit a track man to line the track for the spiral and curve throughout readily.

TABLE OF MEASUREMENTS

31-ft. station	Measurements taken on existing curve		Measurements for re-established curve	
	Middle ordinates of 62-ft. chords in inches	Elevation in inches	Middle ordinates of 62-ft. chords in inches	Elevations in inches for 40 mi. per hr.
1.	0	0	0	0
2.	1 1/8	1 1/8	1 3/4	1
3.	2 3/4	2 3/4	2 3/4	2
4.	5 1/4	2 3/4	3 1/2	3
5.	6	3	4 1/2	4
6.	3 1/2	3 1/2	4 1/2	5
7.	6 1/2	2 1/4	4 1/2	5
8.	7 1/2	3	4 1/2	5
9.	5	3	4 1/2	5
10.	3 1/4	2 3/4	4 1/2	5
11.	4	2 1/2	4 1/2	5
12.	4	2 1/2	4 1/2	5
13.	3 1/2	2 3/4	3 3/4	4
14.	3	2 3/4	2 3/4	3 1/2

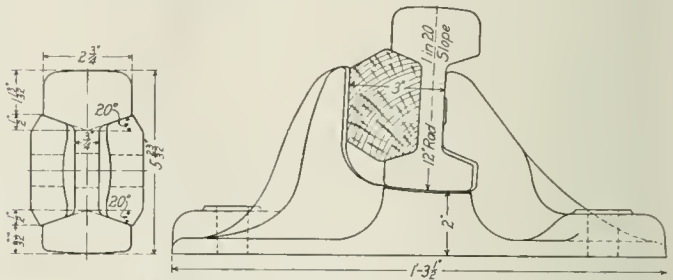
15.	1 1/2	2 3/4	2	2 1/4
16.	1 1/2	2 3/4	2	2 1/4
17.	2 3/4	2	2	2 1/4
18.	1 3/4	2 3/4	2	2 1/4
19.	1 1/4	2 1/4	2	2 1/4
20.	1 3/4	2 1/4	2	2 1/4
21.	2 1/8	2 1/4	2	2 1/4
22.	1 3/8	2 1/4	2	2 1/4
23.	3/4	2 1/4	2	2 1/4
24.	1	2 1/4	2	2 1/4
25.	7/8	1 3/4	1 3/4	1 1/2
26.	5/8	2	5/8	7/8
27.	0	1 1/2	0	0
Total.....	77 7/8	...	77 7/8	...

STANDARD TRACK CONSTRUCTION ON THE GREAT EASTERN RAILWAY OF ENGLAND

By W. A. D. Short

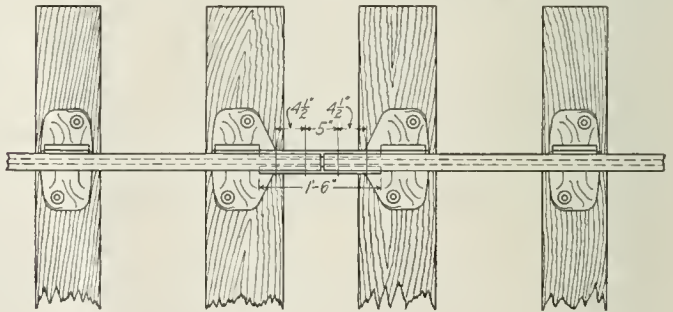
Most American railway men have only a general idea of the principal features of English railway track construction, such as the bull-head rail, the cast iron rail chair, etc., while tourists comment on its excellent riding qualities.

The track standards of the Great Eastern are similar to those of most English railways and will illustrate English practice in



Section Through Rail Joint and Through a Rail Chair for 95 lb. Bull Head Rail

track construction. The rail is of the bull-head type; a section weighing 95 lb. per yd. is used on principal main lines and one weighing 85 lb. on less important main lines and branches. The rails are either 30 or 45 ft. long and are carried in cast iron chairs weighing 54 lb. each, to which the rails are secured by oak keys 7 in. long driven home with sledges. The chairs are



Half Plan at Rail Joint and Cross Section

placed on ties to which they are secured, in the case of the 95 lb. rail, by long bolts passing entirely through the ties, and secured on the under side by special nuts having prongs which bed into the wood. Where the lighter rail is used the chairs are secured to ties by wooden trenails and iron spikes. There are 18 ties for each 45 ft. rail and 13 for each 30 ft. rail. The intermediate ties are 5 in. by 10 in. 9 ft. long, while joint ties are 5 in. by 12 in. in section. The joints are of the suspended type with 4-hole fish plates weighing 32 lb. per pair, the chairs on either side having bases extended towards the joint to give greater bearing area. The ballast, which is generally slag, has a depth of 6 in. under the ties and is carried up flush with their tops.

General News Department

The car shops of the Baltimore, Chesapeake & Atlantic, at Salisbury, Md., were destroyed by fire June 26; estimated loss \$15,000.

The Grand Trunk Railway freight sheds, on the St. Clair river front, at Port Huron, Mich., were destroyed by fire July 6; estimated loss \$300,000. The office of the Port Huron and Duluth Steamship Company adjoining also was burned. The property destroyed included several hundred tons of sugar, flour, feed, and other freight, and 22 freight cars.

Southbound passenger train No. 37 of the Louisville & Nashville was stopped by robbers near Greenville, Ala., on the morning of July 10 and the engine and three cars were cut off and run to a point some distance forward, where the valuables in the cars were taken. Before going on with the robbery the men detached the engine and sent it forward under full steam with no man aboard. Uncontrolled, the engine ran about 40 miles, and finally stopped for lack of steam. The conductor of the train is said to have died of apoplexy during the excitement. It was stated, but not confirmed, that the value of the goods taken from the express and mail cars amounted to from \$60,000 to \$100,000.

Correction

In the report of the proceedings of the recent convention of the Master Boiler Makers' Association, published in the June 4 issue of the *Railway Age Gazette*, the following paragraph appeared in the report on the Oxy-acetylene Process for Boiler Work:

"In this country there are two principal classes of generators; high pressure, by which is meant pressure over 1 lb. per sq. in., and low pressure or less than 1 lb. per sq. in. All things considered the pressure type is the better for railroad work." The sense of the last sentence was changed by the omission of a word. It should have read, "All things considered, the low pressure type is the better for railroad work."

British Railroad Accidents in 1914

The annual return issued by the Board of Trade shows that in the year ending December 31 last the number of passengers killed in train accidents on the railways of the United Kingdom was six; employees killed eight, other persons none. Injuries: passengers, 322; employees, 115; other persons, one. Including all causes connected with the movement of cars or engines the total number of persons killed during the year was 1,115 and of injured 7,850, as compared with 1,131 killed and 9,054 injured in the preceding year. By accidents not connected with the movement of vehicles 9 passengers, 52 employees and 19 other persons were killed and 638 passengers, 22,153 employees and 598 other persons were injured.

Valuation Work on the New Haven

On April 1, 1915, the government placed its first valuation party on the lines of the New York, New Haven & Hartford. A second party has recently been sent out and it is expected that a third party will be added in the near future. The government program calls for the completion of the field inventory for about 800 miles of road this year and for the entire 2,300 miles of line to be covered in two years.

Interest attaches to this work particularly because of the age of these properties, the records of some of the constituent roads going back to 1831. The preparation of the records is estimated to involve the examination of between 30,000 and 35,000 recorded papers exclusive of records of condemnation proceedings. In connection with this work a chart has been prepared showing the 175 distinct corporations forming the New Haven proper and the 27 forming the Central New England, making a total of 202 individual railroad companies composing the present system.

The force now employed by the railroad in its valuation department consists of 114 employes and the expense for the fiscal year just starting is estimated at \$145,000, while the total expense

to the railroad company is placed at \$500,000. In addition to the office force the railway is assigning a pilot and two computers to accompany each government party, pointing out all property of value and checking the computation of all quantities. As indicating the progress which has been made by these parties, the first which started work at Boston Switch, on the old Boston & Providence road on April 1, has averaged a little over a mile a day to date. Only roadway parties have been placed on this line by the government up to this time.

"Stop, Look and Listen"

This is the title of a circular addressed to the public which has been issued by Fairfax Harrison, president of the Southern Railway. Referring to the fact that the automobile has greatly increased the comfort and convenience of life and has contributed to the progress of civilization, he calls attention to the new social complications and new risks which it has introduced. At crossings on the Southern Railway during the year ended June 30 last, there were 69 automobile accidents, in which 12 persons were killed and 58 injured. Calling attention to the need of caution, and noting well authenticated cases of deliberate assumption of risk by drivers of automobiles from pure love of excitement and speed, Mr. Harrison says:

"It does not suffice the public in any moral sense that the fund made up of the revenues collected by the railroad is usually made to respond in damages for consequences of crossing accidents. Suicide to collect life insurance has never been deemed honorable, while no one would deliberately sell the life of a mother or wife, son or brother for money; on the other hand, the collection of damages out of railroad revenues, as a punishment for an avoidable accident, when there can be no real compensation, is an economic waste; it punishes the public more than it punishes the stockholders. . . . Given the progressive policy of the Southern to make improvements to the extent of its ability, it is of interest to note that, in the last year in which a dividend was paid, 3.80 cents of every dollar of revenue went in payment of damages; practically the same amount, 3.88 cents, went to the stockholders, while only thirteen hundredths of one cent could be applied on permanent improvements. Such other improvements as were made were necessarily charged to new capital, thereby increasing the demands on the fund in which the public has so vital an interest. . . .

"In practically all cases these serious and distressing accidents can be readily and easily avoided by the automobile driver acting upon the familiar warning to stop, look and listen. Surely every one, when using a highway, can afford to sacrifice enough of his time and his pride of opinion to have a practical assurance of safety. The demands of commerce and of public transportation do not permit a railroad to stop all its trains at all highway crossings. . . . The company is, speaking generally, making progress more rapidly than most municipalities, which have an obligation in the premises; but by co-operation of municipalities and railroads many dangerous crossings have been eliminated throughout the South, and more will be every year. . . . The elimination of grade crossings must be a gradual development with the growth of population and wealth. But, meanwhile, good judgment on the part of all concerned can do much to anticipate the benefits of the admittedly desirable expenditure of large sums of money. The same sober sense of responsibility for life on the part of automobile drivers which actuates most locomotive engineers, and in addition the willingness of the automobile driver in such a high interest to subordinate his time and convenience to that of the greater number represented by a railroad train, can check the waste of life and limb.

"To this end I appeal confidently for the counsel of every responsible man and woman in the South, whether or not he or she drives an automobile. Words of caution and common sense around the family dinner table can have more influence and can save more lives at crossings than all the warning whistles ever blown by a locomotive engineer."

REVENUES AND EXPENSES OF RAILWAYS

ELEVEN MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses			Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) with last year.
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Maintenance of equipment.	Traffic.	Trans- portation.	Miscel- laneous.		
Alabama & Vicksburg.....	143	\$876,129	\$365,587	\$1,370,314	\$207,485	\$344,738	\$40,003	\$524,930	\$28,528	\$1,208,129	\$162,185
Alabama Great Southern.....	309	3,064,838	946,143	4,354,330	511,087	1,081,339	14,813	1,561,127	32,555	3,368,346	\$86,486
Ann Arbor.....	294	1,502,281	483,133	2,123,338	223,477	1,071,837	56,020	1,561,217	4,720	1,517,446	1,016,004
Arizona Eastern.....	367	1,825,152	294,559	1,935,352	311,830	245,500	23,191	1,233,805	11,374	1,223,805	132,880
Atchafalpa, Topeka & Santa Fe.....	8,514	59,435,941	21,751,811	88,634,119	11,937,010	15,288,886	2,006,688	52,210,201	.....	73,141,290	579,826
Atlanta & West Point.....	93	547,879	393,129	1,091,772	152,214	246,418	59,136	346,987	18,007	32,532,560	4,344,673
Atlanta, Birmingham & Atlantic.....	639	1,775,161	461,624	2,456,627	387,214	482,130	135,593	1,073,287	69,554	217,793	69,554
Atlantic & St. Lawrence.....	167	1,044,755	296,251	1,479,804	210,738	227,691	44,029	653,870	118,800	134,493	127,318
Atlantic Coast Line.....	4,701	19,498,038	7,326,851	29,209,214	4,230,027	4,964,436	615,863	10,410,501	104,166	188,794	134,493
Baltimore & Ohio—System.....	4,516	63,960,396	12,852,359	83,152,842	8,069,846	14,580,791	1,752,431	31,558,080	507,347	21,086,457	63,823
Baltimore & Ohio Terminal.....	79	104,484	14,394	122,161	13,933	190,8	9,614	996,753	208,862	421,113	1,926,801
Bangor & Aroostook.....	631	2,664,260	583,816	3,431,724	153,081	2,084,205	18,439	3,939,821	16,403	217,927	58,319
Belt Ry. Co. of Chicago.....	24	19,450,181	3,022,213	26,196,190	2,432,961	4,994,156	28,193	1,000,825	17,019	1,182,237	127,318
Bessemer & Lake Erie.....	205	6,966,340	342,792	7,444,589	165,366	269,902	10,003	1,043,517	.....	1,043,517	17,553
Bingham & Garfield.....	27	1,131,865	37,246	1,175,133	592,609	1,722,866	112,868	1,777,753	101,06	4,273,180	1,133,498
Buffalo & Susquehanna R. R. Corporation.....	253	1,228,929	73,167	1,335,487	107,708	151,691	10,552	208,858	822	674,406	29,568
Buffalo & Susquehanna Railway.....	91	143,955	70,565	240,740	48,810	81,195	13,561	402,099	.....	1,148,248	158,638
Buffalo, Rochester & Pittsburgh.....	586	7,282,342	1,015,237	8,614,190	1,130,296	1,969,694	130,908	2,888,880	13,260	26,196	17,600
Canadian Pacific Lines in Maine.....	233	919,312	218,092	1,221,700	208,363	186,723	62,048	524,902	.....	20,797	36,432
Carolina, Clinchfield & Ohio.....	248	1,755,599	157,346	1,957,736	211,828	254,374	73,393	389,613	.....	1,021,565	236,207
Carolina, Clinchfield & Ohio of S. C.....	18	104,484	14,394	122,161	13,933	190,8	9,614	996,753	208,862	421,113	1,926,801
Central of Georgia.....	1,924	7,370,485	2,753,731	11,261,382	1,523,081	2,084,205	18,439	3,939,821	16,403	64,281	7,500
Central of New Jersey.....	678	19,450,181	3,022,213	26,196,190	2,432,961	4,994,156	28,193	1,000,825	17,019	52,452	248,163
Central New England.....	304	3,098,874	461,624	3,431,724	153,081	2,084,205	18,439	3,939,821	16,403	8,901,949	31,330
Charleston & Western Carolina.....	341	1,273,812	287,304	1,643,450	700,920	3,682,039	14,442	1,800,950	.....	1,372,085	105,055
Chesapeake & Ohio Lines.....	2,372	28,435,678	5,199,574	33,832,886	316,289	280,637	39,641	596,001	5	362,307	32,323
Chicago & Alton.....	1,033	8,426,328	3,506,949	13,246,758	1,460,959	7,534,199	592,737	11,822,473	213,686	10,713,060	1,234,577
Chicago & Erie.....	2,700	4,500,126	520,146	5,522,174	1,524,751	3,069,241	400,584	8,422,489	106,822	10,255,923	489,425
Chicago & North Western.....	8,108	47,738,103	18,653,660	73,970,065	812,359	4,421,617	204,901	2,523,079	25,184	4,101,146	182,493
Chicago, Burlington & Quincy.....	9,367	57,785,364	18,395,669	83,864,649	9,895,131	14,438,721	1,490,505	26,875,296	550,912	1,813,860	1,238,488
Chicago, Detroit & Can. Gd. Trunk Jctn.....	60	597,241	154,928	873,922	108,366	470,260	17,861	470,260	.....	55,345,921	24,879,222
Chicago Great Western.....	1,427	8,841,354	2,802,574	12,278,554	1,699,339	2,253,951	512,096	4,753,384	77,938	130,902	31,570
Chicago, Indianapolis & Louisville.....	618	3,925,687	1,570,610	5,000,236	662,085	1,006,751	225,197	2,218,553	1,718	3,091,952	530,798
Chicago Junction.....	24	1,166,665	189,941	1,414,238	231,951	206,678	11,952	1,004,416	.....	1,703,622	2,537,110
Chicago, Milwaukee & St. Paul.....	10,071	58,672,686	16,289,885	83,624,505	9,508,693	12,537,888	1,601,843	33,228,472	635,344	1,512,082	1,409,473
Chicago, Peoria & St. Louis.....	255	1,025,033	225,489	1,330,198	225,132	260,464	59,050	1,168,939	52,472	1,618,939	276,733
Chicago, Rock Island & Pacif.....	4,777	1,960,029	539,429	2,708,958	329,629	1,371,872	107,336	1,075,907	19,895	161,259	202,983
Chicago, Rock Island & Pacific.....	7,852	42,089,522	16,065,475	62,573,520	8,266,627	10,395,945	1,615,291	25,080,284	1,828,784	696,810	85,500
Chicago, St. Paul, Minneapolis & Omaha.....	1,753	10,684,585	4,528,890	16,427,889	1,753,336	2,262,474	315,201	6,264,317	161,573	15,376,520	610,668
Chicago, Terre Haute & Southeastern.....	374	1,795,569	175,395	2,025,523	263,643	476,377	38,601	623,139	9,764	1,520,110	12,378,504
Cincinnati, Hamilton & Dayton.....	1,003	6,518,328	1,356,021	8,805,617	1,397,925	1,912,872	216,163	3,952,719	32,735	7,714,315	3,352,927
Cincinnati, New Orleans & Tex. Pac.....	337	6,609,556	1,566,061	8,685,083	348,300	2,118,968	271,068	2,755,068	69,592	1,061,303	389,800
Cincinnati Northern.....	246	1,166,665	189,941	1,414,238	231,951	206,678	11,952	1,004,416	.....	2,375,376	203,564
Cleveland, Cincinnati, Chicago & St. L.....	2,381	22,278,433	7,635,843	32,388,853	3,660,728	6,440,436	840,881	12,774,362	258,531	359,235	341,000
Colorado Midland.....	338	1,241,493	194,295	1,589,101	257,244	360,992	83,338	645,783	11,968	1,420,861	58,963
Cumherland Valley.....	164	1,906,121	596,940	2,650,214	454,237	354,767	51,270	906,368	9,444	6,309,628	209,983
Delaware & Hudson Co.—R. R. Dept.....	881	17,078,777	2,513,719	20,787,626	1,498,069	3,409,076	27,116	7,474,477	132,838	72,991,185	63,042
Delaware, Lackawanna & Western.....	959	27,730,243	7,553,038	39,205,793	4,211,319	6,325,096	811,992	12,656,773	324,815	14,328,544	67,257,878
Detroit & Mackinac.....	490	636,414	279,576	989,043	127,548	176,899	22,710	367,474	1,021	726,600	1,883,832
Detroit & Toledo Shore Line.....	79	1,355,220	.....	1,355,220	134,084	109,622	20,390	394,306	.....	672,195	12,443,048
Detroit, Grand Haven & Milwaukee.....	191	1,475,089	547,749	2,311,195	336,214	375,044	73,056	1,235,832	9,155	2,882,422	187,489
Duluth & Iron Range.....	273	3,680,107	109,478	4,072,262	690,930	625,298	11,217	991,251	23,368	36,960	610,131
Duluth, Missabe & Northern.....	369	4,593,923	291,678	4,985,500	609,240	779,272	21,844	1,005,243	2,369	1,581,436	219,312
El Paso & Southwestern Co.....	1,027	5,310,451	1,207,928	7,036,736	921,557	984,475	206,273	1,881,192	64,833	2,730,702	1,376,455
Elgin, Joliet & Eastern.....	777	7,245,147	59	7,245,147	845,951	1,409,370	63,115	2,317,597	.....	2,831,159	210,860
Florida East Coast.....	1,988	37,011,476	8,185,160	49,871,062	5,241,924	12,149,551	1,039,511	18,235,368	337,409	11,830,034	10,378,007
Fort Worth & Denver City.....	745	2,627,963	1,797,777	4,425,740	645,704	624,488	96,400	1,575,818	35,737	1,843,013	121,958
Georgia.....	454	3,366,991	1,325,937	4,961,211	526,891	786,602	78,341	1,969,541	32,393	3,152,220	1,274,208
Grand Rapids & Indiana.....	575	2,876,642	1,627,784	4,887,360	558,031	823,680	119,173	2,076,814	13,349	2,186,777	341,195
Grand Trunk Western.....	347	4,520,512	1,570,278	6,090,790	885,539	1,338,727	209,638	2,848,547	73,945	5,616,172	884,535
Gulf & Ship Island.....	8,077	43,734,286	11,994,696	61,399,680	7,388,265	6,583,666	1,061,232	16,830,509	2,849	33,696,471	524,968
Hocking Valley.....	308	1,126,803	278,086	1,498,972	192,954	332,326	27,583	399,616	.....	1,031,859	382,296
Illinois Central.....	351	4,509,349	766,236	5,668,071	646,324	5,668,071	1,017,531	1,877,482	403,050	1,816,004	403,050
Indiana Harbor Belt.....	4,767	41,037,349	11,270,271	57,230,154	7,921,951	1,578,234	1,141,434	20,736,070	2,373,353	14,048,840	10,397,923
International & Great Northern.....	1,159	6,220,953	1,618,673	8,466,783	1,403,012	1,456,288	249,060	3,804,714	31,512	7,275,301	926,273
Kanawha & Michigan.....	177	2,256,013	316,232	2,646,446	358,303	651,715	30,244	789,423	72	5,900,983	745,463
Kansas City Southern.....	827	7,124,018	1,294,447	9,243,670	989,034	1,052,155	308,887	3,122,708	.....	3,370,380	619,402
Lake Erie & Western.....	900	4,250,798	867,277	5,198,194	725,964	927,213	149,174	2,090,813	.....	1,170,494	2,839,128
Lehigh & Hudson River.....	97	1,529,934	155,655	1,653,973	220,155	216,820	15,748	588,394	.....	45,650	518,712

REVENUES AND EXPENSES OF RAILWAYS

ELEVEN MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses				Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total.	Way and structures.	Maintenance of equipment.	Traffic.	Transportation.				
Lehigh & New England.....	296	\$2,341,129	\$13,508	\$2,354,637	\$319,360	\$348,527	\$23,074	\$594,297	\$1,021,593	\$59,540	\$962,053	\$155,730
Lehigh Valley.....	1,433	33,909,824	3,673,910	37,583,734	3,891,114	4,118,252	871,932	14,059,240	11,463,704	1,555,000	9,899,108	780,443
Long Island.....	379	1,449,040	9,942,940	11,391,980	1,072,735	1,353,072	121,901	5,078,330	3,703,353	785,410	2,918,089	602,648
Louisiana & Arkansas.....	279	1,315,697	21,109	1,336,806	277,312	256,127	62,774	414,834	526,900	74,900	451,170	31,298
Louisiana Ry. & Navigation.....	351	1,485,970	234,490	1,720,460	1,553,567	199,652	62,774	742,590	439,531	98,500	341,031	49,609
Louisville & Nashville.....	5,034	34,005,229	9,971,343	43,976,572	8,110,916	9,613,859	1,225,119	16,087,937	11,175,418	1,957,266	9,218,459	2,275,439
Louisville, Henderson & St. Louis.....	200	833,545	356,906	1,190,451	1,272,376	1,768,331	57,934	434,210	295,285	41,800	253,353	23,083
Maine Central.....	1,219	6,541,232	30,333,226	36,874,458	1,475,610	1,599,056	119,820	3,894,571	2,443,167	8,880,478	2,308,478	19,169
Michigan Central.....	1,800	19,075,211	8,077,184	27,152,395	3,538,771	4,995,314	680,176	12,920,563	7,747,498	1,408,350	6,334,276	1,220,182
Midland Valley.....	380	825,557	374,166	1,200,723	1,279,883	223,586	22,920	433,085	999,888	65,073	214,281	44,447
Minneapolis & St. Louis.....	1,646	7,020,872	1,731,838	8,752,710	1,068,525	1,277,249	196,100	3,600,308	3,924,395	401,767	2,522,621	384,151
Missouri, St. Paul & North St. Louis.....	4,104	18,458,755	5,300,245	23,759,000	2,900,690	3,807,535	538,382	8,509,499	9,259,201	1,046,677	8,212,524	37,943
Missouri & North Arkansas.....	365	998,419	318,584	1,317,003	321,706	250,176	35,001	562,784	1,362,882	64,538	1,300,000	215,471
Missouri, Oklahoma & Gulf.....	35	848,921	200,480	1,049,401	1,095,860	232,706	46,617	517,012	39,501	65,964	106,040	32,547
Monongahela.....	75	966,971	22,053	989,024	183,098	95,284	6,356	231,552	22,907	18,458	430,047	329,800
Nashville, Chattanooga & St. Louis.....	1,231	6,911,366	2,315,110	9,226,476	1,430,257	2,018,965	495,275	4,061,571	1,664,206	294,491	1,368,033	741,373
Nevada Northern.....	165	936,128	487,863	1,424,991	1,060,298	1,443,541	5,611	230,278	434,975	55,260	379,663	308,116
New Orleans & North Eastern.....	204	2,408,844	87,863	2,496,707	3,196,269	678,996	107,656	1,132,408	755,564	161,990	593,574	76,738
New Orleans, Great Northern.....	283	1,072,131	255,920	1,328,051	1,460,578	232,512	28,329	443,989	966,062	494,516	32,466	193,556
New Orleans, Texas & Mexico.....	286	1,082,716	222,018	1,304,734	1,377,133	210,434	41,474	566,036	1,198,485	17,591	157,567	42,583
New York Central Railroad.....	5,979	41,919,037	16,750,107	58,669,144	7,228,395	14,191,244	1,202,137	23,924,186	49,235,293	18,992,645	4,048,965	14,940,547
New York, Chicago & St. Louis.....	568	8,711,903	1,191,935	9,903,838	1,191,935	1,347,366	471,941	4,840,410	2,237,763	431,267	1,806,529	142,077
New York, New Haven & Hartford.....	2,003	28,162,920	4,396,144	32,559,064	7,220,669	8,940,440	403,212	22,921,137	18,211,955	2,354,000	15,850,650	2,524,698
New York, Ontario & Western.....	568	5,604,251	1,418,051	7,022,302	1,038,779	1,492,995	91,810	3,489,716	2,175,248	218,974	1,956,233	129,364
New York, Philadelphia & Norfolk.....	112	2,669,629	438,802	3,108,431	3,322,015	705,471	47,798	1,480,313	662,162	103,300	558,631	29,852
New York, Poughkeepsie & Western.....	140	2,111,101	482,052	2,593,153	2,752,979	330,359	25,906	1,258,468	937,102	70,896	854,589	142,243
New York & Western.....	2,044	32,796,254	4,263,720	37,060,074	5,102,895	7,571,188	636,875	11,450,759	25,228,496	1,710,000	11,669,214	90,880
Norfolk Southern.....	900	2,366,074	930,095	3,296,169	488,592	560,943	79,842	1,384,257	2,279,972	823,404	1,456,568	156,982
North Carolina.....	6,503	40,375,833	12,289,702	52,665,535	7,657,595	7,033,752	1,063,752	17,500,274	34,129,612	2,370,268	4,256,350	380,359
Oregon Short Line.....	2,181	12,720,335	3,977,833	16,698,168	2,541,783	2,604,557	342,929	4,578,641	10,873,288	7,420,283	3,453,005	1,834,404
Pacific Coast System.....	2,027	8,955,059	3,911,334	12,866,393	1,627,634	1,771,408	423,427	4,720,463	9,248,655	1,165,836	6,251,887	1,354,404
Pennsylvania Railroad.....	1,277	34,607,657	8,791,853	43,400,510	6,982,418	9,162,634	841,101	18,043,934	36,653,334	4,881,208	31,772,126	71,749
Pennsylvania, Baltimore & Washington.....	4,512	11,131,148	34,806,257	45,937,405	2,235,625	3,411,604	2,228,837	6,260,574	4,530,869	128,925,539	38,954,102	7,073,310
Pittsburg & Lake Erie.....	225	1,104,524	1,461,238	2,565,762	2,786,179	3,548,203	297,008	7,879,756	5,022,832	3,439,209	2,817,783	350,174
Pittsburg, Chicago & St. Louis.....	1,479	23,842,890	7,238,077	31,080,967	4,619,362	6,962,945	161,868	3,539,825	26,727,066	4,654,128	558,096	4,095,906
Pittsburg, Fredericksburg & Potomac.....	48	1,368,623	905,760	2,274,383	2,383,339	340,766	91,495	1,247,326	1,697,235	935,233	762,002	107,738
Pittsburg, Kansas & Oklahoma.....	86	1,753,512	1,037,132	2,790,644	377,143	540,766	91,495	1,247,326	2,322,835	843,347	1,579,488	35,629
Pittsburg & San Francisco.....	258	1,018,121	1,390,582	2,408,703	235,927	222,887	51,723	521,207	1,088,176	302,407	785,769	110,465
Portland & Western.....	474	2,592,467	9,165,840	11,758,307	5,143,388	5,943,023	728,301	12,602,449	25,322,799	12,309,752	11,143,057	1,903,323
Portland, Meriden & Bridge Terminal.....	9	1,916	1,670,385	1,672,301	212,713	81,845	8,609	847,933	1,219,933	459,652	76,649	180,556
Portland, Oregon & Texas.....	436	3,707,319	344,565	4,051,884	702,161	1,090,539	280,570	1,830,254	2,174,624	368,317	1,806,257	684,640
Portland, St. Louis & Western.....	810	2,329,568	817,397	3,146,965	796,985	832,885	132,238	1,680,209	3,533,308	162,183	3,371,125	24,618
Portland, Vancouver & Seattle.....	724	2,321,683	937,340	3,259,023	3,133,941	762,233	72,135	1,704,034	1,928,000	169,474	1,758,526	456,410
Portland, Los Angeles & Salt Lake.....	1,132	5,123,570	2,293,624	7,417,194	834,100	1,289,908	354,345	2,784,496	5,631,201	2,947,984	2,683,217	101,397
Portland, St. Louis & Western.....	3,123	13,448,269	4,237,083	17,685,352	2,234,951	2,933,364	698,811	7,203,063	105,723	976,213	4,890,005	1,516,014
Portland, St. Louis & Western.....	7,022	37,459,343	14,901,938	52,361,281	9,937,759	12,062,016	1,943,541	21,062,016	359,931	1,297,253	4,890,005	3,277,167
Portland, St. Louis & Western.....	6,517	52,950,344	25,716,343	78,666,687	12,805,186	18,276,350	1,812,898	28,276,350	55,991,972	31,764,721	27,443,951	2,437,890
Portland, St. Louis & Western.....	294	6,288,033	340,646	6,628,679	326,527	178,443	59,632	535,258	1,175,465	187,629	1,388,260	204,864
Portland, St. Louis & Western.....	35	2,062	2,475,297	2,477,359	201,016	140,604	10,088	869,151	1,127,319	1,196,977	882,804	324,174
Portland, St. Louis & Western.....	1,944	11,558,208	3,743,301	15,301,509	1,778,781	2,626,363	406,025	7,271,804	12,651,318	3,972,401	8,678,917	301,708
Portland, St. Louis & Western.....	436	3,707,319	344,565	4,051,884	702,161	1,090,539	280,570	1,830,254	2,174,624	368,317	1,806,257	684,640
Portland, St. Louis & Western.....	238	610,254	405,447	1,015,701	1,082,109	302,900	26,101	488,804	40,053	1,037,625	22,624	1,502
Portland, St. Louis & Western.....	431	3,639,214	298,843	3,938,057	4,232,419	747,537	182,081	1,640,708	3,160,819	244,708	826,892	277,343
Portland, St. Louis & Western.....	315	690,398	167,734	858,132	226,136	321,346	32,355	458,895	87,143	2,130	46,899	91,270
Portland, St. Louis & Western.....	3,617	32,948,047	9,066,269	42,014,316	5,728,116	6,900,774	1,102,178	12,015,291	27,760,291	19,447,632	2,166,607	438,421
Portland, St. Louis & Western.....	31	1,221,720	233,671	1,455,391	1,474,593	146,611	1,316	1,407,043	1,249,014	21,675	1,885,715	5,518
Portland, St. Louis & Western.....	910	6,833,072	2,153,678	8,986,750	1,020,716	1,020,716	1,316	1,407,043	2,903,505	21,675	2,903,505	40,675
Portland, St. Louis & Western.....	171	725,816	400,767	1,126,583	1,344,322	2,052,162	258,615	3,991,254	7,991,181	360,033	1,740,118	125,663
Portland, St. Louis & Western.....	210	1,469,925	145,321	1,615,246	2,908,880	396,992	25,386	488,222	11,034,975	80,507	39,041	27,405
Portland, St. Louis & Western.....	504	4,657,988	344,284	5,002,272	681,931	944,340	59,369	1,213,278	1,076,552	232,500	2,010,035	43,600
Portland, St. Louis & Western.....	2,519	18,765,792	5,600,105	24,365,897	3,255,407	5,004,259	941,437	11,056,037	153,907	5,692,727	886,568	378,611
Portland, St. Louis & Western.....	36	399,129	441,406	840,535	1,406,624	164,376	16,042	456,607	312,192	36,456	275,572	13,554
Portland, St. Louis & Western.....	356	1,729,873	3,675,045	5,404,918	1,011,116	1,313,980	137,097	257,730	4,833,001	314,656	792,393	6,710
Portland, St. Louis & Western.....	661	6,596,968	872,256	7,469,224	1,096,274	1,338,400	239,226	2,803,615	5,700,126	279,000	1,850,851	1,647,295
Portland, St. Louis & Western.....	133	647,418	392,572	1,039,990	211,665	267,516	64,516	350,551	962,065	50,069	1,322,889	42,105
Portland, St. Louis & Western.....	1,362	8,360,527	2,010,078	10,370,605	1,654,484	1,528,741	188,750	4,044,595	7,691,233	558,000	2,675,491	446,190

Figures in italics here are for five months ending May 31, 1915

Revenues and Expenses of Steam Roads

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for April, 1915, are as follows:

Net operating income of the railways of the United States for April increased \$33 per mile, or 16.2 per cent, as compared with April, 1914. This increase was due not so much to an increase in gross earnings as to reductions in expenses, which have been effected in all parts of the country. In April, 1914, net operating income per mile was 3.5 per cent less than in April, 1913.

Total operating revenues amounted to \$230,997,430, a decrease from 1914 of \$4,363,087. Operating expenses were \$165,131,384, a decrease of \$12,124,214. Net operating revenue amounted to \$65,866,046, an increase of \$7,761,127. Taxes amounted to \$11,106,959, a decrease of \$341,684. This left \$54,709,207 for net operating income, available for rentals, interest on bonds, appropriations for improvements and new construction, and dividends. Operating revenues per mile of line averaged \$1,010, a decrease of 2.7 per cent; operating expenses averaged \$722, a decrease of 7.7 per cent; net operating revenue per mile averaged \$288, an increase of 12.3 per cent, while taxes per mile were \$49, a decrease of 3.9 per cent. Net operating income was \$239, an increase of 16.2 per cent. Railways operating 228,736 miles of line are covered by this summary, or about ninety per cent of the steam railway mileage in the United States.

Total operating revenues of the Eastern railways per mile of line shows an increase of 1 per cent as compared with April,

the East, decreased 16.7 per cent in the South, and decreased 3.5 per cent in the West.

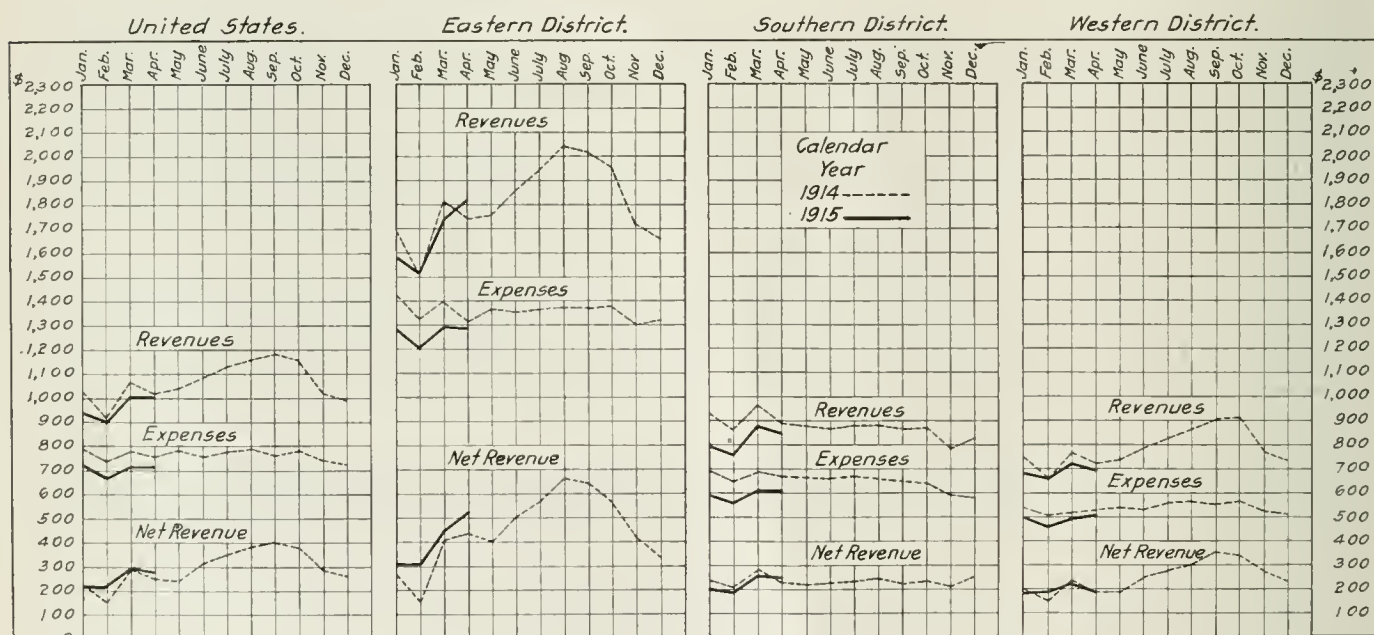
April net operating income per mile was 16.2 per cent greater in 1915 than in 1914, 11.7 per cent greater than in 1913, 12.8 per cent greater than in 1912, and 4 per cent less than in 1911.

The James J. Hill Professorship

The purpose and conditions of the gift to Harvard University of a sum to found the James J. Hill Professorship of Transportation, as mentioned in our issue of July 2, is explained in the following letter to the president and fellows of the University by the committee which arranged for the gift:

"The undersigned self-constituted committee, representing a wide circle of friends and admirers of James J. Hill, Esquire, and desiring to perpetuate many of Mr. Hill's ideas in a way so as to merit his cordial counsel and support, and at the same time give ample latitude in administration to the university, hereby present to the president and fellows of Harvard University the sum of \$125,000 to found the James J. Hill Professorship of Transportation.

"The income only of this fund shall be used to maintain a Professorship in the Graduate School of Business Administration of Harvard University. It is our desire that the recipient or recipients of this income shall give instruction or promote investigations in the subject of transportation, giving chief attention to railroad transportation. While it is our intention that this income shall ordinarily secure the service of a competent teacher, it is also our desire to promote research, and if for any reason



Monthly Revenues and Expenses per Mile of Line in 1914 and 1915

1914, operating expenses decreased 6.1 per cent, net operating revenue increased 23.9 per cent, taxes decreased 1.3 per cent, and operating income increased 29.8 per cent.

Total operating revenues of the Southern railways per mile of line shows a decrease of 6.1 per cent, operating expenses decreased 11.5 per cent, net operating revenue increased 10.3 per cent, taxes decreased 5.4 per cent, and operating income increased 13.5 per cent.

Total operating revenues of the Western railways per mile of line shows a decrease of 5.2 per cent, operating expenses decreased 7.5 per cent, net operating revenue increased 1.5 per cent, taxes decreased 5.5 per cent, and operating income increased 3.3 per cent.

The ten months of the current fiscal year show a decrease in total operating revenues per mile of line of 7.4 per cent as compared with the corresponding period of the preceding year, a decrease in operating expenses per mile of 9.6 per cent, a decrease in net operating revenue per mile of 1.6 per cent, a decrease in taxes per mile of 2.6 per cent, and a decrease in net operating income per mile of 1.4 per cent.

The net operating income per mile increased 8.2 per cent in

the professorship should be temporarily vacant, or in the discretion of the president and fellows it should be unnecessary to apply the entire income of this fund to maintain the professorship, they are authorized to use the income and accumulated income in contributing to the instruction and research in the university in the subjects named in such way as they see fit."

The letter was signed by the members of the committee: Robert Bacon, George F. Baker, Howard Elliott, Arthur Curtiss James, Thomas W. Lamont, Robert T. Lincoln and J. P. Morgan.

In announcing the gift to the alumni of the university President Lowell said:

"The largest single gift in money that the university has received during the year is dated June 21. It is that of \$125,000 to endow a professorship of transportation in the School of Business Administration, subscribed by friends of the school, and admirers of James J. Hill, in whose honor it is founded and named. The chair marks an epoch in the life of the school, and by its recognition of transportation as a permanent object of systematic instruction, in the life of the nation also. It is eminently fitting that such a professorship should bear the name of Mr. Hill, who has applied scientific principles to the construction and operation

of railroads to an extent, and with an accuracy, unknown before. He is, perhaps, best known to the public at large by having aroused the nation to the need of conserving its natural resources, but this was the fruit of a long active career in developing the vast country between the Great Lakes and Puget Sound, and enabling it to prosper. He had the imagination to conceive and the skill to execute a plan of transportation on a vast scale."

Exhibitors at the General Foremen's Convention

The following is a list of the exhibitors at the convention of the International Railway General Foremen's Association, held at Hotel Sherman, Chicago, July 13-16:

Ashton Valve Company, Boston, Mass.—Pop safety and relief valves, pressure and vacuum gages. Represented by J. J. Gettrust.
 American Steel Foundries, Chicago.—Models, Vortic steel column posts, American adjustable pockets, Allrance couplers, Simplex couplers, Economy draft arm. Represented by Wm. C. Walsh and N. J. Melchert.
 Anchor Packing Company, Philadelphia, Pa.—Packing. Represented by E. C. Adams and J. O. Waterman.
 Barco Brass & Joint Company, Chicago.—Barco flexible joints. Represented by F. N. Bard and C. L. Miller.
 Baldwin Locomotive Works, Philadelphia, Pa.—Photographs of locomotives. Represented by A. S. Goble.
 Chicago Pneumatic Tool Company, Chicago.—Air and electric tools. Represented by J. L. Canby.
 Celfor Tool Company, Buchanan, Mich.—Drills and reamers. Represented by C. O. Montague.
 Cleveland Twist Drill Company, Cleveland, Ohio.—Twist drills, reamers and small tools. Represented by H. S. White.
 Duff Manufacturing Company, Pittsburgh, Pa.—Barrett jacks. Represented by C. N. Thulin.
 Dearborn Chemical Company, Chicago.—Catalogs. Represented by Geo. Carr, P. T. Payne and J. D. Purcell.
 Detroit Lubricator Company, Detroit, Mich.—Automatic flange lubricator, radiator valves, injectors, etc. Represented by A. D. Howard.
 Daniels Safety Device Company, Chicago.—Lock nuts. Represented by A. G. Wood and C. F. Ames.
 Edna Brass Manufacturing Company, Cincinnati, Ohio.—Injectors, lubricators, boiler checks, coal sprinklers, fire extinguishers, reflex water gages. Represented by E. O. Corey and H. A. Glenn.
 Grip Nut Company, Chicago.—Lock nuts. Represented by W. E. Sharp and B. C. Hooper.
 Garlock Packing Company, Palmyra, N. Y.—Packing. Represented by J. P. Landreth.
 Goldschmidt Thermit Company, New York.—Examples of thermit welding. Represented by A. F. Beaulieu and H. S. Mann.
 Green, Tweed & Co., New York.—Palmetto packing, wrenches. Represented by V. B. Nickerson.
 Horne-Dale-Brown Company, Chicago.—Ratchet wrenches, Lincoln-Williams twist drills, Victor hack saws, Cleveland steel files. Represented by J. J. Dale, P. V. Bachelé and J. W. Horne.
 Hunt-Spiller Corporation, Boston, Mass.—Side rod bushings, driving boxes, shoes and wedges, cylinder bushings, cylinder packing, headers for superheaters, pistons, eccentrics and eccentric straps. Represented by V. W. Ellet, J. M. Monroe, E. J. Fuller and H. McK. Parker.
 Ingersoll-Rand Company, New York.—Pneumatic tools. Represented by R. C. Cole.
 Independent Pneumatic Tool Company, Chicago.—Pneumatic hammers, portable air and electric tools. Represented by H. F. Finney, F. J. Passino, G. C. Wilson and H. H. Henricks.
 Imperial Brass Manufacturing Company, Chicago.—Oxy-acetylene apparatus. Represented by J. G. Pettis.
 Jenkins Brothers, New York.—Valves and packing. Represented by B. J. Neely.
 Leslie Company, The, Lyndhurst, N. J.—Valves and coupling nuts. Represented by J. J. Cizek.
 Mudge & Co., Chicago.—Mudge-Slater spark arrester. Represented by Burton W. Mudge and G. W. Bender.
 McCord & Co., Chicago.—Journal boxes, locomotive drifting valves. Represented by H. E. Creer.
 National Railway Devices Company, Chicago.—Shoemaker fire door, National and singlelink coupler release riggings. Represented by J. G. Robinson.
 National Boiler Washing Company, Chicago.—"Safety First" fire door. Represented by H. A. Varney.
 Niles-Bement-Pond Company, New York.—Catalogs of small tools and machinery. Represented by G. F. Mills, R. Sloan, D. Tees and F. K. Irwin.
 Ohio Injector Company, Chicago.—Lubricators and injectors. Represented by William Furry and A. C. Beckwith.
 O'Malley-Bear Valve Company, Chicago.—Valves. Represented by R. J. O'Malley.
 Paxton Mitchell Company, Omaha, Neb.—Piston packing rings. Represented by W. M. Leighton.
 Pilbott Company, The, Swanton, Ohio.—Photographs of valve gears. Represented by F. S. Wilcoxon.
 Pyle-National Electric Headlight Company, Chicago.—Electric headlights. Represented by J. Will Johnson, W. Miller, L. H. Steger and C. E. Kinnaw.
 Simmons-Boardman Publishing Company, New York.—*Railway Age Gazette*, *Railway Age Gazette*, *Mechanical Edition*. Represented by R. V. Wright, R. E. Thayer, L. B. Sherman, C. R. Mills, F. H. Thompson and W. Ford.
 Street Company, R. K., Chicago.—Horton lathe and drill chucks, Billings and Spencer wrenches, Hyatt roller bearings, Yale & Towne triple blocks, Keystone pulleys. Represented by F. A. Taylor and C. J. Butterfuss.

Rich Tool Company, Chicago.—Drills and reamers. Represented by L. Whiteside.
 Ryerson & Son, Jas. T., Chicago.—Catalogs of iron and steel and machinery. Represented by E. T. Hendee.
 United States Metallic Packing Company, Philadelphia, Pa.—Leach improved sander, King locomotive piston rod packing. Represented by M. B. Brewster and R. K. Wells.
 Whitman & Barnes Manufacturing Company, Akron, Ohio.—Drills, reamers and wrenches. Represented by M. E. Townner.

Awards at the Panama Pacific Exposition

The superior jury of the Panama-Pacific International Exposition at San Francisco has approved the following list of awards made by the group jury for exhibits in the railway division of the transportation department:

GRAND PRIZE

Baldwin Locomotive Works, Philadelphia, Pa.
 Pennsylvania Railroad.
 Southern Pacific.
 United States Steel Corporation.
 United States Post Office Department.
 Westinghouse Air Brake Company, Pittsburgh, Pa.

MEDAL OF HONOR

American Locomotive Company, New York.
 Cambria Steel Company, Philadelphia, Pa.
 Commonwealth Steel Company, St. Louis, Mo.
 Locomotive Superheater Company, New York.
 Ministry of Communications, Republic of China.
 National Malleable Castings Company, Cleveland, Ohio.
 New York Air Brake Company, New York.
 Pennsylvania Steel Company, Philadelphia, Pa.
 Rail Joint Company, New York.
 Westinghouse Traction Brake Company, Pittsburgh, Pa.
 Wells Fargo & Co.

GOLD MEDAL

American Brake Shoe & Foundry Company, Mahwah, N. J.
 American Arch Company, New York.
 Chicago Car Heating Company, Chicago.
 Canadian Pacific.
 Denver & Rio Grande.
 Fairbanks, E. & T. & Co., St. Johnsbury, Vt.
 Flannery Bolt Company, Pittsburgh, Pa.
 Galena Signal Oil Company, Franklin, Pa.
 Gold Car Heating & Lighting Company, New York.
 Grand Trunk Railway.
 Great Northern.
 Griffin Wheel Company, Chicago.
 Hupp Automatic Mail Exchange Company, Chicago.
 Locomotive Stoker Company, Schenectady, N. Y.
 Manganese Steel Rail Company, New York.
 National Brake & Electric Company, Milwaukee, Wis.
 Railroad Supply Company, Chicago.
 Safety Car Heating & Lighting Company, New York.
 St. Louis Car Company, St. Louis, Mo.
 Standard Steel Works Company, Philadelphia, Pa.
 Taylor-Wharton Iron & Steel Company, High Bridge, N. J.
 Union Switch & Signal Company, Swissvale, Pa.
 Western Wheeled Scraper Company, Aurora, Ill.

SILVER MEDAL

Adams & Westlake Company, Chicago.
 American Steel Foundries, Chicago.
 Ashcroft Manufacturing Company, New York.
 California Dispatch Line.
 Chicago Railway Equipment Company, Chicago.
 Franklin Railway Supply Company, New York.
 German-American Car Company.
 Han-Yet-Ping Iron & Steel Company, Han-Yang, China.
 Hale & Kilburne Company, Philadelphia, Pa.
 International Harvester Company, Chicago.
 McCloud River Railroad.
 Miner, W. H., Company, Chicago.
 Nathan Manufacturing Company, New York.
 Ohio Injector Company, Chicago.
 Orenstein-Arthur Koppel Company, Koppel, Pa.
 Pyle-National Electric Headlight Company, Chicago.
 Union Draft Gear Company, Chicago.

BRONZE MEDAL

Ajax Metal Company, Philadelphia, Pa.
 Atkins, E. C. & Co., Inc., Indianapolis, Ind.
 Carey, Philip, Company, Cincinnati, Ohio.
 Chambers Valve Company, New York.
 Copper River & Northwestern Railway.
 Detroit Lubricator Company, Detroit, Mich.
 General Brake Shoe & Supply Company, Chicago.
 Hewitt Rubber Company, Buffalo, N. Y.
 Hickey, W. J.
 Hwa Nan Kwai, China.
 Independent Pneumatic Tool Company, Chicago.
 John Manville, H. W., Company, New York.
 Metcalf & Co., Chicago.
 Ohio Locomotive Crane Company, Bucyrus, Ohio.
 Parkersburg Iron Company, Parkersburg, Pa.
 Pennsylvania Steel Casting & Machine Company.
 Pittsburgh Steel Foundry Company, Pittsburgh, Pa.
 St. Louis Steel Foundry Company, St. Louis, Mo.
 Semington, I. H., Company, Rochester, N. Y.
 Taylor Portable Steel Derrick Company.
 United States Metallic Packing Company, Philadelphia, Pa.

HONORABLE MENTION

Brill, J. G., Company, Philadelphia, Pa.
 Hobart Altrici Company, Chicago.
 MacLeod Company, Cincinnati, Ohio.
 Sargent Company, Chicago.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.
- AMERICAN RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.
- AMERICAN SOCIETY OF CIVIL ENGINEERS. Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday of each month, Pittsburgh.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 14-16, 1915, Chicago.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, September, 1915.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK. John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Genl. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-10, 1915, Chicago.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

J. F. Townsend, traffic manager of the National Tube Company, has been elected president of the Traffic Club of Pittsburgh.

Special trains carrying representatives of the government to give demonstrations in "better farming" are now touring the provinces of Saskatchewan and Alberta under the auspices of the Provincial Departments of Agriculture. The Canadian Pacific makes reductions in fare for passengers going to the cities and towns where demonstrations are made.

F. D. Underwood, president of the Erie, in an interview given to a Milwaukee paper last week, was quoted as advocating a passenger rate of 1 cent a mile and a 20 per cent advance in freight rates. Mr. Underwood said that if the Interstate Commerce Commission should make an experiment of this kind and it proved unsuccessful, the old condition could be restored on short notice.

The Official Classification Committee held a meeting in New York on Tuesday, July 13, for the consideration of subjects enumerated in docket No. 23, including recommendations of the committee on Uniform Classification respecting classification rules and descriptions of articles. A preliminary hearing was held in the rooms of the Central Freight Association in Chicago on Thursday, July 8.

The Canadian Government Railways expect during the next winter to maintain regular transportation service between the main land and Prince Edward Island regularly, in spite of ice, a new car ferryboat, designed to break thick ice, having just been received from Newcastle, England. The vessel has three sets of engines and in fair weather will make 15 knots an hour. There are two propellers at the stern and one forward. The deck has two tracks for cars, each 254 feet long.

Passenger trains are now running over the National Transcontinental between Cochrane, Ont., and Winnipeg; and, according to the announcement of the "Canadian Government Railways," which is the operating organization, trains will run through between Winnipeg and Toronto, 1,257 miles. The route from Toronto is by the Grand Trunk to North Bay, 227 miles, and the Temiskaming & Northern Ontario, operated by the Ontario government, from North Bay to Cochrane, 253 miles. Trains will leave Toronto on Tuesdays, Thursdays and Saturdays at 10:45 p. m., and are scheduled to run through to Winnipeg in 42 hours.

Car Surpluses and Shortages

The committee on relations between railroads of the American Railway Association, in presenting statistical statement No. 6 giving a summary of freight car surpluses and shortages for July 1, 1915, says:

The total surplus on July 1, 1915, was 275,896 cars; on June 1, 1915, 300,146 cars, and on July 1, 1914, 220,875 cars.

The surplus for June 1, 1915, shown above, includes figures reported since the issue of statistical statement No. 5, reported in the *Railway Age Gazette* of June 18, page 1452.

The decreases in surplus under June 1, 1915, are chiefly in groups 2, 3 and 6 (East and Central North) and group 8 (Central), except box cars. There is an increase in the surplus of box cars, chiefly in groups 2, 3 and 6 (East and Central North) and group 11 (Canada).

The total shortage on July 1, 1915, was 785 cars; on June 1, 1915, 218 cars, and on July 1, 1914, 1,333 cars.

The shortage for June 1, 1915, shown above includes figures reported since the issue of statistical statement No. 5.

The figures by classes of cars follow:

Classes.	Surplus.	Shortage.
Box	131,105	331
Flat	13,536	77
Coal and gondola.....	83,726	185
Other	47,529	192
	275,896	785

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Rates on Lumber to Las Cruces, N. Mex.

Bascom-French Company et al. v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

The commission finds that the rate of 34 cents a 100 lb. on lumber and articles taking the lumber rate in carloads from Texas and Louisiana producing territory to Las Cruces, N. Mex., is unreasonable to the extent that it exceeds 28 cents. Reparation denied. (34 I. C. C., 388.)

Complaint Dismissed

Louden Machinery Company v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

The commission finds that the western classification rating applicable to feed or litter carriers in less than carloads, the minimum weights applying to the same commodities in straight carloads, or mixed with stalls, stanchion frames, or stanchions, and the refusal of the carriers to permit the mixture of these commodities in carloads with agricultural implements is not unreasonable or otherwise in violation of the act. (34 I. C. C., 383.)

Western Newspaper Union v. Aberdeen & Rockfish et al. Opinion by Commissioner McChord:

The commission finds that the present classification of first class on new stereotype plates and third class on old stereotype plates in less than carload lots in official and southern classification territory is not unreasonable or discriminatory. (34 I. C. C., 326.)

Nebraska State Railway Commission v. Union Pacific et al. Opinion by Commissioner Hall:

The commission finds that the rates on wheat and on corn, and articles taking the same rates, from certain stations on the Union Pacific in Nebraska, Central City to Gothenburg, inclusive, to St. Joseph and Kansas City, Mo., and Leavenworth, Kan., are not unreasonable or discriminatory. (34 I. C. C., 381.)

Concentration of Cotton at Alexandria, La.

Opinion by Commissioner Clark:

The commission finds that the Chicago, Rock Island & Pacific has not justified a proposed cancellation of privileges relative to the concentration and compression of cotton and cotton linters at Alexandria, La., and reshipment therefrom, upon the basis of through rates. The carrier contended that the concentration and compression of cotton at this point involved unusual expense to it, as the compress is on the tracks of other companies, whereby the Rock Island is compelled to pay a switching charge of \$2.50 per car or a drayage charge of 10 cents a bale. (34 I. C. C., 163.)

Transit on Grain and Mixed Feed at Memphis

Memphis Grain & Hay Association et al. v. Illinois Central et al. Opinion by Commissioner Harlan:

In the original report in this case (24 I. C. C., 609) it was found that under the rate structure and transit rules then applying on grain and mixed feeds Memphis was unduly restricted in its source of supply when compared with the access of St. Louis to a materially more extensive producing territory through the maintenance of a system of reshipping rates. The result of this was to give St. Louis an undue advantage over Memphis in reaching points in the Mississippi valley that are geographically in Memphis territory. At that time through rates on grain to Mississippi valley points over the Illinois Central were applicable under a transit arrangement through Memphis only when the grain originated on the Illinois Central, the Burlington, the Wabash and the South Dakota Central, and then only when the line of the Illinois Central was used into and out of Memphis. The Illinois Central has since readjusted its tariffs as to meet the requirements of Memphis with respect to grain produced in Missouri, Nebraska, Iowa, South Dakota, Wisconsin, Minnesota, Illinois and Indiana, by establishing through rates to Mississippi

valley points with a liberal transit arrangement at Memphis, and it has extended this arrangement to traffic transported under combination rates where through rates were not established. The commission finds that the widening of the territory in the middle west from which Memphis may now draw grain has circumscribed the advantage heretofore existing in favor of St. Louis to a point where it is no longer undue. This has no application to grain from southwestern territory that reaches Memphis over western lines. It is the opinion of the commission that this territory should be made available to Memphis under a transit arrangement that will permit the participating carriers to retain the proportions they now receive in dividing the current through rates. The record will be left open for further action on the part of the carriers. (34 I. C. C., 315.)

Rates on Coal from the Sullivan-Linton Group

Monon Coal Company et al. v. Chicago & Eastern Illinois et al.

The commission finds that a rate of 87 cents a ton on coal to Chicago from mines in the Sullivan-Linton group of Indiana is not discriminatory as compared with the rate of 77 cents from mines in the Brazil-Clinton district of Indiana. The issue was one of alleged discrimination only, the reasonableness of the 87-cent rate not having been questioned. The commission believes that the situation in which the operators of the Sullivan-Linton group now find themselves is due not to a rate schedule that is unreasonable or discriminatory, but largely to a trade condition which has developed in a neighboring field, namely, the opening of new mines in the Brazil-Clinton field, particularly in the No. 4 vein. (34 I. C. C., 221.)

Rates from Iowa Points to Stations on the Santa Fe in Kansas

Iowa State Board of Railroad Commissioners v. Arizona Eastern et al. Opinion by Commissioner Daniels:

The original order in this case (28 I. C. C., 563) prescribed a mileage scale in conformity to which rates were to be established from points in interior Iowa to certain destinations in Kansas. It is alleged that the application of the scale has resulted in rates to Kansas points from Council Bluffs and other points in western Iowa lower than the present rates to the same points in Kansas from Omaha and other points similarly situated on the Missouri river. The commission, therefore, finds that the order should be modified so that the carriers may establish from the points in Iowa in question to points in Kansas on the main line of the Santa Fe to La Junta, Colo., and other points in Kansas north thereof, rates not less than those which were in effect on May 31, 1914—the day before the order became operative—from the Missouri river cities to the same destinations. (34 I. C. C., 379.)

The Goldfield Cases

Inquiry and investigation concerning the reasonableness of freight rates to points on certain railroads in Nevada. Opinion by Commissioner Meyer:

This is an investigation by the commission on its own motion concerning the reasonableness of the rates on freight from various points in the United States to points in Nevada on the Tonopah & Goldfield, the Las Vegas & Tonopah and the Bullfrog-Goldfield.

Tonopah and Goldfield are mining camps about 30 miles apart, in a wide region of western Nevada with practically no present agricultural possibilities. The former is served by the Tonopah & Goldfield, which extends from Goldfield through Tonopah to Mina, a distance of about 100 miles, where connection is made with the Southern Pacific and by the Bullfrog-Goldfield, which extends in a southerly direction from Goldfield to Beatty, Nev., a distance of 80 miles. At Beatty this road connects with the Tonopah & Tidewater, which extends in a southerly direction 168 miles from Beatty to Ludlow, where it connects with the Santa Fe. At Beatty connection is also made with the Las Vegas & Tonopah, extending in a southeasterly direction 118 miles to Las Vegas, Nev., where connection is made with the San Pedro, Los Angeles & Salt Lake.

The Tonopah Railroad was completed to Tonopah in 1904, and was built as a direct result of the discovery of silver at Tonopah in 1900. It was originally a narrow-gauge line, but when gold was discovered at Goldfield in the fall of 1903, it was

extended to that point, changed to standard-gage and renamed the Tonopah & Goldfield. For a while its business was very great, the tonnage and travel over the Tonopah Railroad during the 16 months of its operation as a narrow-gage line being so great as to tax its capacity to the utmost, and to give it a net income sufficient to pay for more than one-half its original cost. The population of Goldfield in 1905 and 1906 was about 20,000. Tonopah had a population of nearly 10,000, while the outlying mining districts that drew their supplies from these camps had a population of at least 10,000 more. The Bullfrog-Goldfield was built in 1905-6. The Tonopah & Tidewater was completed in December, 1907, and was constructed primarily to furnish a rail outlet for the borax deposits in Death Valley, Cal. The Las Vegas & Tonopah built to Beatty in October, 1906, and to Goldfield in October, 1907, was projected by those owning the Salt Lake Line.

It was shown that the only one of these four roads that has been able to pay dividends is the Tonopah & Goldfield, which has been able to pay $5\frac{2}{3}$ per cent during the years of its operation, and to retire approximately 60 per cent of the bonds outstanding at the time of its completion. All of these roads are almost entirely dependent on the operation and development of the mining industries, the total irrigated and cultivated area along their 500 miles of line not exceeding 500 acres. There is no timber and very little stock, the country not being adapted for the latter. The sparsity of traffic on the lines south of Goldfield is shown by the fact that the mixed train from Las Vegas to Beatty, which runs six times a week, averages from 8 to 11 passengers and from one to three carloads of freight and returns with a like number of passengers and almost no freight whatever. The trains on the Tonopah & Tidewater carry about a like amount. The total tonnage handled by the Las Vegas & Tonopah during October, 1914, was 2,891 tons, and by the Bullfrog-Goldfield, 2,888 tons.

Reductions in rates have been made by the California and the Nevada railroad commissions. The scale of wages paid to the employees of these roads is from 25 to 65 per cent higher than the average upon roads in the United States. The outlook for the future from the development of new business is quite gloomy. The lives of the silver or gold mining camps have been limited and Rhyolite and Beatty, which in 1907 had a population of probably 10,000 people, now have a combined population of about 300. Goldfield's present population is approximately 5,000 and Tonopah's population has been reduced to half of that in 1907. The lines operate over a mountainous and barren country with severe grades and difficult operating conditions.

For these reasons the commission refuses to find that the rates involved in this and the related cases are unreasonable. Complaints dismissed. (34 I. C. C., 360.)

Reshipping Rates on Grain at St. Louis

Merchants Exchange of St. Louis v. Baltimore & Ohio, et al. Opinion by Commissioner Meyer:

This case arises from the establishment by act of the Missouri legislature of lower intrastate rates on grain and flour from interior Missouri points to St. Louis than the proportion of interstate rates for the same movement on through shipments. The lower rates became effective June 12, 1913. On January 10, 1914, the carriers from St. Louis and East St. Louis to central freight association and trunk line territories refused to apply the reshipping rates from St. Louis to points in those territories except upon surrender of inbound expense bills showing that the grain had moved to St. Louis at the interstate rate or else upon payment of the difference between the intrastate and the interstate rate to St. Louis. The Merchants Exchange of St. Louis attacks this regulation as unreasonable.

As a general rule, the rates from St. Louis to southeastern Mississippi valley, and southwestern territories are not published as proportional or reshipping rates, but apply from St. Louis proper as well as on grain coming from beyond.

The Southwestern Missouri Millers' Club alleges that the millers at interior Missouri milling points are discriminated against in that the combination of the state rates to St. Louis and the rates to points in central freight association, trunk line, southeastern, Mississippi valley, and southwestern territories is lower than the rate for the through movement from interior Missouri points to the same destinations.

The case is further complicated because most of the grain which comes to St. Louis is not billed through to destinations beyond but to consignees at St. Louis, by whom it is sold on the grain exchange. It frequently changes hands several times.

The commission finds that in the absence of local or flat rates from St. Louis proper, shipments of grain and grain products are entitled to move out on reshipping rates "regardless of the point of origin of the grain and regardless of the rate paid on the inbound shipment" because "we must so construe the tariffs as to permit the traffic to move, if that be possible," thus reaffirming the decision in *Merchants Exchange of St. Louis v. Baltimore & Ohio* (30 I. C. C., 700.)

It is also held that while reshipping or proportional rates are applicable to part of a through but suspended movement from point of origin to ultimate destination, outbound local rates, although they may likewise apply to part of a through movement, can not be limited according to the point of origin of the shipment or the rates which were paid inbound. So long as there are intrastate rates published to St. Louis shippers can not be denied the right to avail themselves of these rates for movements which are clearly intrastate, and so long as there are flat rates published out of St. Louis shippers must be permitted, in proper cases, to ship outbound under these rates irrespective of the rates paid inbound. It is plain that the intrastate movement to St. Louis must be considered as a separate movement which can not be tied up to the outbound movement in such a manner as to constitute the two one through movement, provided the consignee has in good faith taken possession. Absorption of elevation charges is made upon the theory that the inbound and outbound movements comprise a through movement and that the grain has been elevated in transit. Whenever the absorption is made the grain can not lawfully move forward except at the balance of the through rate.

However, while St. Louis shippers can not be denied the benefit of the intrastate rates to St. Louis so long as they are in force, that does not preclude a finding that the intrastate rates effect an unjust discrimination against interstate traffic.

The record is not sufficient to justify a determination as to the reasonableness of the present interstate rates from interior Missouri points to St. Louis. Should the intrastate rates remain unchanged a widespread revision of rates from interior Missouri points through Memphis to the southeast and the Mississippi valley and of the direct rates to the southwest will have to be made. This revision may even spread to the rates from Kansas and Nebraska points to St. Louis and other markets.

The Commission must come to the conclusion, nevertheless, that in the maintenance of interstate rates higher than the intrastate rates from interior Missouri points to St. Louis an unlawful prejudice and advantage is given to St. Louis and an unjust discrimination is effected against the interior Missouri and southern Illinois points and East St. Louis.

The carriers serving St. Louis from the west are, therefore, ordered to desist from this discrimination. (34 I. C. C., 342.)

STATE COMMISSIONS

The Arkansas Railroad Commission has given permission to the Arkansas Central to charge a 2-cent a mile passenger fare on its line from Ft. Smith, Ark., to Paris, 60 miles.

Investigation of rates and service of the Westmoreland Water Company and the Ohio Valley Water Company, which supply large districts and railroads in western Pennsylvania has been undertaken by the Pennsylvania Public Service Commission. Physical valuation may be ordered.

The Missouri railroads have filed their brief with the public service commission of the state, reviewing the evidence that has been taken in a series of hearings throughout the year on the application of the roads for general advances in freight and passenger rates throughout the state. Final arguments in the case were set for July 15.

The State Corporation Commission of Arizona has entered before the Interstate Commerce Commission a formal complaint that passenger rates between Arizona and California are unjust and discriminatory. Charges are made against the Southern Pacific, the El Paso & Southwestern, the Arizona & New Mexico, the Arizona Eastern and the Grand Canyon.

The Alabama State Railroad Commission has denied the pe-

tition of the Louisville & Nashville for authority to advance passenger rates on its branch lines from 2½ cents a mile to 3 cents. Two applications for authority to make advances in freight rates have also been denied; that of the Nashville, Chattanooga & St. Louis to advance certain rates on its Huntsville division, and that of the roads entering Mobile to make an advance in the rates on pig iron carried to that city. The rate from the principal mines to Mobile is now \$1.75 a ton; the roads desired to advance it to \$2.75 a ton. The petition of the Anniston Chamber of Commerce for an order reducing rates on steam coal to that city, over the Louisville & Nashville and the Southern, was denied; and all petitions for authority to increase rates on coal to Birmingham were denied.

The Arkansas Railroad Commission has announced that it will make no effort to restore a 2-cent passenger rate on the St. Louis & San Francisco and the Kansas City Southern, although it had previously refused to accept the railroad's 2-cent a mile tariffs, pending an appeal from the recent decision of Judge Trieber of the United States court at Little Rock, sustaining a 3-cent fare. Judge Trieber has rendered a decision declaring unreasonable the freight tariff filed by the St. Louis & San Francisco to take the place of the railroad commission's tariff which the court had earlier declared unreasonable. This placed into effect a court tariff which had been in effect for a time during the litigation. A hearing on the application of the roads for a perpetual injunction against the Arkansas Railroad Commission's freight tariff will be held in St. Louis in the circuit court of appeals in December.

COURT NEWS

The Wadley Southern, a company operating less than 100 miles of line, has paid into the treasury of the State of Georgia a fine of \$1,000, being the penalty imposed by the court, in Jefferson county, in 1911, for refusal to obey an order of the state railroad commission. The order of the commission had directed the Wadley Southern to cease giving preference to the Central of Georgia in through freight shipments, to the prejudice of the Macon, Dublin & Savannah. The Wadley Southern is owned by the Central of Georgia.

Showing Tickets Before Entering Cars

The Oklahoma Supreme Court sustains order No. 804 of the Corporation Commission directing railroads to desist from requiring passengers to show tickets before entering the cars and requiring them to collect from passengers who board cars without tickets an additional one cent a mile fare (except where tickets are not on sale). The court holds that the rule is not in conflict with Section 812, Rev. Laws 1910, authorizing a common carrier to demand passenger fare either at starting or at any subsequent time. *St. Louis & S. F. v. Travelers' Corporation* (Okla.), 148 Pac., 166.

Damages from Sparks—Plaintiff Must Indicate Engine

In an action for damages from fire alleged to have been caused by sparks from an engine, it was held by the Georgia Supreme Court that the petition, speaking of "defendant's engine" did not plainly and distinctly set forth the ground of complaint in such manner as to put the defendant on notice of what engine it was claimed emitted the sparks, so that it might be prepared to show, if it could, that any emission of sparks was not due to negligence in the equipment or operation of the engine. The petition should have alleged, as was claimed by the railroad, at what time of day the fire occurred. *Louisville & Nashville v. Moreland* (Ga.), 85 S. E., 341.

Reasonable Uses of Freight Yard—Sufficient Regulation as to Soft Coal

The following are the New York Court of Appeals' holdings in the case of *Hearst v. New York Central*, which has already been briefly noticed: (1) That the plaintiff was entitled to maintain the action, which was to enjoin certain uses by the company of its tracks west of Riverside Drive and between Seventy-second and Ninety-sixth streets, New York; (2) that the company had the right in the regular course of business to use switch engines in transferring cars to the different freight yards,

though this involved some noise, and that the kicking of cars from the main tracks on to stub tracks was not unreasonable; (3) that the habitual and indefinite storing of livestock outside the yard and near the plaintiff's residence should be enjoined; (4) that the use by the company of its through tracks for the purpose of separating and classifying cars intended for its other yards was not reasonably incident to the use of the yard at the point in question. Anthracite coal only was used on yard engines, and the company's rules required that outgoing road engines should be supplied with enough of such coal to carry them beyond the point in question, and that the fires of incoming engines should be banked above that point and no smoke or cinders emitted. It was held that the enforcement of these rules was sufficient for a reasonable regulation of the business of the road. The order of the Appellate Division was modified in accordance with these views.

Improper Remarks of Counsel Cause Reversal

In an action for injuries to a switchman the defenses were negligence of fellow servant, assumption of risk and contributory negligence. The question of contributory negligence was exceedingly close and depended entirely upon the credibility of the witnesses. In his closing argument to the jury the plaintiff's counsel, after giving a vivid description of the perils which constantly threaten a switchman, made the following statement: "I say to you the time will come in this country and in this civilization when the rule of fellow servants, and the rule of assumed risk and contributory negligence, will be relics of barbarism, and will no longer disgrace our law." This statement was objected to, and the trial court ruled that it was improper and should not be considered. Plaintiff's counsel then said that it was not the law now, but that he had a right to express his opinion of the law if he did not attempt to mislead the jury as to what was, in fact, the law, nor seek to induce them not to follow the law. On appeal from a judgment for the plaintiff, the Illinois Supreme Court held that, in view of the condition of the plaintiff, who was seriously and permanently injured, and whose condition was likely to awaken the jury's sympathy, the argument was of such a character as to be calculated to arouse the prejudice of the jury, and the defendant was entitled to a new trial. *N. V. Coy v. Chicago & Alton* (Ill.), 109, N. E. 1.

Fires—Limits of Liability—New York Rule

In an action for the value of two buildings and contents and some lumber and shingles set on fire by sparks or dropped coals, the trial court charged the jury that they must find, in order to make the railroad liable for the lumber and shingles, that the fire was communicated directly to them and not from the buildings. It was impossible to determine from the evidence where the fire started, or whether it was communicated from one building to the other or from the buildings to the lumber and shingles, or vice versa. The jury therefore returned a verdict for the company. All the property abutted on the track.

On appeal the New York Court of Appeals said that it is the settled law of the state of New York that the limit of liability for damages caused by a fire allowed to spread from one's premises to his neighbors is the damage to the abutting lands, and that damages to the lands of other proprietors not adjoining the premises of the one responsible for the origin of the fire are too remote. *Hoffman v. King*, 160 N. Y., 618, 55 N. E. 401, 46 L. R. A. 672; *Van Inwegen v. Port Jervis, M. & N. Y.*, 165 N. Y., 625, 58 N. E. 878; *Dougherty v. King*, 165 N. Y., 657, 59 N. E. 1121. The prior decisions of the New York Court of Appeals were reviewed in the *Hoffman* case, and a workable, if somewhat arbitrary, rule was adopted. The court thinks that this rule should be adhered to, but not extended. In the present case there was no intervening property between the plaintiff's lands and the track. A fire communicated to any part of the property destroyed was almost certain to spread to the rest. If the origin of the fire was attributable to the railroad's negligence, the entire destruction of property caused by it was a proximate result of that negligence. The mere fact that the fire may have spread from one building to the other, or from the buildings to the lumber, did not break the causal connection between the company's negligence and the entire damage done. Judgment for the defendant was reversed and a new trial ordered. *Davies v. D. & L.* (N. Y.), 109 N. E. 95.

Railway Officers

Executive, Financial, Legal and Accounting

W. C. Carr has been elected treasurer of the Toledo Terminal Railroad, with office at Toledo, Ohio, vice R. H. Scribner, resigned.

C. S. Burg, assistant general counsel of the Missouri, Kansas & Texas, has been appointed interstate commerce counsel, with headquarters at St. Louis, Mo.

G. H. Winsor, secretary, auditor and traffic manager of the San Benito & Rio Grande Valley at San Benito, Tex., has been appointed also general superintendent, vice E. E. McLellan, resigned.

John J. Ekin, general accountant of the Baltimore & Ohio, with headquarters at Baltimore, Md., has been appointed general auditor of the entire system. Mr. Ekin was born on June 8, 1873, at Whitestown, Pa., and began railway work in 1895, as a warehouse clerk on the Pittsburgh & Western, now a part of the Baltimore & Ohio. He then served in the yard and freight offices at Ellwood City, Pa., and later was transferred to the auditor's office, at Pittsburgh, Pa. On February 1, 1901, he was appointed general book-keeper, and was promoted to chief clerk to the auditor the following July. In March, 1902, he was appointed book-keeper and general clerk in the office of the auditor of subsidiary lines of the Baltimore & Ohio at Baltimore, Md., and in January, 1904, was promoted to chief clerk in the same department, remaining in that position for four years. He was subsequently auditor, superintendent of the relief department and secretary to the board of managers of the Washington Terminal Company, and at the time the government instituted the railroad valuation campaign, Mr. Ekin was appointed secretary of the valuation committee of the Baltimore & Ohio. On December 1, 1913, he was appointed general accountant, which position he held until the time of his recent appointment as general auditor of the same road, as above noted.



J. J. Ekin

Operating

C. B. Davidson has been appointed trainmaster of the Wabash for the sixth and seventh districts, with headquarters at Forrest, Ill.

Morris Donahue, roadmaster of the Chicago & Alton at Bloomington, Ill., has been appointed general roadmaster, with headquarters at Bloomington. F. B. McMillan, supervisor at Springfield, Ill., succeeds Mr. Donahue.

Frank E. Hatch has been appointed trainmaster of the Illinois Central at Centralia, Ill., succeeding A. M. Umshler, and James D. White has been appointed trainmaster of the Johnson City and Galesburg branches, and the Carbondale and Eldorado districts (except between Du Quoin and Pinckneyville), with headquarters at Carbondale, Ill., succeeding Mr. Hatch.

J. H. Stanfel, superintendent of the Southern Railway and the Northern Alabama at Birmingham, Ala., has been promoted to general superintendent of the Southern district of the Southern Railway, with headquarters at Birmingham, Ala., vice C. L. Harris, resigned. H. H. Vance, superintendent of

terminals of the Southern Railway at Birmingham, has been appointed superintendent of the Southern Railway and the Northern Alabama, with headquarters at Birmingham, vice Mr. Stanfel. B. Haggard, trainmaster of the Southern Railway at Birmingham, Ala., has been appointed superintendent of terminals, in charge of Birmingham terminals, with headquarters at Birmingham, vice Mr. Vance, and T. O. Crane has been appointed trainmaster, east end, Birmingham division, with headquarters at Birmingham, vice Mr. Haggard, promoted.

Clifford E. Ocheltree, whose appointment as superintendent of terminals of the Wabash at St. Louis, Mo., has been announced, was born at Homer, Ill., on January 20, 1874. He was educated in the public schools at Homer and attended the University of Illinois during the years of 1891 and 1892. He entered railway service on June 21, 1893, with the Wabash as telegraph operator and agent, and served in that capacity at various stations on the Decatur division until April, 1902, when he was made car distributor at Decatur, Ill. Later in 1902 he was promoted to despatcher at Decatur, and in November, 1904, was made night chief despatcher, becoming chief despatcher of the Springfield division in December, 1905. In November, 1906, he was made chief despatcher of the Decatur division, which position he held until November, 1910, when he was appointed trainmaster of the sixth, seventh and eighth districts of the same division. From October, 1912, until July, 1915, he was assistant superintendent of the Decatur division, from which position he is now promoted.



C. E. Ocheltree

William Chappell Downing, whose appointment as general superintendent of the Northwest system of the Pennsylvania Lines West of Pittsburgh, with headquarters at Pittsburgh, Pa., has been announced, was born at Richmond, Ind., on August 21, 1865. He was educated in the public schools and the Earlham college at Richmond, and entered railway service in April, 1885, with the Chicago, St. Louis & Pittsburgh as rodman on an engineering corps. On June 1, 1886, he was made acting assistant engineer, and on September 7, 1888, was appointed assistant engineer at Indianapolis, Ind. From May 1, 1891, to June 1, 1895, he was engineer of maintenance of way of the Richmond division of the same road, with headquarters at Richmond, Ind., when he was appointed in the same capacity on the Main Line division of the Terre Haute & Indianapolis (now the Vandalia). On June 10, 1901, he was appointed superintendent of the Peoria division of the Vandalia, and on April 5, 1902, he returned to the Maine Line division as superintendent, which position he held until November 1, 1912, when he was appointed superintendent of the Pittsburgh division of the Pittsburgh, Cincinnati, Chicago & St. Louis, with headquarters at Pittsburgh, Pa. On February



W. C. Downing

1. 1914, he was appointed general superintendent of the Central system of the Pennsylvania Lines West of Pittsburgh, with headquarters at Toledo, Ohio, from which position he is now promoted.

Charles L. Mason, whose appointment as superintendent of the Kansas City division of the Atchison, Topeka & Santa Fe, with headquarters at Kansas City, Mo., has been announced, was born at Portland, Ind., on December 24, 1868, and was educated in the public schools of that city. He entered railway service on June 10, 1887, and served as clerk at various stations on the Middle West and the Oklahoma divisions until May, 1893, when he came to Chicago and worked as clerk at the Grand Central passenger station. The following year he returned to the Atchison, Topeka & Santa Fe and served in clerical positions on the Illinois division until August, 1899, when he was made agent at Streator, Ill. In April, 1903, he was appointed superintendent and agent at St. Joseph, Mo., and on July 1, 1914, was appointed trainmaster of the eastern division, with headquarters at Emporia, Kan., from which position he is now promoted.

Traffic

C. M. Fish has been appointed traffic manager of the Texas-Mexican, with headquarters at Laredo, Tex.

J. D. Cornell has been appointed traffic manager of the Joplin & Pittsburg, with headquarters at Kansas City, Mo.

H. G. Leutert has been appointed traffic manager of the Kansas City, Mexico & Orient of Texas, with headquarters at San Angelo, Tex., succeeding J. P. O'Donnell, resigned.

C. L. Ewing, chief of tariff bureau (freight) of the Central of New Jersey at New York, has been appointed assistant general freight agent. He will continue in charge of the tariff bureau.

J. C. Murray, general freight agent of the Missouri & North Arkansas at Harrison, Ark., has been appointed general freight and passenger agent, with headquarters at Harrison, and the office of J. Kerr, general passenger agent, has been abolished.

George H. Lee, general passenger agent of the Third district of the Chicago, Rock Island & Pacific at St. Louis, Mo., has been appointed general passenger agent of the Lehigh Valley, with headquarters at New York, succeeding George W. Hay, resigned, effective August 1.

Lewis Snodgrass, commercial freight agent of the Delaware & Hudson at St. Louis, Mo., has been appointed special agent, freight department, with office at Albany, N. Y., and J. B. Stewart has been appointed general agent, freight department, with office at St. Louis, Mo., vice Mr. Snodgrass.

Engineering and Rolling Stock

George M. Rice has been appointed chief engineer of the Puget Sound & Willapa Harbor, with headquarters at Raymond, Wash., succeeding C. H. Byers, resigned.

G. E. Buckley, engineer maintenance of way of the Western district of the Southern Railway, at St. Louis, Mo., has been appointed engineer maintenance of way of the Northern district, with headquarters at Richmond, Va., vice W. T. Dobyns, resigned; and H. E. Tyrrell, supervising engineer, at Washington, D. C., has been appointed engineer maintenance of way of the Western district, with headquarters at St. Louis, vice Mr. Buckley.

Purchasing

The office of C. A. Gerrard, general storekeeper of the Missouri & North Arkansas at Harrison, Ark., has been abolished, and the duties of that office will in future be performed by Charles Manley, master mechanic at Harrison.

Special

G. S. Ward has been appointed chief special agent of the Wabash, with headquarters at St. Louis, Mo.

L. J. Ferritor, formerly superintendent of the Chicago & Alton, has been appointed personal representative of President E. F. Kearney of the Wabash, in charge of affairs in Canada, with headquarters at Buffalo, N. Y.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE GOVERNMENT RAILWAYS OF THE UNION OF SOUTH AFRICA are reported to have ordered 6 narrow gage locomotives from the Baldwin Locomotive Works.

THE ST. PAUL BRIDGE & TERMINAL has ordered one Mogul type locomotive from the American Locomotive Company. This locomotive will have 20 by 26 in. cylinders and 51-in. driving wheels.

CAR BUILDING

THE QUANAH, ACME & PACIFIC has ordered 25 box cars from the Mount Vernon Car Manufacturing Company.

THE NORTHERN RAILWAY OF FRANCE is reported to have ordered 1,300 freight cars from the National Steel Car Company.

THE BUFFALO, ROCHESTER & PITTSBURGH is said to be contemplating the purchase of 900 underframes. This item has not been confirmed.

THE CHICAGO, BURLINGTON & QUINCY has ordered 1,000 box cars from the Bettendorf Company, and 1,000 from the American Car & Foundry Company.

G. HARRY PEACOCK, Selma, Ala., writes that he is in the market for 6 second hand 30-ft. box cars, and 15 second hand 3-ft. gage box car bodies for New York city delivery.

THE CHICAGO & NORTH WESTERN has ordered 2 observation-lounging cars and 3 observation-buffet-lounging cars from the Pullman Company, and is inquiring for 300 automobile cars.

IRON AND STEEL

THE LEHIGH & NEW ENGLAND has ordered 300 tons of bridge material from the Phoenix Bridge Company.

THE BALTIMORE & OHIO has ordered 300 tons of steel from the Fort Pitt Bridge Works for a bridge in Ohio.

THE CHICAGO, BURLINGTON & QUINCY has ordered 500 tons of steel for girder spans from the American Bridge Company.

THE PULLMAN COMPANY has ordered 180 tons of steel for a track system and overhead crane at Pullman, Ill., from the American Bridge Company.

THE SOUTHERN has ordered from the American Bridge Company 1,200 tons of structural steel shapes, to be used in a new building at Washington, D. C.

THE RUSSIAN GOVERNMENT is reported to have ordered 100,000 tons of 67-lb. rails from the Cambria Steel Company and 60,000 tons from the Lackawanna Steel Company.

THE PENNSYLVANIA RAILROAD has placed a large order for rail joints, frogs and switches for the Delaware River Terminal at Philadelphia, with the Pennsylvania Steel Company.

MACHINERY AND TOOLS

THE NEW YORK, ONTARIO & WESTERN is inquiring for one turret lathe.

THE SEABOARD AIR LINE has taken bids on about 75 machine tools for the shops at Portsmouth, Va.

SIGNALING

The Western Maryland is to install automatic block signals on its line, single track, between Highfield, Md., and Big Pool, Md., 35 miles. Highfield is 17 miles east of Hagerstown and Big Pool is 18 miles west of Hagerstown. Plans are being made also for the installation of automatic signals from Highfield east to Thurmont, 11 miles.

Supply Trade News

Andrew Allen, Sr., the founder of the firm of A. Allen & Son, New York, died July 6.

The Bourne-Fuller Company, Cleveland, Ohio, announces that on August 1, its selling arrangement with the A. M. Byers Co., Pittsburgh, Pa., will terminate.

J. F. McNamara has been appointed general manager of the Bayonne Steel Casting Company, Bayonne, N. J., succeeding W. E. Oakley, effective July 1.

The Eastern Railway Signal Company, Elkton, Md., has been incorporated with a capital stock of \$100,000. Clement M. Egner, Elkton, Pa., is one of the incorporators.

Flint & Chester, Inc., New York, dealers in railway, mill and contractors' supplies, have been appointed New York sales agents for the jacks made by A. O. Norton, Inc., Boston, Mass.

Paul B. Oatman, formerly manager of the Ideal Die & Tool Company, Beaver Falls, Pa., has been appointed manager of the small tools department of the Modern Tool Company, Erie, Pa.

H. A. F. Campbell has been appointed European representative of the Baldwin Locomotive Works, with headquarters in Paris. Mr. Campbell has been in the service of the company since 1900.

The Northern Railway Signal Company has been incorporated with a capital stock of \$15,000 at Pittsburgh, Pa. The incorporators are Joseph P. Taggart and E. A. Schooley, Pittsburgh, and Herbert L. Stitt, Edgeworth, Pa.

H. Gossen has been placed in charge of the New York office of the American Steel Export Company. This is the new company which has been incorporated to take over the foreign business of the Cambria Steel Company.

F. N. Hibbits, until July 1, superintendent of motive power of the Lehigh Valley at South Bethlehem, Pa., has been appointed assistant general superintendent of the Baldwin Locomotive Works, effective July 1.

The National Hose Coupling Company, which has recently been incorporated, with Mortimer J. Silverberg as president, will manufacture a coupling which is applicable to various railway uses. The works of this company are at Kankakee, Ill., and its general offices are in the Peoples Gas building, Chicago.

Joachim G. Giader, chief engineer of structural design and foundations for D. H. Burnham & Co., for the past seventeen years, has opened offices as a consulting engineer at 751 Railway Exchange building, Chicago. He will specialize in structural design, foundations and building engineering in general.

An item in the New York Times of July 15 says that it has been creditably reported but not confirmed that the Baldwin Locomotive Works has taken an order for \$80,000,000 worth of shells from the Allies. The report also says that a subsidiary company will be organized and that possibly a new plant will be built.

The Continental Piston Ring Company, Memphis, Tenn., has been incorporated with a paid in capital of \$100,000. It will manufacture piston rings for locomotives, engines, automobiles and pumps of various kinds. The officers are B. H. Mason, president; W. P. McCadden, vice-president; R. E. Brown, secretary and treasurer, and C. R. Bryant, chief engineer.

Thomas E. Carliss, manager of the works of the Buffalo Brake Beam Company at Buffalo, N. Y., and Hamilton, Ont., died suddenly in Buffalo on July 9. Mr. Carliss had been in the brake beam business for about 30 years. He was at one time associated with the Central Brake Beam Company, at Detroit, for many years, afterwards becoming associated with the Monarch Brake Beam Company, when that company was started by Detroit capital. He had been in the service of the Buffalo Brake Beam Company for about six years.

The Columbus Bolt Works Company, Columbus, Ohio, has been incorporated with a capital stock of \$660,000 to take over the business of the Columbus Bolt Works. J. R. Poste, formerly secretary and general manager of the Columbus Bolt Works, has been elected president, treasurer and general manager of the new company; J. H. Poste, vice-president; T. A. Fleming, assistant treasurer, and H. A. Mason, secretary. The incorporators include J. R. Poste, J. H. Poste, W. F. Burdell, Beale Poste and F. H. Barrett. Julius Blum & Co., 510 West Twenty-fourth street, New York, have been appointed eastern sales agents.

TRADE PUBLICATIONS

SUPERHEATERS.—The Locomotive Superheater Company, New York, has issued the fourth edition of its pamphlet entitled: The Use of Highly Superheated Steam in Locomotive Practice. This is devoted to a description of the Schmidt superheater, including data concerning its operation. A number of superheater accessories are also described.

SLOTING MACHINES.—Catalog No. 49, recently issued by the Newton Machine Tool Works, Inc., Philadelphia, Pa., contains illustrations and specifications of the company's complete line of standard and special slotting machines and a number of illustrations of different designs of milling, boring, drilling and cold saw cutting off machines.

TOOLS FOR CUTTING SCREW THREADS.—This is the title of a catalog recently issued by the J. M. Carpenter Tap & Die Company, Pawtucket, R. I. The booklet, which is quite similar to the usual tap and die catalog, contains illustrations of the several taps, dies, die-stocks, etc., made by the company, as well as tables of sizes and list prices.

BRONZE CASTINGS.—The Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., has just issued a booklet describing the titanium, aluminum and other standard bronze castings produced by this company, with descriptions and approximate composition of these various standard alloys. This booklet is illustrated with photographs of etched sections.

CAR HEATING APPARATUS.—The Gold Car Heating & Lighting Company, New York, has recently issued circulars relative to that company's No. 804S positive lock coupler, its pressure regulator No. 1,014, and its up-to-date vapor system. The last of these three not only describes the vapor system, but also shows how Gold's thermostatic control may be used in connection with it.

DRIVING BOX LUBRICATOR.—A catalog just issued by the Franklin Railway Supply Company, New York, is devoted entirely to the Franklin automatic driving box lubricator. It is illustrated with a large number of sectional drawings, showing the construction of lubricators of various sizes and for different classes of service. The methods of removing packing and replacing the cellar is clearly explained with illustrations.

STEEL SASH.—The Trussed Concrete Steel Company, Youngstown, Ohio, has just issued an elaborate 128-page catalog describing the United steel sash and its application. This book is printed on the standard 8½ in. by 11 in. sheet adopted by the American Institute of Architects, and is well illustrated throughout. The first portion is devoted to a general discussion of the features of steel sash construction, followed by detailed descriptions of pivoted, vertical sliding and other types of sash. The latter part of the book contains many interesting structures on which these sashes have been used.

LOCOMOTIVES.—The H. K. Porter Co., Pittsburgh, Pa., has recently issued the eleventh edition of its catalog devoted to light and heavy steam locomotives. This is a book of over 150 pages, 8½ in. by 11 in., and is substantially bound in cloth. In addition to the usual catalog features dealing with a large variety of standard Porter locomotives it contains a section devoted entirely to engineering information, tables and formulas and another section containing tables and other useful information not usually found in print. The book is intended specially for engineers, superintendents and master mechanics of industrial plants, coal mines, logging roads, contractors, etc. Owing to the expense involved in the compilation of the data which the book contains, general distribution is being made at the price of \$1 per copy.

Railway Construction

AUGUSTA-AIKEN RAILWAY & ELECTRIC CORPORATION.—This company has increased its capital stock, it is said, from \$1,500,000 to \$2,500,000, and, it is understood, is planning to build an extension from Aiken, S. C., northeast to Columbia, about 50 miles.

CANADIAN NORTHERN.—On the Western division the following new lines have been opened for business: Strathcona subdivision, from Camrose Junction, Alta., west to Terminal Junction, 45.8 miles; St. Brieux subdivision, from Melfort, Sask., west to St. Brieux, 21.5 miles; Tollerton subdivision, from Edmonton Junction, Alta., west to Peace River Junction, 33.8 miles. On the Central division the Wakopa subdivision has been extended from Adelphi, Man., west to Deloraine, 28 miles.

CHARLESTON INTERURBAN.—A contract has been given to Board & Duffield, Charleston, W. Va., to build an extension of the Charleston Interurban from Charleston, W. Va., southeast via Malden, Marmet, Winifrede Junction, Cabin creek, and Coalburg to Montgomery, about 25 miles. Track has been laid on about one mile, and the company expects to finish 13.5 miles this year from Charleston to Cabin creek junction. The Charleston Interurban now operates a line from Charleston west via Spring Hill to St. Albans, and is leased to the Kanawha Valley Traction. (March 12, p. 493.)

CLINTON & OKLAHOMA WESTERN.—This road has been extended from Hammon Junction, Okla., to Hammon.

FLORIDA EAST COAST.—This company has under consideration the question of building an extension, it is said, of the Maytown-Okeechobee branch from Okeechobee, Fla., south around the eastern shore of Lake Okeechobee, thence east to West Palm Beach.

FLORIDA ROADS.—The Southern Investment Company is planning to build a railway, it is said, from Placida, Fla., on the Charlotte Harbor & Northern, northwest towards Venice on the Seaboard Air Line, about 22 miles. L. M. Williams, president; J. G. Earnest, secretary, Richmond, Va.

GRAND TRUNK PACIFIC.—The Prince Albert subdivision of the Prairie division has been extended from Hoey, Sask., to St. Louis, 3.8 miles.

INTERCOLONIAL.—An officer writes regarding the diversion to be constructed between the main line of the Intercolonial and the National Transcontinental that from Moncton west these two railways parallel each other for a distance of about 11 miles. It is proposed to construct a connection between the two roads at mileage 11. Both these railways are now being operated by the Canadian government, and the diversion, which is to be three-quarters of a mile long and will consist of one cut and one fill, is to be built to do away with the expense of maintaining one of the lines.

JOHNSTOWN & SOMERSET (Electric).—A contract has been given to J. A. Vandegrift & Co., Incorporated, Somerset, Pa., to build from Johnstown, Pa., south via Davidsville, Haas Mine, Jerome Mine, Boswell, Jenner, Belmont Mine, Harrison and Somerset to Rockwood, about 40 miles. Bids are wanted at once for the bridges, ties, rails, poles, wire and construction material. The maximum grades will be 3.5 per cent, and the maximum curvature will be 15 deg. There will be 14 steel girder bridges, each 15 ft. long, six steel girder bridges each 30 ft. long, and one viaduct 650 ft. long and 85 ft. high. The plans include constructing two car barns and four rotary stations. The power will be furnished by the Pennsylvania Electric Service Company, Johnstown. The company expects to develop a traffic in coal, farm and dairy products. J. A. Berkey, president; F. O. Keller, engineer, Somerset, Pa.

MICHIGAN RAILWAY.—A new section of this road has been opened for business from Grand Rapids, Mich., south to Kalamazoo, 50 miles.

MISSISSIPPI VALLEY RAILWAY & POWER COMPANY. Incorporated in Delaware with \$4,500,000 capital, it is said, to construct

railroads. The incorporators include C. B. Bishop, J. Jacobs and H. W. Davis, Wilmington, Del.

NEW YORK SUBWAYS.—Bids are wanted by the New York Public Service Commission, First district, on July 27, for the last section of the Broadway subway in the borough of Manhattan, extending under Broadway from Thirty-eighth to Forty-second street, and under Seventh avenue from Forty-second street to Fifty-first street. Bids are also wanted on July 27 for work on the Eastern Parkway subway in the borough of Brooklyn under Eastern Parkway from Nostrand avenue to Buffalo avenue, and bids are wanted on July 28 for the second section of the Nostrand avenue subway under Nostrand avenue from Church avenue to Flatbush avenue.

Ward & Tully, Incorporated, submitted the lowest bid at \$71,355 for the installation of tracks on the New Utrecht avenue elevated line from about Thirty-eighth street and Tenth avenue to a point near avenue Y, in the borough of Brooklyn.

OCILLA, PINEBLOOM & VALDOSTA.—This 11-mile line in Coffee county, Ga., which passes through Willacooche has been bought by the Henderson Lumber Company, of which J. A. Henderson, Ocilla, Ga., is president. It is understood that the line will be extended on the northern end from Lax northwest to Ocilla, 15 miles, and on the southern end from Pinebloom southeast to Homerville, about 28 miles.

OKLAHOMA & TEXAS SOUTHERN.—A contract is reported let to Ward & Lee, Floresville, Tex., for work on this line. The company plans to build from Denton, Tex., northwest to Buckburnette and later north of the Red river. W. R. Heagler, Potosi, Mo., chief engineer.

OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY.—This company will build a 30-mile extension from Riverside to Crane Creek Gap in Harney county, Oregon. Contracts for grading and bridges will be awarded soon. The track will be laid by company forces. The maximum grade is 1 per cent.

OZARK SOUTHERN.—This company proposes to build a line from Harrison, Ark., through Elmwood, Marble City and Jasper to Parthenon. The estimated cost is \$600,000. G. H. T. Shaw, Lee Center, Ill., is chief engineer.

PACIFIC GREAT EASTERN.—Announcement is made that through an arrangement with the Canadian and British Columbia governments this company has secured funds to continue construction work on the line between Vancouver, B. C., and Fort George. The line is now in operation out of North Vancouver towards Squamish, and from Squamish to Lillooet, 120 miles. Considerable work has been done between Lillooet and Fort George, and the company expects to have 100 miles additional completed during 1915. (April 9, p. 811.)

PETERSBURG & JAMES RIVER (Electric).—Construction work was started recently on this line, it is said, at City Point, Va. The company was organized to build an electric line from City Point, southwest to Petersburg 10 miles. J. W. Long, president; B. R. Walters, secretary and treasurer, 801 Real Estate Trust building, Washington, D. C.; J. H. Starkey, chief engineer, Rockville, Md. (May 14, p. 1033.)

PHILADELPHIA, PA., ROADS.—A. M. Taylor, director of city transit, at Philadelphia, Pa., has been authorized to let contracts and start work at once on the Broad street subway and the Frankford elevated. Ordinances passed recently by councils allotted \$3,000,000 for each of these projects. Actual construction work is to be started on September 13. Bids are wanted until August 10, for some of the work on both projects.

PITTSBURG, SHAWMUT & NORTHERN.—This road has been extended from Kittanning, Pa., to Cadogan, 6 miles.

SOUTHERN TRACTION. See Texas Traction.

TEXAS TRACTION. It is announced that plans are under way to merge the properties of the Texas Traction and the Southern Traction. The pending transaction involves the interurban electric lines radiating out of Dallas, Tex., and other holdings of the two companies. Following the consummation of the plans, work on an extension of the Southern Traction is to be started, it is said, south from Waco via Austin to San Antonio.

VIRGINIA-CAROLINA. This road has been extended from West Jefferson, N. C., south to Elkland, 20 miles.

RAILWAY STRUCTURES

BAYONNE, N. J.—The Central of New Jersey has plans under way for the proposed rebuilding of the Newark bay bridge. Actual construction work will probably not be started for a year.

CHICAGO, ILL.—The Pennsylvania has awarded the contract for the structural steel of its new freight house at this place to McClintic Marshall Construction Company, Chicago.

The Baltimore & Ohio Chicago Terminal is building new engine and passenger terminal facilities at Fourteenth and Robey streets, Chicago, which will include a 33-stall roundhouse, a 300-car coach yard, a 2-story building 600 ft. long for coach yard supplies, a power plant, oil house, coaling station, sand house and office building. Contracts for the construction of these buildings have been awarded to James Stewart & Co., Chicago.

KANSAS CITY, MO.—The Union Pacific, the Chicago, Rock Island & Pacific and the Metropolitan Street Railway of Kansas City, will build a viaduct at Eighteenth street and Muncies boulevard over the tracks of the Union Pacific and the Chicago, Rock Island & Pacific. The city authorities awarded the contract for the fabrication and erection of the steel to the American Bridge Company. The viaduct will be 1,383 ft. long and will have 36 steel deck and through spans of various lengths up to 100 ft. It will have concrete piers and 224 lineal ft. of reinforced concrete retaining walls. Work has not yet been started.

MILTON, PA.—The Philadelphia & Reading has applied to the Pennsylvania Water Supply commission for permission to build a steel bridge over the Susquehanna river at Milton.

NEW YORK.—Bids are to be opened on August 3, by the New York Public Service Commission, First district; for station finish on the Corona elevated railroad and the extension of the Queensboro subway in the borough of Queens. Bids are wanted on August 4, for station finish on the Astoria line in the borough of Queens.

SIMCOE, ONT.—The Railway Commission of Ontario has approved the location of the Lake Erie & Northern's proposed yard and station in Simcoe township, Ont., provided the end of the freight siding be constructed north of Victoria street.

TRENTON, N. S.—The Intercolonial has let contracts for the following buildings: For a combined station and freight shed at Trenton, N. S.; to Rhodes, Curry & Company, Ltd., Amherst, N. S.; combined station and freight shed at Derby Junction, N. B.; and station at Humphreys, N. B., to McLaggan, McBean & Bell, and for a freight shed, 40 ft. by 400 ft., at Levis, Que., to G. B. Mitchell, Montreal, Que.

YARMOUTH, N. S.—Bids will be received up to July 17, it is said, for the construction of a passenger station for the Halifax & Southwestern at Yarmouth.

THE AUSTRALIAN TRANS-CONTINENTAL RAILWAY.—Notwithstanding the fact that Australia is just as much at war as any other part of the Empire today, and is doing everything possible to bring about a speedy and successful termination, the great public works of that country are not being held up, but, if anything, more energy is being thrown into those works which are regarded as of national importance, and among these is the line of railway which is to connect the systems of Eastern and Western Australia. This is being pushed on as quickly as possible. The latest reports indicate that if no greater difficulties are experienced than have been overcome, the line should be ready for through working in January or February of 1917. About 900 men are at work on the western section, and 1,700 on the eastern section. Expected difficulties in supply of material have been settled by the new order of 12,500 tons of rails from a British firm. Lack of water is now the main trouble, but the engineer is confident that the bores now being put down at various points ahead of the railheads will secure sufficient supplies. Of the eight bores so far completed five have produced salt water, one brackish water, and two good drinking water. Five other bores are being sunk near the West Australian border. Local traffic proceeds on each section for nearly 200 miles.—Engineering (London).

Railway Financial News

CHICAGO, ROCK ISLAND & PACIFIC.—It is understood that the 60 days' period of grace which the indenture securing the \$20,000,000 5 per cent debenture bonds provides for will be availed of before action is taken in regard to the payment of interest due July 15. Judge Carpenter, under whose jurisdiction the receivers are acting, is now on his vacation.

DENVER & RIO GRANDE.—E. T. Jeffery, chairman of the board of the Denver & Rio Grande, has announced that the \$853,000 necessary to meet the semi-annual interest on the first and refunding mortgage bonds, which interest is due August 1, has been deposited with the Bankers Trust Company, and with Blair & Co., both of New York.

NEW YORK CENTRAL.—Judge Mayer, in the United States district court, has denied a motion for the dismissal of the suit brought by J. W. Hunnewell on behalf of himself and other holders of stock of the Rutland against the New York Central for an accounting. The suit alleges that the New York Central has improperly used the Rutland's funds.

NEW YORK, NEW HAVEN & HARTFORD.—A suit brought by minority stockholders of the New York, New Haven & Hartford against William G. Rockefeller, Lewis Cass Ledyard, James S. Elton, Charles S. Mellen and other directors to recover \$102,000,000 alleged to have been improperly paid out by the New Haven, has been dismissed. The opinion dismissing the suit says, among other things, that "the allegations of the bill do not show reasonable application to the directors to institute proceedings to recover the losses referred to in the bill, nor facts showing that such application would have been useless." Permission has been given to amend the petition for a suit.

RUTLAND RAILROAD.—See New York Central.

UNION STATION COMPANY (CHICAGO).—Since three-quarters of the stock of the Union Station Company, of Chicago, which is to build a new union station, is held by the Pennsylvania and the Chicago, Milwaukee & St. Paul, it is supposed that Kuhn, Loeb & Co. and the National City Bank will underwrite the sale of the bonds, and it is said that this bond sale will amount to \$25,000,000 to \$30,000,000. The Chicago, Burlington & Quincy is the only other railroad owning stock in the new station, and the other companies which will use the station will pay a rental charge.

PETROZAVODSK-SOROKA BAY RAILWAY OF RUSSIA.—Owing to difficulties that have arisen in contracting out the Petrozavodsk-Soroka Bay line the Russian government has decided to take over the construction of the railway.

CHINESE PROPOSE A SHORT RAILWAY LINE AT CANTON.—A group of business men of Canton have conceived the idea of laying a short local line, about ten miles in length to bring a very populous district outside Canton in closer touch with the capital, and hence with Hongkong, by means of the Kowloon-Canton line. As far as the promoters can at present estimate the cost of the line, with rolling stock, will be about \$100,000 United States currency. The project provides for a narrow-gauge line, about 3½ ft. wide. The large villages through which the proposed line will pass are numerous and some of them important.

THE FOREIGN TRADE OF THE BRITISH EMPIRE.—The British Empire's total trade with foreign countries in 1913, according to the Statistical Abstract of the British Empire, was \$7,577,914,300, made up of \$4,114,504,100 imports and \$3,463,410,200 exports. The United Kingdom's trade with other parts of the British Empire was \$1,172,291,200 imports and \$1,126,915,900 exports, the inter-colonial trade imports being \$384,755,200, making a total of inter-imperial trade of \$2,683,962,300. The grand total of empire and inter-imperial trade was \$10,261,876,600, the percentages being: foreign trade, 73.8, and inter-imperial trade, 26.2 per cent.

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GENERAL NEWS SECTION.....

*Illustrated.

The suggestion made by Mr. Basford in the address before the Burlington Association of Operating Officers, which is printed in another part of this issue, that the matter of selecting, training and promoting employees be placed in charge of an officer with full authority over these matters and reporting direct to the president of the railroad, appears to offer a simple and logical solution to a most troublesome problem. The methods outlined to be followed by such an officer are practical. Many railway officers are frank to admit that the proper selection and training of men is the most important problem now before the railroads. They are equally frank in admitting that something must be done immediately to improve the situation. Why not give the suggestions which are made a thorough trial?

In the recent hearings in the western freight rate advance case, three accounting "experts" employed by the shippers and state railway commissions, and one employed by the Interstate Commerce Commission, sought to segregate the cost of handling various commodities, and by the use of different methods arrived at very different results.

More "Expert" Cost Accounting

In the western passenger fare hearing at Chicago last week the same state commissions put on the stand one of the same "experts," who proceeded to enlighten the commission as to the cost of passenger service. He arrived at the conclusion that it costs less to earn a dollar in the passenger service than in the freight service; and he vouchsafed the information that he was "surprised himself" at the result. Then, on cross-examination it was brought out that in his analysis of the expenses of the Chicago & North Western he had adopted a basis of division in the freight rate case which showed the ratio of passenger expenses to revenue as 77 per cent, while in the passenger rate case he had used a basis which produced a passenger expense ratio of 72 per cent! In other words, in the zeal of his efforts to show that advances in either freight or passenger rates would be unreasonable, he had used a different method of "cost accounting" in the one case from what he had used in the other. The methods used by the railroads in dividing freight and passenger expenses in these cases at least had the merit of consistency because they used the same methods both times. If they redounded to the carriers' advantage in the freight case, by showing freight costs too high, then they worked to their disadvantage in the passenger case by showing the passenger proportion of the expenses as too low. Many hope that some method will eventually be worked out for correctly distributing the various expenses between the freight and passenger traffic. The state commissions and their "experts" are not helping the matter along by the use of such extraordinary means.

The question of the legality of the series of arbitrary measures which the postoffice department has adopted in recent years to compel the railways to handle increased quantities of mail without an increased, and even for a decreased, compensation, is to be finally settled, in the only way such a question can be settled—by a lawsuit. The New Haven, the Boston & Maine and some other New England roads have joined in a proceeding against the government in the Court of Claims for the recovery of an aggregate of \$10,880,865. They allege this amount is due them mainly on the ground that under the system of quadrennial weighing they are not paid at all for handling the annual increment in the mails, and that they have been forced to handle the parcel post traffic without adequate compensation. It is gratifying that a group of railways finally has decided to appeal to the courts to ascertain what are the respective rights of the carriers and the postoffice department. For almost ten years successive postmaster-generals and Congress itself have dealt with the compensation of the railways for carrying the mails with an insolent and tyrannical arbitrariness which would have done credit to the bureaucracy of Russia. It is high time that it should be ascertained whether the Constitution and laws of the United States afford no protection to railway property against the attacks of government officials bent, for political purposes, on making a showing in the postoffice department at the expense of other people. Meantime, the question arises as to why railways should have to sue the government to determine their rights regarding compensation for carrying the mail, when the rates they may receive for carrying freight and passengers are determined by the Interstate Commerce Commission? Why should not the government submit the question of what rates it shall pay for transportation to the same body to which it requires the traveler and shipper to submit the question of what rates they shall pay?

Of the \$32,375,000 paid by the Class I roads (those having annual revenues of more than \$1,000,000) of this country for loss and damage to freight for the 12 months ended December 31, 1914, as reported in the *Railway Age Gazette* of July 16, 1915, page 90, over 13 per cent, or \$4,343,481, was directly traceable to rough handling of cars.

Damage Due to Rough Handling of Cars

In other words, \$2.18 of each \$1,000 of total freight revenue was used to pay for damage caused in this way. If we consider the damage which may have been caused to the equipment at the same time, and also the fact that a large proportion of the damage to freight by rough handling could not be directly traced to that cause, the figure will be much larger. Is there no way in which it can be reduced? One railway officer who has given the subject much attention says emphatically that there is. He believes that a large part of this damage caused by the rough handling of cars is due to the fact that the tendency to economize in the number of switch engines has been carried to the extreme, thus causing the crews to work so fast that they cannot use proper precautions to protect the lading in the cars. In his opinion the addition of a comparatively small number of switch engines in yards or terminals where this is being done will greatly decrease the amount of the payments for damage to freight. It may be difficult to demonstrate this, but considering the rate at which such damage is increasing, would it not be worth the trial? Suppose that the cost of the additional service would only equal the reduction in damage to freight, or even be somewhat greater than it. Over and above this we would have the decreased cost of maintenance of equipment and the good will of the consignors and consignees who would not be disappointed and hampered by delay and damage to the shipments.

THE WABASH-PITTSBURG TERMINAL REORGANIZATION PLAN

THE story of the Wabash-Pittsburg Terminal bristles with superlatives. The building of the road into Pittsburgh, with the break between the Goulds and the Pennsylvania Railroad interests and the subsequent bankruptcy of the Terminal company, followed by the collapse of the great scheme for a transcontinental railroad under Gould control, was one of the most dramatic incidents in contemporary railroad history. The reorganization plan recently announced is one of the most drastic ever proposed for an American railroad. The possibilities held out at the time of the sale of the Wabash-Pittsburg Terminal Company's first mortgage bonds of that company's getting a share of the Pennsylvania Railroad's Pittsburgh traffic was one of the romances of American railroading and the failure is within these ends one of the most complete imaginable.

The Wabash-Pittsburg Terminal owns a single track road running from Pittsburgh Junction, in Ohio, where it connects with the Wheeling & Lake Erie, to the corner of Ferry street and Liberty avenue, within the city of Pittsburgh, a distance of 60 miles. On this 60 miles of road there are 77 bridges and 17 tunnels. The road was put in operation in July, 1904. The entrance into Pittsburgh was obtained by building a tunnel under the rock bound ridge on the west side of the Monongahela river and bridging that river with a bridge 1,504 ft. long and by using an old street railway franchise for the necessary permit to lay tracks to the Ferry street property which had previously been secretly acquired. The Pennsylvania Railroad considered this an invasion of its territory, and the feeling between the Goulds and that company was extremely bitter. It will be recalled that the Gould transcontinental system was to have consisted of the Western Pacific, running from San Francisco to Salt Lake City, Utah; the Denver & Rio Grande, running from Salt Lake City to Denver and Pueblo, Col.; the Missouri Pacific, running from Pueblo to St. Louis; the Wabash, running from St. Louis to Toledo; the Wheeling & Lake Erie, from Toledo to Pittsburgh Junction; the Wabash-Pittsburg Terminal, from Pittsburgh Junction to Pittsburgh, and the

Western Maryland, running from a point in West Virginia, only about 40 miles from a branch of the Wheeling & Lake Erie, to Baltimore. The final completion of this system called for the building of the Wabash-Pittsburg Terminal and the 40-mile line to connect the Wheeling & Lake Erie with the Western Maryland. This latter link was never built.

In addition to the 60 miles of main line, the Terminal company owns a branch line $3\frac{1}{2}$ miles long and owns a majority of the stock of the Wheeling & Lake Erie, all of the consolidated mortgage bonds and all of the stock of the Pittsburgh Terminal Railroad & Coal Company, the only other securities of the Coal company outstanding being \$3,922,000 first mortgage 5 per cent bonds. All of the stocks and bonds mentioned above which the Terminal company owns had been pledged as security for loans. The Coal company mentioned above owns at present about 12,880 acres of unmined coal estimated to contain from 90,000,000 to 100,000,000 tons of coal, and also owns the stock and bonds of the West Side Belt Railway, which has a single track railroad running from a point in the west end of Pittsburgh south paralleling the Monongahela river and some few miles to the west of it to Clairton, in Allegheny county, Pa., 21 miles.

Summed up, the Wabash-Pittsburg Terminal now owns about 63½ miles of single-track railroad and can obtain coal property having 100,000 tons of unmined coal on it and a 21-mile single-track railroad by paying \$3,818,152. After this payment, of course, the coal property will still have a mortgage on it of \$3,922,000. The total par value of securities and loans and other indebtedness, including receiver's certificates of the Terminal company, is now \$91,260,345, and adding to this the \$3,818,152 necessary to get out of pawn its title to the coal properties and the 21 miles of belt railroad, the gross capitalization is \$95,078,497. The total interest charges would call for \$2,783,252 yearly. The total amount which the properties, including the Coal company, earned in 1914, a moderately prosperous year, available for interest charges was \$513,172, and in the year ended June 30, 1915, a very unprosperous year, \$95,156.

The public owns \$30,236,000 first mortgage bonds of the Terminal company and \$20,000,000 second mortgage bonds, and there is in default on these two issues of bonds \$13,459,343 of back interest. The reorganization plan calls on the holders of the first mortgage bonds to give up their bonds and in addition to pay \$300 in cash with each \$1,000 bond given up and receive in exchange stock in the new company of par value of \$300 preferred and \$1,000 common. The second mortgage bondholders can only come into the reorganization plan if some of the first mortgage bondholders refuse to pay their \$300 per bond and take their new securities.

If this plan works out successfully the first mortgage bondholders, or the first and second mortgage bondholders together, will put into the new company \$9,070,800 cash. This cash will be used to pay the \$2,395,880 Wabash-Pittsburg Terminal receiver's certificates and \$714,286 West Side Belt Receiver's certificates and the \$3,818,152 necessary to get the consolidated mortgage bonds and stock of the Coal company out of pawn and the remainder for paying certain judgments and forming working capital. Under this plan there will be but \$5,100,868 bonds all told outstanding, of which \$3,922,000 will be the first mortgage bonds of the Coal company which it was previously mentioned are held by the public; \$383,000 first mortgage bonds of the West Side Belt which are held by the public, and \$795,868 mortgages on real estate. The interest charges will therefore be cut from the \$2,783,252, which they stood at before, and only a fractional part of which, of course, were ever earned before, to \$261,103. It will be recalled that in 1914 the earnings applicable to interest charges amounted to \$513,172.

If the present plan goes through the new company will issue \$39,600,000 stock, of which a quarter will be preferred and three-quarters common. This will make a total capitalization, including the bonds mentioned above, of \$44,700,868, as against a present capitalization of \$91,260,345, plus the \$3,818,152 required to get the Coal company stock and bonds.

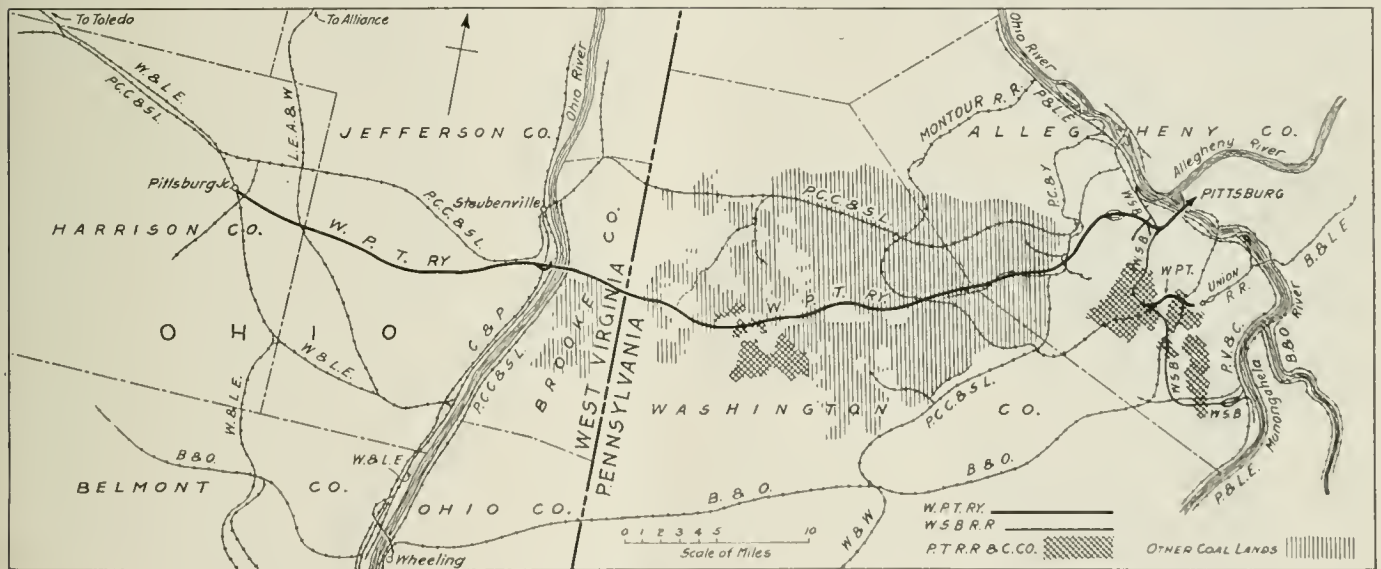
The Wabash-Pittsburg Terminal owns the majority stock of the Wheeling & Lake Erie, which is of doubtful value, however. The reorganization plan of the Wheeling & Lake Erie, which has been in the hands of receivers, calls for an assessment on this stock. The Terminal reorganization plan, therefore, quite properly provides that each of its own bondholders should receive his pro rata share of the Wheeling & Lake Erie stock, and thus be in a position to decide for himself whether he wants to pay the assessment or not.

It would simply be a retelling of a stale scandal to recount in detail the history of the Wabash-Pittsburg Terminal; but there are certain facts in this history which are brought out in so lurid a way that they may well form an object lesson to investors. In 1905 the Wabash-Pittsburg Terminal first mortgage 5 per cent bonds were selling at above 90. The purchaser of a \$1,000 bond paid for it \$900 or more. He received his interest only up to June 30, 1908. Since then he has received nothing, and under the reorganization plan he will have to put up \$300 more in cash, give up his bond, and get for the total investment of \$1,200 \$300 preferred stock in a new company and \$1,000 common stock, with no present prospect of any return on the common stock and no certainty of return on the \$300 preferred stock. The lesson is obvious. The building of the Wabash-

Whether or not a holder of these bonds should pay the assessment of \$300 per bond would seem to depend entirely on whether his individual circumstances are such as to permit him to put the required amount of money in as a speculation with the hope and fair prospect of recouping himself for losses, or whether he is in a position where he cannot afford to risk any more money and therefore should take the losses which he has now sustained.

ST. LOUIS, "INADEQUATE TERMINAL FACILITIES"

THE people of St. Louis are in a position to realize the truth of the old saying, "Curses, like chickens, come home to roost." The Interstate Commerce Commission, in an opinion rendered last week in a case brought by the Business Men's League of that city, said that the "rail terminal facilities of St. Louis have not grown proportionately with the growth and trade of the community." The terminal facilities are afforded almost solely by the Terminal Railroad Association, which is owned by 15 of the trunk lines. Persons not familiar with the facts might naturally assume that the failure to develop them adequately was chargeable to the managements of the Terminal Railroad Association and of the companies which own it. This assumption would be incorrect. The managements of the Ter-



The Wabash-Pittsburgh Terminal and Pittsburgh Terminal Railroad and Coal Company's Coal Lands

Pittsburg Terminal was a speculation pure and simple. Bonds issued at the rate of more than three-quarters of a million dollars a mile on a road whose earning power was a pure matter of guesswork should never have been offered to investors by any reputable banking house. No investor who made any investigation of the situation for himself should have ever bought these bonds, and the moral of that is that an investor should make some investigation for himself of the nature of the assets which are held out as security on which he is asked to loan money.

On the other hand, the present plan of reorganization appears to be a conscientious, thorough-going and common sense attempt to make the best of a very bad bargain. The new securities are speculative, of course. They are not proper investments for the conservative man or woman who is not already entangled in the Wabash-Pittsburg situation. On the other hand, to the holder of the old 5 per cent first mortgage bonds of the Terminal company they hold out the only opportunity to get back in the future something of the losses already sustained. If, as the reorganization committee appears to think, traffic can be developed, which development has never taken place so far, the road has good potential earning power.

terminal Association and of the controlling railways have put forth great efforts adequately to develop its facilities. They have failed because for years they have been blocked by persons seeking to profit by bottling up the Terminal.

The Terminal Railroad Association was organized originally to furnish to the St. Louis district a unified terminal system which could render the best service at the least cost. For about 14 years, or since 1901, almost every attempt which it has made to enlarge its accommodations has been opposed by shippers seeking thereby to obtain advantages in rates, by real estate men seeking thereby to gain by speculation in land, and by politicians seeking thereby to win public favor. Back in 1901, 1902 and 1903, just preceding the Louisiana Purchase Exposition, an ordinance was presented authorizing the construction of elevated tracks, connecting the Eads bridge with the elevated railroad on the river front. This would have enabled the passenger tracks using the bridge to be handled without passing through the tunnel operated in connection with the bridge. The ordinance was defeated. Subsequently, as an agency for solving the entire terminal problem, a Municipal Bridge and Terminal Commission, composed of public officials and prominent local business men, was created by the city council. After a series of conferences

with this commission, the officers of the railways agreed to absorb the terminal charges at St. Louis, except on traffic originating within 100 miles. This being satisfactory to the Bridge and Terminals Commission it recommended that the roads should now proceed to improve and enlarge their physical facilities. The Terminal Association, therefore, bought a large tract of land, known as the Rankin tract, and ordinances were introduced looking to the development of this property at an outlay of about \$2,000,000.

The Terminal Association was now met with attacks of two kinds. It was denounced as a monopoly, and suit was brought in the federal court to dissolve it. The ordinances for the development of the Rankin tract were defeated in an effort to compel the railways to absorb the terminal charges on traffic originating within the 100-mile zone. The people of St. Louis repeatedly were warned that the main effects would be to prevent adequate development of their railway facilities. It was pointed out that it was to their interest that the question of the absorption of the "arbitrary" should be taken before the Interstate Commerce Commission, and that meantime the roads should be allowed to go ahead with their development plans. President McChesney of the Terminal Association gave figures showing that while the freight traffic of the city had more than doubled its terminal facilities had remained practically at a standstill, notwithstanding the efforts to enlarge them. These arguments were of no avail.

The proceeding for the dissolution of the Terminal Association finally went to the Supreme Court of the United States. It held that the Terminal was an illegal monopoly, but that it could bring itself within the law by admitting to its facilities at a reasonable compensation any line that wished to use them. This decision has as yet had no practical effect, for no railway has since applied for admission. The court also indicated that the question whether the railways should absorb all the terminal charges was one for the Interstate Commerce Commission. The matter was then taken before the commission, which held last February that the so-called "arbitrary" within the 100-mile zone was reasonable and legal. In other words, all the efforts to "hold up" the Terminal proved futile.

Since the decision of the commission approving the "arbitrary" the city, through its public service commission, has manifested a willingness to co-operate with the railways. It seems, therefore, to be only a matter of time until the conditions at St. Louis will be greatly improved. But it would have been better for St. Louis if it had heeded the dictates of reason and fairness, as expressed by its Municipal Bridge and Terminal Commission some eight years ago. And other communities can best avoid causing similar delay in the expansion of their railway facilities by pursuing a policy the opposite of that which St. Louis pursued for so long.

NEW BOOKS

Purchasing, Its Economic Aspects and Proper Methods. By H. B. Twyford. Size, 6 in. by 9 in.; 230 pages, 112 diagrams and forms. Bound in cloth. Published by D. Van Nostrand Company, New York. Price \$3.

The author of this book speaks with the authority of experience gained in the purchasing departments of the Otis Elevator Company (with which company he is at present connected), J. G. White & Co., and the Underground Electric Railways of London. The book contains 15 chapters, these being arranged under the following heads: purchasing, the purchasing organization; the operation of the purchasing department, and purchasing as practised. The first section relates primarily to the importance of the purchasing function. The chapters in the second division consider the position of the purchasing agent and treat in brief of the work to be done by him and his assistants. This work is classified under the following heads: the obtaining and recording of information; the actual purchasing; the recording and checking of invoices; and in the case of the purchasing depart-

ments of some companies, there may also be included the functions of traffic, inspection, and the receiving and storage of materials. These elements and their sequence are shown also in graphic form. The third section, dealing with the operation of the purchasing department, enlarges upon this and treats in detail of the methods followed in the well organized purchasing department. The fourth division, which supplements it, relates, in particular, to the methods used in the purchasing departments of the Otis Elevator Company, J. G. White & Co., and the Underground Electric Railways, the chapters in both divisions being well illustrated with about 100 specimen requisition, order and other forms. The book apparently does not aim so much to train the purchasing agent as it does to show wherein the work of that officer can be simplified and applied in the most effective manner.

Railroad Accounting. By Wm. E. Hooper. D. Appleton & Co., New York and London. 641 pages. Price, \$2.*

According to its title, this is a book which deals with nothing but railroad accounting; and railroad accounting in the United States at that. According to its form, it is little more than a reprint with running commentary of all the instructions issued by the Interstate Commerce Commission for the compilation of the statutory reports which they require from every railway company. For all that, it may be heartily commended not only to railway accountants but to every railwayman in this country who wants to master his own profession.

The author does not specify his own qualifications on the title-page, so it may be as well to say that he is an "associate editor" of the *Railway Age Gazette*, and that not much happens on American railways without being known in the office of that journal; and that—as he tells us in the preface—he has been helped by Mr. Cunningham, who has the unique position of being at once a professor and an active railwayman; by Mr. Mahl of the Southern Pacific, the *doyen* of all railway accountants; and by Mr. Trumbull, who has risen from being accountant of the Colorado & Southern, to being chairman of the board of two great railway companies. So we may be sure that the book is worth very serious attention. For Mr. Hooper and those who have helped him are all much more than accountants in the narrow sense. They are all men trained in the use of figures, who know that figures are indispensable for "disciplining the property." And they can be trusted to make figures their servants, and not their masters; to remember, according to the old phrase, that, though figures cannot lie, liars can figure; to assume, in Mr. Hooper's own excellent phrase, "an attitude of sceptical good fellowship with the figures that are used."

It is, of course, impossible within the limits of a review, to attempt detailed comment on a book of this kind. English railwaymen who criticized our new form of accounts on the ground that it was too voluminous, may perhaps be surprised to find that the corresponding American form consists of nearly 800 "primary accounts," and that the instructions drawn up by the Interstate Commerce Commission as to what items are to be included under each heading constitute in themselves a considerable volume. And in the near future the commission proposes to elaborate these accounts still further by including the costs of freight and passenger services respectively, figures which are already published by some railways and prepared by most for their own information. Mr. Hooper discusses at considerable length the question of how far cost accounting is carried and can be carried; and the extent to which such figures, if and when worked out, are useful to the manager and the public control authority respectively. And by the way it may be mentioned that he appreciates one point in which our English accounts are superior to the American, namely, that on certain large items of expense the wages costs and the material costs are entered separately.

One of the most interesting points in the book is the discussion of the eternal and insoluble question of the proper treatment of

*This review is reprinted from *The Railway Gazette* of London

additions, betterments, obsolescence, and the "costs of progress." In this country till very recently all additions and betterments were, speaking broadly, charged to capital. In America, however far the practice on poorer or less honestly managed railroads may have fallen short of the theory, the ideal was that net revenue should yield a dollar for dividend and a dollar for betterments; and the betterments dollar was ploughed into the road through the maintenance accounts, and no trace of its presence appeared in the balance sheet. Nowadays the practice is very different. The Interstate Commerce Commission requires—and, through its right of inspecting the accounts, can enforce its requirements—that nothing shall be charged to maintenance beyond actual replacement. If an engine costing \$10,000 is scrapped, and a new engine costing \$18,000 is substituted for it, only \$10,000 must be debited against operating expenses. And so, if a bridge of steel or stone replaces a wooden trestle, the cost of a new trestle alone is a working expense. The additional cost must be shown as "additional investment." Whether the company issues new capital to pay for it, or charges it against income, is still left to the directors to decide; but the main point on which the commission insists is that the accounts shall show clearly what the net revenue of the company is after charging against current income everything that can be included as maintenance proper, but nothing more.

It is evident that the whole of the net revenue so obtained is available for dividend if the company thinks fit so to apply it. Such application is no doubt unwise. No company can devote its revenue wholly to dividend without having cause to regret its action sooner or later. But here in England no one has yet doubted that undivided profits put back into the business belong to the shareholders just as much as the property purchased with the capital originally subscribed. In America, on the other hand, this position is very seriously challenged. The attitude of the public authority is this: railway companies are an agency of the nation; they are employed by the nation to execute a public function on condition that they may charge reasonable rates and earn, if at these rates they can do so, a reasonable return on their money. If they earn, say, 7 per cent dividend, that is reasonable. But if they earn 14 per cent and can afford, after taking 7 per cent for themselves, to pay another 7 per cent into betterments, that implies an unreasonable return obtained by charging unreasonably high rates. The extra 7 per cent, therefore, cannot in equity belong to the shareholders. They might later on issue capital against it, and pay 7 per cent dividends on this new capital also. To all time it must, however, belong to the public, who are entitled to claim that the railroad company should hold it in trust for them as a fund out of which the railroad can be improved for the public benefit without further cost to the public in the shape of dividends on new capital. The position is curious. *Prima facie* the contention of the public authorities seems not without force. On the other hand, there is nothing either in law or in equity to prevent the company dividing the full 14 per cent. It is clearly more in the public interest that they should divide only 7 per cent. And the claim of the public authority seems in effect to amount to penalizing the railway company for acting in the public interest.

The latter part of the book gives a very full account of the auditing and accounting organization of the American railways, the details of which will naturally appeal to specialists. But scattered all through the chapters are to be found many shrewd remarks showing what may be done by treating figures with "sceptical good fellowship." On the whole it is quite safe to say that no railwayman, whatever be his department, can fail to find this book interesting, or fail to profit by reading it. Scientific scepticism is an admirable attitude of mind, and we all need to be shaken up and made to think what is behind and what has gone to the compilation of the summary figures which we are apt to take for granted as simple and positive facts.

W. M. ACWORTH.

Letters to the Editor

SAFETY FIRST SUGGESTIONS

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

As railroad inspectors are primarily employed to insure safety, would it not be well to designate them as Safety Inspectors; for example: Car Safety Inspector, instead of simply Car Inspector; Track Safety Inspector, in place of Track Walker; Signal Safety Inspector, instead of Signal Inspector? I would also suggest furnishing these inspectors with badges or shields with their respective titles inscribed on them. It is believed that by following a plan of this kind, whereby inspectors would be placed in a special "Safety" class, it would not only have a good moral effect on the individual inspectors but on the other employees with whom they came in daily contact. As car inspectors mingle with the traveling public at terminals, it is also believed that the "Safety" badge would attract attention and tend to insure confidence in the management of the road. Quite often inspectors are called before public investigation committees, etc., and if it were brought out that they were safety inspectors, employed solely for the purpose of safety, it might have some weight in favor of the railroad company.

O. R.

RAILROAD MORTGAGES

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In regard to an article in your issue of June 8, 1915, headed "A Recent Development in Railroad Finance," by George A. Clark, I take the liberty of differing with Mr. Clark, as to the statement he makes in the table headed "Comparison of salient provisions in latest type of railroad 'blanket mortgage' bonds."

Opposite the title "Authorized Issue" under the N. Y. C. & H. R., C. M. & St. P., and N. P., he uses this language: "Limited to three times outstanding capital stock." I think that if he will refer to the mortgages of the New York Central & Hudson River and the Northern Pacific, he will find that the language contained in those mortgages is not the language he has used. The mortgage of the Chicago, Milwaukee & St. Paul, in conjunction with the supplemental mortgage, also does not contain the limitation named. The New York Central & Hudson River mortgage, under article 1, has the following language:

The authorized issue of bonds under this indenture is limited so that the amount thereof at any one time outstanding, together with all outstanding prior debts of the railroad company, after deducting therefrom the amount of all bonds reserved under the provisions of this indenture to retire prior debts at or before maturity, shall never exceed three times the outstanding capital stock of the railroad company.

As I interpret that language, under certain circumstances, the limit could be three times the outstanding capital stock, but under other circumstances it could not equal three times the outstanding capital stock, for if the prior debts to be added are greater than the prior debts reserved for under the mortgage, then the authorized issue under that language would be less than three times the capital stock, and I think that the language used in the other mortgages is of a similar nature.

The language used in these mortgages cited was evidently intended to comply with the savings bank law of New York, and if the law is examined, it will be found that the language used is practically the same as that used in the law. The savings bank act does not say that the authorized issue is limited to three times the outstanding capital stock but states that

The mortgage shall not authorize a total issue of bonds which together with all outstanding prior debts of said company, after deducting therefrom the bonds reserved under the provisions of the mortgage to retire prior debts at maturity, shall exceed three times the outstanding capital stock of said company.

KENNETH G. WHITE,
White & Knoble.

Training of Young Men With Reference to Promotion*

A Powerful Directive Influence in Selecting, in Training, and in Promoting Men Is Absolutely Necessary

By GEORGE M. BASFORD

Chief Engineer Railroad Department, J. T. Ryerson & Son, New York.

A railroad president recently made this observation and asked this question: "What troubles me most is the question of promotion of men to subordinate executive positions. I don't know who should be promoted and my department heads don't have proper confidence in their own recommendations. Can you suggest a way to promote men intelligently?"

American railroad officials have attained their positions either because of or in spite of the conditions under which they came to the front. These paragraphs are based upon the opinion that they have come to the front in spite of unfavorable conditions. They are also based upon the belief that railroad problems of the immediate future will create demands for ability beyond the possibility of present methods to supply. They are further based upon the conviction that the selection, training and promotion of their personnel is the problem of supreme importance before railroads today. The object of your speaker is to reveal this problem and show how it may be solved by inspired leaders of a railroad organization.

The time-honored method of waiting for executive force and leadership to reveal itself in the ranks has produced magnificent men, but this method will not meet the great need now coming upon us. It is inadequate. It will result in a famine of leadership. It belongs to the past days of relatively small things. You must make men. You can not afford to wait for them to make themselves.

On the other hand, the plan adopted by some railroads a generation ago and now coming to new life—that of training young men, usually college men—announcing that they are being trained for official positions—is unquestionably wrong in principle and is doomed to failure. With some notable exceptions, it has failed generally, and for a very definite reason it is sure to continue to fail. West Point and Annapolis plans are ideal for the army and navy, because enlistments in the rank and file are for limited periods and the majority of recruits leave the service in early manhood. It is, therefore, necessary to train many young men specifically as officers of the army and navy. Success of railroads, however, largely depends upon the permanent enlistment of its rank and file. This changes the entire problem. It is from the ranks of enlisted men in railroad service that most of you have come. It is from the same source that nearly all of the great railroad leaders of the time have come. It is from the rank and file that the very greatest leaders of the world have come. Railroads will fly in the face of history of achievement if they forget this fact. It is safe to predict that the same source will supply the even greater leaders that the future will require. When you announce that young college men are being trained for official positions, you slam the gates to advancement in the face of the man in the ranks. This plan has brought exactly this result on one of our great railroads. It is not fair to the college men. It is not fair to the rank and file.

Great works require great leaders. Great leaders require perfection of training in the ranks. Perfection of training in the ranks in turn produces and develops great leaders. Therefore, it appears that the men in high authority today will leave the legacy of greatest value to the future if they properly attend to the training of the recruits coming into the ranks.

For success, all large business organizations must depend upon ability, fitness, training and loyalty of men in the ranks

and of subordinate executive officials. Because its organization is scattered over thousands of miles, this is particularly true of a big railroad. Picture your own position as a railroad officer if you could depend upon the individual shopman, trackman, yardman, brakeman, conductor, fireman, engineer, despatcher, agent or clerk to do the right thing at the right time and intelligently to devote the hours of his day to that part of your problem for which he is responsible! You would have time to think and time to plan. Your mind would be free for the larger tasks and larger opportunities before you. Your desk would not be piled high with the useless official literature of today, the burden of which is, "Please explain." Today we are looking for the genius and are overlooking the production of good workmen. We are depending upon officers. We need to depend upon men. Trained, properly educated and encouraged workmen will provide good officers later.

Whereas greatest care, deliberation, study, specification, test or guarantee are applied in the purchase of property, rails, equipment, machinery or material and the highest officials interest themselves in the purchase, the prevailing custom is to leave selection of new employees to mere chance. It may happen that the future chairman of the board will in his first entrance into the service be hired by a clerk, or that one capable of development to such an office may be rejected by a clerk. High-priced officials buy your locomotives and your rails. Who buys your men of the future?

Solution of this problem begins with the selection of men in the ranks. Systematic methods of selecting human material for the organization are imperative. The boys in offices, in shops, and all along the road should be most carefully and intelligently selected. Some one well qualified must be given this responsibility. Then these recruits must be tried out, and those "making good" must be trained. This word "trained" represents a new meaning as applied in this connection. It means thorough education of hand and brain and conscience. Selection is important in all organizations, regardless of size. The larger the organization, however, the more important is the matter of training. Training through apprenticeship is imperative. It may not safely be deferred. You will not be able to hold your own in railroad progress without it. For example, how will you keep up with requirements in locomotive-boiler construction and maintenance without apprentices in your boiler shops? You need workmen who are better informed than the foremen used to be. This is true of many trades and many positions in railroad service.

It is believed to be perfectly practicable to provide thorough training for boys and young men in every department of the railroad. Each should be trained and encouraged to develop and advance as far as he can go. For shop recruits the way is clear, through apprenticeship and apprentice schools. This has already been worked out on several railroads. The Santa Fe today has 877 shop apprentices in nine separate trades at forty-one shops. They are under instruction by shop instructors, through whom they are learning their trades. In company schools in working hours these boys receive mental training and development in lines corresponding with their work. The school instructors are company employees who have developed an educational plan so satisfactory as to merit the attention of the professional educators of highest standing. The shop and school instructors are selected and trained most carefully. They are expected to, and they do, exert a powerful moral in-

*An address recently made before a meeting of the Burlington Association of Operating Officers.

fluence over the boys. After eight years of continual growth, the Santa Fe will this year graduate 175 of these boys into the ranks of competent, educated workmen, and this is only a beginning. Ask yourselves whether or not your official load would be lightened if you had 175 trade trained and educated workmen launched into your organization each year. In eight years the road referred to has graduated 651 of these competent reliable young men. Seventy-one per cent of these youths are now in the service. If only half of these remain in the service a promising start has been made.

With a suitable plan of promotion a large proportion will remain in service, and that curse of railroads—the floater—will be displaced by the steady, reliable workman you all want. At a shop on another road where apprenticeship has been established eight years, and where 1,500 men are employed, but 57 men of mechanical trades have left the service in a year.

Because the boys are supervised and trained in groups, training in mechanical trades is relatively easy, but boys in every department may be trained if an officer high in authority issues the order that every one on the road must see to it that the employee immediately below him in rank is trained and prepared for promotion. This applies to offices, stations, yards, and everywhere else. All employees will some day be told that they must not expect promotion until they have properly trained and educated their own successors. You will all agree with this, but are you doing it? Every shop and large office building will some day have its school and every road will some day provide educational schemes for outlying points by correspondence. Every road will also some day provide an officer whose duty is to scour the cities and the rural districts along the line for boys of the right sort.

Clerks are a neglected crowd of competent and incompetent men—usually in blind-alley jobs with no training and no outlook. You can not afford to have any blind alleys on a railroad. Many of these clerks would make good station men if they had a friend and a chance, just as many good shop boys would make excellent firemen and roundhouse men. Don't forget that many of the best high officials of our railroads have been clerks. They did not rise because they were clerks, but in spite of that fact. The development of this idea has no limit, but two factors are absolutely necessary to successful accomplishment. One of these is an adequate, complete and systematic scheme of promotion. The other is an inspired officer, very close to the president of the road, as organizer and administrator of the training and promotion of men. Let us speak of this officer first.

There can be no better foundation for an organization than the principle that the ranks, if carefully recruited, will necessarily contain the men of the future. The men are there. We must turn on the light in order to find them. The men of the future must be discovered and promoted. Because of the size of a railroad organization it is necessary to provide easy and automatic methods of discovering ability. It is desirable that promotion should be proposed by co-operative action by subordinate officials and controlled by a very high official whose authority is complete in this case. Suppose the president of a railroad could find a man qualified for the duty of directing the training and promotion of men. The difficulty in finding such a man emphasize the importance of the duty. This man should be given a dignified, powerful position, with such a title as "assistant to the president." He should be responsible for methods of recruiting, methods and means of training men, and for a scheme whereby he will personally know that every promotion is based upon merit, with favoritism and politics banned. He should be responsible for and personally approve every promotion in the entire organization. To do this with intelligence, periodical individual surveys of the organization should be made, say, every six months. This was done with success by L. G. Parish for his department when superintendent of motive power, and the scheme is adaptable to all departments with practically no limits.

The cards used by Mr. Parish have been mentioned and described publicly before and are worthy of your earnest attention. This is the personal record card and these are the definitions of terms accompanying it:

NAME.....	AGE.....			
EMPLOYED AT				
AS				
	Very Good	Good	Medium	Poor
EDUCATION				
SPECIAL KNOWLEDGE.....				
EXPERIENCE				
HONESTY				
MORALITY				
TEMPERANCE				
TACT				
RESOURCE				
RELIANCE				
FORESIGHT				
APPEARANCE				
MEMORY				
ENERGY				
INITIATIVE				
PERSISTENCE				
ASSERTIVENESS				
DISCIPLINE				
PROMPTNESS				
ACCURACY				
SYSTEM				
ORGANIZATION				
EXECUTIVE ABILITY.....				
SIGNATURE.....				
DATE.....				

DEFINITIONS

EDUCATION: Mental and moral training.
 SPECIAL KNOWLEDGE:
 EXPERIENCE: Knowledge acquired by actual trial and observation.
 HONESTY: Upright disposition or conduct.
 MORALITY: Accord with the rules of right conduct.
 TEMPERANCE: Moderation.
 TACT: Ability to do or say what is best for the intended effect.
 RESOURCE: Good at devising expedients.
 RELIANCE: Sure dependence.
 FORESIGHT: The act or power of foreseeing.
 APPEARANCE: Outward look or aspect
 MEMORY: Mental hold on the past
 ENERGY: Active, Effective.
 INITIATIVE: The ability or disposition to take the lead.
 PERSISTENCE: Steady or firm adherence to, or continuance in, a state, course of action, or pursuit that has been entered upon.
 ASSERTIVENESS: Affirming confidently; positive.
 DISCIPLINE: To teach rules and practice and accustom to order and subordination.
 PROMPTNESS: Quickness of decision or action.
 ACCURACY: Correctness.
 SYSTEM: Regular method or order.
 ORGANIZATION: A systematized and regulated whole
 EXECUTIVE ABILITY: Ability to carry into effect in a practical manner.

Mr. Parish issued exactly enough of these cards for all employees in the department except laborers. These were filled out by foremen, for the men under them; by general foremen, for the foremen; by master mechanics, for general foremen; by roundhouse foremen, for their men; by road foremen of engines, for firemen; by chief clerks, for clerks, and by every under official for those immediately reporting to him. This extended all along the line up to his own position. He personally kept the cards and compared the reports from time to time. No official was allowed to keep records of his opinions of his subordinates, and it was soon clear that the officials were undergoing a course of training in observation of their men. The manner of making out the cards reveals the difficulty in getting people carefully and systematically to estimate the value of the

work of their subordinates. Some time is required to train officers properly to make out these cards. This fact emphasizes the value of the cards.

It is hard to tell about a man whom you do not really know. For example, when one of these cards is filled out by a foreman, suffering on that particular day with rheumatism, everything takes on a somber hue and under such conditions the foreman's opinion of a subordinate is not normal and not fair. In other words, the estimate of the good and poor qualities of the subordinate is likely to be colored by the condition of mind of the one who makes the estimate, at the time he makes it. An officer, until he has made a very careful study of a subordinate, is quite likely to mark up some of these personal characteristics differently at different times, according to his own moods. When these cards are examined and compared with those previously issued for the same individual, it may be found that the officer has recorded on one card that the subordinate is "very good" as to tact. On the next card six months later he may mark the same individual "poor" as to tact. This means that the officers making the records need training in studying their own men. Let me suggest that you fill out these cards for your own first assistant. Lay the cards aside and repeat the operation three months later. One of the best results to be obtained by the cards is to compel, and check up, this intimate study of individuals. It is perfectly clear that today promotions are made without any such study. The difficulty indicates the great importance of improvement of methods of promotion.

A part of the scheme was the general announcement that the standing of an officer was affected by the records of his men, by the improvement of those records, and by the number of men under him that were promising for promotion. All promotions were made from these records which in a large measure revealed the capacity of men for the particular promotion recommended. This scheme was carried out for a length of time sufficient to prove its value before Mr. Parish left the service. It is unnecessary to elaborate the method of application of this principle to other departments. It is sufficient to state that upon one occasion this scheme prevented the promotion of a worthless youth simply upon the ground that the official recommending the promotion wished to marry the lad's mother.

Do not misunderstand this card. It is not a blacklist of any kind, but a record of virtues with intent to use them for promotion. It will reveal weakness, but with intent to overcome it. A very broad man must dictate the policy of handling the cards. He must not be one to look for trouble, but to look for light. Then the cards must be kept as if sacred by the heads of departments. Note that this plan requires no bureau, not even an additional clerk, and no red tape. In the form shown it is not final, but may be varied to suit any conditions of employment.

Our assistant to the president need not personally watch all these cards. He should, however, by frequent checks know positively that every department head is watching them, and he should personally keep the records of all important officials. He should also require record cards for a long period to accompany a recommendation for promotion. For example, a vacancy as assistant superintendent is to be filled. The assistant to the president would call on all interested departments for recommendations and the office would be filled after an intelligent and complete investigation of all eligible men, including the mechanical and track as well as the operating department. The plan should cover every department. If you are to have the mechanical officials you need for future problems you must consider them for promotion into operating positions. Railroads are already paying dearly for neglect of their mechanical men. Of course, the jobs to which promotion is to be made should also be analyzed as well as the men who are to be promoted and misfits thereby may be avoided.

How about the college man in railroad service? College men are needed on railroads, but they will be most valuable if they come from the ranks or through the ranks. If you establish

trade apprenticeship wherever your boys may be grouped, as in the shops, and other methods of training boys who can not be grouped; if you require these boys to attend schools, either day schools on company premises and on company time or night schools directed or controlled by you, you will soon have a lot of earnest youths honestly endeavoring to improve themselves. If you select the best of these as candidates for courses in colleges or technical schools, you will certainly have at hand the best possible raw material from which to make college men. Moreover, they will be of and from your organization. You will know them and they will have already established themselves as a part of your organization. Send a few such youths to college and they will return splendidly equipped for your service.

Your speaker believes that railroads should offer scholarships in technical schools as rewards to youths in the service. It would cost \$1,200 per year for a scholarship each year as a reward for the best personal record among the apprentice or other boys on your road. Three hundred dollars a year, with a little money earned during vacation, will see a boy through college. Send one of your own boys each year, require him to work for the railroad during vacations and require him to return to the service for two years after graduation. You will have four boys at college all the time and one graduate each year. These graduates will be college men of great value to you. You may not retain all of them in service, but this plan will enable you to offer college courses as a stimulant for ambition to the recruits in your service. This may be worked out in the form of prizes for young men in all departments of the service. As an investment, it would pay to send several boys each year.

For twelve years Joseph T. Ryerson & Son scholarships have been available for boys from the ranks in railroad service. Three fine young men have enjoyed the advantages of a four-year course in mechanical engineering. The more young men of this sort you have in your service, the better for you. The American Railway Master Mechanics' Association provides several scholarships. Why don't you send boys from your ranks to college?

Training of men will cost something. It has, however, been demonstrated beyond question that it pays from the very start. It will pay in every department. The instructor in shop trades pays for himself from the very first day in the damage saved in machines and materials. At the Montreal works of the American Locomotive Company apprentice boys became efficient as workmen at the end of the first year. Wherever apprenticeship with real training and apprentice schools have been accorded a fair trial, the results have fulfilled most sanguine expectations as definite examples would prove if time permitted of their presentation.

These words, from a report of a Massachusetts commission on industrial training, represent the need in all departments of a railroad as well as they apply to the manufacturers of this country.

"In many industries the processes of manufacture and construction are made more difficult and more expensive by a lack of skilled workmen. This lack is not chiefly a want of manual dexterity, though such a want is common, but a want of what may be called industrial intelligence. By this is meant mental power to see beyond the task which occupies the hands for the moment, to the operations which have preceded and to those which follow it—power to take in the whole process, knowledge of materials, ideas of cost, ideas of organization, business sense, and a conscience which recognizes obligations."

Train your men in every department. This can not be made too emphatic. You will fail in your mission in life if you don't. You will leave a priceless legacy in the form of an organization replete with human efficiency and, therefore, human happiness, if you do. Train your rank and file and this great railroad organization will be a pyramid resting upon its base. A pyramid is typical of the structure of an ideal organization built to endure. It has a broad, firm base as a foundation. In the human

organization this foundation is the men in the ranks. If the men in the ranks are what they ought to be, the top will take care of itself. If only the top is right, the structure is unsafe. When you raise the rank and file you lift yourself also. You can't be a master of efficiency unless the men you trust to carry out your orders are efficient. The organization is strong as the ranks are strong in the old-fashioned virtues—skill, industry, economy and integrity.

To the man in the ranks the future looks hopeless with increasing intensity as organizations grow larger. Do something for him. Recognize the individual whom you as officers seldom or never see. Save the souls of men of the kind the world needs by simple encouragement, by recognition of merit, by looking for it, by recording it, and by rewarding it. Employers are responsible for many lost souls and ruined lives just because of neglect of the subject of this talk.

The path has already been blazed. The pioneer work has already been done, but thus far the complete plan here suggested has never been carried out. Remember that while this plan is really simple in principle, its inauguration and operation can be entrusted only to an inspired and powerful official, and one capable of handling it is not easily found. This fact indicates the tremendous importance of the question of training and promotion. It is a great undertaking as measured by the certain results, but the plan itself is simple and the expense is negligible.

There is no greater work in the world than to help those who desire to help themselves. There is no nobler task than the training of young minds. But experience has shown that training alone is not sufficient. A powerful directive influence in selecting, in training and in providing the organization for men who are trained is absolutely necessary. To show the necessity for and the possibility of providing this influence is my object.

HEARING ON ADVANCES IN WESTERN PASSENGER FARES

The hearing at Chicago before Examiner Thurtell of the Interstate Commerce Commission on proposed advances in western passenger fares which was begun on July 6, was concluded on Saturday, July 17. Reports of the testimony presented during the first week of the hearing were published in the last two issues of the *Railway Age Gazette*. The second week of the hearing was mainly devoted to the introduction of exhibits by representatives of the protesting state railway commissions and cross-examination by the attorneys for the roads.

C. W. Hillman, president of the Mutual Audit Company, who, as reported in last week's issue, testified on behalf of the protesting state railway commissions, making a separation of the freight and passenger expenses of seven of the roads in the case, was subjected to a vigorous cross-examination by Charles Donnelly, assistant general counsel of the Northern Pacific. Mr. Hillman's figures had shown the operating ratio in the passenger service of these roads as only 68. He said he had been surprised himself to find that the ratio of expenses to revenues in the passenger service was less than in the freight service. Mr. Donnelly brought out the fact that although he had made a separation of expenses between various classes of service in several other cases against railroads he had used different formulas in almost every case. While he had used six different bases of separation between freight and passenger expenses in his exhibits, he said that he had a strong personal preference for the gross weight basis, which he had used for the separation of most of the accounts.

"Upon your gross weight basis of dividing freight and passenger expenses," said Mr. Donnelly, "if we had a 3,000-ton freight train moving at 15 miles per hour and a 500-ton passenger train moving at 40 miles per hour, you would charge the passenger train with only one sixth as much expense as you would the freight train." Mr. Hillman replied in the affirmative, saying he had made no allowance for the element of speed, because there were some compensating factors on the other side and he had made no investigation as to the effect of speed.

Mr. Hillman had divided all of the maintenance of way and structures expenses between wear and weather, attributing 17½ per cent of the expense of renewing ties, 10 per cent of the rail expenses, 15 per cent of bridge expense, and 25 per cent of the account for cattle guards, fences and signs, to wear. He said that portion of the expense attributable to wear should be divided between freight and passenger on the basis of the use, but that the portion attributable to the weather could not be divided on the basis of any operating factor. He preferred the revenue basis, but said that that had been largely discredited. Therefore, he had used the net ton mile basis for dividing the expenses due to weather. He had attributed 52 per cent of the total maintenance expenses to weather, and this method resulted in assigning to the passenger service only 2 per cent of the cost due to weather and to the freight service 98 per cent. He said he had taken his percentages for wear and weather from figures used by the Wisconsin Railroad Commission, with some modifications of his own. Mr. Hillman said that the railroads had used antiquated methods in dividing their freight and passenger expenses, whereas he had endeavored to keep up with the latest developments on the subject. Mr. Donnelly asked if any railroad man had ever used a method more crude than that of assigning a fixed percentage of the ballast, or tie, or bridge expense to weather, regardless of different conditions on different railroads. Mr. Hillman said that the basis was not absolutely dependable, but that he had taken it as an average. Mr. Donnelly brought out the fact that the figures presented by the railroads in the passenger case as to the comparative cost of passenger service are the same as were presented in the freight case. Therefore, if they redound to the benefit of the roads in this case, showing passenger costs too high, then they would have been to the disadvantage of the roads in the freight case. He also contended that the witness had reversed methods he had used in the recent western freight rate case, and had made numerous deviations in his oral testimony describing his methods from those outlined in his written statement of his methods and percentages. "In the freight case," said Mr. Donnelly, "you found the passenger expenses 31.02 per cent of the total for November, 1914, for the Chicago & North Western. If you had used the same basis in this case the passenger expense for the North Western would be \$1,058,647 higher than you showed in the passenger case exhibit. If you had used the same basis in this case as in the freight case the North Western ratio of passenger expense to revenue would be 77 per cent, instead of 72 per cent." Mr. Hillman admitted that the difference in his methods would make a difference of about 5 per cent. Mr. Donnelly also showed that the witness had charged freight with all non-revenue freight, but charged passenger with no non-revenue passenger business, thus reducing its cost. He had also used a different basis for dividing the maintenance of way expenses than he had used for dividing the maintenance of equipment expenses, with the result that in each instance less was charged to the passenger service. It was also shown that the witness had charged all special train miles to freight and all officers' cars to freight, showing none of their expense in the cost of operating passenger service.

U. G. Powell, rate expert and accountant for the Nebraska Railroad Commission, presented an elaborate exhibit to show the comparative cost of operation of through and local trains, but his figures were limited to the direct train costs, in which he included only fuel and wages of train crews. His figures showed that it cost more to handle local passengers than through passengers, but he contended that this was offset by the more expensive character of equipment in the through traffic. His figures were based on an analysis of the accounts of the Chicago & North Western for 14 days, and of the Chicago, Rock Island & Pacific for seven days in 1915, and showed that for the two roads combined the average train cost per passenger mile was 5.9 mills for local trains and 4.83 mills for through trains. For the North Western the combined cost of through and local trains was 4.97 mills and for the Rock Island 5.4 mills. For the Rock Island the average cost of through passengers per mile was 5.33

mills, and for local passengers 5.69 mills. These figures excluded suburban passengers and passengers in mixed trains.

W. E. Reed, attorney general of Nebraska, asked the witness his opinion as to whether the railways are earning a fair return on their property. "In my opinion," replied Mr. Powell, "the roads are making a fair return on the value of all their property which represents a sacrifice on the part of the investor, but if the courts finally hold that they are entitled to a return on all of their property, regardless of the source, I would have to change my opinion." This remark caused a commotion among the representatives of the states. Mr. Reed said he thought the witness misunderstood his question. Mr. Powell said he would limit his statement to the six roads of which he had made a study, including the Missouri, Kansas & Texas; Chicago, Milwaukee & St. Paul; Chicago & North Western; Chicago, Burlington & Quincy; the Atchison, Topeka & Santa Fe, and Chicago, Rock Island & Pacific. Mr. Thorne then fired a volley of questions at him in an effort to impeach his qualifications to speak at all on the question of return on value, while representatives of other states interrupted with additional questions. "Is this cross-examination or impeachment of your witness?" asked Attorney H. A. Scandrett of the Union Pacific.

Mr. Powell said, that in his opinion the higher cost of hauling passengers a short distance did not justify a different fare on that short haul business, but that a road should be considered as a whole. Mr. Scandrett brought out that his exhibit showed that on passenger traffic for hauls of less than 50 miles the cost was very much higher than for the longer hauls. His question as to whether this justified a higher charge on the short hauls aroused a protest by representatives of the state commissions, but after a ruling by the examiner Mr. Powell stated that there should be no difference, at least until the courts are commissioned to determine the exact difference in cost. Mr. Scandrett also contended that the wage and fuel items included by Mr. Powell in his direct train costs amounted to only about one-fourth of the total expenses.

The next witness was W. M. Sangster, an accountant for the Arizona Corporation Commission, who presented a number of statistical exhibits for 21 western roads for the period 1904-1914. On cross-examination it was found that his figures showed in almost every case a reduction in the number of passengers per mile of line, in passenger revenue per mile of road and in revenue per train mile, although there was a total increase of passenger miles. S. T. Bledsoe, assistant general solicitor of the Atchison, Topeka & Santa Fe, brought out the fact that the exhibit showed that the number of passengers per mile of road on the Santa Fe in 1911, was 143,000, and in 1914 only 137,000. The passenger service train revenue per mile of road was \$3,796, in 1911, but only \$3,671 in 1914. The passenger service train revenue per train mile was \$1.54 in 1911 and \$1.46 in 1914. Mr. Sangster contended that this condition was explained in part by operating conditions. For example, he said, the Santa Fe had constructed a large mileage of line, especially for the freight service, on which few passengers were carried, and that, therefore, the passenger figures per mile of road would be correspondingly reduced. Mr. Sangster also filed an exhibit to show alleged discriminations in the fares to Arizona points.

Other witnesses for the state commissions were M. A. Chambers, an accountant for the Kansas Public Utilities Commission, who presented a number of statistical exhibits to show the amount of improvements charged to operating expenses, and Wayne Ellis, an accountant for the Iowa commission, who presented figures showing what the returns of the railroads would have been if their capitalization had been one-third stock and two-thirds bonds, based on valuations made by D. F. Jurgenson, engineer for the Minnesota Railroad Commission.

Clifford Thorne requested that a large number of the exhibits on behalf of the protestants in the western freight advance case be included as a part of the record in this case, and he made a long statement explaining the bearing of each exhibit on this case, based on his theory that the railroads have decreased their

net operating income in recent years by including in operating expenses a large amount of additions and betterments, and by increasing the rate of renewals, etc., thus raising the standard of the property, and endeavoring to show that the railroads were earning as high a net return as other lines of business.

Mr. Thorne also demanded that the railroad men who had compiled the replies to the commission's list of 18 interrogatories be produced as witnesses for cross-examination. This request was denied by the examiner.

The testimony on behalf of the state railway commissions was completed on Saturday morning, after which E. K. Clink, chairman of the committee representing the International Federation of Commercial Travelers, filed a long statement with the commission, entering a protest against the proposed advances as "unnecessary, inconsistent, arbitrary and an imposition on the traveling public, and a particular hardship on the commercial travelers." The statement was said to be on behalf of a membership of 400,000 commercial travelers, and figures were presented to show that 500,000 commercial travelers, making an average of 50 miles a day for 10 months of the year, would spend in railroad fares an average of \$15,000,000 a month, or \$150,000,000 a year. The statement also declared that 75 per cent of the commercial travelers are on a commission basis and pay their own expenses.

The railroads then put on the stand a number of witnesses in rebuttal. The first rebuttal witness was T. A. Hamilton, supervisor of efficiency of the St. Louis & San Francisco, who criticized the gross ton mile basis of division between freight and passenger expenses used by Mr. Hillman, explaining the engine ton-mile basis used by the railroads, and also the equivalent ton-mile basis recommended by the committee on Economics of Railway Location of the American Railway Engineering Association in a bulletin issued in 1913. These bases, he said, take into consideration the speed of a train, and also the fact that from one-half to three-quarters of the damage to the track is done by the locomotive. He ridiculed Mr. Hillman's division of the expenses between wear and weather, saying that the best engineer ever born, entirely familiar with the conditions on his own railroad, could not apply the same figures to another railroad with any degree of accuracy. He said that the Supreme Court had held that expenses must be divided according to the use, and that the use is measured by weight, distance and speed, which are taken into consideration in the formulas used by the railroads. Mr. Hillman had not taken the effect of speed into consideration in any of his formulas. Mr. Hamilton said that on the engine ton-mile basis, after the principle is once accepted no figures need be estimated, but absolute records can be used. "We do not have to assume as Mr. Hillman did," he said, "an arbitrary average weight of carload or locomotive and then apply a theoretical division to this and get a result carried out to seeming refinement by the use of a large number of decimal places which look like a punctuated box car number." Mr. Hamilton said that the engine mile basis is defective because it makes no allowance for the different types of engines; the train mile basis does not allow for the fact that the engine does the most damage to the track, and that expenses cannot be divided on the revenue basis unless the rates are based on cost.

Frank Nay, controller of the Chicago, Rock Island & Pacific, testified that he checked over Mr. Hillman's figures pertaining to the Rock Island and found an under-statement of \$1,023,803 in the passenger expenses for the year covered, and that there was an over-statement of the net revenue. He also defended the locomotive ton-mile basis as the proper basis of division. Other rebuttal testimony was given by A. L. Conrad, assistant general auditor of the Atchison, Topeka & Santa Fe, and G. R. Martin, controller of the Great Northern.

SOUTH AFRICAN RAILWAYS LINKED UP.—The extension of the Upington railway line to Kalkfontein, north of Warmbad, has been completed, thus linking up the German lines with the Union system. This linking up constitutes a remarkable record, all material having been brought 400 miles.

International Railway General Foremen's Convention

Reports on Rods, Tires and Wheels, Shop Efficiency, Roundhouse Efficiency and Oxy-Acetylene Welding

The first session of the eleventh annual meeting of the International Railway General Foremen's Association was reported in the *Railway Age Gazette* of July 16, page 102, and the report of the committee on valves and valve gearing was given in abstract. The greater part of the first two sessions was devoted to the discussion of this report, which covered 65 pages in the advance sheets. One member strongly advocated the Stephenson valve gear for switch engines because of the variable lead which assists in starting. While the piston valve is accepted as the best all-around valve and is especially desirable on superheater locomotives, some roads have found that the slide valve could be made to work satisfactorily on these locomotives.

There is quite a difference of opinion regarding the use of superheater valve oil on superheater locomotives, some claiming that as good results could be obtained with Perfection oil, which gives less trouble in the gumming up of the air compressor ports. Some members reported favorable results with common gray iron piston valve bushings, while others believed that special metals give enough better service to warrant the additional expense. W. F. Lauer, of the Illinois Central, reported that on a test run with a superheater passenger locomotive fitted with Hunt-Spiller bushings and rings, 266,000 miles had been made using one pint of valve oil for every 65 miles. It was clearly shown that from the standpoint of economical operation it is very necessary to keep the valves in first-class condition, and with that end in view several roads require inspection every 30 days. The use of the piston valve accessories, such as vacuum valves, has been quite generally done away with. Good service records were reported for both the Baker and the Walschaert valve gears. Special stress was placed on the necessity for proper and careful design of valve gears. One of the most important claims made for the Baker gear is the standardization of parts for all locomotives.

RODS, TIES, WHEELS, ETC.

Rods.—One member of the committee on this subject favored the rectangular rod as against the I-beam rod, from the standpoint of maintenance, saying that the rectangular section is much less subject to fracture and that it is about 20 per cent cheaper to make. The material in the rod should be of mild steel, without welds. The forked end rod was recommended by one member, as it is much less difficult to maintain. Regarding the crank pin bearings in the side rod, one member favored the split brass and straps on heavy engines, for the reason that they can be kept to a closer fit than the bushing, and are much easier to keep in proper repair. One road is experimenting on large freight engines with cast iron crank pin bushings with babbit blocks dovetailed in them.

One road has tried both brass and steel bushings for knuckle joints, and has found the steel to be more efficient. It was pretty generally conceded that all rods should be annealed at least every year or two. Among the many causes of broken rods and poor service are the rods being out of tram, the engine being out of tram, rod collars binding on the rod brasses, pins worn out of round, flaws in the straps or rods, engine out of quarter and engine not properly counterbalanced.

One road is using the electric welding process to build up worn places in the knuckle end of the rod and for welding small cracks in the jaws and rods to prevent them from getting larger. Another road finds it expedient to shim the side rod bushings and rebore them, stating that as much as 35,000 miles have thus been obtained on freight engines with but one set of bushings. It was recommended that cotter keys be placed in all main rod keys in conjunction with the two set screws, as too much care cannot be given to the back end main rod keys to prevent them from working out.

Tires.—It is recommended by one road that a lip be placed on all tires to facilitate the setting, and also to prevent the tires from creeping in when they become loose. The rim of the driving wheel centers should be 5 in. wide to give a proper bearing surface on the tire. One road recommends that the wear of the tire in the center should not exceed $\frac{1}{4}$ in., and that flat spots should be limited to $\frac{1}{16}$ in. in passenger service and $\frac{1}{8}$ in. in freight. The minimum thickness to which a tire may be worn will vary in the different services and on different roads. When the tires become thin the brakes should be watched to see that they do not drag. Retaining rings were recommended for passenger engines; the use of shims on new tires was believed to be bad practice. Cut flanges are caused by the driving wheels being out of square with the engine, the wheels out of tram, the side motion not properly distributed, the engine trucks leading to one side and the engine not being level on the frame.

The report is signed by A. A. Masters, chairman (D. & H.); W. G. Reyer (N. C. & St. L.); M. J. Hayes (C. H. & D.); A. D. Clark (C. G. W.); A. B. Corbett (M. K. & T.); W. T. Gale (C. & N. W.); W. F. Lauer (I. C.), and A. F. Taylor (M. St. P. & S. S. M.).

Discussion.—Several roads reported that they were discarding channel rods and applying the rectangular or slab rods on account of the channel rods breaking. On heavy engines a number of the members recommended strap ends for the middle connection, as it is much easier to keep them in proper conditions between general shopping periods, the bushing rods requiring too much labor to renew. Special metal, such as gun metal, has been used instead of brass for rod bushings, with very good success, if it is properly lubricated. Some roads have even used gray iron. Several members spoke strongly in favor of the automatic flange oiler, but it was pointed out that the engineman should be carefully instructed to handle it properly, or that its manipulation be placed in the hands of the engine inspector at the terminal.

Several methods were reported for heating the tires, the cheapest being that where wood was used as a fuel, the wood, of course, being scrap material. The Soo Line reported that tires could be applied at a cost of 16 cents apiece where wood was used for the heating medium. Several roads reported that they were using cast iron for hub liners, while some used no hub liners until the wheels become sufficiently worn, when bronze is used. Some roads place a definite age limit on driving axles and crank pins, believing that after a short time the metal is liable to fail. This, of course, depends on the quality of steel used on the locomotive.

SHOP EFFICIENCY

The greatest factor in effecting and maintaining shop efficiency is competent supervision. Competent supervision, insuring competent workmen, makes it possible for an old shop, with less modern tools and facilities, to not only equal but exceed the output of the modern shop with the latest improved facilities, but poorly supervised. The foreman or the gang foreman who is in direct touch with the individual workman is the man who is largely responsible for efficiency, and his qualifications necessarily must be many. A combination of executive and mechanical ability is to be desired, and if he lacks in either, it is better that his executive ability be the greater.

Close supervision is conceded to be profitable, and no foreman should have under him more men than he can keep in touch with intelligently. He should be able not only to know what each man is doing, but how he is doing it.

Shop Schedules.—No shop can be efficient unless there is a fixed time set for the completion of repairs to the engines. There is no real need of an elaborate schedule which covers the time each separate part of an engine must be finished, but there

is an absolute need of a schedule which allows a certain number of hours for each class of repairs handled, consistent with the facilities. If, by reason of financial depression it is necessary to operate, say a 20-pit shop, with only enough men to properly handle 10 engines, put but 10 engines in the shop and get them out as quickly as possible, as even with the closest kind of supervision and checking of labor and material charges, the cost of repairs on 20 engines handled with a 10-engine force will be way above the usual cost of repairs, when engines are repaired in their usual time. There are a number of logical reasons for this, but I will mention only two: The first and principal reason in a shop which has been working full force under a satisfactory schedule is, of course, the changes which must unquestionably be made in the schedule time, thus disorganizing systems, and making for confusion and its attendant delay.

The second reason is the noticeable relaxation of efforts of the working forces which, under a short schedule, were keyed to a much higher pitch and the need of haste to get work completed on time kept men energetic and active; lengthening of the schedule has seemingly indicated to them that the need of haste has been obviated and that they now have lots of time, and it is a difficult matter to keep them from taking it. Schedule time as short as consistent with conditions makes for efficiency.

Facilities.—Modern facilities make for efficiency and where an improved tool or appliance will show a consistent increased output sufficient to pay a good rate of interest on the investment, it should be bought and installed.

Too often a shop's efficiency is retarded by reason of the initial cost of tools or appliances being considered rather than the ultimate profit that would be made with them. Then again, tools or appliances are purchased because of their price rather than their worth, and because they do not duplicate the output or come up to the standard of some similar tool or appliance, higher priced and of higher efficiency, men in charge are criticized and oftentimes termed incompetent.

Tool Room.—In a large shop where mechanics get their own tools on checks from the tool room, the delay of a minute multiplied by the number of times they occur in a day and by the number of men affected runs into hours, which in turn mean dollars. Therefore, energetic, quick moving and thinking men who know the condition of all tools in their charge, and who do not leave a defective tool where it may get in service are necessary.

Apprentices.—An apprentice makes for efficiency in proportion to the amount of interest he shows and the amount of interest that is taken in him. Select boys with as good an education as possible and who have a real desire to master the trade they wish to follow. Give the boy every opportunity to thoroughly learn his trade. Apprentice schools increase the efficiency in some shops—why not schools in all shops?

Shop Demonstrator.—A thoroughly competent demonstrator in a shop of any size is an absolute necessity. It is through his efforts largely that maximum capacity of machine output is obtained. He is invaluable because of his intimate knowledge of machines, enabling him to break in a new machine or a new operator on any machine which is at all complex. His work is not confined to machines, but to any proposition which needs close checking to insure results.

Store Department.—The store department can increase the efficiency by keeping a stock consistent with the mechanical department's needs and the prompt shipment of necessary material to the unfortunately located foreman of shops at an outside point where only stock common to ordinary requirements is carried. When it is considered that, as stated by G. S. Goodwin, in a paper read before the Western Railway Club of Chicago last February, the average value of a locomotive's services through the United States was \$44 a day, it is problematical whether the cause of efficiency is best served by the store department keeping material so low that at any time it makes for an engine delay. The problem should be given the most careful analysis.

Shop Appearance.—Shops should be roomy and well ventilated, windows so designed and lighting systems so planned that there are no dark spaces and glare of sun or lights so modified that the eyes of employees are not subjected to any undue strain; lockers and toilet rooms sufficient for the convenience of all employees should be installed and maintained in an absolutely sanitary condition.

The report is signed by Geo. H. Logan (C. & N. W.), chairman; J. M. Kerwin (C. R. I. & P.); J. C. Newmarch (N. Y. C. West); C. M. Newman (A. C. L.); J. Miller (I. C.); E. E. Griest (Penn. Lines); F. A. Byers (S. L. & S. F.); Wm. Smith (P. L. & E.), and W. T. Abbington (C. & N. W.).

Discussion.—Most men find that the scheduling of the locomotive parts through the shop is desirable, some roads going into more detail than others. On the St. Louis & San Francisco at Springfield, Mo., a man is assigned to the routing of the material through the shop, and is sort of an assistant to the general foreman. Another man devotes his whole time to checking up material, making shortage reports every day, and keeping after the store department for the material needed. The routing man also makes a daily report and red marks the work that is behind. On the Santa Fe a material man works in conjunction with the shop and store department.

On the Delaware, Lackawanna & Western a special committee inspects and passes on new devices or inventions presented by the employees, and if these devices are accepted for use the employees are paid for them. Other roads obtain the patent rights for the men with the understanding that the devices can be on the roads without the payment of royalty.

ROUNDHOUSE EFFICIENCY

The roundhouse is the connecting link between the mechanical and transportation departments. A well-equipped roundhouse will do much towards strengthening this link, and it is time that more attention be paid to its construction and equipment, so that it may be brought up to the highest state of efficiency. Too much of the details of the construction of roundhouses is in the hands of the engineering department, and too little in the hands of the man who is on the ground, who has to furnish the power for moving trains, and who knows more than anyone what is required for the highest state of efficiency. To the roundhouse foreman belongs the responsibility for engine delays, engine failures, engine mileage, cost of despatching, etc., and therefore his ideas and recommendations should receive the first consideration. Good light, heat and ventilation are important for facilitating roundhouse repairs, for in order to get good results from the employees' conditions should be equal to those of the repair shop. Lockers and adequate toilet facilities should also be provided.

Equipment.—Drop pits for driving wheels, engine and tender wheels should be in all roundhouses where running repairs are required to any extent. An engine may be kept out of the repair shop indefinitely by dropping the driving wheels for repairs to driving boxes, turning tires, etc. Overhead cranes or trolleys should be arranged for removing dome caps, front end doors, bumper beams, etc. Washing out systems effect a great saving as well as protecting the boiler against leaking flues, and all roundhouses should have hot water and plenty of it for washing and filling boilers. Storage tanks, or sumps, should be made large enough to take care of all the water that is blown from the boilers; it should then be used for washing out, reclaiming all of the water by filtration.

There are instances of roundhouses equipped entirely with old tools discarded by the repair shop. This is a short sighted policy. The tools for the roundhouse should be the very best, especially where it is isolated from the repair shop, and it would seem that the repair shop should take the old tools rather than the roundhouse, because the repair shop is in a better position to make repairs to them than the roundhouse.

Roundhouse piping is a subject for consideration. It would seem that the only proper and safe way to install the piping is in

conduits of sufficient size to hold all the pipes and provide easy access should repairs be necessary. No sewer pipe leading from the roundhouse should be less than ten inches in diameter and preferably 12 in. Engine house pits, especially drop pits, not properly drained, dispel an odor causing dissatisfaction among the employees, and are also unhealthy.

There should be two inbound tracks with an emergency run-around track and two outbound tracks. The inbound tracks should be of sufficient length to admit of a water crane a reasonable distance from the entrance so that engines coming in from the road leaking and having low water in the tender can be given water. Otherwise with engines ahead, they will die before getting into the house, causing delay. There should be about 350 ft. between the water crane and the coal chute so that after taking water the engines may move ahead to wait their turn for coaling. There should be at least 600 ft. between the coal chute and turntable to allow for engines standing after taking coal.

To prevent damage to cars by fire from hot cinders pits containing several feet of water are being constructed so that the cinders can be dumped from the engine into the water. The Chicago & Western Indiana load cinders with clam shells, the cinder pits containing water to the depth of 7 ft. The cinders are loaded into cars at a cost of about twelve cents per car. These cinders are sold to the track elevation department for \$3 per car, for which the roundhouse is credited. Water cranes should be located, one at the entrance of the inbound tracks, one on the inbound tracks between the cinder pit and turntable and one on the outbound tracks.

The office and store house should be combined into one building conveniently close to a track for loading and unloading purposes and should be made fire proof.

Cleaning engines, on a number of roads, is being discontinued on account of the expense. This would not appear to be a good policy for the reason that the defects are liable to be covered up and may not be detected by the engine inspectors. There are several mechanical devices for cleaning engines, which bring the cost down so much lower than the hand cleaning, that it does not seem that a railroad can afford to entirely dispense with cleaning.

The report is signed by: N. B. Whitsel (C. & W. I.), chairman; H. W. Ensign (C. G. W.); Chas. Snyder (A. T. & S. F.); E. J. Buckbee (C. C. C. & St. L.); W. S. Whitford (C. & N. W.); S. J. Harper (Y. & M. V.); W. B. Middleton (A. C. L.); and E. R. Butler (C. & O.).

Discussion.—Those roads that are equipped with electric cranes in the roundhouse are very strongly in favor of them, and believe that they are indispensable. Some roads use jib cranes at the posts between the pits. A number of roads also find the use of portable lathes valuable. One road has a satisfactory arrangement of drainage providing settling boxes in the sewer line to catch the waste and sediment. These boxes are cleaned every week at a small cost. Roads cleaning engines by washing with a mixture of oil and water under pressure find that the work is done very satisfactorily. On the Delaware, Lackawanna & Western a large Mikado engine can be cleaned in about 15 minutes, by this process at a cost of not more than 30 cents. A mixture of 75 gal. of water to 1 gal. of oil is used with a pressure of 90 lb., the pressure being taken from the air line in the yards. This method of cleaning not only gives the locomotive a very neat appearance and does the work economically, but it keeps all the parts clean and free from grease, which makes more perfect inspection possible.

OXY-ACETYLENE WELDING

The oxy-acetylene process of welding and cutting metals has during the past few years been adopted by many of the principal railroads. It is doubtful, however, whether any of the present installations are of as great capacity as will eventually prove necessary to handle the volume of work which can be most efficiently performed by this process. As far as is known, the large

est single oxy-acetylene installation is that at the Springfield shop of the St. Louis & San Francisco. This plant, in addition to the ten others on the Frisco System, was furnished and installed by the Oxyweld Railroad Service Company. The oxygen generators are of the duplex type and 1,000 cu. ft. capacity. The oxygen used is purchased from the Linde Air Products Company, being delivered to the road in 100 and 250 cu. ft. cylinders. These are connected to a duplex manifold which makes it possible to remove and replace cylinders without cutting off the gas supply to the shop. In all of the Frisco plants* the oxygen and acetylene gases are piped throughout the shop, stations being placed at convenient intervals to serve the various departments.

The only trouble which has ever been experienced with oxy-acetylene welds has been due to the inefficiency or inexperience of the operators. On the Frisco welders are selected from among the best journeymen of the various trades. No handy-men or apprentices are used on any class of work whatever. The mechanics who are selected are given a four months' course of training under an expert. By this system a corps of more than seventy expert welders has been trained on the Frisco System, and the work which is being turned out of the shops today is of first quality.

The Frisco with first-class boilermakers as burner operators is handling all classes of boiler work with unvarying success. It is the present practice to weld in all part sheets, whole sheets and seams of complete boxes. This method is more economical than riveting as to initial cost, and also represents a great saving in subsequent repairs required at roundhouses.

During the past two years all broken frames have been welded by the oxy-acetylene process, which has proved itself not only cheaper, but more satisfactory than any method previously used. The percentage of failures on frame welds when competent operators, usually blacksmiths, were used has been zero. This process has no limitations as to classes of metal; brass, cast, malleable and wrought iron or steel being welded with equal facility.

The New York Central at the Collinwood shops use both the electric and oxy-acetylene welding process. The latter is used principally for boiler work in welding and cutting. The electric process has been found of special advantage in welding flues in fine sheets, very good results having been obtained from this practice.

The Chicago, Rock Island & Pacific at Silvis, Ill., operate both systems but still adhere to the use of Thermit for all frame welds.

The report is signed by: E. A. Byers (St. L. & S. F.), chairman; J. M. Kerwin (C. R. I. & P.), and I. C. Newmarch (N. Y. C. West).

Discussion.—A large number of interesting jobs were mentioned as being done by both the electric and oxy-acetylene processes, showing that as the operation of these systems becomes better known the opportunities increase. It was shown that in order to be used successfully the operators must be expert and have a thorough understanding of the art of welding, the varying successes on different roads on the same class of work making this clearly evident.

CLOSING EXERCISES

During the Thursday session an address on the Selection of Men and Their Promotion was made by Roy V. Wright, managing editor of the *Railway Age Gazette*. The necessity of having the officers and foremen study their men more critically was emphasized.

The following officers were elected for the ensuing year: President, L. A. North, superintendent of shops, Illinois Central, Chicago, Ill.; first vice president, Walter Smith, general foreman, Chicago & North Western, Deadwood, S. D.; second vice president, W. T. Gale, foreman, Chicago & North Western.

*For a complete description of these plants and the work done see the *Railway Age Gazette* of September 11, 1914.

Chicago, Ill.; third vice-president, W. G. Reyer, general foreman, Nashville, Chattanooga & St. Louis, Nashville, Tenn.; fourth vice-president, C. L. Dickert, assistant master mechanic, Central of Georgia, Macon, Ga.; secretary-treasurer, William Hall, foreman, Chicago & North Western, Winona, Minn.

NEW LEHIGH VALLEY PASSENGER AND FREIGHT TERMINALS AT BUFFALO

The Lehigh Valley has recently started the construction of complete new passenger and local freight terminals at Buffalo to replace the present facilities which have become inadequate for the traffic. The passenger station, located between Main, Quay, Washington and Scott streets will be a four story structure of gray Indiana limestone with a granite base and terra cotta trimmings. The building will be set back 50 ft. from the east line of Main street to provide for a driveway and approach to the main entrance. It will have a frontage of 164 ft. on Main street and will extend back 102 ft. on Scott street. The area-way between the north side of the building and Quay street will be paved, providing standing room for cabs and another driveway to the building. On the Washington street side an open

rooms, etc. A hospital room will also be provided in the station.

Offices will be provided on the Main street side of the building on the second, third and fourth floors for the use of the Lehigh Valley and tenant companies. These offices will be provided with double elevator service and with independent stairways.

A ramp will lead from the waiting room to a tunnel under Washington street, providing access to trains. At the opposite end of the tunnel there will be another ramp bringing passengers to the street level, the headhouse and the train shed.

The headhouse will be a two-story steel-encased building set back 20 ft. from the building line on the east side of Washington street. It will have a frontage on this street of 181 ft., and a depth of 100 ft. on Scott street. In outward appearance the building will be of gray brick with granite base and terra cotta trimmings in harmony with the station proper.

On the first floor of the headhouse a baggage room will be provided with an area of 4,300 sq. ft., 3 independent express rooms with a total area of 4,600 sq. ft., and a mail room of 1,200 sq. ft. A concourse 181 ft. long will extend across the full length of the building with a total area of 5,600 sq. ft., and will be open to the roof. At one end there will be another cabstand. Exits will be provided on Scott street and on the areaway on



Architect's Drawing of the Main Street Side of the Proposed Passenger Station

area 50 ft. wide will be given over to a grass plot. Coming through the main entrance on Main street or from Quay street, one enters immediately into the main waiting room 82 ft. by 102 ft. in area and the full height of the building. Three large arched windows will be provided on the Main street side and smaller windows on the other sides in addition to large skylights in the roof. Marble will be used for the floors and wainscoting of this room. A lunch room and restaurant will be located on the Quay street side of the waiting room, while on the Scott street side there will be a smoking room, a women's room and retiring rooms for both men and women. Adequate space will be provided for the telephone, telegraph, news-stands, parcel

the north side. The ramp from the tunnel under Washington street will lead directly to this concourse. Seats will be provided here as well as in the main waiting room.

Provisions will be made for immigrant travelers on the second floor of the headhouse where separate rooms will be provided for men and women, for the exclusive use of this class of travel. There will also be lounging rooms and lockers for enginemen, firemen, conductors, trainmen and Pullman and station employees on this floor.

The train shed will be 195 ft. wide and 842 ft. long and will provide for 10 tracks. The Bush type of concrete and steel shed with Keppler skylights has been adopted, requiring more than

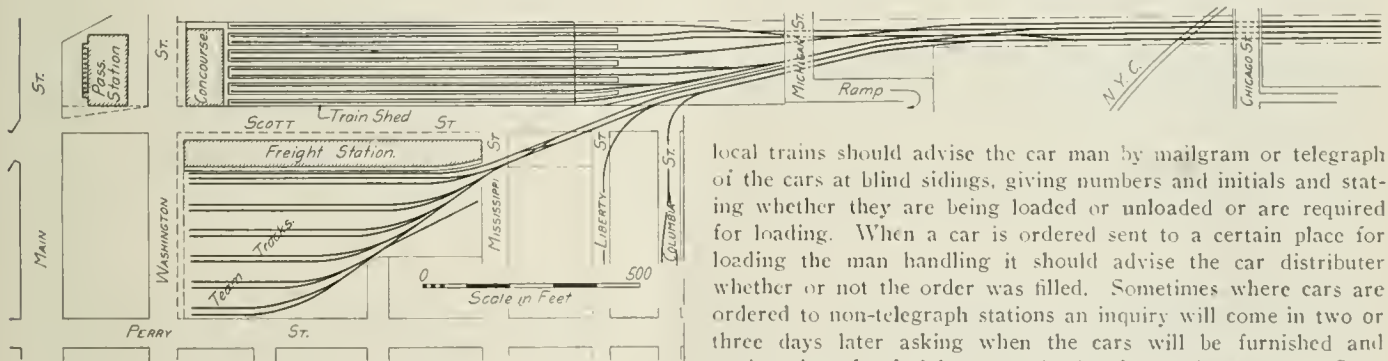
50,000 sq. ft. of glass. The platforms will be of concrete, built at an elevation 8 in. above the top of rail.

The freight terminal will be located between Washington, Scott, Quay, Perry and Mississippi streets. A two-story office building of steel encased construction with a granite base and terra cotta trimming, in harmony with the passenger buildings, will be located 15 ft. from the east line of Washington street and 18 ft. from the south side of Scott street, having a 60 ft. frontage on Washington street and being 111 ft. deep. Connected directly with this building will be the freight house proper, a steel and concrete structure divided into three separate sections by fire walls. The building itself is 600 ft. in length, while each section is 191 ft. long and 60 ft. wide. Natural illumination will be provided by a continuous line of sashes around the entire house just above the doors and daylight will enter from all four sides. The floors of the freight house and the platforms on either side will be of concrete. The platforms will be 10 ft. wide, while there will be a ramp on the track side leading to the ground at either end. A line of steel curtain doors will be provided on both sides with steel canopies above. The area between Scott street and the freight house will be paved with Belgian blocks, while the two tracks on the opposite side will provide room for 32 cars.

Beyond the two freight house tracks there will be 11 team tracks spaced 45 ft. between pairs. The driveways will be paved with Belgian blocks, while an electric crane will be provided to handle heavy materials. A concrete wall 8 ft. high will sur-

round the entire block occupied by the freight terminal with the exception of that portion occupied by the office building and freight house proper. An all-electric interlocking plant housed in a brick and steel tower will govern the entrance to the terminal.

The agents and yardmasters should be so drilled that their car reports, both by wire and mail, will be promptly transmitted at the appointed time and not an hour later; if any fail in this the superintendent should apply a remedy at once to prevent a repetition because the car distributor cannot do his work efficiently without knowing what cars are on the line and the requirements at the different stations. When these reports are received he should make a thorough check in order to fill the orders for the next day and at the same time rid the division of any foreign cars not needed for immediate loading. It will also be necessary to haul some empty cars for loading and he should figure on the short haul for them. He should place his orders for empties with the yardmasters far enough in advance to insure their being put in the trains and not make it necessary for trains to be reduced to put them on. At the end of their runs conductors of



Track Layout at New Lehigh Valley Terminal at Buffalo

round the entire block occupied by the freight terminal with the exception of that portion occupied by the office building and freight house proper. An all-electric interlocking plant housed in a brick and steel tower will govern the entrance to the terminal.

THE CAR DISTRIBUTER

By J. L. Coss,

Assistant Chief Dispatcher, Chicago, Rock Island & Pacific, Haileyville, Okla.

On heavy divisions a car distributor is usually employed to distribute cars, as the chief dispatcher cannot do this in addition to his other duties. This man fills a position which is of more importance than the average person appreciates. The quick handling of cars is essential; therefore, it requires a man who can place them promptly for loading and at the same time do it with the least expense. The position should be made attractive enough to secure the right kind of a man—one who will stay with the job and who has an ambition for something better; for the service required will not be obtained when frequent changes are made. Where business is heavy and especially where there are several industries to serve, the position should pay at least \$125 per month. There should also be another incentive. When there are vacancies in the general office of the car accountant, transfer to which would be a promotion to the car men on the road, they should be given a chance at them.

A first-class car distributor should have a thorough knowledge

of the geography of the surrounding country, the different railroad connections, etc. He should have the different series of cars in use on his system committed to memory and should acquaint himself as far as possible with those in use on direct connecting lines so that when a car number comes before him he will not have to refer to the Equipment Register to ascertain whether it is a box, stock, flat or passenger car. He should also be familiar with the M. C. B. rules in order to be in a position to act when a defective car is to be interchanged and he cannot communicate with higher officers on the subject. An idea as to the construction of a car will help out many times when a car is "bad-ordered" on the road and disposition is desired.

The agents and yardmasters should be so drilled that their car reports, both by wire and mail, will be promptly transmitted at the appointed time and not an hour later; if any fail in this the superintendent should apply a remedy at once to prevent a repetition because the car distributor cannot do his work efficiently without knowing what cars are on the line and the requirements at the different stations. When these reports are received he should make a thorough check in order to fill the orders for the next day and at the same time rid the division of any foreign cars not needed for immediate loading. It will also be necessary to haul some empty cars for loading and he should figure on the short haul for them. He should place his orders for empties with the yardmasters far enough in advance to insure their being put in the trains and not make it necessary for trains to be reduced to put them on. At the end of their runs conductors of

local trains should advise the car man by mailgram or telegraph of the cars at blind sidings, giving numbers and initials and stating whether they are being loaded or unloaded or are required for loading. When a car is ordered sent to a certain place for loading the man handling it should advise the car distributor whether or not the order was filled. Sometimes where cars are ordered to non-telegraph stations an inquiry will come in two or three days later asking when the cars will be furnished and stating that the freight to be loaded is on the ground. Such service results in law suits for delays and damages.

The car distributor should be furnished with a copy of each conductor's report and have access to the index book at the yard office where he is located. In tracing cars and handling diversion orders the telegraph service is severely abused because many car distributors will not avail themselves of the information at hand; for instance, they can check the conductor's wheel reports, index books and agents' and yardmasters' car reports and secure a great deal of information which will be of value in tracing cars, and filling orders for empty cars. It has been noticed that some large yards do not make a daily car report showing the record of individual cars into and out of the yard, on hand, etc., claiming insufficient force. The time consumed by operators sending telegrams concerning cars would more than offset the salary of a clerk to make such a report in the yard office.

All inquiries concerning cars should be referred to the car distributor and handled by him and not by other employees in the division office. Then he is familiar with what is going on and there is no chance for a duplication of messages, mailgrams and letters; this will also insure against agents and yardmasters having to answer two or three inquiries concerning a certain car, a practice which has a tendency to cause them to become negligent in making replies.

The car distributor should also be qualified as a telegrapher for the reason that he can communicate direct with the different agents' and yardmasters' offices, by the use of the instrument, secure information that will assist him in making a quick disposition of cars, and secure tracing and diversion records, when if he has to wait until telegrams take the regular course he may

Proposed Bureau for Clearing Car Repair Accounts*

Organization to Be Supervised by the American Railway Association or the Master Car Builders' Association

By C. F. STRAUB

The idea of traveling M. C. B. inspectors in the employ and under the supervision of the American Railway Association or the Master Car Builders' Association, as recently suggested by a car department officer in one of the railroad journals, is undoubtedly a good one. It would obviate a great deal of discussion regarding improper charges on M. C. B. repair cards. It would in time eliminate the suspicion that strict honesty is not always adhered to by those handling M. C. B. charges, due, it is said, to overzealousness in attempting to make good showings in departmental expenses, which is too often thought to be condoned by higher officers.

The writer has been engaged for a number of years in the detail work of M. C. B. billing, accounting and correspondence, including the direction and instruction of car shop clerks and car inspectors in the issuing of repair cards and entering the charges thereon, and has felt the need for such inspectors; he would, however, propose going a step further, in the establish-

bill work and should be instructed to select his staff of leading assistants from applicants who are qualified M. C. B. billing clerks, so located geographically that different parts of the country are represented. Such men, it is suggested should be retained on the payroll of the company employing them at the time of their appointment and the amount of their salaries billed monthly against the bureau; the manager of the bureau, however, should have entire jurisdiction over them, even to the fixing of salaries. This plan would not only insure the maintenance of a competent staff but in justice to the men would permit them to retain the benefits accruing from long service records with the railroads; it would at once place the bureau in a position to meet the approval of everyone concerned. A corps of M. C. B. inspectors, the need for which has been referred to, would be a part of the bureau organization.

Each company would forward to the bureau, either monthly or semi-monthly, properly assorted, all of its billing repair

M. C. B. CLEARING HOUSE

BALANCE SHEET OF CHARGES FOR FREIGHT TRAIN CAR REPAIRS, PER M.C.B. BILLING REPAIR CARDS AND DEFECT CARDS

MARCH 1915	A.T. & S.F.	B. & O.	BOS. & ME.	CAN. PAC.	C.B. & Q.	D.L. & W.	ERIE	G.T. RY.	ILL. CENT.	L.V. R.R.	MICH. CENT.	NYC	PENNA.	PHILA. & RDG.	SOU. RY.	UNION PAC.	TOTAL CHARGES
A.T. & S.F.																	71,463.10
B. & O.																	91,953.20
BOS. & ME.																	21,210.30
CAN. PAC.																	94,400.40
C.B. & Q.																	67,313.50
D.L. & W.																	29,000.60
ERIE																	51,376.70
G.T. RY.																	52,021.10
ILL. CENT.																	65,147.90
L.V. R.R.																	47,447.00
MICH. CENT.																	27,372.10
N.Y.C.																	79,176.20
PENNA.																	177,559.30
PHILA. & RDG.																	43,176.40
SOU. RY.																	52,974.50
UNION PAC.																	21,062.60
TOTAL CREDITS	71,463.10	91,953.20	21,210.30	94,400.40	67,313.50	29,000.60	51,376.70	52,021.10	65,147.90	47,447.00	27,372.10	79,176.20	177,559.30	43,176.40	52,974.50	21,062.60	1,015,131.60

Suggested Form of Clearing House Balance Sheet

ment of a clearing house for the settlement of car repair accounts.

By creating a bureau to handle these accounts, either under the jurisdiction of American Railway Association or Master Car Builders' Association, the matter of M. C. B. billing could be placed on an economical and efficient basis and benefits would accrue which no doubt have been and now are, apparent to every railroad officer and employee who is familiar with the amount of work involved in the present method of handling. So far as is known, no one has yet presented a sufficiently definite plan to warrant the consideration of either association and year after year the needless waste goes on.

The proposed bureau should be organized somewhat as follows. After a sufficient number of companies who are members of the M. C. B. Association, have subscribed to the new plan the bureau could be established by the appointment of a manager and a number of assistants. The manager should have had a number of years' experience in M. C. B. general office

cards. The bureau would then make up credit bills in favor of each company, without showing car numbers or details. This would mean that, instead of a large company making up several hundred bills, some having 300 or more pages, containing 12,000 or more car numbers and showing charges in detail, there would be but one bill to debit the bureau. The repair cards would then be appropriately stamped by the bureau (mechanically, some what as letters are stamped in large postoffices) showing that credit had been allowed the issuing company, and the charges then entered in the balance sheet in the credit column of the issuing company opposite the names of the various debtor companies. By referring to the proposed form of balance sheet shown in the illustration it will be seen that when the credit entries of all the member companies have been properly made both the total credits and the total debits of each company are directly obtainable. In the form illustrated no detail entries are given but totals are shown, the number of dollars in each case being equivalent to the number of cars owned according to the 1911 Proceedings of the Master Car Builders' Association

The use of these figures is based upon the fact that on some roads the amounts of monthly credits and debits account of interchange car repairs have each been found to average approximately one dollar per car owned; they may be considered as representative of the amounts which would be involved in the clearing house transactions.

The bureau staff handling the credits and charges would be interested only in the proper charges on repair cards, and being experienced in M. C. B. billing, would be qualified and authorized to make such changes and corrections as to make the cards eligible for billing, or return them to the issuing company for correction. This would eliminate all checking of bills by the railroads except as to the location of cars by the car record office, which could readily be done from the repair cards. The cards for such cars as did not check with the car accountant's records could be returned to the bureau and proper credit allowed. The bureau could then return the cards to the issuing company for correction and deduct the amount of the charges from the next credit bill in favor of the issuing company, permitting the return of the cards to the bureau for rebilling only after they had been endorsed by that company's car record office showing the interchange record. Under the bureau plan repair cards would not be given the close supervision in the offices of department heads which they now receive and such supervision should be given at the shops and inspection points as to insure the least possible amount of correspondence with the bureau. Each company should endeavor to send its repair cards to the bureau as nearly correct as possible.

It has been the writer's purpose to go into detail far enough so that it may be readily understood that the plan is feasible. No doubt objections may be raised, perhaps the greatest one of which is the vast number of private car lines. However, if the railroads once put the bureau plan into operation there will certainly be enough such owners who will at once recognize its benefits to start a movement in favor of a bureau of their own if they do not care to become members of the railroad bureau. A separate bureau would probably be found to be the best plan, and it is believed would receive the endorsement of the greater number of private owners. All matters pertaining to repairs to privately owned cars would then be settled between the two bureaus.

It is obvious that considerable expense, on some roads thousands of dollars each year, would be saved by handling but one credit and one debit bill each month, instead of several hundred as at present. Also in the operation of the bureau, mechanical devices could be extensively employed, the use of which is entirely impracticable under the present unit system of billing. On railroad systems having an average monthly credit and debit for interchange car repairs of from \$40,000 to \$45,000, it is safe to say that a net saving can be effected of from \$8,000 to \$10,000 per annum, including stationery, postage, clerk hire, etc., in the motive power and accounting departments.

The cost of operating the bureau should be apportioned among the members monthly on the basis of the amount of both credit and debit repair accounts. The bills rendered on this account should be separate from those rendered on account of car repairs.

The advantages of the bureau system may be briefly summed up as follows:

1. Elimination of the suspicion of dishonesty and unfair practices.
2. Elimination of a vast amount of correspondence, due to exceptions to charges, wrong car numbers, etc.
3. Several hundred accounts of bills payable consolidated into one account and *closed* as soon as received.
4. Several hundred accounts of bills receivable consolidated into one account and *closed* as soon as received.
5. Postage saved by elimination of multiplicity of bills and correspondence in connection therewith.
6. Of the gross amount saved by each company, possibly not

more than 20 per cent would be required to meet its share of the cost of maintaining the bureau.

It is the hope of the writer that he may some day see such a plan tried out and its feasibility proven. It seems as though the time were ripe for action to that end by either the American Railway Association, the Master Car Builders' Association or the Accounting Officers' Association.

HUNTING STRAY FREIGHT ON THE PENNSYLVANIA

The Over and Short Bureau of the Car Record office of the Pennsylvania Railroad, at Philadelphia, under the charge of T. S. Bell, receives about 2,500 over and short reports daily, reports being made to this office by all stations on the Pennsylvania and its controlled lines east of Pittsburgh and Erie; and an ingeniously devised index has been put in use for the purpose of matching the overs with the shorts; that is, for satisfying, as far as possible, all reports of freight short by discovering the missing goods at some other station. This is accomplished by carefully searching the records of all the over reports which are received within the next 10 or 15 days after the date on which the freight reported short began or should have begun its journey; searches are begun, usually, about the tenth day. For a large proportion of the shipments or packages which go astray the clerk, with little trouble, finds an over report and a short report which match each other; and, indeed, many cases are, of course, settled by the station agents without troubling the head office at all; but the system here referred to deals with those cases which cannot be cleared up without some little study; perhaps two or three hundred daily. Of these a considerable portion can be settled readily by correspondence. Many others require more particular treatment, and the office employs twenty-four men who are on the road, most of the time, searching for lost goods and making other investigations incident to the proper treatment of freight claims of all kinds. Classes of shortage which cannot be readily settled are those where the corresponding "over" is on another road and is not reported; or where thieves have stolen the goods. A record of this kind should be looked upon as an essential feature of the service, even if costly; but there have been gratifying results from a financial standpoint. In a typical week the number of lost shipments located was 50, involving claims amounting to \$2,056; and in the same time 93 shipments, for which claims had not been presented.

The essential feature of this over and short record is the combination of four indexes in one. The clerk has before him four sheets; and each item is entered on all four. In the first one the shipment in hand is indexed alphabetically by the name of the originating point; in the second it is indexed, on a line bearing the same number, under the name of the station to which it is billed; in the third by the name of the consignee, and in the fourth by the name of the commodity.

The illustration shows a set of index blanks as arranged for use, the engraving being reduced about two-thirds in width and height. These four indexes, consisting each of 24 sheets, fastened one above another, are arranged on a board 21 in. wide and 14 in. high, the sheets being held at the top by strong clips. In the photograph diameters are reduced as stated, and to further save space, about *one-half* of each sheet has been cut out, viz., lines 4 to 24 inclusive and lines 41 to 56 inclusive. Sheet B has one more line than Sheet A; C has one more than B and so on, this arrangement having been found the best to facilitate the quick uncovering of any given sheet.

In the illustration the letters A, B, C, D, E, F, G, H represent each the lower end of a separate sheet; and a complete view would show separate sheets for the whole alphabet, A to Z.

The method of making the record may be illustrated by referring to line 28. Reading this line the interpretation is as follows: The shipment was billed from Ashland, N. J., on May 2; and the name of the place billed to, is indicated in the right hand

margin. This is to be found in the next index under A; referring to the next index, line 28, we find in the first column a letter A referring back to the word Ashland. (The date shown here is not the date on which the waybill arrived at destination or on which the short report was made; it is the date of the waybill. Throughout the records this earliest date is kept constantly prominent.) The letter A in the last column at the right indicates that the consignee's name is to be found in the index under that letter. Following the same rule we find in the third index that the commodity is to be found under A, and that leads us to the fourth index.

Going back now to the first index we find that in the item entered on line 31 the letter at the right is H. This indicates that the name of the station billed to will be found on sheet H, of the second index. The H sheet begins at line 40. The clerk always reads up. With his pencil, he turns up the lower left-hand corner of the sheet marked G, which discloses sheet H; and there, on line 31, he finds that this item was billed to Harrisburg. In the right-hand column of this index he finds the letter M; and by referring to sheet M in the third index, which ends at line 45 he reads on line 31 the name of the consignee, A. Morris. The whole of the index is made up in this way. If the sheet for a given letter is filled up while yet there is much room on the others, an additional sheet is inserted. A bunch of sheets lasts two or three days.

A similar set of indexes, with the heading slightly modified, is

stations was similar freight loaded?" "Have you received an over report from any other point covering this shipment?"

The instructions require this report to be made within two days after receipt of waybill, if all or a part of any shipment is short. Three copies are made, one for the agent at the point of shipment, one to go to the last transfer station at which shipment checked "O. K." and one to be retained. If the shortage has not been accounted for in seven days then a report is to be sent to the over and short bureau, including replies received, should there be any.

In making reports of overs property must be described as fully as possible. Castings and parts of machinery must be described in detail, so as to show, if possible, to what they belong. Packages must be described as old or new. An over report should bear notations of any articles reported short from the same car.

Freight known to belong at some other station is immediately forwarded, of course; but the report is made just the same.

An agent who receives freight which is known to belong at his station, but for which he has no waybill must make an over report within two days. He can of course, deliver the goods on presentation of original bill of lading or other proof of ownership, and payment of freight charges from point of shipment. Freight found over, which, because of absence of marks or other reasons, cannot be disposed of, must within ten days be sent to the unclaimed freight station, which is at Downingtown, Pa.

Mistakes in marking, or the sending of packages with no marks,

Billed From	W. P. No.	Date	Billed To	S. P. No.	Date	Commodity	Remarks
Ashland N.Y.	368	5-2	A				
Altoona	14672	5-1	H				
A			A				
B			B				
C			C				
D			D				
E			E				
F			F				
G			G				
H			H				

Forms for Indexes to Freight Shortage Reports—Pennsylvania Railroad

kept for the over reports received. The first of the four indexes is to show the point of origin, so far as this can be ascertained, whether there is or is not a waybill to give light on this point. The second index shows the station with which the over report is connected, without regard to whether there is or is not any waybill reference. For a package without marks, or with marks which are not understood, the entry in the third index, instead of showing name of consignee, would be registered as "no marks."

The reports both for shorts and overs are made on very large blanks (8½ in. by 14 in.) with a view to having spaces large enough for writing in each item of information, so that as a rule the same kind of information can always be found in the same part of the sheet. On the short report, for example, there are ample spaces not only for facts obviously needed, but also for copies of all transfers, time stamps or other marks on the waybill; seals on all four doors, and answers to such questions as:

1. "Was car left at your station, or taken forward in same train?"

2. "How long was car at your station unsealed before shipment in question was checked?"

3. "Value of freight short."

4. "Has claim been entered." Give particulars.

The report fills one-half the sheet, and the other half contains spaces for the answers to be made by the agent at the forwarding station. Among the questions which must be answered by him are: "For what other stations was freight loaded?" "For what

or illegible marks, are the most numerous causes of freight going astray; and the searching of the records in most cases begins with the commodity index. For example Eminton, Pa., reports short one barrel of flour for McGinnis. A search of the flour items on the over reports discloses a barrel, the record of which agrees in all particulars with the short report except the name of the consignee. The name of the shipper, the point of shipment and the date agree to such an extent that it appears to be an error of the shipper; and it is found that he marked one too many barrels for Krugg, Rahway, N. J., and one too few barrels for McGinnis. Frequently it will be found that two items will match in the name of consignee but not in destination, the shipper having made a mistake in marking the package. A mistake of this kind often passes undetected by freight-house men, though there is a plain discrepancy between the shipping receipt and the mark on the goods. Errors of this kind are quickly disclosed.

The original reports are filed under the name of the destination, or assumed destination of the goods, all for one name being put in a box together. For example, the Philadelphia box contains records not only of goods wanted at Philadelphia, Pa., but also any similar information concerning Philadelphia, N. Y., on the New York Central, or Philadelphia, Miss., on the New Orleans, Mobile & Ohio. Likewise—

"Springfield, O., and Springfield, Mo.,

And Springfields, Mass., and Ill."

are all in the same box.

NEW ENGLAND ROADS FILE CLAIMS FOR MAIL PAY LOSSES

Alleging that they have lost large sums through carrying the mails under the present system of weights and that their compensation at the present rate fixed per mile is unreasonable and confiscatory, seven New England roads, filed petitions, July 17, in the Court of Claims in Washington in an effort to obtain from the government the money which they contend they have lost in the last six years by reason of the postmaster general's alleged arbitrary mandates and the operation of the present system.

The roads filing these petitions and the sums they claim from the government are as follows:

New York, New Haven & Hartford.....	\$4,524,714
Boston & Maine	3,676,824
Maine Central	1,839,740
Bangor & Aroostook.....	490,194
New York, Ontario & Western.....	305,000
Sandy River & Rangeley Lakes.....	30,968
Bridgeton & Saco River.....	13,425
Total	\$10,880,865

This is an average annual loss of \$1,813,478 for the last six years.

The petitions filed by these New England railroads claim:

First.—That the annual increase of mail has not been paid for at all.

Second.—The carrying of the parcel post has been without adequate compensation.

Third.—That the deficiency created by loss of mail compensation must be made up from the freight, passenger and express receipts.

Two causes of action are set up in the petitions filed, one with respect to the system of quadrennial weighing, declared to be illegal, and the other with respect to the rate of pay per mile and the increasingly expensive demands made from time to time by the postmaster general upon the railroads for facilities, for which no adequate compensation has been made.

With respect to the weighing of the mails every four years as a basis for the mail payments to them, the railroads assert that such weighing has been done exclusively by the postoffice department and that they have been prohibited from fully inspecting and verifying such weighing. This weighing of the mails for a certain period every four years as the basis for stating the average weight of the mail carried for the four years beginning a number of months after such weighing had been made, it is contended is not in accordance with the law.

The railroads charge that the postmaster general deliberately resorted to this system for the reason that the railroads would be compelled to carry the increasing amount of mail during the subsequent four-year period without any compensation. This is held to be illegal inasmuch as the annual compensation was by law fixed according to "the amount of mail carried per annum." The railroads assert that they repeatedly requested of the postmaster general that the mails be weighed annually or that the weights be taken at the beginning and end of the four-year period and averaged, but that such demands were ignored.

With regard to the effect of the parcel post the railroads point out that the increased mail resulting since the law went into effect on January 1, 1913, has not been included in any weights ascertained by the department and no compensation has been paid them for it upon any basis of weight. Furthermore, the raising of the weight limit of packages by the postmaster general on July 25 and December 18, 1913, has enormously increased the amount of this mail. The railroads ask in each case for the difference between the extra compensation granted them by the act of March 4, 1913 for this parcel post business and a sum which they fix as the reasonable compensation for the transportation of such mail.

Since the law was passed in 1873, fixing the rate of pay per mile, there have been several reductions, the last occurring in 1907. It is alleged, however, that even prior to these reductions the total compensation paid was insufficient to pay the cost of transportation furnished, the reductions merely increasing the deficiency.

At the same time, according to the petitions, the cost of labor, materials, depreciation charges, betterments, maintenance, taxes and operation have largely increased, notwithstanding which the demands of the postoffice department have from time to time been made more exacting, making necessary increased expenditures, and a far more costly service in the transportation of mails.

Regarding the acts of the postmaster general by which they allege that their burdens have been increased, the railroads say that not only has he made more exorbitant demands for a more extensive use of terminal facilities and switching conveniences, but "he has pretended to exercise an arbitrary, discriminating and unfounded discretion constantly against the legal rights and contract interests of the carriers; he has from time to time during the existence of outstanding quadrennial contracts made large additions thereto and increased requirements therein; he has refused to pay the statutory rates for carrying the mails during contract periods stated by him; he has at various times ordered apartment and railway postoffice cars of special construction, design and equipment, and entered into contracts for their use for definite periods, and then refused to pay the rates stated in the contracts, but offered lower and different rates which were unremunerative and confiscatory; he has made greater and more expensive demands as to rooms in stations for handling the mails; he has made many and extensive demands in the handling and the disposition of the mails at the several stations along the lines of railroad, and in the transportation of the mails between the stations and the postoffices not more than 80 rods therefrom; he has required the hauling of vast amounts of gold coin as mail of the fourth class in violation of law and without compensation to the carriers; he has required the carrying of mail on limited trains, and has burdened the service with onerous fines, forfeitures and increasing exactions."

Another charge made against the postmaster general is that "without any warrant or authority in law" he raised the weight limit of the parcel post packages by his executive orders of July 23, 1913, and December 18, 1913, the latter order bringing it up to 50 lb. in the first and second zones, "and thereby invited and permitted the shipping of vast quantities of merchandise, farm, mine and factory products, and materials of all kinds which theretofore had been shipped by freight or express, all without any adequate compensation therefor."

SUEZ CANAL TRAFFIC IN 1914.—The net tonnage of vessels passing through the Suez canal in 1913 showed a decrease of 241,236 tons as compared with 1912. The reduction of the transit dues to 6.25 francs, or \$1.206 per ton from January 1, 1913, together with the slight reduction of tonnage, had the effect of reducing the transit receipts to \$24,443,630 in 1913, as compared with \$26,329,800 in 1912. In the early months of 1914 traffic improved showing an increase of 254,497 net tons for the first six months as compared with 1913, while the transit receipts increased \$409,000. Traffic through the canal after the war began decreased considerably.

RAILWAY CONSTRUCTION IN CHILE.—The president has been authorized to proceed with unfinished public works begun in 1914 and to use the income of the Arica-La Paz Railway up to \$82,000. Among other expenditures will be the surveys for the Alamo-Molina Railway, Curico-Los Queñes Railway, and the branch railway from Arica to Zapiga. The president has also been authorized to contract at public tender for the construction of the railway that will unite Traiguén with the Central Railways, at a maximum cost of \$600,000 United States currency, and to expend in the present year \$150,000, which will be taken from the earnings of the Arica-La Paz Railway.

The Pennsylvania's 1915 Rail Specifications

The Specifications for 100 and 125-lb. Rail Are Based on Previous Experiments and Experimental Rollings

For the past two years the Pennsylvania Railroad has been engaged in the preparation of specifications for carbon steel rails and in the design of a new 125-lb. section. Various changes in these specifications have been tested as to their practicability by the rolling of small lots in several different mills. Based on previous experience and on the results of these experimental rollings the specifications given below have been prepared for 100-lb. rail. The specifications for the 125-lb. rail ordered this year differ from those for the 100-lb. rail in that they do not require the chemistry to be taken from the finished rail, omitting sections 6c, 6d and 6e. They differ from the specifications for the 125-lb. rail first prepared last year in that the carbon limits are established at 0.68 to 0.82 or 10 points below those previously set.

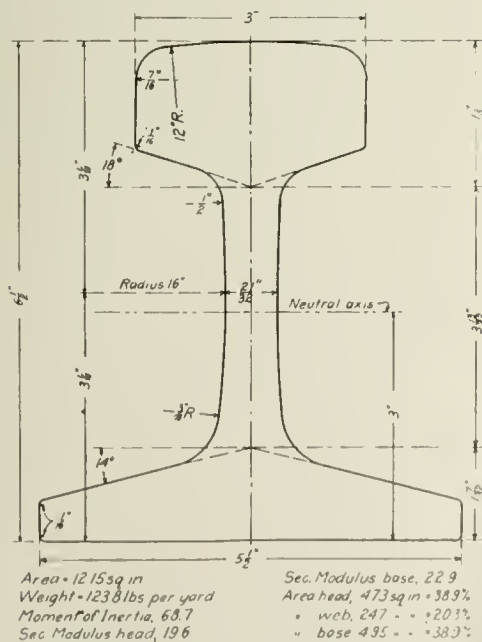
The 125-lb. section illustrated herewith is $6\frac{1}{2}$ in. high with a $5\frac{1}{2}$ -in. base. The head is 3 in. wide with a top radius of 12 in. and vertical sides. Complete dimensions are shown in the sketch.

SPECIFICATIONS FOR 100-LB. CARBON STEEL RAILS

INSPECTION

1. *Access to Works.*—Inspectors representing the purchaser shall have free entry to the works of the manufacturer at all times while the contract is being executed, and shall have all reasonable facilities afforded them by the manufacturer to satisfy them that the rails have been made and loaded in accordance with the terms of the specifications.

2. *Place for Tests.*—All tests and inspections shall be made at



The New Pennsylvania 125-lb. Rail Section

the place of manufacture prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the mill.

MATERIAL

3. *Material.* The material shall be steel made by the Bessemer or open-hearth process, as provided by the contract.

CHEMICAL REQUIREMENTS

4. *Chemical Composition.*—The chemical composition of the rails rolled from each melt of steel, determined as described in

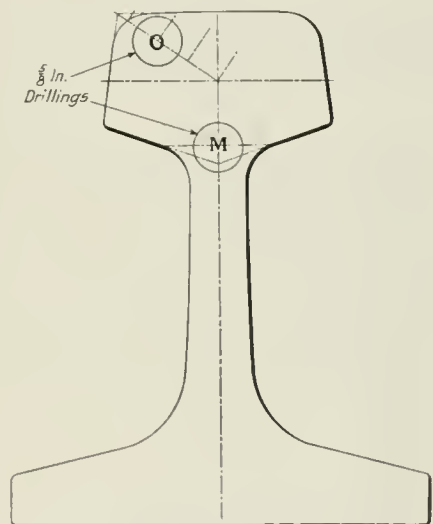
Section 6, shall be within the limits shown in the following table:

Elements	Bessemer process Per cent	Open-hearth process Per cent
Carbon	0.45 to 0.10	0.60 to 0.75
Phosphorus	Not to exceed 0.55	Not to exceed 0.04
Manganese	0.80 to 1.10	0.60 to 0.90
Silicon	0.05 to 0.20	0.10 to 0.50

In the event of nickel and chromium being present to the extent of 1.0 per cent and 0.35 per cent, respectively, these elements will be considered as the equivalent of 0.07 per cent of carbon in the above requirements. When the analyses for carbon by the mill chemists and by the railroad chemists do not agree, a tolerance of two points below the minimum or two points above the maximum will be allowed to cover such variation before condemnation.

5. *Average Carbon.*—It is desired that the percentage of carbon in an entire order of rails shall average as high as the mean percentage between the upper and lower limits specified.

6. *Analyses.*—In order to ascertain whether the chemical com-



Section Showing Location of Borings

position is in accordance with the requirements, analyses shall be furnished as follows:

(a) For the Bessemer process, the manufacturer shall furnish to the inspector daily, the carbon determination for each melt before the rails are shipped, and two chemical analyses every 24 hr., representing the average of the elements, carbon, manganese, silicon, phosphorus and sulphur, contained in the steel, one for each day and night turn, respectively. The analyses shall be made on drillings taken from the ladle test ingot not less than $\frac{1}{8}$ in. beneath the surface.

(b) For the open-hearth process, the makers shall furnish the inspectors with a chemical analysis of the elements, carbon, manganese, silicon, phosphorus and sulphur, for each melt.

(c) For the open-hearth process, a check analysis will be made by the purchaser of a piece of rail representing a melt, after the rails from that melt have passed the physical requirements. On request of the inspector, and in his presence, the manufacturer shall furnish from one of the drop-test pieces (See, 10) representing the melt, drillings satisfactory to the inspector, taken with a $\frac{5}{8}$ -in. flat drill, parallel to the axis of the rail, at a point one-third of the distance from the upper corner to the center of the head, as shown at location "O" in the accompanying section. The analysis from these drillings shall conform to the chemical requirements specified in Section 4, and failure to meet these re-

quirements shall be sufficient cause for the rejection of the entire melt.

(d) For the open-hearth process, after the rail has passed the physical requirements, additional drillings will be taken from the same rail, and in the same manner as specified in Section 6 (c), at the junction of the head and web, as shown in location "M," in the figure. The carbon determination from these drillings (Note 2, Sec. 4) shall be within 12 per cent of the amount found at location "O." If the test from the top rail fails to meet this requirement, all the top rails from the melt shall be rejected, and a similar determination shall be made from location "M" of a second rail (Note, Sec. 10). If this test fails all the second rails from the melt shall be rejected, and a similar determination shall be made from location "M" of a third rail. If this test fails, all the remaining rails from the melt shall be rejected.

(e) If, however, the segregation found at location "M" in any rail in a rolling exceeds 25 per cent, when determined as provided for in Section 6 (d), the progressive testing of the second and third rails will not be permitted on any subsequent melts; but on such melts the failure of the top rail to pass the requirements provided for in 6 (d) will cause the rejection of the entire heat.

PHYSICAL REQUIREMENTS

7. *Physical Qualities.*—Tests shall be made to determine:

(a) Ductility or toughness as opposed to brittleness.

(b) Soundness.

8. *Method of Testing.*—The physical qualities shall be determined by the drop test.

9. *Drop Testing Machine.*—The drop testing machine used shall be the standard of the American Railway Engineering Association.

(a) The tup shall weigh 2,000 lb., and have a striking face with a radius of 5 in.

(b) The anvil block shall weigh 20,000 lb., and be supported on springs.

(c) The supports for the test pieces shall be spaced 3 ft. between centers, and shall be a part of, and firmly secured to, the anvil. The bearing surfaces of the supports shall have a radius of 5 in.

10. *Pieces for Drop Test.*—Drop tests shall be made on pieces of rail not less than 4 ft. and not more than 6 ft. long. These test pieces shall be cut from the top end of the drop rail of the ingot, and marked on the base with gage marks 1 in. apart for 3 in. each side of the center of the test piece, for measuring the ductility of the metal.

NOTE.—Where it is necessary to test rails lower than the first rail, the bottom of the first rail, in lieu of the top of the second rail; and the bottom of the second rail, in lieu of the top of the third rail, will be accepted, if preferred by the manufacturer.

11. *Temperature of Test Pieces.*—The temperature of the test pieces shall be between 60 and 120 deg. F.

12. *Height of Drop.*—The test piece shall be placed head upwards on the supports, and be subjected to impact of the tup falling free from a height of 18 ft.

13. *Elongation or Ductility.*—(a) Under this impact the rail under one or more blows shall show at least 6 per cent elongation for 1 in. or 5 per cent each for two consecutive inches of the 6-in. scale, marked as described in Section 10.

(b) A sufficient number of blows shall be given to determine the complete elongation of the test piece of at least every fifth melt of Bessemer steel, and of one out of every three test pieces of a melt of open-hearth steel.

14. *Permanent Set.*—The permanent set for No. 1 classification rails, measured by the middle ordinate in inches in a length of 3 ft., after one blow under the drop test, shall not exceed that in the following table:

Section	Rail		Permanent set in inches	
	Weight per yard	Moment of inertia	Bessemer process	Open-hearth process
P. S.	100	41.9	2.00	2.00

15. *Test to Destruction.*—The test pieces which do not break

under the first or subsequent blows shall be nicked and broken, to determine whether the interior metal is sound.

(The words "interior defect" in the following sections shall be interpreted to mean: seams, laminations, cavities or interposed foreign matter made visible by the destruction test, the saws, or the drills.)

16. *Bessemer Process Drop Tests.*—One piece shall be tested from each melt of Bessemer steel.

(a) If the test piece does not break at the first blow and gives the required elongation (Sec. 13), all of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according as the permanent set is less or more, respectively, than the prescribed limit, provided that the test piece, when broken, does not show interior defect.

(b) If the test piece breaks at the first blow, or does not give the required elongation (Sec. 13), or if the test piece does not break and gives the required elongation, but, when broken, shows interior defect, all of the top rails from that melt shall be rejected.

(c) A second test shall then be made of a test piece selected by the inspector from the top end of any second rail of the same melt, preferably of the same ingot (Note, Sec. 10). If the test piece does not break at the first blow and gives the required elongation (Sec. 13), all of the remainder of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according as the permanent set is less or more, respectively, than the prescribed limit, provided that the test piece, when broken, does not show interior defect.

(d) If the test piece breaks at the first blow, or does not give the required elongation (Sec. 13), or if the test piece does not break and gives the required elongation, but, when broken, shows interior defect, all of the second rails from that melt shall be rejected.

(e) A third test shall then be made of a test piece selected by the inspector from the top end of any third rail of the same melt, preferably of the same ingot. If the test piece does not break at the first blow and gives the required elongation (Sec. 13), all of the remainder of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according as the permanent set is less or more, respectively, than the prescribed limit, provided that the test piece, when broken, does not show interior defect.

(f) If the test piece breaks at the first blow, or does not give the required elongation (Sec. 13), or if the test piece does not break and gives the required elongation, but, when broken, shows interior defect, all of the remainder of the rails from that melt shall be rejected.

17. *Open-Hearth Process Drop Tests.*—Test pieces shall be selected from the second, middle and last full ingot of each open-hearth melt, and all three pieces shall undergo the complete set of physical tests.

(a) If none of the test pieces break at the first blow and give the required elongation (Sec. 13), all of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according as the permanent set is less or more, respectively, than the prescribed limit, provided that the test pieces, when broken, do not show interior defect.

(b) If any of the test pieces break at the first blow, or do not give the required elongation (Sec. 13), or if none of the test pieces break and give the required elongation, but, when broken, show interior defect, all of the top rails from that melt shall be rejected.

(c) Second tests shall then be made from three test pieces selected by the inspector from the top ends of any second rails of the same melt, preferably the same ingots (Note, Sec. 10). If none of the test pieces break at the first blow and give the required elongation (Sec. 13), all of the remainder of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according as the permanent set is less or more, respectively, than the prescribed limit, provided that the test pieces, when broken, do not show interior defect.

(d) If any of the test pieces break at the first blow, or do not give the required elongation (Sec. 13), or if none of the test

pieces break and give the required elongation, but, when broken, show interior defect, all of the second rails of the melt shall be rejected.

(e) Third tests shall then be made from three test pieces selected by the inspector from the top ends of any third rails of the same melt, preferably of the same ingots (Note, Sec. 10). If none of the test pieces break at the first blow and give the required elongation (Sec. 13), all of the remainder of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according as the permanent set is less or more, respectively, than the prescribed limit, provided that the test pieces, when broken, do not show interior defect.

(f) If any of the test pieces break at the first blow, or do not give the required elongation (Sec. 13), or if none of the test pieces break and give the required elongation, but, when broken, show interior defect, all of the remainder of the rails from that melt shall be rejected.

18. *No. 1 Rails.*—No. 1 classification rails shall be free from injurious defects and flaws of all kinds.

19. *No. 2 Rails.*—(a) Rails which, by reason of surface imperfections, or for causes mentioned in Sections 16, 17 and 29, are not classed as No. 1 rails, will be accepted as No. 2 rails, but No. 2 rails which contain imperfections in such number or of such character as will, in the judgment of the inspector, render them unfit for recognized No. 2 uses, will not be accepted for shipment.

(b) No. 2 rails to the extent of 5 per cent of the whole order will be received. All rails accepted as No. 2 rails shall have the ends painted white and shall have two prick punch marks on the side of the web near the heat number near the end of the rail, so placed as not to be covered by the splice bars.

DETAILS OF MANUFACTURE

20. *Quality of Manufacture.*—The entire process of manufacture shall be in accordance with the best current state of the art. Ingots shall be kept in a vertical position until ready to be rolled, or until the metal in the interior has had time to solidify.

21. *Bled Ingots.*—Bled ingots shall not be used.

22. *Discard.*—There shall be sheared from the end of the bloom formed from the top of the ingot sufficient metal to secure sound rails.

23. *Lengths.*—The standard length of rails shall be 33 ft., at a temperature of 60 deg. F. Ten per cent of the entire order will be accepted in shorter lengths varying by 1 ft. from 32 to 25 ft. A variation of $\frac{1}{4}$ in. from the specified lengths will be allowed, except that for 15 per cent of the order this variation may be $\frac{3}{8}$ in. No. 1 rails less than 33 ft. long shall be painted green on both ends.

24. *Shrinkage.*—The number of passes and speed of train shall be so regulated that on leaving the rolls at the final pass the temperature of the rail will not exceed that which requires a shrinkage allowance at the hot saws, for a rail 33 ft. in length, of $6\frac{1}{4}$ in.

25. *Cooling.*—The bars shall not be held for the purpose of reducing their temperature, nor shall any artificial means of cooling them be used after they leave the finishing pass. Rails, while on the cooling beds, shall be protected from snow and water.

26. *Section.*—The section of rails shall conform as accurately as possible to the template furnished by the railroad company. A variation in height of $\frac{1}{64}$ in. less or $\frac{1}{32}$ in. greater than the specified height, and $\frac{1}{16}$ in. in width of flange, will be permitted; but no variation shall be allowed in the dimensions affecting the fit of the splice bars.

27. *Weight.*—The weight of the rails specified in the order shall be maintained as nearly as possible, after complying with the preceding section. A variation of $\frac{1}{2}$ of 1 per cent from the calculated weight of section, as applied to an entire order, will be allowed.

28. *Payment.*—Rails accepted will be paid for according to actual weights.

29. *Straightening.*—(a) The hot straightening shall be carefully done, so that gaging under the cold presses will be reduced to a minimum. Any rail coming to the straightening presses show-

ing sharp kinks or greater camber than that indicated by a middle ordinate of 4 in. in 33 ft., will be at once classed as No. 2 rail. The distance between the supports of rails in the straightening presses shall not be less than 42 in. The supports shall have flat surfaces and be out of wind.

(b) Rails heard to snap while being straightened shall be at once rejected.

30. *Drilling.*—Circular holes for joint bolts shall be drilled to conform accurately in every respect to the drawing and dimensions furnished by the railroad company.

31. *Finishing.*—(a) All rails shall be smooth on the heads, straight in line and surface, and without any twists, waves or kinks. They shall be sawed square at the ends, a variation of not more than $\frac{1}{32}$ in. being allowed, and burrs shall be carefully removed.

(b) Rails improperly drilled or straightened, or from which the burrs have not been removed, shall be rejected, but may be accepted after being properly finished.

(c) When any finished rail shows interior defects at either end or in a drilled hole the entire rail shall be rejected.

32. *Branding.*—Rails shall be branded for identification in the following manner:

(a) The name of the manufacturer, the month and year of manufacture, and the weight and types or section of rail shall be rolled in raised letters and figures on the side of the web. The type shall be marked by letters which signify the name by which it is known as for example:

Sections of Pennsylvania Railroad System.....	P. S.
Sections of American Society of Civil Engineers.....	A. S. C. E.
Sections of American Railway Association.....	A. R. A.—A.
Sections of American Railway Engineering Association.....	A. R. E.—B.

(b) The number of the heat and letter indicating the portion of the ingot from which the rail was made shall be plainly stamped on the web of each rail where it will not be covered by the joint bars. The top rails shall be lettered "A" and the succeeding ones "B," "C," "D," etc., consecutively; but in case of a top discard of from 20 to 35 per cent the letter "A" will be omitted, the top rail becoming "B." If the top discard be greater than 35 per cent the letter "B" shall be omitted, the top rail becoming "C."

(c) Open-hearth rails shall be branded or stamped "O.-H." in addition to the other marks.

(d) All markings of rails shall be done so effectively that the marks may be read as long as the rails are in service.

33. *Separate Classes.*—All classes of rails shall be kept separate from each other.

34. *Loading.*—Rails shall be carefully handled and loaded in such a manner as not to injure them.

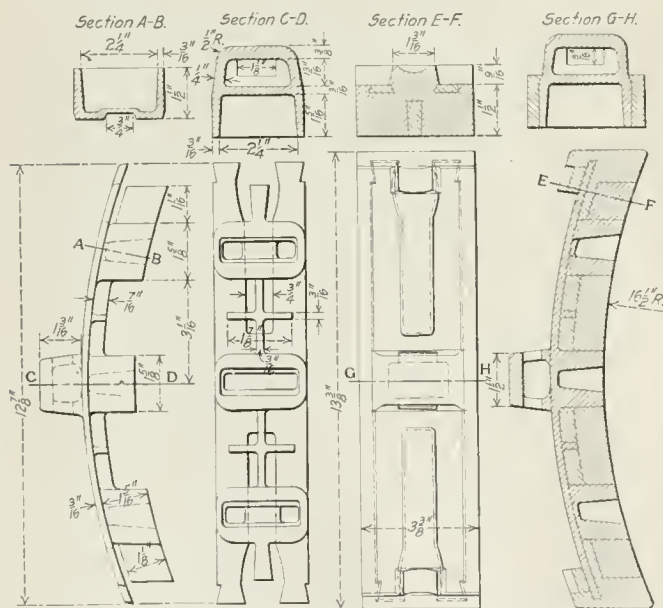
LONDON TUBE SERVICE EXTENSIONS.—The utility of the new Queen's Park extension of the Bakerloo tube will soon be increased further by the running of through trains to the new London & North Western station at Willesden Junction. Work is also proceeding on the Central London extension which will link up that railway with the Great Western main line at Ealing Broadway. The tube railway, as originally conceived, was to have been a self-contained undertaking, with no connection with other lines. The tubes were deep-level lines and tunnels of too small diameter to admit modern main-line rolling stock with the exception of the Great Northern & City, which has never been used for such rolling stock. The new era of through bookings and other facilities for encouraging interchange traffic has since caused the old policy of isolation to be abandoned and there now is through running on surface lines. This innovation is of value to all concerned, but it raises the question whether the tunnels would have been built to their narrow diameter if future developments could have been foreseen. Standard main line rolling stock cannot be used for these new through services, and it is possible that that may militate against other extensions of through service. The difficulties can be overcome by changing at suitable junction points, but experience gained during the past few years has shown plainly the cash value of through facilities.

BRAKE SHOE WITH MALLEABLE IRON INSERTS

A recently developed car wheel brake shoe which is claimed to have given excellent results both in service and laboratory tests is shown herewith. It is of the insert type and details of its construction will be readily understood by referring to the drawing.

The body of the shoe is a special cast iron mixture poured around three inserts of malleable iron which form an integral part of the back and lug of the shoe. The inserts are rectangular in section and in the center of each is a dust pocket, the opening of which in the face of the shoe is $\frac{3}{4}$ in. wide by $2\frac{1}{4}$ in. long. The back of the shoe, which is reinforced with stiffening ribs, is so formed that it is well secured in the cast iron body.

A laboratory test of one of these shoes was recently made at Purdue University. When tested on a cast iron wheel at a pressure of 2,808 lb., it developed a coefficient of friction of 28.01 per cent. When the pressure was increased to 6,840 lb., the coefficient was 20.37 per cent. The coefficient at these pressures required by the Master Car Builders' specifications are respectively 22 per cent and 16 per cent. A similar test on a steel wheel developed coefficients of 15.92 per cent at a brake shoe pressure of 6,840 lb., and 11.96 per cent at 12,000 lb., the minimum Master Car Builders' coefficients for these conditions being 12.5 per cent and 11 per cent respectively. On the steel wheel the loss in weight for each 100,000,000 ft.-lb. of work done was 1.04 lb., the specifications permitting a maximum of



Details of Brake Shoe with Dust Pockets in the Inserts

four pounds under these conditions. The average distance of stop from 65 miles an hour on the steel wheel was 890 ft. under 12,000 lb. brake shoe pressure; under 6,840 lb. pressure the average stop was made in 1,348 ft. On the cast iron wheel the average distance of stop in the low pressure test was 881 ft., while in the high pressure test it was only 440 ft.

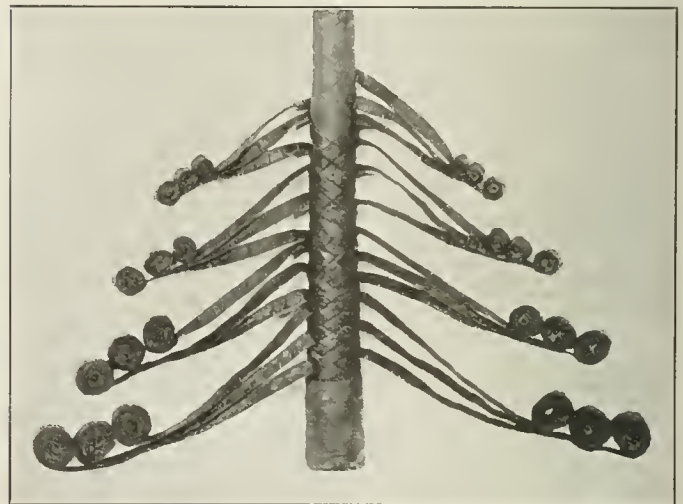
This shoe is known as the Streeter safety brake shoe and the special features of its construction have been patented. Its further development is in the hands of A. Mitchell, Bedford building, Chicago.

RUSSIAN RAILWAY TO THE ARCTIC OCEAN.—The Council of Ministers at Petrograd has sanctioned an expenditure of \$8,500,000 for the construction of a railway line from Kandalakscha, in the Government of Archangel, to Kola, in the same government, which will run across the Kola peninsula and connect the Arctic ocean with the Russian railway system.

AIR BRAKE HOSE

A method of rubber hose construction has been developed by the Goodyear Tire & Rubber Company, Akron, Ohio, which permits the manufacture of a hose of uniform thickness throughout in which the tendency to twist or contract under pressure has been entirely eliminated. It is known as the Subers process, and is now being used in the manufacture of standard M. C. B. air brake hose.

In the making of what is termed wrapped hose, the fabric is cut on the bias, overlapped and wrapped directly over the tube. The lap of the fabric in hose of this type varies the thickness often as much as $\frac{1}{32}$ in., and when cut through, a section of the material clearly shows that the fabric is not thoroughly impregnated with the rubber. The wrapping material under the Subers process consists of parallel strands or cords combined into strips, each strip consisting of about 288 strands and being approximately $\frac{1}{16}$ in. thick by $\frac{1}{2}$ in. wide. Every strand is separately coated with rubber compound which binds the strands in each strip firmly together, the impregnation of



Method of Wrapping the Tube or Lining in the Subers Process

the fabric being thus very complete. The strips are wound spirally about the tube or lining of the hose, there being two complete layers in each direction. The strips in each layer are separated by a space equal to their own width and there is no overlapping. The manner in which the strips are applied may be clearly understood by referring to the accompanying illustration.

Hose of this construction shows a specially high bursting pressure and the distorting effect of the pressure is minimized. The elongation per foot per 1,000 lb. pressure will average about $\frac{1}{8}$ in., with an expansion of about $\frac{1}{16}$ in. on the diameter, there being no twisting or contracting. Until a pressure of 1,300 lb. has been reached, however, but little change takes place.

At the present time the manufacturers are confining their production of this type of hose to the standard air brake hose in lengths of 22 in., but later expect to adapt the process to the manufacture of car heating steam hose, pneumatic tool hose, etc. The air brake hose now being manufactured conform to the Master Car Builders' specifications presented at the last convention of the association. They are being used at the present time by several railroads.

REGISTRATION OF TRADE-MARKS IN LATIN AMERICA.—The Bureau of Foreign and Domestic Commerce of the Department of Commerce has recently issued a preliminary report on this subject giving data relative to the offices for registration of trade-marks; duration; fees, and formalities of registration in the countries of South and Central America.

General News Department

The safety first and the freight claim preventive committees on the St. Louis & San Francisco were consolidated, effective July 1.

The city council of Cleveland has appointed a committee to investigate the subject of electrification of steam railroads. The committee will have before it for consideration a report on the subject presented in 1913 by E. T. Roberts, then city smoke inspector.

The special recess committee appointed to study the development of terminal facilities in Boston, Mass., has elected Edward J. Dunn secretary, and has set July 29 for the first public hearing, to which Boston civic organizations, street railway officers and steam railroad officers are invited.

The Colorado Eastern Railroad, which has been operating one train a day between Colorado and Scranton, Col., a distance of about 20 miles, in order to hold a franchise, has suspended operation in consequence of a decision of the Colorado supreme court, declaring that the franchise to use the city streets was invalid.

United States civil service examinations will be held on August 17 and 18 respectively for senior land appraisers and junior land appraisers for men desiring to qualify for these positions on the Interstate Commerce Commission's valuation corps. The senior land appraiser positions pay from \$1,800 to \$3,600, and the junior from \$900 to \$1,500.

The Georgia state senate, by a vote of 38 to 2, passed a bill to amend the constitution so as to prohibit any privately owned railroad from paralleling the tracks of the Western & Atlantic so long as it remains the property of the state. The bill now goes to the House. The Western & Atlantic is now leased by the state to the Nashville, Chattanooga & St. Louis, and this lease expires in December, 1919.

Bulletin No. 8 of the Pennsylvania Lines is a warning against trespassing. These bulletins are issued from time to time by the Pennsylvania "to inform its patrons as to facts and problems of importance to the railroad and the public." No. 8 is headed with red letters an inch high, "The Most Needless Waste of Human Life in America," and winds up with red letters half an inch deep, "Don't you trespass." The circular points out that it is a fact that more people are killed every year trespassing on railroad tracks in the United States than the total number who lost their lives in the Johnstown flood, San Francisco earthquake and fire, the Salem, Baltimore and Jacksonville fires, and the sinking of the Titanic and Lusitania.

Operating Revenues and Expenses of Express Companies for March, 1915

The following statement, which is subject to revision, has been compiled by the Interstate Commerce Commission from the monthly reports of operating revenues and expenses of the principal express companies for March, 1915.

A—FOR THE MONTH OF MARCH											
Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.		
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914	
Mileage of all lines covered (miles).	44,846.63	38,545.94	72,499.10	60,187.33	9,676.50	7,080.31	2,839.78	2,839.78	9,557.73	9,334.20	
Charges for transportation.....	\$2,924,366	\$2,545,088	\$3,939,222	\$3,181,573	\$229,604	\$240,227	\$53,607	\$43,285	\$221,149	\$224,939	
Express privileges—Dr.	1,391,890	1,310,410	1,984,410	1,581,840	111,984	112,426	26,739	22,472	134,068	136,496	
Operations other than transportation	39,960	26,825	190,879	175,086	4,744	7,034	752	817	3,724	3,727	
Total operating revenues	1,572,437	1,261,502	2,145,690	1,774,819	122,364	134,835	27,619	21,630	90,805	92,170	
Operating expenses	1,446,855	1,361,127	1,938,624	1,870,649	120,968	127,648	28,096	28,450	80,370	84,115	
Net operating revenue.....	125,581	99,624	207,066	95,729	1,395	7,186	—477	—6,820	10,435	8,055	
Uncollectible revenue from transp'n.	501	.....	261	.....	27	.....	.....	.....	9	.....
Express taxes	16,495	16,704	21,604	32,756	4,000	3,000	800	800	2,868	2,826	
Operating income	108,584	—116,329	185,201	—128,486	—2,631	4,186	—1,277	—7,620	7,558	5,228	
Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named*		
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914	
Mileage of all lines covered (miles).	8,115.34	8,080.40	34,639.60	33,510.60	113,150.05	99,869.25	5,174.26	5,008.97	300,501.99	296,517.08	
Charges for transportation.....	\$202,703	\$204,316	\$1,318,466	\$1,289,459	\$3,324,897	\$2,532,170	\$91,789	\$86,543	\$12,305,806	\$11,831,144	
Express privileges—Dr.	111,486	112,673	687,834	669,278	1,688,896	1,240,256	43,421	44,078	6,180,733	5,958,950	
Operations other than transportation	3,251	2,940	25,972	27,171	58,518	54,289	3,044	2,250	330,849	325,227	
Total operating revenues	94,468	94,583	656,604	647,352	1,694,518	1,346,204	51,412	44,724	6,455,922	6,197,421	
Operating expenses	63,592	83,693	525,902	572,258	1,419,039	1,209,434	49,551	48,197	5,693,002	6,202,010	
Net operating revenue.....	10,875	10,990	130,702	75,094	275,479	136,769	1,860	—3,472	762,920	—4,619	
Uncollectible revenue from transp'n.	24	5	73	33	974	.....	25	.....	1,897	38	
Express taxes	5,000	4,500	14,205	15,423	31,095	35,000	948	1,102	97,018	124,280	
Operating income	5,850	6,485	116,423	59,637	243,409	101,769	886	—4,574	664,005	—128,937	
B—FOR THE NINE MONTHS ENDING WITH MARCH											
Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.		
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914	
Charges for transportation.....	\$25,371,028	\$25,211,666	\$34,105,037	\$31,117,996	\$2,308,758	\$2,387,761	\$538,349	\$510,835	\$2,333,558	\$2,451,501	
Express privileges—Dr.	12,829,016	13,247,347	17,132,791	15,601,413	1,166,733	1,140,709	270,068	257,326	1,474,420	1,501,732	
Operations other than transportation	368,063	271,099	1,626,728	1,634,921	44,431	80,577	7,188	7,453	38,645	37,497	
Total operating revenues	12,910,075	12,235,418	18,599,474	17,151,504	1,186,460	1,378,130	275,469	260,961	947,783	988,266	
Operating expenses	13,646,466	12,652,045	18,533,553	17,480,571	1,161,840	1,370,005	263,045	271,957	799,250	809,034	
Net operating revenue	736,391	—416,626	65,920	—329,070	24,619	58,125	12,423	10,991	148,533	179,232	
Uncollectible revenue from transp'n.	4,451	.....	1,752	158	77	.....	.....	.....	54	.....
Express taxes	153,489	151,138	297,414	278,828	36,000	35,700	9,000	10,000	34,880	34,961	
Operating income	893,331	—567,765	233,247	—608,057	—11,457	32,425	3,423	—20,991	113,598	144,270	
Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named*		
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914	
Charges for transportation.....	\$1,050,713	\$2,263,000	\$10,449,711	\$11,794,675	\$28,149,462	\$23,595,037	\$850,479	\$902,933	\$106,163,091	\$115,150,798	
Express privileges—Dr.	1,120,010	1,279,666	5,379,818	6,053,970	14,104,065	11,808,009	480,804	501,947	54,177,230	58,671,345	
Operations other than transportation	29,261	8,980	2,6845	29,161	576,457	490,379	27,607	21,216	2,895,278	3,054,245	
Total operating revenues	959,964	1,062,318	5,296,738	5,990,066	14,771,839	12,777,407	433,783	425,703	54,881,089	59,533,698	
Operating expenses	797,622	877,072	4,748,111	5,214,027	13,341,338	11,141,467	469,158	448,453	63,763,387	57,984,670	
Net operating revenue	162,342	240,242	548,627	776,039	927,500	1,133,939	35,875	26,250	1,117,702	1,549,028	
Uncollectible revenue from transp'n.	132	36	113	126	934	.....	77	.....	14,924	320	
Express taxes	45,000	40,500	131,755	135,634	319,453	298,000	9,080	7,474	1,035,074	1,080,244	
Operating income	117,210	199,706	416,129	640,278	600,112	835,939	—45,034	—33,724	67,704	468,464	

*Includes previous year's returns of United States Express Co.

Southern Railway's Accident Record

More than 16,500 passengers were carried on the Southern Railway in the year ended June 30 with not a single passenger killed in a train accident and only one fatal injury to a passenger while on a train. This injury occurred to the passenger while standing on a car platform. In making this announcement the company calls attention to the fact that during this year 12 persons were killed at public highway crossings on the Southern in automobile accidents, every one of which could have been prevented by the exercise of caution on the part of the driver of the automobile.

Tool Foremen's Convention

The seventh annual convention of the American Railway Tool Foremen's Association was held at the Hotel Sherman, Chicago, July 19 to 21, Henry Otto, tool foreman, Atchison, Topeka & Santa Fe, presiding. The opening address was presented by R. W. Bell, general superintendent of motive power, Illinois Central, and a paper was read on "Getting the Most Out of Tools," by B. W. Benedict, director of shop laboratories, University of Illinois. A report of the convention will be included in next week's issue of the *Railway Age Gazette*.

The following is the list of exhibitors:

Abrasive Material Company, Chicago.—New electric abrasive—"boro-carbone." Represented by J. C. Dillenbeck.

Armstrong Brothers Tool Company, Chicago.—Lathe and planer tool holders, drop forged wrenches, lathe dogs, drills and clamps. Represented by Geo. E. Armstrong and Paul Armstrong.

Besly, Chas. H. & Co., Chicago.—Helm temper taps. Represented by C. A. Mills.

Brown Instrument Company, Philadelphia, Pa.—Pyrometers. Represented by J. W. Lazear and F. C. Mahoney.

Brown, Tom, & Co., Chicago.—Flue expanders; beading tools and journal jacks. Represented by Tom Brown.

Browne & Sharpe Manufacturing Company, Providence, R. I.—Machinists' tools and cutters. Represented by H. M. Geis and R. E. Doras.

Carborundum Company, Niagara Falls, N. Y.—Carborundum crystals and wheels. Represented by C. C. Schumaker, E. P. Ritzma and H. P. Frost.

Celfor Tool Company, Buchanan, Mich.—Twist drills, reamers, countersinks and miscellaneous tools. Represented by W. Nochnumson and C. O. Montague.

Chicago Pneumatic Tool Company, Chicago.—Pneumatic tools.

Cleveland Pneumatic Tool Company, Cleveland, Ohio.—Riveters, clippers, drills and hose couplings. Represented by C. J. Albert.

Cleveland Twist Drill Company, Cleveland, Ohio.—Drills and reamers. Represented by A. L. Beardsley and H. S. White.

Colonial Steel Company, Pittsburgh, Pa.—Specimens of tool steel. Represented by Mallory P. Spencer.

Desmond-Stephen Manufacturing Company, Urbana, Ohio.—Grinding wheel dressers. Represented by H. H. Dovell.

Detroit Twist Drill Company, Detroit, Mich.—Twist drills, reamers and cutters. Represented by M. F. Crawler.

Duff Manufacturing Company, Pittsburgh, Pa.—Genuine Barrett jacks, Duff ball bearing and high speed screw and journal jacks. Represented by C. N. Thulin.

Edgar-Allen & Co., Chicago.—Specimens of steel.

Faessler, J., Manufacturing Company, Moberly, Mo.—Flue expanders, cutters, etc. Represented by G. R. Maupin.

Greenfield Tap & Die Corporation, Greenfield, Mass.—Taps, Wells self-opening dies, gages and reamers. Represented by J. K. Simons and Martin Sweder.

Hardy, F. A., & Co., Chicago.—Safety welding and grinding glasses; new Hardy noviweld glass. Represented by C. S. Wells.

Horne, Dale Brown Company, Chicago.—Sateco safety drill holders and ratchets; Cleveland crucible steel files; L. W. drills and reamers; Victor hack saw blades. Represented by J. J. Dale, J. W. Horne and P. V. Bachellet.

Hyland, R. H., & Co., Chicago.—Norton self-lowering ball bearing jacks, journal jacks, Mulcomoy flexible metallic air and steam twin acetylene hose. Represented by R. H. Hyland.

Independent Pneumatic Tool Company, Chicago.—Pneumatic and electric tools; pneumatic roller bearing drills and new chipping hammers. Represented by H. F. Finney, H. H. Henricks, V. W. Robinson, G. C. Wilson and F. J. Passino.

Ingersoll-Rand Company, New York.—Pneumatic tools.

Norton Company, Worcester, Mass.—Norton grinding wheels, India oil-stones and grinding machinery. Represented by George W. Thomson, W. N. Jore and Wm. H. Warner.

Nye Tool & Machine Works, Chicago.—Nye cutter wheel, dies, combination stocks, post vise and reeding stock. Represented by H. G. Nye and Chas. Wildridge.

Racine Tool & Machine Company, Racine, Wis.—High speed hack saw. Represented by J. M. Jones and Edward Genten.

Rich Tool Company, Chicago.—High speed tools, reamers, rivet sets and tungsten valves. Represented by O. F. Schubert.

Ryerson, Jos. T., & Son, Chicago.—Exhibiting booklets on special machinery and special nikrome and tool steels. Represented by A. H. Ackerman and John Pomie.

Street R. R., Chicago.—Billings & Spencer tools; Horton chucks; Yale chain blocks; Jackson drill press vise; Hyatt roller bearings; and Keystone steel pulleys. Represented by A. H. Taylor, Chas. Butterfuss and Lane Schofield.

Whitman & Barnes Manufacturing Company, Akron, Ohio.—Exhibiting drills, reamers and wrenches. Represented by M. E. Townner and A. O. Wange.

Wilson, T. A., & Co., Reading, Pa.—Safety glasses and grinders' glasses. Represented by B. T. Roberts.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the *Railway Age Gazette* for each month.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.

AMERICAN RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

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

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

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Laylor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

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

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

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

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

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.

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

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

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

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

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

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

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

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

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

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, September, 1915.

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

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

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

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

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

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Genl. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.

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

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-10, 1915, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

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

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

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses			Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.					
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Maintenance of equipment.	Traffic.					Miscellaneous.	General.	Total.		
Atlantic City	170	\$66,215	\$121,143	\$194,558	\$52,452	\$23,754	\$1,998	\$103	\$3,334	\$163,530	\$31,029	\$17,524	\$13,500	\$17,524	\$36,875	
Birmingham Southern	44	39,936	713	88,324	10,538	11,080	688	19,672	3,229	45,207	13,116	11,023	2,093	11,023	13,755	
Boston & Maine	2,30	2,358,308	1,173,783	3,874,708	707,668	508,402	33,357	1,597,515	17,006	92,785	2,956,733	97,975	163,006	754,968	106,947	
Central Vermont	411	235,045	63,600	325,664	42,217	45,658	9,719	133,453	65	8,165	239,277	86,388	15,760	70,623	14,020	
Chicago & Eastern Illinois	1,282	707,842	208,801	1,012,041	317,512	308,742	24,304	402,531	7,026	36,379	1,093,205	81,164	135,031	53,600	239,537	
Chicago & North Western	1,089	413,498	103,975	560,032	91,587	140,692	10,519	184,453	3,298	22,143	452,693	107,339	73,338	35,000	8,562	
Denver & Rio Grande	2,885	1,212,120	380,570	1,734,189	205,059	260,244	45,150	468,897	34,622	46,708	1,060,680	67,509	52,834	80,600	92,550	
Denver & Salt Lake	755	97,610	23,058	126,626	16,676	20,184	2,471	39,396	.....	4,832	83,340	43,285	7,500	35,785	15,942
Delaware, Maryland & Pennsylvania	441	101,139	9,819	119,692	11,926	16,791	3,233	59,396	.....	5,909	97,255	22,437	20,437	2,000	170,950
Duluth, South Shore & Atlantic	626	162,614	63,349	250,556	70,557	37,217	5,931	95,210	3,563	9,071	221,548	29,008	13,008	16,000	17,747	
Duluth, Winnipeg & Pacific	185	67,489	12,753	83,627	13,314	9,648	1,518	27,769	585	6,150	58,984	23,642	4,131	19,511	17,056	
Elgin, Joliet & Eastern Illinois	87	87,397	16,473	103,568	13,658	10,850	2,910	27,711	.....	4,374	59,503	46,065	40,275	5,790	.....
Galveston, Harrisburg & San Antonio	1,350	545,610	217,100	828,494	144,021	158,475	30,662	376,034	9,926	33,734	752,643	75,851	39,624	35,785	33,133	
Genesee, Southern & Florida	305	95,013	43,311	163,358	20,219	26,355	7,054	72,498	1,773	9,529	137,429	27,929	17,637	10,132	17,637	
Gulf, Colorado & Santa Fe	1,937	846,299	212,851	1,113,238	245,141	191,564	29,998	450,574	.....	45,564	962,748	169,590	124,432	45,043	54,141
Houston East & West Texas	191	81,809	25,121	115,669	18,030	16,692	1,903	39,382	449	2,987	79,438	36,231	4,170	32,042	4,866	
Houston & Texas Central	894	343,901	115,094	501,797	99,597	69,883	15,451	214,914	3,910	17,430	420,371	81,426	54,359	26,951	97,708	
Kansas City, Mexico & Orient	740	145,339	25,241	180,252	54,697	36,826	8,407	88,571	.....	10,392	198,883	18,630	9,125	27,768	.....
Kansas City, Western & Missouri	208	108,982	52,793	174,691	27,269	30,708	7,516	57,040	1,618	6,641	130,791	43,900	9,895	33,768	3,485	
Missouri, Kansas & Texas System	3,865	1,503,718	605,277	2,287,570	328,397	339,791	52,213	903,062	20,846	89,694	1,694,310	593,259	468,874	111,794	54,306	
Missouri, Oklahoma & Gulf of Texas	19	8,274	251	8,684	2,477	12,745	261	5,072	.....	544	21,099	12,414	140	140	12,103
Missouri Pacific	3,920	1,660,151	369,879	2,220,800	357,269	454,635	54,129	871,516	7,692	59,310	1,804,550	416,249	304,305	109,100	128,580	
Mobile & Ohio	1,122	817,989	95,875	967,550	97,170	161,643	32,204	352,686	2,458	29,747	675,858	291,692	257,437	20,013	75,149	
Morgan, Louisiana & Texas, R. R. & S. S. Co.	405	215,481	80,419	328,969	50,704	60,809	12,297	135,595	1,965	11,662	272,597	56,371	36,194	36,194	3,493	
New Orleans, Mobile & Chicago	403	114,817	19,422	141,950	21,880	20,799	3,894	51,192	.....	7,622	105,353	36,597	29,949	6,398	.....
Northwestern Pacific	401	97,451	160,312	295,589	43,178	45,727	6,586	113,649	.....	6,431	213,523	82,066	66,614	15,451	16,099
Oahu Ry. & Land Co.	109	61,800	19,555	89,265	7,641	5,765	807	29,537	.....	3,716	39,537	47,738	42,386	7,152	3,464
Panhandle & Santa Fe	670	276,668	73,545	366,779	90,485	80,808	3,962	91,756	.....	11,167	285,177	81,602	15,838	12,082	15,838
Pere Marquette	2,312	1,038,746	283,649	1,447,930	293,922	271,036	29,398	533,732	3,547	39,092	1,190,695	257,234	46,847	210,429	2,957,931	
Philadelphia & Reading	1,120	3,292,487	540,891	4,047,617	486,244	718,311	38,217	1,348,831	13,936	73,178	2,675,883	1,341,733	99,485	1,241,508	2,957,931	
Pittsburgh, Shawmut & Northern	294	126,179	7,922	136,021	16,355	30,352	1,558	43,416	.....	3,850	95,531	40,491	38,890	1,599	11,171
Port Reading	21	96,031	.....	117,819	13,073	4,597	38	36,514	.....	336	54,548	63,271	51,271	12,000	1,892
St. Louis, Brownsville & Mexico	548	129,235	53,382	199,485	26,545	19,063	5,964	69,082	.....	9,860	130,481	60,004	62,411	6,479	34,241
St. Louis, Iron Mountain & Southern	3,365	1,769,700	378,552	2,313,415	377,655	472,793	67,668	735,627	6,405	67,311	1,727,459	585,956	473,930	110,405	238,667	
St. Louis, San Francisco & Texas	235	57,711	18,584	82,544	21,790	14,184	2,295	42,977	.....	3,853	85,098	2,554	3,770	1,216	8,814
Southern Union	281	43,470	22,013	65,483	20,957	7,496	1,879	36,059	.....	3,548	69,938	1,648	8,375	8,375	815
Spokane International	163	46,678	9,665	58,816	11,229	4,640	2,044	19,911	.....	3,144	40,968	17,848	13,741	4,108	17,527
Spokane, Portland & Seattle	556	166,469	114,424	314,876	87,971	32,831	7,400	83,544	3,410	12,627	227,783	87,087	53,400	33,506	41,412	
Texas & New Orleans	469	210,872	75,784	318,361	64,628	59,679	8,209	124,793	5,143	10,561	272,543	45,818	15,805	15,805	58,729	
Texas & Pacific	139	46,765	21,337	68,078	16,025	15,888	4,385	35,701	56	4,224	76,279	7,800	4,502	3,300	25,497	
Western Pacific	913	306,000	158,162	503,578	95,689	57,931	24,368	167,531	15,503	16,776	377,799	125,779	30,580	30,580	73,586	
Whiting & Lake Erie	512	411,681	41,030	491,283	56,254	85,828	9,232	172,246	1,380	13,332	338,272	153,011	32,278	32,278	19,828	
ELEVEN MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915																
Albany City	170	\$724,469	\$1,290,335	\$2,121,404	\$414,997	\$258,137	\$25,703	\$1,071,604	\$1,056	\$17,607	\$1,788,165	\$333,240	\$184,371	\$148,500	\$184,371	\$23,511
Birmingham Southern	43	430,357	9,323	738,089	145,979	131,949	6,205	277,967	38,175	600,275	137,815	110,712	27,103	110,712	175,623
Boston & Maine	2,30	2,408,950	1,083,745	4,263,716	6,550,151	6,303,601	394,389	18,621,812	182,779	1,072,092	33,124,822	9,512,394	7,731,915	1,780,478	7,731,915	1,201,816
Central Vermont	411	2,431,935	799,725	3,502,747	444,502	575,631	94,063	1,622,739	23,292	79,586	2,839,814	662,933	488,842	173,360	488,842	338,846
Chicago & Eastern Illinois	1,282	9,555,860	2,529,897	13,142,499	2,006,476	2,895,958	264,454	4,979,979	88,427	401,564	10,627,365	2,515,134	1,931,310	582,400	1,931,310	189,829
Chicago & North Western	1,102	5,275,673	1,271,731	7,072,242	857,219	1,619,799	113,697	2,231,110	42,857	220,717	5,085,400	1,986,842	1,599,040	387,445	1,599,040	159,455
Denver & Rio Grande	2,571	14,069,223	3,982,048	19,957,462	2,337,910	3,649,188	429,294	5,834,501	300,547	602,855	13,144,541	6,812,920	5,864,356	947,300	5,864,356	232,909
Denver & Salt Lake	255	1,129,224	288,547	1,499,268	183,622	257,103	25,448	503,095	57,595	1,023,401	47,867	67,500	40,367	67,500	203,945
Detroit, Toledo & Ironville	441	1,885,403	150,547	2,135,330	212,829	260,762	41,710	956,648	63,499	1,535,447	99,883	765,710	60,500	765,710	140,020
Duluth, South Shore & Atlantic	627	1,621,653	782,029	2,643,805	494,857	389,915	86,317	1,051,022	41,049	113,096	2,176,255	467,550	291,473	175,970	291,473	131,109
Duluth, Winnipeg & Pacific	185	958,970	167,369	1,182,101	175,672	189,929	23,004	436,711	10,185	67,662	903,165	278,936	219,942	58,993	219,942	57,981
Elgin, Joliet & Eastern Illinois	87	87,397	16,473	103,568	13,658	10,850	2,910	27,761	4,374	59,503	46,065	40,275	5,790	40,275
Galveston, Harrisburg & San Antonio	1,346	6,793,631	2,726,898	10,108,942	1,499,431	1,750,041	323,888	4,505,783	102,032	386,138	8,560,035	1,748,907	1,322,442	424,621	1,322,442	86,510
Genesee, Southern & Florida	305	1,193,432	599,445	2,054,943	274,454	404,043	78,880	845,453	4,484	113,209	1,730,522	371,371	226,420	106,041	226,420	80,457
Gulf, Colorado & Santa Fe	1,937	11,559,033	2,695,301	15,122,034												

No cumulative figures shown.

REVENUES AND EXPENSES OF RAILWAYS

ELEVEN MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Maintenance of way and structures			Operating expenses			Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total.	Way and structures.	Of inc. misc.	Total.	Traffic.	Transportation.	Miscellaneous.				
Houston East & West Texas.....	191	\$800,708	\$278,308	\$1,079,016	\$213,453	\$185,588	\$213,453	\$20,845	\$499,981	\$1,838	\$286,409	\$45,441	\$240,624	\$55,376
Houston & Texas Central.....	886	4,288,186	1,344,109	5,632,295	1,092,138	857,687	1,092,138	19,237	2,440,045	26,278	1,296,075	280,025	1,014,608	365,937
Kansas City, Mexico & Orient.....	208	1,264,637	613,394	1,878,031	255,372	355,363	255,372	75,278	629,159	28,163	605,558	112,884	492,121	5,985
Louisiana Western.....	3,855	20,901,340	7,459,617	28,360,957	4,109,318	4,122,553	4,109,318	603,445	11,161,355	273,371	9,487,943	1,217,158	8,270,785	1,591,834
Missouri, Kansas & Texas System.....	19	112,480	3,000	115,480	17,884	3,472	17,884	2,402	51,637	.....	2,847	1,079	968	—8,667
Missouri, Oklahoma & Gulf of Texas.....	3,920	19,529,950	4,290,773	23,820,723	3,409,991	4,994,472	3,409,991	633,348	10,233,970	82,860	5,984,992	1,105,605	4,859,591	1,675,663
Missouri Pacific.....	1,122	8,381,625	1,344,158	9,725,783	1,004,053	1,747,682	1,004,053	426,177	3,846,942	28,484	3,818,458	351,638	3,466,820	112,226
Mobile & Ohio.....	405	2,769,190	958,611	3,727,801	1,124,337	711,165	1,124,337	125,505	3,124,491	26,187	2,897,993	218,922	2,679,071	1,367
Morgan's L. & Tex. R. & S. Co.....	403	1,296,212	259,044	1,555,256	305,962	224,095	305,962	42,645	577,868	—75	415,091	69,451	345,640	—280,160
New Orleans, Mobile & Chicago.....	401	1,225,574	1,615,019	2,840,593	561,094	458,063	561,094	56,018	1,265,919	.....	824,445	175,100	649,345	—141,326
New Orleans Pacific.....	109	1,808,516	234,266	2,042,782	1,120,335	92,439	1,120,335	7,433	1,337,133	.....	629,115	78,978	550,136	33,180
Omaha, N. & W. Pac.....	669	2,878,456	624,401	3,502,857	708,148	746,151	708,148	42,493	1,971,100	.....	97,911	105,031	818,481	446,528
Pere Marquette.....	2,316	11,574,824	3,611,960	15,186,784	1,681,698	3,236,157	1,681,698	347,066	6,899,007	48,783	4,621,101	470,559	3,840,317	558,603
Philadelphia & Reading.....	1,120	34,709,485	5,906,338	40,615,823	4,166,291	7,791,169	4,166,291	490,578	15,222,414	175,272	14,043,520	1,099,588	12,968,296	—1,074,492
Pittsburgh, Shawmut & Northern.....	294	1,549,583	111,856	1,661,439	281,403	447,277	281,403	18,508	556,936	.....	333,244	17,835	315,409	45,924
Port Reading.....	21	1,142,817	.....	1,142,817	128,325	82,316	128,325	425	468,007	.....	707,830	132,000	575,830	54,036
St. Louis, Brownsville & Mexico.....	548	1,271,897	651,897	1,923,794	367,448	226,370	367,448	60,181	770,241	.....	573,813	69,902	503,130	45,602
St. Louis, Iron Mountain & Southern.....	3,364	20,828,700	4,735,010	25,563,710	3,997,056	5,065,220	3,997,056	661,344	8,791,865	87,439	8,311,972	1,230,973	7,102,542	—2,695,581
St. Louis, San Francisco & Texas.....	235	675,027	250,430	925,457	240,021	170,804	240,021	22,837	472,117	.....	40,623	12,477	28,146	—157,790
Southern in Mississippi.....	281	548,306	289,660	837,966	241,284	95,190	241,284	25,936	330,864	.....	91,220	92,762	—146,791	.....
Spokane International.....	563	516,114	134,807	650,921	131,022	51,809	131,022	24,700	230,188	.....	228,522	47,257	181,137	—172,910
Spokane, Portland & Seattle.....	556	2,371,828	1,291,435	3,663,263	647,614	391,915	647,614	83,414	959,726	36,527	1,775,307	587,400	1,185,661	—223,835
Texas & New Orleans.....	469	2,274,817	943,162	3,217,979	603,125	864,675	603,125	87,177	1,460,568	89,599	357,202	174,740	180,449	4,558
Utster & Delaware.....	129	482,242	296,026	778,268	143,728	186,894	143,728	18,560	434,203	652	113,489	36,300	76,490	92,525
Western Pacific.....	943	3,617,309	1,155,160	4,772,469	1,048,383	656,411	1,048,383	265,937	1,719,554	126,036	1,055,788	317,587	736,808	156,280
Wheeling & Lake Erie.....	512	3,886,134	504,552	4,390,686	535,074	941,196	535,074	103,637	1,907,284	13,950	1,175,195	345,892	829,302	—1,014,350

*Operations began July 6, 1914. No figures shown for eleven months.

Traffic News

Through train service on the National Transcontinental between Toronto and Winnipeg was begun on July 14. The through train is to be known as the National, and makes the run in 42 hours.

The Union Pacific has announced that effective at an early date, to be announced later, only one coupon will be required on tickets reading to points on or reached by any one or more of the Union Pacific System lines, instead of a separate coupon as heretofore for each of the system units.

The Atlantic Coast Line has made arrangements for the exhibiting of products of the south at a number of fairs to be held in the fall in New York, Pennsylvania, West Virginia and Maryland. Co-operation of the farmers in Virginia, North Carolina, South Carolina, Georgia, Florida and Alabama is asked and arrangements have been made for an express car to carry the exhibit, leaving Wilmington, N. C., about August 15.

The number of ocean-going vessels which passed through the Panama canal during the month of May was 141. This is more than used the canal during any preceding month. The previous highest number was 136 for March. The cargo passing through the canal in May amounted to 578,708 tons. The cargo traffic during March amounted to 635,057 tons. During May 75 vessels passed through the canal eastbound and 66 westbound. Thirteen of the vessels were in ballast. The average loading of the 128 vessels which carried cargo was 4,961 tons.

Railroads serving New York harbor have agreed to furnish importers of South American beef with one car to a float at a cost of \$4 to \$6 a car. Heretofore six cars were furnished to a float and a charge made of \$9 for each car not used. The Argentine beef importers have claimed that adequate facilities are not furnished them by the trunk lines and have filed briefs with the Interstate Commerce Commission. The action of the railroads is in answer to one of the complaints of the importers, and the other complaint that the railroads do not or cannot furnish refrigerator cars will be answered before the Interstate Commerce Commission.

James McCrea, general manager of the Long Island, has given out a statement showing the passengers handled and delays to trains over the Fourth of July holidays in 1915, together with comparisons for the previous six years. The total number of passengers carried on trains in five days was 917,917 in 1915, comparing with 893,667 in 1914, and 588,500 in 1909. The number of passenger-train movements to handle this business was 5,015 in 1915, comparing with 5,441 in 1914 and 4,178 in 1909. During this time in 1915 there were 780 carloads of express and baggage movement, comparing with 894 in 1914 and 381 in 1909. The average delay to all trains in 1915 was 2 min. and 45 sec., comparing with 3 min. and 3 sec. in 1914 and 2 min. and 22 sec. in 1909. Of the total 4,097 scheduled trains 2,636 were on time and the average delay to each train that was late was 7 min. and 42 sec.

Some States Freed from Quarantine

The Department of Agriculture announced on July 19 that the last remaining quarantine for foot and mouth disease in Rhode Island and Ohio had been raised, parts of these states having been under quarantine since last fall. Three counties in Illinois have been entirely freed, and the only "exposed area" is now the union stock yards in Cook county. Eight counties in Pennsylvania have been freed, leaving only Allegheny, Chester, Jefferson, Lebanon and Philadelphia under quarantine. In Massachusetts quarantine has been raised from Plymouth and Worcester counties, leaving only the Brighton stock yards and abattoir under quarantine in the state. In West Virginia the whole of Jefferson county has been freed, leaving a part of Berkeley county the only territory still under quarantine in the state. In New Jersey, Bergen, Essex and Union counties have been freed from quarantine, leaving Hudson the only territory in the state under quarantine.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has given out a decision written by Commissioner Clements, in which it is held that the carriers have not justified proposed charges for trap or ferry car service in trunk line, Central Freight Association western trunk line, trans-Missouri, and southwestern territories and Chicago. The schedules naming the proposed charges are required to be cancelled. A more complete abstract of the report will be given in this column next week.

Examiner Dow held a hearing in Chicago last week and the first part of this week on tariffs filed by the eastern railways advancing the rates on livestock, meats and packinghouse products from Chicago and St. Louis to the East, and on livestock in Central Freight Association territory, which have been suspended by the Interstate Commerce Commission. The tariffs provide for rates from Chicago to New York on dressed beef, 47½ cents; on cattle, 33 cents; hogs, 33 cents; packinghouse products, 33 cents and bulk meats, 38 cents per hundred pounds. Witnesses who testified for the railroads were L. E. Oliphant, chief of tariff bureau of the Lake Erie & Western; W. C. Maxwell, general traffic manager of the Wabash, and William Hodgdon, freight traffic manager of the Pennsylvania Lines.

Rates on Stone and Marble to St. Paul, Minn.

In re rates on stone and marble in carloads not polished, lettered, or figured, from Chicago and Peoria, Ill., to St. Paul, Minn. Opinion by the commission:

The commission finds that the carriers have justified proposed increased rates on stone and marble, not polished, lettered, or figured, from Chicago and Peoria, Ill., to St. Paul, Minn., in the case of stone and marble, sawed or dressed, but not in the case of rough stone and marble. (34 I. C. C., 350.)

Complaint Dismissed

George M. Spiegle & Co. et al. v. Southern Railway. Opinion by Commissioner Hall:

Defendant's rules and regulations applying to lumber hauled in transit at Newport, Tenn., are not found to be unreasonable or discriminatory. It is also found that the charges on lumber bought by complainants at points between Newport, Tenn., and Asheville, N. C., shipped to Newport, and reshipped from the latter point under transit rates through Asheville to Virginia cities and east, are not unreasonable. Reparation denied. (34 I. C. C., 448.)

Rates to Montrose & Delta Counties, Colo.

Montrose & Delta Counties Freight Rate Association v. Denver & Rio Grande et al. Opinion by Commissioner Hall:

The commission finds in this case that the rates on classes and certain commodities from Missouri river points and points east thereof to Montrose, Olathe, Delta, Hotchkiss and Paonia, Colo., are not unreasonable or discriminatory. Montrose is typical of these points. The Denver & Rio Grande maintains two routes from Salida, Colo., to Montrose. Originally shipments from the east moved through Pueblo to Salida and were there transferred to the narrow gage line running through Marshall Pass to Montrose. Later when a standard gage line was opened through Tennessee Pass and Grand Junction with a branch to Montrose, shipments were sent over the standard-gage line throughout. The latter is much longer, but the freight does not have to be transferred, the grades are easier and the supply of equipment greater. Because of the decision in *Grand Junction Chamber of Commerce v. D. & R. G.*, 23 I. C. C., 115, the carrier was led to accord to Grand Junction rates not in excess of those to Salt Lake City, but this basis of rates was not extended to points not directly intermediate. Early in 1915, following the decision in *Class and Commodity Rates to Salt Lake City*, 32 I. C. C., 551, increases in rates were made to Salt Lake City,

Grand Junction, Montrose and other points. The commission finds that the former reduction in rates to Grand Junction because of competition or an order of the commission is no justification for a similar reduction in rates to a branch line point not intermediate to Grand Junction, such as Montrose. (34 I. C. C., 393.)

Montrose & Delta Counties Freight Rate Association v. Denver & Rio Grande et al. Opinion by Commissioner Hall:

The commission finds that the rates on apples, deciduous fruit, potatoes, onions and other vegetables from points in Montrose and Delta counties, Colo., to destinations in the east are not unreasonable or discriminatory. Upon the record in this case the commission is not prepared to require the establishment of rates on low-grade apples in bulk from Montrose and Delta counties to various destinations in the east lower than the rates on apples in packages contemporaneously in effect between the same points. The question is held to be of sufficient importance, however, to merit further consideration by the defendants. It is also found that the charges for the refrigeration of shipments noted above are not unreasonable. (34 I. C. C., 400.)

Montrose & Delta Counties Freight Rate Association v. Denver & Rio Grande et al. Opinion by Commissioner Hall:

The commission finds that the rates on classes and certain commodities from Los Angeles and San Francisco, Cal., and related points, to Delta, Olathe, Montrose, Hotchkiss and Paonia, Colo., are not unreasonable or discriminatory. Complaint dismissed. (34 I. C. C., 409.)

Weighing of Livestock at Kansas City

Kansas City Live Stock Exchange v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Hall:

Complaint is made against the following tariff provisions; first, those providing that when cars are not track scaled the hoof-selling weights, less certain fill allowances, shall be the basis for freight charges, and second, those forbidding track-scale weights, if taken, to be set aside in favor of hoof-selling weights unless the difference between these weights amounts to 1,000 lb. a car, under some tariffs, or 500 lb. a car under others.

The commission finds that the assessment of freight charges upon hoof selling weights, less the fill allowances, is not unlawful, but the requirement that the variation between weights taken on track scales and hoof-selling weights shall amount to 1,000 lb. a car as a condition to setting aside the one in favor of the other is found unreasonable. According to the findings in the case *In re Weighing of Freight by Carriers*, 28 I. C. C., 7, it is held that a sufficient variation would be 500 lb. (34 I. C. C., 423.)

Western Trunk Line Rules

In the matter of western trunk line rules, regulations and exceptions to classifications. Opinion by Commissioner Meyer:

Western trunk lines circular I-K, I. C. C., No. A-513, containing special rules and regulations and exceptions to classifications, filed to become effective October 1, 1914, was suspended by the commission until January 21, 1915, and further suspended until July 29, 1915. The commission makes the following findings relative to this circular:

The rule providing in effect for a carload rating on miscellaneous freight in mail sacks is disapproved. The elimination of rules for mixtures of salt and different kinds of pitch and tar in carloads with cement, lime, stucco and plaster is approved. The cancellation of the rule providing for the shipment of cigarette papers with smoking tobacco at the tobacco rating is approved. Corn starch is held to be an uncooked cereal food product and ordered continued in the list of uncooked grain or cereal food products manufactured from corn subject to corn rates. The class B rating on iron and steel pipe applied as a proportional basis is ordered continued. The cancellation of the rule providing for a rate on plastering hair or fiber with carload shipments of lime or plaster 25 per cent above the carload rate on lime or plaster at actual weight is approved. The elimination of the provision for fifth class rating on straight or mixed carload shipments of stove-pipe iron, stove-pipe, stove pipe elbows, and coal hods, and for mixed carloads of the foregoing articles and sheet-iron dripping pans and stove elbows is authorized. An

increase to 50,000 lb. of minimum carload weight on scrap iron into concentrating points is approved. Numerous other rules are discussed and changes authorized for publication in a revised circular.

Attention is directed also to the views of the commission in *Investigation and Suspension Docket 76*, respecting publicity of proposed changes and method of classification procedure, and the opinion is expressed that if the classification committee had given these changes greater publicity the present proceeding would probably not have been necessary. Where provisions are eliminated from one tariff in anticipation of publishing them in another the two tariffs should be amended simultaneously.

Rates on Bituminous Slack Coal to Martins Creek, Pa.

Alpha Portland Cement Company v. Baltimore & Ohio et al. Opinion by Commissioner Clements:

The commission finds that a rate of \$2 a gross ton on bituminous slack coal in carloads to Martins Creek, Pa., from mines in the Fairmont region of West Virginia and in the Westmoreland region of Pennsylvania are not unreasonable or discriminatory. It also holds that the requirement of a differential between slack and other sizes of bituminous coal would not be justified.

The complainants asked for a rate of \$1.45 on slack and \$1.65 on other grades of bituminous coal and produced figures showing that the cost of carrying this traffic was about \$1.42 a gross ton. The commission notes:

"In determining the reasonableness of rates, cost of service is one of several factors to be considered, and, while carriers are not entitled to receive more than a reasonable rate on any traffic, in cases where it appears that the rate challenged is in harmony with a general adjustment between a large number of producing regions and an extensive consuming territory consideration must be given not only to the accuracy of cost estimates, but to the probable effect of a substantial reduction on the main body of rates. Complainant's estimates of observed cost may be reasonably accurate, but its total operating cost estimates are, after all, approximations based on general averages of the various carriers which may or may not be correct on the particular traffic in question and they do not, of course, take into consideration the comparative values of the lines traversed and equipment used and of all lines and equipment of the carriers defendant. These estimates, which are elaborate and represent much labor, may be the most complete that can be furnished in advance of a complete valuation of the properties of the carriers, but we do not feel justified upon the showing made thereby in making a finding of unreasonableness in the rate challenged." (34 I. C. C., 414.)

Rates on Pulpwood from Points in Minnesota

Pulp & Paper Manufacturers' Traffic Association v. Chicago, Milwaukee & St. Paul, et al. Opinion by Commissioner Clark:

In the commission's original report in this case, 27 I. C. C., 83, it was found that the carload rates on pulp wood from points in Minnesota to gateways and junctions of connecting carriers in that state, applying on shipments to Wisconsin and Michigan were unreasonable, and reasonable maximum rates were prescribed, effective August 1, 1913. The Duluth & Northern Minnesota was one of the defendants, but it did not file an answer to the complaint, or offer any testimony. It did, however, comply with the order by filing proper tariffs. In December, 1914, it sought to enjoin the enforcement of the order. The court granted a preliminary injunction, but in February, 1915, dissolved the latter and dismissed the bill. In March, 1915, the carrier filed a petition for a rehearing.

The stock of this railroad is held by Alger, Smith & Company, or by stockholders of that company and the owning interest supplies 50 per cent of the road's tonnage. The carrier produced cost figures showing a deficit from operation in 1914, but the commission refuses to hold this year a representative one, as there have been surpluses in previous years. It also appeared that the carrier's principal interest in the rehearing was to have the commission find that the rates prescribed were unreasonably low, so as to enable it to use such finding as a shield when certain outstanding reparation claims were represented. The commission, therefore, is unable to release the petitioner from the requirements of the order. (34 I. C. C., 500.)

Shipper's Load and Count

Louisiana State Rice Milling Company v. Morgan's Louisiana & Texas et al. Opinion by Commissioner Clements:

The complainant protests against practice provided for under rule No. 23 of western classification No. 51 reading:

Freight loaded by shipper and not checked by carrier must be receipted for "shipper's load and count."

The commission holds that this rule is not contrary to the Carmack amendment, and that it is not a limitation upon carriers' liability as is contemplated by the prohibitions of the Cummins amendment. "It does not appear that the rule operates to limit the liability of the carrier for the full value of the property shipped but, in its application to a claim for loss because of alleged failure to deliver the whole amount transported, has the effect of placing the burden upon the shipper who loads on his private track to prove that the amount specified was loaded and that a less amount was taken out of the car by the consignee; whereas in the case of a receipt not so qualified the burden is upon the carrier to prove that the amount specified in the bill of lading was either not in fact loaded, or was delivered, or otherwise to settle for the full value thereof."

The commission finds that the rule is not unreasonable and dismisses the complaint. (34 I. C. C., 511.)

The Shreveport Case

J. J. Meredith, Shelby Taylor, and Henry B. Schreiber, constituting the Railroad Commission of Louisiana v. St. Louis Southwestern et al. Opinion by Commissioner Hall:

The commission's first order in this case was made March 11, 1912, in 23 I. C. C. 31. That order was upheld by the Commerce Court April 25, 1913, in 205 Fed. 380 and by the Supreme Court June 8, 1914, in 234 U. S. 342.

The order, save in so far as it required the establishment of new rules to govern the concentration of cotton ran only against three of the defendants, the Texas & Pacific, the Houston, East & West Texas, and the Houston & Shreveport. It required the establishment by them of specified class rates on shipments by their lines from Shreveport, La., to specified destinations in Texas, which rates were established July 1, 1912. It further required that these three defendants "abstain from exacting any higher rates for the transportation of any article" from Shreveport to Dallas, Tex., and points intermediate via the line of the Texas & Pacific, and from Shreveport to Houston, Tex., and points intermediate via the lines of the Houston, East & West Texas and the Houston & Shreveport, "than are contemporaneously exacted for the transportation of such article from Dallas or Houston for an equal distance toward said Shreveport."

The case is now brought up again by a petition of the Louisiana authorities requesting (1) the establishment of reasonable class rates from Shreveport such as were previously prescribed over the lines of the three defendants to all points on the lines of all the defendants, and (2) the application of no higher rates upon all commodities from Shreveport to all points on the lines of all defendants than for like distances from any points on said lines eastbound to destinations in Texas. The petition alleges that the other defendants will not establish a uniform scale of rates except upon a supplemental order; and that as a result shippers over the three lines whose rates have been adjusted in conformity with the order of March 11, 1912, will have an undue advantage.

The commission now finds:

The evidence upon supplemental hearing shows no material change in transportation conditions over the lines of defendants, either from or toward Shreveport, since this proceeding was first before the commission.

Class rates are prescribed for transportation from Shreveport to points in eastern Texas, and also from points in eastern Texas, toward Shreveport, on the lines of all the defendants.

As the transportation conditions for the competitive hauls here involved are substantially similar, justice demands that the same classification shall apply to all, and consequently that the western classification shall govern on traffic via the lines of these defendants from points in eastern Texas toward Shreveport.

It is discrimination for defendants to charge higher rates upon any commodity from Shreveport into eastern Texas than on such commodity for an equal distance from points in eastern Texas toward Shreveport; and such commodity rates should not exceed, distance considered, the corresponding class rates named herein.

It constitutes discrimination against Shreveport for defendants

to charge higher inbound rates on uncompressed cotton from eastern Texas to Shreveport for concentration there than they charge, distance considered, on uncompressed cotton to concentration points in eastern Texas. (34 I. C. C., 472.)

The St. Louis Terminal Case

In the matter of terminal allowances and rates at St. Louis, Mo., and East St. Louis, Ill. Opinion by Commissioner Harlan:

In 1906 when St. Louis, East St. Louis and a number of other stations were made into a definite rate point in the 117 per cent zone, the eastern carriers, which hitherto had had terminals in East St. Louis only, were obliged to receive traffic for through movement to and from St. Louis itself under through bills of lading. For a while they undertook to do this by moving their freight across the river under an agreement with the Terminal Railroad Association of St. Louis which controls the four means of transportation across the river, namely, the Eads bridge, the Merchants bridge, the Wiggins ferry and the Interstate car transfer. It was found that the terminal association did not have sufficient facilities in St. Louis to enable it to handle all the additional traffic with promptness. The eastern carriers, in order to give the public a service that was sufficiently prompt, were compelled to make arrangements with certain transfer companies to move the freight by wagon between St. Louis and East St. Louis. As a part of the arrangement, the transfer companies undertook also to furnish and operate stations in St. Louis where they could receive and deliver freight for the carriers.

These freight stations in St. Louis, are often referred to as "off-track" stations because they are not reached by the rails of any carrier. Although the western lines have rail depots of their own in St. Louis, many, if not all, of them have made similar arrangements with the transfer companies. This arrangement was made by the carriers only with such transfer companies as had warehouses that could be used as freight stations. These are the St. Louis, the Columbia, the Fidelity and the Central Transfer companies. In most instances the first floor of the warehouse is considered the station of the carriers, the floors above being used by the transfer companies in their private business as warehousemen. Obviously the transfer companies that conduct a private warehouse business are enabled, under this arrangement, to save all cartage expense that other warehouse companies, not participating in this arrangement with the carriers, must pay, and it is on this ground that the allegation of discrimination rests. The off-track stations, however, are intended for the use of the general shipping public without restriction and it is shown that these freight stations have proved to be a substantial aid in the prompt handling of traffic into and out of St. Louis.

The carriers, finding the above arrangement so successful, also made arrangements with the same transfer companies, and also with others, for hauling the traffic by wagon between the East St. Louis rail stations and the store doors of shippers and consignees in St. Louis, without passing it through the off-track stations, but through what is referred to by the carriers as their "constructive" stations on the west bank of the river. These stations are simply an undefined point on the river bank and have no corporeal existence. By employing the transfer companies as their agents, the eastern lines perform a "constructive" station service, making at the undefined point on the west bank a purely nominal or constructive delivery of the inbound shipment and in the same manner an imaginary acceptance of outbound traffic, the freight not being moved from the wagon in either case. The rail rate takes the traffic to and from the constructive point, the cartage charges of the transfer companies being paid by the carriers. The shippers and consignees pay the cartage charges, however, between the incorporeal station and their store doors.

Besides operating the "off-track" stations, the transfer companies perform certain other services as agents of the carriers. They undertake to quote rates. They collect charges on shipments and remit the amounts to the carriers. They do not issue bills of lading; they issue dray tickets on outbound shipments, which may be surrendered to the carriers by the shipper for a bill of lading. In handling traffic to and from the constructive stations, however, nothing of this kind is done by the transfer companies.

The commission is of the opinion that the operation of the off-

track stations is not unlawful and that it does not result in discriminations that are undue.

It is found, however, that the constructive receipt and delivery of traffic at incorporeal stations at the undefined points on the west bank of the river is not available to all shippers and should be condemned unless that fault is corrected. It is agreed that the carriers' service begins and ends at the undefined point. The undefined point, if comparable with anything physical, must therefore be regarded as taking the place of a station for less-than-carload traffic and a team track for carload traffic. In either case the right to use this constructive service is limited to shippers who approach the constructive terminals through the agency of transfer companies designated by the carriers. They may not, with their own vehicles, go to the constructive stations to deliver or receive their traffic. In other words, the right of a shipper to have an east side line extend its service to and from these undefined points depends upon his willingness to employ the carrier's agent to haul his traffic between those points and his store door. If he employs a transfer company designated by the carrier he may have the service; if he uses his own vehicle the service is denied to him. The result is an unjust discrimination which must be corrected. (34 I. C. C., 453.)

Rates on Lumber from Southern Points

In re rates on lumber from southern points to the Ohio river crossings and other points. Opinion by Commissioner McChord:

The southern carriers have proposed to increase the rates on lumber and articles taking the same rates from the producing regions of the southwest, the Mississippi valley, and the southeast to St. Louis, East St. Louis, Thebes and Cairo, Memphis and the Ohio river crossings. The proposed increases average about one cent a 100 lb., except that the increases are greater than one cent in those instances where the present rates on hard wood are less than the rates on pine. The territory of production involved is as follows: (1) The southwestern territory, including part of Oklahoma, Missouri and northern Arkansas, and the territory embraced in the so-called southwestern yellow-pine blanket, bounded on the north by the Arkansas river, on the east by the Mississippi river, on the south by the Gulf of Mexico, and on the west by a line drawn through Kansas City and Houston, Tex.; (2) Mississippi valley territory, the region lying east of the Mississippi river and on the west of the line of the Mobile & Ohio; (3) southeastern territory, embracing Georgia and Florida, and parts of Alabama and Tennessee.

The methods of constructing through rates from the territories of origin to points in central freight association and trunk line territories are not uniform. From the southwest the local rates to the gateways are generally used also as proportional rates and are added to other local or proportional rates beyond the gateway to make the through rates. The present yellow-pine rate to Cairo, Ill., for example, is 16 cents, both local and proportional. The rate from Cairo to Chicago is 10 cents, making a through rate of 26 cents. From Mississippi valley territory to the consuming territory north of the Ohio through rates are made by combination upon the Ohio river crossings, except in a few cases, and they are in some cases published as joint through rates. From southeastern territory there is a dual system of rates, one set being the rates to the crossings proper and the other the proportional or basing rates. The same increases are proposed in both.

The principal reasons given by the southwestern lines for the increases are the following: (1) They need more revenue; (2) the rates are unusually low, having been made for the purpose of aiding an industry which was struggling to overcome the prejudices against it and market its product in competition with other woods; (3) the prejudice no longer exists and competition is almost a thing of the past; (4) water competition, which originally influenced the rail rates, is now negligible.

The southwestern lines taken collectively are not prosperous. A consolidated statement, filed on behalf of 26 of these lines, shows that from 1903 to 1914 their mileage increased from 24,897 miles to 34,012 miles, and that their total operating revenue increased during the same period from \$166,516,000 to \$287,116,000. In spite of this, the net operating income decreased during the same period from \$45,269,000 to \$41,175,000, the average net operating income for the whole period being only

\$48,937,000. The ratio of net operating income to property investment account of these roads in 1903 was 4.78 per cent, while in 1915 it was 2.84 per cent. The average ratio for the entire period was 3.78 per cent, while for 35 railway systems in official classification, which were interested in the *Five Per Cent case*, the ratio was 5.41 per cent. Even though the carriers may not be prosperous it does not follow, in the commission's opinion, that they should get additional revenue by means of an increase in the rates on lumber, for the latter may at present be contributing its fair share of revenue.

The respondents show that commendable efforts have been made by some of them to conserve their revenues, with gratifying results, and the St. Louis & San Francisco is chosen as typical. During the period beginning June 30, 1913, and ending November 30, 1914, that carrier, by increasing its trainloads, reducing the amounts paid for loss and damage, reclaiming scrap material, and in numerous other ways, effected a saving of \$931,526. The extent to which the other carriers in the southwest have been able to conserve their revenues is not shown in the record, but the evidence just detailed suggests that it is possible to better materially the financial condition of these lines without an increase in the rates on lumber.

The commission, therefore, finds that the proposed increased rates on yellow-pine lumber from the southwestern blanket to St. Louis, Mo., and East St. Louis, Thebes and Cairo, Ill., have not been shown to be reasonable. The evidence of record also does not show that the rates from Little Rock, Ark., and Pine Bluff, Ark., to Memphis, Tenn., should be increased to the blanket basis. The commission in *Northbound Rates on Hardwood*, 32 I. C. C., 521, held that was no good reason why the rates on hardwood lumber should not be as high as the rates on yellow pine. For that reason the commission will now allow increases in the rates on hardwood from the blanket to St. Louis, Cairo, etc., to the extent that they do not exceed the rates on yellow pine.

The carriers proposed also to make increases of one and two cents in the rates on all kinds of lumber to the gateways named from points north of the Arkansas river. These increases are not found reasonable. Because of its difficult operating conditions, however, the Chicago, Rock Island & Pacific will be allowed to increase a basing rate to Thebes and Cairo from stations Hazen, Ark., to Galloway, inclusive, on its Memphis branch and to increase its rates to Memphis from certain other points on that branch. Increases to Thebes and Cairo are also allowed from certain stations on the Missouri & North Arkansas.

A proposed cancellation of a local rate to Cairo from points on the Texas & Pacific is found not to be justified. Proposed increased rates to Louisville and Cincinnati from stations on the Rock Island, Walker Spur, La., to Eunice; Fitch, Ark., to Apex; and Milams, La., to Meridian, La., are also found to be unreasonable.

The commission also refuses to allow the carriers to make increases averaging two cents in the rates on all kinds of lumber to New Orleans from a number of stations in the southwestern territory.

Concerning the increases proposed by a number of carriers from points east of the Mississippi river the commission holds that these carriers may increase their rates to north bank Ohio crossings by not more than one cent in those instances in which such increases are necessary to effect a spread of one cent between the rates to opposite crossings in accordance with the conclusions in the so-called *Ohio river cases*. In no case may the rates to north bank points be increased more than is necessary to make the rates to those points one cent higher than the rates to the opposite southbound points.

The commission will also allow proposed increased rates to Ohio river crossings from points on the Texas & Pacific, the Vicksburg, Shreveport & Pacific and Southern Pacific lines in Louisiana.

The record shows that cottonwood and gum are not entitled to lower rates than other kinds of hardwood, and the proposed rates on cottonwood and gum are permitted in all cases where they do not exceed the rates on other hardwoods. In no case may the rates on cottonwood or gum or other hardwoods exceed the rates on yellow pine.

Proposed increased rates from Cincinnati to western termini and points in trunk line territory are held not to be justified. (34 I. C. C., 652.)

STATE COMMISSIONS

In last week's issue, page 138, it was incorrectly stated that the Arkansas Railroad Commission had given permission to the Arkansas Central to charge two cents a mile passenger fare. The commission authorized a three-cent rate.

The New York Public Service Commission, Second district, which recently denied the Ulster & Delaware permission to raise its mileage rate above the two-cent maximum set by the legislature has formally denied an application for a rehearing.

William G. Busby, counsel for the Missouri Public Service Commission, has filed a brief with the commission in answer to the briefs of the railroads of the state, that are asking a general advance in freight, passenger and baggage rates throughout the state. The brief opposes the application of the railroads, saying they have failed to justify the proposed increases, and is largely devoted to a defense of the formula for dividing the expenses between freight and passenger service and between state and interstate business, prepared by the accountant for the commission, which was attacked by the railroads during a hearing.

PERSONNEL OF COMMISSIONS

H. A. Herndon, chief draftsman of the Fort Worth & Denver City at Childress, Tex., has been appointed junior mechanical engineer, division of valuation, of the Interstate Commerce Commission, with headquarters at Kansas City, Mo.

Ledyard P. Hale, counsel for the New York Public Service Commission, Second district, has been given a leave of absence until September 1, because of press of duties as chairman of the public utility committee of the constitutional convention. During his absence, Frank H. Mott, secretary will serve as counsel, and Francis X. Disney, assistant secretary, will succeed Mr. Mott.

M. Maltbie, formerly a member of the New York Public Service Commission, First district, and more recently chairman of the valuation committee of the National Association of Railway Commissioners, has been appointed a member of the advisory board of C. A. Prouty, director, valuation division, of the Interstate Commerce Commission, with headquarters at Washington, D. C.

COURT NEWS

Judge Sanborn of the United States Circuit Court of Appeals has rendered a decision reversing that of the United States district court of Nebraska, that the Union Pacific acted in violation of the Sherman anti-trust act in acquiring a majority of the stock of the St. Joseph & Grand Island. The opinion is concurred in by Judges Carland and Amidon. The court, however, ordered that a perpetual injunction be entered to prevent the St. Joseph & Grand Island while dominated by the Union Pacific from purchasing the line of the Hastings & Northwestern from Hastings, Neb., to Gibbons, 26 miles. The case was remanded to the lower court for a re-trial.

Limitation of Liability—Fire—Interstate Commerce

The Alabama Court of Appeals holds that section 20 of the Interstate Commerce Act, providing that a common carrier shall be liable for loss caused by it, or by any connecting carrier, does not prevent a carrier from exempting itself from liability for goods destroyed by a fire which is not attributable to the carrier's negligence. *Central of Georgia v. Patterson* (Ala.) 68 So., 513.

Mississippi Spur Track Statute Held Invalid

The Mississippi Supreme Court holds that Laws 1908, c. 88, providing that upon application the Railroad Commission may order railroad companies to construct and maintain tracks to connect with industrial plants, if the tracks can be built without undue hazard to the trains or other property of the railroad, is in conflict with the Fourteenth Amendment prohibiting the taking of property without due process; for it neither provides for compensation to the railroad nor makes the right contingent on the amount of freight offered by the applicant. *McInnis v. New Orleans & N. E.* (Miss.) 68 So. 481.

Scope of Federal Employers' Liability Act

In proceedings under the New Jersey workmen's compensation act for the death of an employee of the Pennsylvania, who fell off a barge on the Delaware & Raritan canal, in the course of his employment as a boatman, it was held by the New Jersey Supreme Court that, although the employer is a railroad and the canal is an interstate waterway, the federal employer's liability act did not apply so as to supersede the workmen's compensation act, because, as the deceased's employer, the railroad was operating a canal. *Hammill v. Pennsylvania* (N. J.), 94 Atl., 313.

Right to Fence Right of Way

A railroad built a fence along its right of way to prevent the use thereof as a passageway by the patrons of a neighboring restaurant. In an action by the proprietor of the restaurant for injunction, the Texas Court of Civil Appeals held that the company was within its rights, though there were no other means of ingress or egress to or from the restaurant, as the use of the right of way for such a purpose would largely increase the risk of accident and consequently the liability of the company, and was inconsistent with the use of the right of way for railroad purposes. A railroad may exclude trespassers from its right of way, and take reasonable steps necessary to do so, even though the title to the land it occupies is not vested in it. *Ft. Worth & D. C.* (Tex.), 176 S. W., 827.

Fares—Overcharges—Statutory Penalties

A railroad's ticket agent gave a passenger, by mistake, a ticket for a station in the opposite direction from his intended destination. The conductor on the train refused to accept the ticket, and demanded the fare in cash. In an action for the statutory penalty for taking or receiving any "greater compensation for the transportation of passengers than is allowed by law," the Arkansas Supreme Court held that, though the carrier was liable for damages for violating the contract of carriage, it was not liable for the statutory penalty, there being no intention to charge or receive more than the legal rate. Judgment for the defendant was affirmed. *Smith v. St. Louis, I. M. & S.* (Ark.), 176 S. W., 308.

Validity of Contract for Open Farm Crossing

Action was brought to require the Missouri Pacific to maintain an open farm crossing provided for under a contract whereby the railroad's predecessor obtained its right of way across the plaintiff's land. The Kansas Supreme Court holds that such a contract is not contrary to the public policy of Kansas, as indicated by its statutes, and that the contract might be specifically enforced by the land owner, although he had had considerable trouble about cattle getting killed at the crossing, and the railroad desired to erect gates to avoid killing the plaintiff's cattle and to protect the public. *Atkinson v. Mo. Pac.* (Kan.), 149 Pac., 430.

Stoppage of Trains at Small Stations—Necessity

A decree of the New York Appellate Division required the Boston & Maine to maintain a regular station at a sulphur spring on the outskirts of Saratoga Springs, "at which all its regular trains must stop." There was scarcely a resident in the vicinity whose convenience would be served by the stopping of trains, and the only substantial travel to the station, if any, would be during the summer months. On a motion for contempt against the company for failure to comply with the decree, the court held, on this showing, that all that was contemplated by the decree was the stoppage of regular trains only when necessary to take on or put off passengers who held tickets, or on signal. (*Franklin v. Boston & Maine*, 153 N. Y. Supp., 688.)

Presentation of Claims for Loss—Waiver of Condition

An interstate shipment contract in the state of New York provided for the re-icing of perishable fruit at points within the state, and also that the carrier should not be liable on claims for loss, damage, or delay unless they were presented in writing within four months. The company, by deviating from the agreed route, converted the shipment into an interstate shipment, and loss resulted from its failure to properly re-ice the fruit. No claim for the loss was made within four months. In an action

for the loss the Niagara County Court holds that by such deviation the railroad became an insurer, and could not avail itself of the exception in the contract, though the exception would have been valid as applied to an interstate shipment. (*Lynch v. New York Central*, 153 N. Y. Supp., 633.)

Fall of Article from Rack—Burden of Proof of Negligence

In an action for injuries in a passenger car caused by the fall of a suit case from a rack above the plaintiff, the plaintiff testified that it fell about an hour and a half after he got on the train, that he did not change his seat, did not fall asleep, and did not know whether the suit case was on the rack when he boarded the train. It was held by the Wisconsin Supreme Court that the burden was on the plaintiff to show that the suit case was in the rack long enough so that the defendant's employees, in the exercise of reasonable care, should have discovered and removed it, and that the plaintiff had not met this burden. It was a matter of pure speculation how long the suit case had been in the rack before it fell. The complaint was dismissed. *Colburn v. Chicago & N. W.* (Wis.), 152 N. W., 821.

Trespassing Animals—Duty of Road

The conductor and engineman of a train were warned that horses had got loose and were likely to be found on the track at a certain point. The animals were afterwards killed by the train. The Indiana Appellate Court holds that, though the animals were on the track without right, nevertheless the railroad's knowledge that they were there imposed a duty on it to take due care, by maintaining a reasonable lookout, and, upon discovery, exercising reasonable care to avoid injuring them; and for violation of this duty, resulting in injury to the stock, the railroad was liable. What constituted such reasonable lookout and care were questions for the jury, bearing in mind the railroad's correlative duty safely to carry its passengers, and its duty to itself to preserve its property. *Vandalia Co. v. Duling* (Ind.), 109, N. E. 70.

Validity of Contracts for Services by Shippers

In an action for freight charges the defendant set up a counterclaim under a contract made in 1894, by which the carrier agreed to pay to the defendant one cent for each 100 lb. of incoming and outgoing freight handled by the defendant, for spotting cars on the defendant's own track. The only question was whether this contract violated the Interstate Commerce Act. The New York Appellate Division held that the contract was one for the performance by the shipper of a duty, which the carriers owes, to place each car so that it can be unloaded, and, there being nothing to show that the service performed by the shipper was not worth the agreed price, the contract did not provide for the payment of a rebate, in violation of the act of 1887, but was within section 15 thereof inserted by the amendment of 1906, providing that, where the owner of property transported under the act directly or indirectly renders any service connected with the transportation, an allowance therefor shall be no more than is just and reasonable. (*New York Central v. General Electric Co.*, 153 N. Y. Supp., 478.)

Hours of Service—Application to Work Train Service

A fireman on a work train handling only company material between Hiawatha, Mo., and Seneca, Mo., went on duty at 4:30 a. m. and continued on duty until 7:30 p. m., when the train was placed on a siding at Seneca and the fireman remained as watch in charge of the engine until 12:40 a. m. Action was brought by the government in the district court for the first division of Kansas to recover penalties for the violation of the federal hours-of-service act. The defendants claimed that since the work train was handling only company material to be used wholly within the state, the crew was not in interstate service. The courts holds that since the line on which the fireman was working is part of the through main line over which interstate commerce passes, the fireman's service comes within the jurisdiction of the federal law. The opinion by Judge Pollock says in part: "Congress has the constitutional power to regulate commerce among the states. The power to regulate is inclusive of the right to make safe. The purpose of Congress in the passage of the act in question was not alone to conserve the safety of those employees of railways

actually engaged in interstate commerce at the time of the performance of the service, but to further the protection and safety of passengers or co-employees traveling or engaged in interstate commerce from the negligent acts of employees of the road connected with the movement of trains, whether engaged in interstate or intrastate commerce, whose minds, having become clouded and whose senses have become deadened by long-continued service and loss of rest and sleep, and who for such reason may through neglect bring disaster not to themselves or to the train on which they are working, but to other trains moving in interstate commerce, and such are the decisions."

Parol Gift of Right of Way—Continued Use of Spur Track

The owner of land, after a right of way for a spur track had been staked thereon, said to a representative of the railroad company that the land was theirs, to go ahead and take it. The company took possession and laid the track which it maintained with the consent of the owner for more than 20 years. In an action by a subsequent owner of the land to quiet title in the strip occupied by the track, the Iowa Supreme Court holds that there was a parol gift, or at least an irrevocable license for an easement in the right of way. Moreover, during the 20 years other industries were established along the track, which were dependent on the continued use of the spur track, and the railway company had, known to the owners of the land, expended about \$4,000 in improving the track. After acquiescing in the use of the track for the advantage of the other industries for so many years, the plaintiff's grantor and himself were estopped from setting up any claim inconsistent with the continued use of the right of way by the defendant. *Shimanek v. Chicago M. & St. P.* (Iowa), 152 N. W., 574.

Child Held Passenger, Though Paying No Fare

A mother, carrying a girl about nine months old, became a passenger and notified the trainman who collected the fare that she desired to get off at a certain station, and informed him she had never been there. The Alabama Court of Appeals holds that the child, though riding free, was a passenger, and the railroad owed her the same duty as if she had paid fare. In this instance the duty it owed was to give the mother notice that the train had stopped, or was about to stop at her destination, either by calling the station distinctly, or by personal notice, and to stop the train and afford the mother a safe place and reasonable time to alight. While ordinarily the railroad is under no duty to give the passenger personal notice that his particular station has been reached, exceptional circumstances, such as age, or physical infirmity, may impose this duty. Having failed in this duty, and carried the child and the mother beyond destination, and in returning to the destination the child becoming ill as a proximate consequence, it was held that the child could recover. *Southern v. Herbon* (Ala.), 68 So. 551.

Increase in Rates—Reasonableness

In affirming the judgment of the Appellate Division (159 App. Div. 546, 145 N. Y. Supp., 513), annulling an order of the New York Public Service Commission, Second district, directing a reduction of commutation fares to stations between New York and Peekskill and White Plains on the New York Central, the New York Court of Appeals makes the following rulings: That a lower rate has been in force for some years raises no presumption that an increase is unreasonable, in the absence of a showing that the lower rate was reasonable and compensatory. Because a rate was once compensatory, it will not be presumed that several years later it afforded a fair return, it being common knowledge that the price of materials and scale of wages had increased. In establishing a rate, a railroad is not bound to consider that branch alone for which the rate is applicable, but may take into consideration the cost of operation and rates prevailing over its entire system. In view of the regulations imposed upon railroads, and the public reports required of them, it is improper to assume that they have peculiar knowledge of their affairs, and so should have the burden of justifying an increase in rates, instead of those objecting having the burden of proving that the increase was unwarranted. The question of whether it is impolitic for the railroad to make the increase is immaterial, and the commission should not set aside the increase on that ground. *People ex rel. New York Central v. Public Service Commission* (N. Y.), 109 N. E., 252.

Termination of Liability for Interstate Freight—Oklahoma Statute

In an action against an initial carrier for damages for delay in transportation of fruit trees, the Oklahoma Supreme Court announced the rule under the statute of that state to be as follows: If intrastate freight, addressed to a place beyond the usual route of a common carrier who has received it, is lost or injured, or if the shipper is damaged by unnecessary or unreasonable delay in transportation, the carrier must, within a reasonable time after demand, give satisfactory proof to the consignor that the loss, injury, or damage did not occur while it was in its charge, or because of delay caused by it, or it will be liable therefor. The demand for such proof must be direct and specific, and a simple request or demand for payment of the loss or damage does not bring the shipper within the requirements of the statute. The shipper in the present case having made no such demand, but having merely demanded payment for the damages caused by the delay, it was held that he was not entitled to recover. *Missouri, K. & T. v. Foote* (Okla.), 149 Pac., 223.

Twenty-Eight-Hour Law—Additional Time for Rest

In an action for damages to cattle by negligent delay in transportation from Worth, Mo., to Chicago, the plaintiffs' theory was that, as experienced shippers, they knew that the cattle arrived at Galesburg at from 6 to 9 a. m., and obtain 11 hours' freedom from the cars, and present a good appearance on their arrival in Chicago next day; but owing to a delay in transit, they did not arrive in Galesburg until 10 or 11 a. m., and were unloaded in the heat of the day. It was admitted by the plaintiffs that the cattle were transported from Worth to Chicago in the usual time, and got over five hours rest at Galesburg. It was held by the Kansas City Court of Appeals that the railroad had done all that was required of it under the 28-hour law, and its failure to give the additional time for rest anticipated by the shippers did not render it liable, in the absence of a contract stipulation relative to such additional time. *Kent v. C. B. & Q.* (Mo.), 176 S. W., 1,104.

Interstate Shipments—Limitation of Liability—Change After Loss Is Discrimination

A contract for the shipment of horses recited that in consideration of the lower of two rates being paid, the railroad's liability should not exceed \$100 for each horse. The shipment being interstate was therefore governed by the federal law. One of the horses had a leg broken during transit, and was killed. The railroad agreed to settle the owner's claim by paying \$172, the stipulated value of the horse. In an action for the loss of the horse, the Kansas Supreme Court holds that the limitation in such a contract becomes a part of the rate, and the parties cannot, by any agreement after a loss has occurred, change the limitation and arrange for the payment of a greater amount than the value as fixed in the contract. To hold otherwise would be giving him an advantage over other shippers and constitute an unlawful discrimination. *Donohoo Horse & Mule Company v. Missouri, K. & T.* (Kan.), 149 Pac., 436.

Additional Taking of Land for New Location of Right of Way—Measure of Damages

A railroad had acquired a right of way across a farm by a deed which provided that the consideration named therein covered all damages to the adjoining lands incident to the construction and operation of the railroad. The right of way was 100 ft. wide, consisting of 2.91 acres, and the consideration was \$750. It afterwards began a new survey to swing the road east from a point in the farm, necessitating the taking of a small triangular piece of the land, amounting to .91 of an acre. In proceedings to condemn this land the Kentucky Court of Appeals holds that the measure of damages was the difference between the value of the farm with the railroad constructed and operated on the original right of way and its value with the railroad constructed on the new location, and it was error to admit evidence, instruct the jury, and permit argument by the owner's attorney on the theory that the damages caused by the construction of any railroad on the farm could be recovered. In view of the consideration of \$750 for the original 2.91 acres conveyed, a verdict for \$1,200 for the .91 taken for the new location was manifestly excessive. *L. & N. v. Wilson* (Ky.), 176 S. W., 980.

Railway Officers

Operating

C. Gavin has been appointed trainmaster of the Northern Alabama, with headquarters at Sheffield, Ala.

C. A. Hodgman has been appointed superintendent of car service of the Minneapolis & St. Louis, with headquarters at Minneapolis, Minn.

J. H. Elliott, superintendent of the New Orleans division of the Texas & Pacific, has been appointed general superintendent, with headquarters at Dallas, Tex., succeeding J. E. Taussig, resigned.

J. P. Falk, general yardmaster of the Chicago, Burlington & Quincy at Kansas City, Mo., has been appointed superintendent of terminals, with headquarters at Kansas City, succeeding O. C. Hill, resigned.

W. R. Cahill, formerly superintendent of the Nebraska division of the Union Pacific, has been appointed superintendent of the Texas division of the Missouri, Kansas & Texas, with headquarters at Wichita Falls, Tex.

O. C. Hill, formerly superintendent of terminals for the Chicago, Burlington & Quincy, has been appointed general superintendent of the Kansas City Terminal Railway, succeeding R. A. Barrett. Mr. Hill's headquarters are at Kansas City, Mo.

Fred J. Stimson, whose appointment as superintendent of the Zanesville division of the Central system of the Pennsylvania Lines West of Pittsburgh, with headquarters at Zanesville,

Ohio, has been announced, was born at Kalamazoo, Mich., on October 30, 1868. After graduating from the Kalamazoo high school in 1886, he entered the employ of an engineering company at Knoxville, Tenn. He entered railway service in November, 1888, with the Grand Rapids & Indiana as clerk in the office of the claim and timber agent. The following year he worked as rodman on survey and construction work. In June, 1890, he entered the employ of the Colorado Midland as assistant engineer on preliminary and location surveys, which position he held until December,

1892. He returned to the Grand Rapids & Indiana in March, 1893, as assistant roadmaster and on January 1, 1904, was appointed division engineer, from which position he is now promoted.

Traffic

Leon O. Dismuke, city passenger agent of the Houston & Texas Central at Dallas, Tex., has been appointed division passenger agent, with headquarters at Dallas.

Roy Hinchman, formerly agent of the Baltimore & Ohio at Athens, Ohio, has been appointed general passenger agent of the Cincinnati, Hamilton & Dayton, with headquarters at Dayton, Ohio.

C. B. Sloat, assistant general passenger agent of the Chicago, Rock Island & Pacific, Little Rock, Ark., has been appointed general passenger agent, with headquarters at St. Louis, Mo.,

succeeding George H. Lee, who has resigned to go to the Lehigh Valley.

John S. Talbot, recently general agent of the Chicago & North Western, has been appointed commissioner for the Association of Lake Lines, with headquarters at Cleveland, Ohio, succeeding F. E. Signer, who resigned last December to enter the service of the Lehigh Valley.

George H. Lee, whose appointment as general passenger agent of the Lehigh Valley, with headquarters at New York, has already been announced in these columns, was born at Mt. Morris,



G. H. Lee

N. Y., and was educated at Hamilton College, Clinton, N. Y. He began railway work in 1886, as a clerk in the auditor's office of the Arkansas Valley Route at Little Rock, Ark. He subsequently entered the traffic department, and for a time was in the service of the Choctaw, Oklahoma & Gulf, and other western lines until he went to the Chicago, Rock Island & Pacific. He held various positions on that road until his appointment as general passenger agent of the Third district, with headquarters at St. Louis, Mo., and on August 1, will leave that road to become general passen-

ger agent of the Lehigh Valley, with headquarters at New York, as above noted.

Engineering and Rolling Stock

R. H. Pembroke, having resigned as chief engineer of the Coal & Coke, with headquarters at Gassaway, W. Va., that office has been abolished, and F. D. Cosner has been appointed engineer maintenance of way, assuming all duties heretofore assigned the chief engineer.

Purchasing

R. A. Lunsford has been appointed storekeeper of the Kansas City, Mexico & Orient of Texas, with headquarters at San Angelo, Tex., succeeding T. A. Pratt.

OBITUARY

Frank Roberts, president of the Valdosta, Moultrie & Western, died on July 15, at Valdosta, Ga.

Judge Henry L. Waldo, formerly solicitor for New Mexico for the Atchison, Topeka & Santa Fe, died recently in Kansas City, Mo.

E. E. Smythe, formerly general freight agent of the Kansas City Southern, died in Kansas City, Mo., of injuries received in an automobile accident on May 5.

G. Aldrich, supervisor of bridges and buildings of the New York, New Haven & Hartford, with headquarters at Boston, Mass., died on July 9, after an operation for cancer of the stomach.

Theophilus P. Brown, formerly, from 1883 to 1885, president of the Toledo & Indianapolis, and later president and general manager of its successor, the Toledo, Columbus & Southern, now a part of the Toledo & Ohio Central, died recently in Toledo, Ohio, at the age of 80.

Arthur Brown, who was division superintendent of the Maine Central previous to 1875, and from 1876 was superintendent of the Bangor & Piscataquis until that road was taken over by the Bangor & Aroostook in 1892, when he retired from railway work, died on July 19 at his home in Bangor, Maine, at the age of 95.



F. J. Stimson

Equipment and Supplies

LOCOMOTIVE BUILDING

THE MINNESOTA STEEL COMPANY has ordered 3 saddle tank locomotives from the H. K. Porter Co.

THE ALABAMA & TOMBIGBEE has ordered one Consolidation type locomotive from the Lima Locomotive Corporation.

THE CZARNIKOW-RIONDO COMPANY, 112 Wall street, New York, has ordered one Mogul type locomotive for the Gomez Mena Plantation Company from the American Locomotive Company. This locomotive will have 18 by 24-in. cylinders and 50-in. driving wheels.

CAR BUILDING

THE ILLINOIS STEEL COMPANY is in the market for 10 tank cars.

THE EL PASO & SOUTHWESTERN has ordered two dining cars from the Pullman Company.

THE NEVADA NORTHERN has ordered 50 Ingoldsby dump cars from the Pullman Company.

THE PHILADELPHIA & READING is said to be contemplating the purchase of a number of freight cars.

THE TEMISKAMING & NORTHERN ONTARIO has ordered four passenger cars from the Pullman Company.

THE COLD BLAST TRANSPORTATION COMPANY has postponed its inquiry for 300 refrigerator cars for the present.

THE CHICAGO & NORTH WESTERN has ordered 300 automobile cars from the American Car & Foundry Company.

THE NEW YORK CENTRAL is said to have issued inquiries for 1,500 box and 500 automobile cars for the Michigan Central.

THE FRENCH GOVERNMENT is reported to have ordered 200 armored cars from the Standard Steel Car Company. This item has not been confirmed.

THE RUSSIAN GOVERNMENT has exercised its option for 200 cars with the Pressed Steel Car Company, thereby increasing that company's order to 7,000 cars, and is also reported to have given it an additional order for 2,000 cars.

THE BALTIMORE & OHIO has divided an order for 2,000 hopper cars among the American Car & Foundry Company, the Pressed Steel Car Company and the Cambria Steel Company, and ordered 35 coaches, 5 combination passenger and baggage cars, 2 baggage and mail cars, 4 baggage cars, 2 café-parlor cars and 2 café coaches from the Pullman Company.

IRON AND STEEL

THE GULF, FLORIDA & ALABAMA has ordered 750 tons of steel from the American Bridge Company.

THE ITALIAN GOVERNMENT is reported to be negotiating with an American company for the purchase of 20,000 tons of rails.

THE MINERAL RANGE has ordered 289 tons of steel from the American Bridge Company for an approach to a bridge at Houghton, Mich.

THE NEW YORK PUBLIC SERVICE COMMISSION, FIRST DISTRICT, has ordered 35,500 tons of open hearth rails and 2,400 tons of open hearth guard rails from the Bethlehem Steel Products Company for use on the lines of the dual subway system of New York City. The Public Service Commission will open bids on August 18 for the supply of special work needed on the rapid transit lines in the Borough of Queens.

MACHINERY AND TOOLS

THE SOUTHERN PACIFIC is reported to be preparing specifications for a large number of machine tools. This item has not been confirmed.

Supply Trade News

The Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has taken a small order for tractor trucks for Russia.

The Hail Switch & Signal Company, New York, is reported to have received an order for shells aggregating \$1,000,000 in value.

The Burd High Compression Ring Company, Rockford, Ill., is beginning the installation of machinery in an additional new factory building.

The U. S. Metal and Manufacturing Company, New York, has been appointed railroad sales agent for the injector sand blast apparatus manufactured by J. M. Betton.

Thomas J. McMaster has been appointed district sales manager in the western territory for the Diamond Power Specialty Company of Detroit, Mich., with headquarters at 809 Ashland block, Chicago.

L. S. Love, formerly head of the L. S. Love Machinery Company, has become associated with the Sherritt & Stoer Company, Inc., Philadelphia, Pa., dealers in machine tools and railway and machine shop equipment.

Louis F. Beckert, a salesman in the railway equipment division of the railway and lighting department of the Westinghouse Electric & Manufacturing Company, died suddenly of typhoid fever at his home in Pittsburgh on July 7.

Roy C. McKenna, of the McKenna Brothers Brass Company, Pittsburgh, Pa., has been elected president of the Vanadium-

Alloys Steel Company, also of Pittsburgh. He succeeds E. T. Edwards, who has resigned to accept the presidency of the Latrobe Electric Steel Company, Latrobe, Pa., but who will remain a member of the board of directors of the Vanadium-Alloys Steel Company. Mr. McKenna brings to his new position the experience gained in the years he has been the head of the mechanical department of the McKenna Brothers Brass Company. He graduated from the University of Pittsburgh in 1903 in electrical and mechanical engineering. His family has been identified with the high-



R. C. McKenna

speed steel trade ever since the year 1902.

It is reported that the Baldwin Locomotive Works, which has recently taken a contract for about \$80,000,000 worth of shells, will incorporate a new company to be known as the Eddystone Munitions Company, and spend about \$1,500,000 for another new plant at Eddystone.

W. Spencer Robertson, assistant to Leigh Best, vice-president of the American Locomotive Company, has been appointed secretary of the company, effective July 14, succeeding C. B. Denny, formerly treasurer and secretary, who has resigned. Mr. Robertson has been in the service of the American Locomotive Company since May 1, 1908. He was born in Brooklyn, January 10, 1885, and from November, 1900, until 1908 he was associated with the law office of Simpson, Thacher & Bartlett, New York.

The publicity department of the Pennsylvania Railroad has issued the following: It can be authoritatively stated that the Pennsylvania Railroad Company has not given an option on its

Cambria Steel Company's stock to Mr. Frick, nor is there any basis for the reported consolidation of the Cambria and Pennsylvania Steel Companies. When Mr. Donner became chairman of the board of the Pennsylvania Steel Company, he was given an option on a portion of the Pennsylvania Company's holdings, both in the Cambria and Pennsylvania Steel Companies.

Negotiations now are pending between the Canadian Car & Foundry Company and the allies for an additional contract for war supplies. It is understood the amount of new business, which it is believed will be closed shortly, is about \$6,000,000. First shipments to Europe of completed shells called for under the terms of the company's original \$83,000,000 contract are expected to be made from the Kingsland, N. J., plant early in August. That plant was erected as an assembling factory for the parts which are being turned out by about fifty manufacturers in the eastern section of this country.

The Locomotive Stoker Company, Schenectady, N. Y., has purchased the coal pusher business and taken exclusive licenses under all of the patents covering mechanical coal pushers for locomotive tenders owned by Ryan, Galloway & Co., Chicago, which, with the patents already controlled, will enable the Locomotive Stoker Company to add a complete line of mechanical coal pushers for all classes of locomotive tenders to its rapidly growing stoker business. Edward Ryan, of Ryan, Galloway & Co., has entered the employ of the Locomotive Stoker Company as mechanical expert.

TRADE PUBLICATIONS

CONDUIT.—The Sprague Electric Works, of the General Electric Company, New York, has issued a four-page folder, naming the good qualities of Spragueduct superior enameled conduit and giving price lists and other data.

GEARS, PINIONS AND TROLLEYS.—The R. D. Nuttall Co., Pittsburgh, Pa., has recently issued catalog No. 12 relative to gears, pinions and trolleys for mine and industrial locomotives, and catalog No. 13 relative to like equipment for electric railways. Each booklet contains illustrations and specifications of the apparatus described, there being included tables giving the sizes and list prices of the gears and pinions which may be obtained.

VERTICAL GAS ENGINE.—The National Transit Company, Oil City, Pa., has recently issued bulletin No. 401, in which is illustrated and briefly described a vertical four-cycle, air cooled gas engine. A unique feature in the design of this engine is the use of the exhaust to induce the circulation of air through the cooling flanges on the cylinder. Bulletins Nos. 104 and 105 also recently issued are devoted to a line of the Duplex direct acting type steam pumps, the former outside center packed and the latter of the packed piston type. These pumps are designed for service from 200 lb. to 1,000 lb. pressure per sq. in.

FLEXIBLE JOINTS.—Barco Flexible Joints is the title on the cover of a loose-leaf booklet recently issued by the Barco Brass & Joint Company, Chicago. In this booklet are contained catalog No. 10, relating to blow-off, terminal coach heating and wash-out nozzle connections; catalog No. 20 relating to round-house blower connections and specifications and the Barco automatic smokebox blower fitting; catalog No. 30, entitled "Barco Flexible Joints, Catalog and Descriptive Bulletin," and catalog No. 40 relating to engine tender connections for steam, air and oil and car connections for steam and air.

RAILWAY CONSTRUCTION IN ENGLAND.—According to the Railway News, the Gowdall-Braithwell Railway, 22 miles in length, intended to form an additional route from new South Yorkshire collieries to the Humber, is now approaching the final stages. The line was originally promoted by the Hull & Barnsley Railway, with the support of the Midland Railway, to which trackage rights were to be given, and which was to find part of the capital. Later the North-Eastern Railway also obtained trackage rights and other advantages, while opposition by the Great Central resulted in the new line being vested in the Hull & Barnsley and Great Central companies. The Act was obtained in 1909, contracts were let the following year, and the work of construction commenced in 1911. The rails have now been laid, and only a few finishing touches are required to complete the work.

Railway Construction

ARTESIAN BELT.—It is stated that work to complete the extension from Christine, Tex., south to Crowther, 16 miles, on which grading work is already finished, will be carried out soon. Plans have been made to extend the line southeast via Beeville to some point on the Gulf coast. The company now operates a 43-mile line from Macdona south to Christine.

CANADIAN NORTHERN.—Construction work is reported resumed on the line to St. Paul de Metis, Alta. About 14 miles of grading has already been finished; D. F. McArthur is the contractor. (October 22, p. 779.)

CANADIAN NORTHERN QUEBEC.—The new location of the projected extension of the old Montford & Gatineau Colonization Railway has been approved from Huberdeau, Que., to a point near St. Remi d'Amherst. The route is along the east bank of the Rouge river to the Argenteuil county line, thence crossing to the west side of the river joins the original approved route, about six miles from Huberdeau. (January 1, p. 39.)

CENTRAL CANADA.—A sub-contract is reported let to J. Timothy for grading the last 22 miles to Peace River Crossing, Alta. Track laying has already been completed, it is said, to mile 28 from McLennan, where connection is made with the Edmonton, Dunvegan & British Columbia. The grading work yet to be carried out will be heavy. It is expected that the grading work will be finished by October 1, and track laying completed and the line ready for operation this year.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—New double track from a point north of Huffman, Tenn., to north of Sunbright, 2.9 miles, was placed in service on July 15. The company now has a total of 129 miles of double track in service between Cincinnati, Ohio, and Chattanooga, Tenn.

CORPUS CHRISTI TRACTION.—Incorporated in Texas with \$100,000 capital to build and operate an interurban system of railways. The plans call for building lines north, west and south of Corpus Christi. The incorporators include J. H. Caswell, San Diego, Cal.; J. R. Hopkins, G. Boone, O. P. Metcalf, W. E. Pope, Corpus Christi, and A. McEvoy, New York.

INTERCOLONIAL.—A contract has been given to J. W. McManus & Co., Moncton, N. B., it is said, for building an industrial spur at Bathurst, N. B., 2.3 miles long.

LOUISIANA ROADS.—Surveys are being made by the Cady Lumber Company, McNary, La., it is said, for a line to be built to connect with the Texas & Pacific and the Chicago, Rock Island & Pacific at Lamourie.

MANITOBA ROADS (Electric).—H. W. Adcock, Winnipeg, Man., is said to be back of a project to build a line from Winnipeg, Man., east to Transcona, about 10 miles. Gasolene motor cars are to be used for the motive power. The line is to be finished by October of this year, and early in 1916 is to be extended to the south side of the town.

MERIDIAN & MEMPHIS.—A contract is reported let to C. G. Kershaw, Birmingham, Ala., for work on this line involving the handling of about 200,000 cu. yd. of earth. The company started work early this year on an extension from Union, Miss., west to Sebastopol, about 13 miles. This line will probably be extended to Carthage, about 30 miles from Union. (April 30, p. 955.)

NEW YORK STATE RAILWAYS (Electric).—The New York Public Service Commission, Second district, has approved the extension of the New York State Railway's lines from Rochester, N. Y., into the town of Greece, Monroe county, to connect the company's tracks, with a loop crossing Dewey avenue in Greece and crossing the Kodak branch of the New York Central's tracks.

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has approved plans and form of contract for the erection of steel, construction of tracks, etc., on the Broadway elevated railroad, in the borough of Brooklyn, between Myrtle avenue and Aberdeen street, in connection with the third tracking of that line. The commission also approved the

plans and form of contract for the supply of structural steel for widening and strengthening the Myrtle avenue elevated railroad from Willoughby avenue to Wyckoff avenue for the third-tracking of that line.

The contract for the installation of tracks on the New Utrecht avenue elevated railroad, in the borough of Brooklyn, has been awarded to Ward & Tully, Incorporated, the lowest bidders, who offered to do the work for \$71,355. (July 16, p. 143.)

Post & McCord, Incorporated, submitted the lowest bid at \$877,959 for the construction of Section 1 of Route No. 49 of the Culver rapid transit line in the borough of Brooklyn. Section 1 extends from Thirty-seventh street to the intersection of Gravesend avenue and Bay parkway (Twenty-second avenue). (July 2, p. 39.)

PHILADELPHIA, PA. ROADS.—Bids are wanted, until August 16, by A. M. Taylor, director, Department of City Transit, Philadelphia, Pa., for the construction of the city hall section station of the Broad street subway. This section will extend under city hall and the Market street subway, and will be about 700 ft. long. Bids are also wanted on the same date for the construction of concrete column foundations and piers for about 26,000 lineal ft. of elevated railway in Front street, Kensington avenue and Frankford avenue. (July 16, p. 143.)

ST. LOUIS RAILWAY & DOCK COMPANY.—Incorporated in Missouri with \$250,000 capital, to build a terminal railroad in St. Louis county and the city of St. Louis, Mo., about 25 miles long. The projected route is from a point north of the St. Louis city limits near the Columbia Bottom road in a general southerly direction to a point near Van Buren and Catalan streets. The incorporators include W. J. Holbrook, J. T. Moore, E. W. Bannister, D. A. Bowman, J. Hill and H. F. Bell, all of St. Louis, Mo.

TAMPA, CLEARWATER & ISLAND CITY.—Organized in Florida with \$100,000 capital to build a line from the eastern limits of Clearwater to Clearwater Key, about 2.75 miles. The work includes the construction of a bridge about two miles long to be of pile, timber and concrete construction. Bids for a 50-ft. steel draw are wanted, it is said, until August 7. E. W. Parker, president and general manager, Tampa; G. R. Smoyer, vice-president, Clearwater; E. T. Roux, secretary, Plant City, and H. W. Bivins, treasurer, Clearwater.

RAILWAY STRUCTURES

BAY CITY, TEX.—At a meeting of the officials of the Gulf, Colorado & Santa Fe, the Southern Pacific and the St. Louis & San Francisco, with the business men of Bay City, on July 8, a committee was appointed to select a site for the union station to be built by the three railroads entering the city.

CHICAGO, ILL.—The city council has passed a five-year ordinance permitting the Chicago & Western Indiana to build a temporary one-story addition to the Dearborn station on Polk street. It will be a brick structure about 40 ft. wide and 60 or 70 ft. deep.

GALESBURG, ILL.—The Chicago, Burlington & Quincy is rebuilding its blacksmith shop at this place, which was recently destroyed by fire. The work is being done by company forces.

MANITOU RAPIDS, MAN.—A contract for the substructure of the cantilever bridge to be built for the Hudson Bay Railway, over the Nelson river at Manitou Rapids, has been let, it is said, to Robert McDonald, Winnipeg, Man.

NEW YORK.—Bids for the construction of station finish on the new rapid transit lines in the borough of Queens are wanted by the New York Public Service Commission, First district, on August 3, for the junction section on the Queensboro bridge plaza, for the elevated railroad from that point to Corona, and for the extension of the Queensboro subway through Davis street and Ely avenue, and on August 4, for the elevated railroad from the Queensboro bridge to Astoria.

OAKLAND, CAL.—The Southern Pacific is considering the erection of a suburban station on its terminal property in Oakland. No plans have been prepared at present for such a building.

PILOT ROCK JUNCTION, ORE.—The Oregon-Washington Railroad & Navigation Company has awarded the contract for the grading on its new freight terminal at this place to Twohy Brothers Company, Portland, Ore. There will be about 100,000 cu. yd. of grading required.

Railway Financial News

EL PASO & SOUTHWESTERN.—The Corporation Commission of Arizona has approved the issuance of \$16,627,000 bonds by the El Paso & Southwestern. These bonds are to be used for refunding purposes.

HOUSTON & TEXAS CENTRAL.—See Missouri, Oklahoma & Gulf.

INTERNATIONAL & GREAT NORTHERN.—The receivers have filed injunction proceedings against the state tax board of Texas to restrain the board from certifying to tangible assets totaling \$10,000,000. This valuation the receivers claim is excessive.

MISSOURI, OKLAHOMA & GULF.—The Houston & Texas Central has given the Missouri, Oklahoma & Gulf trackage rights from Sherman, Tex., to Plano, and the St. Louis Southwestern has given the Missouri, Oklahoma & Gulf trackage rights from Plano to Ft. Worth and Dallas. It is said that through train service between Ft. Worth and Dallas and Joplin, Mo., will be begun in the near future.

PENNSYLVANIA RAILROAD.—See official statement in regard to Pennsylvania Steel Company and Cambria Steel Company stock in Supply Trade News.

ST. LOUIS SOUTHWESTERN.—See Missouri, Oklahoma & Gulf.

SOUTHERN RAILWAY.—The Tennessee railroad commission has approved the issue of \$3,500,000 Atlanta & Charlotte Air Line bonds, the proceeds of the sale of which are to be used to pay for the double-tracking of the line between Spartanburg, S. C., and Central, 56 miles, and between New Holland, Ga., and Cornelia, 21 miles.

WABASH.—The Wabash was sold under foreclosure at St. Louis on July 21. This, of course, is the preliminary step to the putting through of the reorganization plan, described in the issue of May 7, page 978. The price, which, of course, was subject to the liabilities of the company, was \$18,000,000, which covered the receivers' liabilities.

CONSTRUCTION WORK ON BENGUELA RAILWAY, ANGOLA.—The war has delayed construction work on the Benguela Railway, extending from Lobito Bay, Angola, into the interior. Plate-laying has been entirely suspended for the present, but the construction of earthworks is being steadily pushed forward, and the bed is now ready for rails to be laid to a distance of 40 miles from the present railhead. Only a relatively small amount of work remains to be done in order to complete the road as far as Belmonte, capital of the Bihe district, 390 miles from Lobito. It may, however, be many months before the rails and other material are received. The railway has been in operation as far as Chinguar, 322 miles from Lobito, since the end of 1913.

FROM HOLLAND TO BELGIUM.—The Railway Gazette (London) in a recent issue, quoting from an Antwerp paper, gives interesting particulars of the difficulties attending a railway journey between Holland and Belgium under existing conditions. A German passport office, served by German officials has been opened at the frontier town of Roosendaal. The first step on the journey into Belgium is to obtain the passport, which costs a trifle over 45 fr. (\$9.00). The passenger then makes his way to the little station where all refreshments are sold at famine prices, and waits patiently for the train which rarely leaves at the appointed time. The traffic over this section of line would appear to be relatively heavy, since it is said that on the average from 600 to 700 persons leave daily for Antwerp, while about 400 to 500 journey in the reverse direction. The actual Belgian frontier station is at Esschen, where the line is patrolled by sentinels. Here each coach is inspected. The examination, although lasting two hours, is described as not being "very severe." After this formality passengers change into another train, which eventually brings them into Antwerp, the actual time of arriving being a matter on which it is impossible to speculate in advance. At Antwerp the male passengers are allowed to leave the station as soon as their papers are found to be in order, but the women are first searched, a process to which they also have to submit at the beginning of the journey.

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GENERAL NEWS SECTION.....

*Illustrated.

All-steel gondola and hopper cars have now been in service on a number of roads for a sufficiently long time to give a fairly accurate idea as to their possible life. On one road 50-ton gondola cars used in coal and ore traffic are only now having the floor sheets replaced, although they have been in service about 12 years. The

Life of Steel Freight Cars

underframes are in first-class condition and the side sheets in fair shape. With the new floor sheets it is expected that the life of the car will be extended, without excessive maintenance costs, for another six or eight years. On hopper cars, or gondolas with hoppers, the side sheets opposite the hoppers usually go first because of pounding upon them to loosen the coal and

ore so that it will flow freely. As unloading machines have come into more general use, this trouble is decreasing and in some cases gondola cars are having the hoppers removed and replaced with a level floor. On one road the expanded metal top sides on coke cars are being replaced after eight years of service. The expanded metal has rusted out where it is fastened to the framing members, but is otherwise in good condition. The expense of replacing it is not large and is much less than would be the cost of maintenance of wooden racks or the cost of hauling about the greater weight of either steel or wooden sides. As facilities have been improved for handling repairs to steel freight cars, the trouble in maintaining them has grown less, until now they are giving no more and probably less trouble than the wooden cars which they replaced.

With the increase in the cost of car maintenance, due principally to the rougher treatment freight cars receive in the long trains of today and in hump yards, steel ends are coming to be considered an economical adjunct in car construction. In the words of one prominent mechanical officer, "the steel end is going to offer a very fortunate

Steel Ends for Box Cars

and economical solution after the years of trouble we have had with box car equipment due to the ends bulging and tearing out." The end is the most vulnerable part of the body of a car, with the possible exception of the door, and by the use of the steel end a structure of more uniform strength is obtained. On several roads the cost of these ends has been proved to be entirely justified on new equipment, as well as old equipment, with a probable life of six to ten years, that is receiving general repairs. The two-piece steel ends seem to be more popular, as they are easier to handle and ship, and in case of damage will be more economical to repair. In some cases, such as the Union Pacific cars described in the February 5 issue of the *Railway Age Gazette*, three pieces are used on account of the large size of the car. A canvass of five roads shows that no serious difficulty is experienced in the maintenance of these ends and in case of an accident it has been found cheaper to replace them than the wooden ends. Any deformation may be easily straightened, and cases have been known in which steel ends have been bulged out 6 or 8 in., due to a sudden shock, with no other injury to the car.

To the average civil engineer in railway service construction seems to make a stronger appeal than maintenance of way work.

The Engineer in Maintenance Work

There are a number of reasons for this. Popular fancy always connects the railway engineer with the location of new roads, the bridging of canyons and the tunneling of mountains. In other words, he is regarded as a pioneer and a wonder worker, and there can be but little doubt that it is these notions of him which prompt the high school graduate to select engineering as a profession. In the technical school this same feeling prevails. Almost all the training is directed toward design and construction. Lectures are given by engineers engaged in construction work and such inspection trips as are made usually cover new work or reconstruction. In actual practice there is also a certain fascination about the construction project, the satisfaction of seeing the work develop from day to day, an appeal which holds as long as it is in progress but which quickly wanes when the job is finished. On the other hand, maintenance of way is largely of a routine character, and is surrounded with no glamor. In fact, the public is largely ignorant of its character or very existence, and to the engineering graduate it seems uninteresting. Considered purely from the standpoint of material gain, however, maintenance possesses several advantages over construction. The permanence of employment neutralizes any possible advantage in the rate of pay in favor of the construction man.

It also makes it possible for those engaged in maintenance to establish permanent homes. But most important of all is the unlimited opportunity maintenance of way work affords for gaining intimate familiarity with railway operation, not to say of the entire science of transportation; for the railways and the engineers themselves are beginning to look to the operating positions as offering opportunities for the increased usefulness of the engineer. The relative permanence of employment is well illustrated at the present time. There have been few periods when so many competent and experienced construction engineers were out of work. In the maintenance of way department, on the other hand, the prevailing measures for retrenchment have not seriously affected the trained men. While great reductions have been made in the number of laborers it has not been practicable or advisable to reduce the supervision to any great extent. There is growing demand for trained men in the maintenance of way department. The increasing density of traffic, the diversity of the problems, and the labor situation are calling for the best talent available. The principal difficulty with the technically trained man has been a lack of proper appreciation on his part of the practical features of the work, due partly to a disinclination to serve the necessary apprenticeship and partly to a lack of training in the college; for most of the technical schools have made little effort to readjust their courses of study to meet the changes taking place in the railway business.

PREFERRED STOCK IN EXCHANGE FOR FIRST MORTGAGE BONDS

AN outline of the plan for the reorganization of the Missouri Pacific without receivership was published in the *Railway Age Gazette* of July 9, page 82. The proposal that holders of such a very large volume of securities should agree to a plan of reorganization in which they must make very considerable sacrifices of at least paper values shows a degree of faith in human nature on the part of the banking house making the proposal that is not usually credited to bankers as a class. Of the many interesting features of the plan none is of greater interest or throws more light on the complexities of railroad financing than the proposal that the holders of certain absolutely first mortgage bonds secured at a rate of less than \$12,000 a mile shall exchange these bonds for preferred stock. First lien divisional mortgage bonds at the rate of \$12,000 a mile one would think would be about as conservative an investment as could be secured, providing, of course, that the railroad ran through territory which would justify any railroad at all.

One of the divisional mortgage bond issues for which the holders are asked to make the exchange to preferred stock is the Lexington division first mortgage 5 per cent bonds. The Lexington division is 57 miles long and runs from Sedalia, Mo., to Lexington. It forms, therefore, one of the feeders of the Missouri Pacific system, and this 57-mile line would need to earn only \$600 per mile net, or a total of \$34,200 a year, to pay the interest on this issue. The conclusion to be drawn from the fact that holders of these bonds are asked to exchange them for preferred stock apparently is that, in the opinion of the bankers, this line could not be operated independently from the rest of the Missouri Pacific system and earn \$34,200 a year on the average over good and bad years. To the holder of these bonds the question pretty surely arises as to whether or not the bankers are asking for a larger sacrifice than is justified because of a belief that the holders of these bonds cannot get together or are not likely to get together and insist on a foreclosure sale and the independent operation of their little line. Of course this is a question of fact which could only be determined by a very careful study of traffic conditions on this line, and since the bankers have made such a careful study, the presumption is that this is not a bluff but an honest estimate of the facts. If it were not, presumably some one would buy up a large enough block of these bonds to get control of the situation and force a foreclosure sale.

The situation illustrates quite remarkably clearly the fact

which investors in railroad securities have been so slow to recognize, namely, that a first mortgage is no better than an unsecured debenture on a railroad property which does not have the *earning power* to meet its interest charges. Until within recent years about the last thing that an investor who was offered railroad bonds asked was where his railroad was or what the density of freight and passenger traffic on it was. This Missouri Pacific situation is also a good illustration of the apparent wisdom of railroad companies which are consolidating all of their mortgage debt and issuing a blanket mortgage covering the entire system, with liberal provisions for future financing and refunding. The investors can make some intelligent estimate of what he is getting in the bonds issued under a mortgage like this, and what the security back of his bonds is. The real security back of the bonds is the earning power of the road. Of the earning power of the system as a whole even the investor who knows very little about railroad affairs can get impartial information either from the figures published by the Interstate Commerce Commission or by the annual reports of the company itself which are compiled in accordance with the rules made by the Interstate Commerce Commission.

LOWER PASSENGER FARES AND HIGHER FREIGHT RATES

PRESIDENT UNDERWOOD of the Erie has started an interesting discussion by his recent interviews concerning the readjustment of railway rates in this country. He is quoted as having said that he is not in favor of increasing passenger rates. On the contrary, he favors reducing them to one cent a mile and then raising freight rates 20 per cent. His proposal has called forth considerable comment, some of which is quite astonishing. Seth Low, president of the National Civic Federation, writes to the *New York Times* to say that he has long recommended that our railways adopt the policy of making their passenger rates relatively low and their freight rates relatively high. This, as he points out, is the policy of the state railways of Europe, and is popular, because while almost everybody directly pays passenger fares, only comparatively few directly pay freight rates.

The most astounding expressions of all come from an entirely unexpected source. We have always regarded the *Christian Science Monitor* as an unusually fair and intelligent newspaper, but in its issue of July 15, it published an editorial entitled, "Lower Passenger Fares," which discloses either an ignorance or an unfairness, or a combination of the two that is surprising. "All things considered," according to the *Monitor*, "transportation is higher in the United States today than it has been at any time since the introduction of the railroad. . . . Tens of thousands of people in the United States who would gladly see America, if not first, at least sometime, are prevented from seeing it at all by the almost prohibitive cost of travel." Reduced fares, according to this new, but entirely cocksure, authority on transportation, would quadruple the passenger business of our railways and greatly increase their profits.

It would be somewhat surprising if it should be found that Seth Low and the *Christian Science Monitor* know more about what is good for the railways as well as the public than all of the experienced railway managers who are now seeking advances in passenger fares. It might be said that Mr. Underwood, at least knows what he is talking about. There is no question about that. But Mr. Underwood was very careful to say that he was not advocating merely a reduction in passenger fares. "My plan," he said, "is not only to reduce passengers to one cent a mile, but to increase freight rates 20 per cent on the average." The application of this reduction in passenger fares and this increase in freight rates to the Erie's business would, on the basis of the present traffic, reduce its passenger earnings about \$3,000,000 a year and increase its freight earnings about \$8,500,000 a year, thereby adding \$5,500,000 to its net earnings. You bet Mr. Underwood knew what he was talking about! He always does.

But he was not expecting, as the *Christian Science Monitor* seemed to think, to get an increase in profits from an increase in passenger business. On the contrary, he said that if one cent

a mile would not cover the cost of the passenger service, "whatever adverse balance there might be should be absorbed in the freight earnings where it would not be felt." The application of Mr. Underwood's plan to the railways of the United States as a whole would, if there were no change whatever in the amount of traffic, increase their net earnings over \$90,000,000 a year, simply because an increase of 20 per cent in their freight rates would increase their freight earnings that much more than the reduction of their passenger rate to one cent a mile would reduce their passenger earnings.

But what of the Christian Science Monitor's statement that transportation now costs more than ever before? It is simply not true. Both passenger fares and sleeping car fares are lower on the whole than ever before. And what of its contention that if passenger rates were reduced there would be such a large increase in passenger business that the profits of the railways from that source would be increased? In the first place, contrary to its assumption, passenger rates are reduced voluntarily for the express purpose of enabling people to "see America first." At the very time its editorial appeared there were special rates in effect between practically all points in the United States for vacation trips, trips to the fairs on the Pacific coast, etc., which averaged only 1¼ cents to 1½ cents a mile. It estimated the cost of a trip from Boston or New York to Chicago at from \$25 to \$45, when, as a matter of fact, the regular fare between New York and Chicago by all except two roads is \$19.10, and there was in effect a round trip summer tourist rate between Chicago and New York of \$28.65.

Now as to the wonderful effect that would be produced by a reduction in fares in increasing traffic: In 1907 many of the states passed two-cent fare laws on the theory that a reduction in the regular rate would increase business. In the seven years before these laws were passed the number of passengers carried by the railways of the United States increased 59 per cent, while in the seven years afterward it increased 21 per cent. A few years ago the Interstate Commerce Commission ordered a reduction of 20 per cent in the rates for upper berths in sleeping cars. It was expected that this would increase the demand for upper berths. As a matter of fact, the proportion of upper berths sold since that time has decreased a fraction of one per cent. The average passenger fare of the Erie railroad, which has a line between New York and Chicago, is 1.56 cents. The average rates by way of the New York Central and the Pennsylvania are substantially higher, excess fares being charged on many of their trains. But in spite of this difference in rates the density of passenger traffic of both the New York Central and the Pennsylvania is very much larger than that of the Erie. The average rate per passenger per mile of the railways of Germany is very much lower than that of the New York, New Haven & Hartford. The population per mile of railway in Germany is much larger than that in the states in which the New York, New Haven & Hartford operates. In spite of these facts, the New York, New Haven & Hartford has developed a greater passenger traffic per mile than the railways of Germany. Again, the average rate per passenger per mile in the United States is two cents; the average rate on the New York, New Haven & Hartford is 17 cents. This is not a very great difference in rates. Nevertheless, the New Haven has a passenger traffic density five and a half times as great as the average in the United States, and it has developed it without any such reduction in its fares as the Christian Science Monitor proposes.

What is the explanation of the foregoing facts? Why have not compulsory reductions in passenger fares and in the rates for upper berths stimulated business? Why does the large majority of the passenger business between New York and Chicago move by way of the railways which charge the highest rates? Why has the New Haven, with a higher rate and a smaller density of population, developed a denser passenger traffic than the railways of Germany? One reason is that service counts for as much and even more in developing passenger business than reductions in rates. Experience has shown that a reduction in the regular rate has no more tendency to increase pas-

senger traffic than it has to increase the amount of travel in upper berths. The things which stimulate passenger traffic on our railways are an increase in the service or a reduction from the regular rate, carrying with it a right to the best service. The second reason for some of the facts given above is a difference in the density of population. The New Haven has five and a half times as dense a passenger traffic as the average railway in this country, not because its average rate is somewhat lower, but chiefly because it operates in a territory with a dense population.

Even if a reduction of passenger fares did cause a great increase in passenger business, it would make it necessary to run many more passenger trains, which in turn would cause an increase in operating expenses that would more than consume the increase in earnings. The New Haven road has as large a passenger business as the Christian Science Monitor predicts other roads would have if fares were reduced and it gets a higher average rate than the Monitor thinks other roads should charge, and yet the chairman of the New Haven, who ought to know, has testified that even on its present rate the cost of operating its passenger trains is so great as to leave no net earnings with which to pay taxes or a return on investment. Such a reduction in passenger fares as Mr. Underwood proposes would make the passenger business of all railways unremunerative. It would bankrupt a road like the New Haven, which derives one-half of its revenue from its passenger business.

Another of its effects, as foreseen by Mr. Underwood, would be to make it necessary to pay a deficit in the passenger business from the earnings of the freight business. This is precisely what is done on those state railways of Europe on which, as Mr. Low has pointed out, passenger rates are made relatively low and freight rates relatively high. No expert who ever studied the figures has any doubt that the German railways suffer losses on their passenger business which are made good from their relatively high freight rates.

Is it fair to make those who directly or indirectly pay freight rates bear not only the cost of freight transportation, but also part of the cost of passenger transportation? We do not believe it is. Is such a policy legal? The Interstate Commerce Commission has indicated that the passenger business even on the present rates is unremunerative, and that advance in these rates are one source from which the railways should increase their net earnings. How, as a practical matter, can the railways hope to reduce their passenger rates and more than offset the effect by increases in their freight rates when the body which controls their rates tells them that they should increase their passenger rates and will not permit them to make any very large general advances in their freight rates? Again, the United States Supreme Court has held in the Norfolk & Western and in other cases that each branch of the service, passenger and freight, should earn enough to pay its own way. In other words, however attractive, theoretically Mr. Underwood's plan may be to some roads, its execution, it would appear, would be both impracticable and unconstitutional; and to railways handling a large passenger business the plan is decidedly unattractive.

From the point of view of the railways it makes no difference so long as their earnings are adequate, whether they receive exactly proportionate amounts of them from the passenger and freight services or a disproportionately small part of them from one branch of the service and a disproportionately large part of them from the other. But it does make a great deal of difference to them and to the public how such questions are discussed, because ignorant and misleading discussions of them, such as appeared in the Christian Science Monitor, have frequently led to ignorant and harmful legislation. One of the great misfortunes of this country is that there are so many people who have had no experience in railway affairs and never devoted a week to the study of them, who nevertheless, doubtless as the result of inspiration, know more about them than all the men who have devoted their lives to railway operation or to the study of transportation problems. This misfortune is much aggravated when gentlemen who have learned so much more by inspiration and

absorption than others have by years of experience and study break into the editorial sanctums of influential papers or into legislative and regulating bodies.

OWNERSHIP OF RAILWAY STOCK

OWNERSHIP of the stock of American railways at the close of the fiscal year ending June 30, 1914, was distributed among 622,284 stockholders with an average holding of only \$13,958 par value, according to a compilation just made by the Bureau of Railway Economics from the returns of the railways to the Interstate Commerce Commission. These figures, as shown in the accompanying table, are based on returns from 837 roads operating 254,387 miles of line, and 450 non-operating roads, making a total of 1,287 companies, with a total outstanding capital stock of \$8,685,764,125. This includes 171 Class I roads having annual operating revenues of \$1,000,000 or over, 271 Class II roads with revenues between \$100,000 and \$1,000,000, and 395 Class III roads with revenues of less than \$100,000.

The compilation thus covers practically all of the railways of the country, excepting only a few for which data were not available, and presents the number of stockholders as shown on the books of the companies and reported to the Interstate Com-

District and Class	Number of roads	Number of stockholders, June 30, 1914	Capital stock outstanding, par value	Average amount of capital stock per stockholder, par value	Miles of single track operated
UNITED STATES.					
Operating roads—					
Class I	171	520,918	\$6,774,840,346	\$13,006	224,550.31
Class II	271	10,040	441,579,609	43,982	20,945.25
Class III	395	8,840	134,782,574	15,894	8,891.44
Total operating roads	837	539,438	7,351,202,529	13,628	254,387.00
Non-operating roads	450	82,846	1,334,561,596	16,109	.....
Total United States	1,287	622,284	8,685,764,125	13,958	254,387.00
EASTERN DISTRICT.					
Operating roads—					
Class I	69	219,882	2,572,849,742	11,701	58,666.66
Class II	86	4,648	123,930,909	26,663	4,330.60
Class III	105	3,595	36,832,378	10,245	1,783.97
Total operating roads	260	228,125	2,733,613,029	11,983	64,781.23
Non-operating roads	312	75,480	745,695,994	9,879	.....
Total Eastern District	572	303,605	3,479,309,023	11,460	64,781.23
SOUTHERN DISTRICT.					
Operating roads—					
Class I	33	37,933	956,612,500	25,218	41,102.67
Class II	57	2,905	91,990,650	31,666	4,549.05
Class III	118	1,846	40,284,625	21,823	2,703.17
Total operating roads	208	42,684	1,088,887,775	25,510	48,354.89
Non-operating roads	57	4,692	68,284,450	14,553	.....
Total Southern Dist.	265	47,376	1,157,172,225	24,425	48,354.89
WESTERN DISTRICT.					
Operating roads—					
Class I	69	263,103	3,245,378,104	12,335	124,780.98
Class II	128	2,487	225,658,050	90,735	12,065.60
Class III	172	3,039	57,665,571	18,975	4,404.30
Total operating roads	369	268,629	3,528,701,725	13,136	141,250.88
Non-operating roads	81	2,674	520,581,152	194,683	.....
Total Western Dist.	450	271,303	4,049,282,877	14,925	141,250.88

merce Commission. For some reason, however, the Interstate Commerce Commission has never found these figures sufficiently interesting to publish them in its statistical reports.

For the Class I roads, operating 224,550 miles, the average holding per stockholder was \$13,006, for the Class II roads \$43,932, and for the Class III roads \$15,894, making an average for all operating roads of \$13,628. The average for the non-operating roads was \$16,109. For the roads in the eastern district the average holding per stockholder was \$11,460, for the southern district \$24,425, and for the western district \$14,925. Relatively large holdings per stockholder are shown for Class II roads and for non-operating roads in the western district, due to the fact that many small roads are owned in whole or in part by other railways or by mining or other industrial corporations.

The popular notion that the railways of the United States are owned by Wall Street has been pretty thoroughly exploded in recent years along with many other fallacies that have caused a great deal of trouble in their time. It is not so well understood that the ownership of the American transportation system really constitutes it one of our most democratic institutions. The Bureau of Railway Economics therefore has performed a useful

service in investigating this subject and showing authoritatively how the stock of our railways is held.

Never before was the ownership of American railways so widely distributed. In 1904, 1,182 companies reported 327,785 stockholders. In 1914 this total was exceeded by 20 of the leading railway companies, which had 376,897 stockholders on their books. The same roads in 1904 had 153,610, so that the increase in 10 years was 146.7 per cent. The Pennsylvania Railroad last year had over 90,000 stockholders of which 48 per cent were women. The Atchison, Topeka & Santa Fe was second in the list with 39,825 and five other roads, the New York Central, the New York, New Haven & Hartford and the Union Pacific, the Great Northern and the Southern Pacific, all had over 25,000.

Of the \$8,685,764,125 capital stock outstanding \$3,019,020,981, or 34.78 per cent received no dividend during the year, according to Interstate Commerce Commission reports. The dividends paid averaged 5.2 on all of the stock outstanding so that the average stockholder received an income of \$625.81 on his investment. Even this rate of dividend was not earned from the operations of the year and the total amount of dividends paid—\$451,262,197—includes \$196,931,595 of dividends declared out of surplus, a very large percentage of which represents duplication in the form of dividends paid out of the treasury of the company into that of another and used to make up the dividend paid by the latter to the public. The total for the year was also swelled considerably by the extra dividend of \$74,020,372 declared by the Union Pacific in distributing its holdings of Southern Pacific stock, which reduced the regular dividend on the Union Pacific from 10 to 8 per cent.

The bureau's compilation takes no account of the ownership of railway bonds, as there are no data from which this can be shown. The total funded indebtedness of the railways in 1914 was \$11,566,541,553, and although there is no record of the distribution of these securities we do know that at least indirectly it is much wider than that of railway stocks. Railway bonds are largely held by banks, insurance companies and educational and benevolent institutions and thus form the basis of the security and earning power of the savings and small investments of a very large proportion of the public. It has been estimated that the insurance companies alone, with over 34,000,000 life insurance policies, have over \$1,500,000,000 invested in railroad securities, while the savings banks, with nearly 11,000,000 depositors, in 1913, held \$821,552,244. State banks held \$65,501,389 and loan and trust companies \$297,234,766, so that there are at least 45,000,000 savings and insurance investments largely dependent on railroad securities.

NEW BOOKS

Poor's Manual of Public Utilities, 1915. Published by Poor's Manual Company, 80 Lafayette street, New York. 2,280 pages. Price \$7.50.

This is the third annual number of this standard manual of public utilities. It is the most comprehensive manual covering this class of companies that is published, and the fact that it is compiled under the direction of Poor's Manual Company guarantees a high standard of accuracy and authority. In many states public utility corporations are required to make reports to state commissions, but in the majority of instances the statistics which these state commissions compile are confusing rather than illuminating and are generally published so long after the expiration of the fiscal year as to be of comparatively small value. The investor, therefore, is largely dependent on information in the manuals. The inter-relation of public utility companies under the present trend of their development is particularly complicated. Poor's Manual of Industrials shows subsidiary, controlled and affiliated companies in conjunction with the parent company, and in most cases a lucid statement is given of the relation of one company to another. Poor's manuals consist of the Manual of Railroads, issued in January; of the Manual of Public Utilities, just issued, and the Manual of Industrials, which will be issued in a few weeks.

The Essential Qualities of Good Steel Rails*

A Discussion of the Defects in the Present Sections and in the Methods of Manufacture, with Remedies

BY GUSTAVE LINDENTHAL
Consulting Engineer, New York

In the beginning of the steel rail industry, 40 or 50 years ago, the details of fabrication were left almost wholly to the manufacturer, who could then claim with some reason to know more about the matter than the consumer. The time has arrived when the rail consumers themselves must now take the lead in determining certain details of manufacture, which will insure thoroughly sound steel, but they must also expect to pay, at least for a time, a higher price for better steel and for better rails.

Towards that first requisite of sound ingots should be directed all efforts at any reasonable cost. Not one of the present specifications for steel rails insures through its provisions thoroughly sound ingots. The external defects of flaws and seams, etc., are more readily discovered by inspection and tests than the insidious internal defects, caused by unsound metal which are in fact discovered only by chance, notwithstanding the closest inspection. The only way to prevent internal defects is to insist on methods of manufacture that will absolutely avoid them. It would not be unjust, that the rail manufacturers should share with the railroads responsibility and damages for such accidents as can be traced to defective rails. Now the railroads alone are responsible.

Modifications of methods must be metallurgically sound and reasonable in cost. Unbalanced rail sections, meaning those with thick heads and thin webs and flanges, should be given up. For these the railroads alone are responsible. Really good and tough rails cannot be made that way. Neither can good rails be made by rolling them in the fewest number of passes and finishing at a high heat. But this is the only way the present form of heavy rails with thin flanges which get cold in the rolling while the thick heads are still waxy, can be finished without breaking the rolls.

It is known that ordinarily the manufacturing difficulties are not in the melting furnace, but that the defects of fabrication as regards soundness of steel occur mostly after the metal is teemed into the ingot molds. Thereafter the defects in steel arise mainly from five causes: blow-holes, piping, segregation, enclosure of slag, oxides, and other foreign matter, and a coarse crystalline structure. The first four causes occur in the ingots, the fifth in the rolling.

It is generally recognized that small blow-holes are not harmful and are readily welded up in rolling and that larger blow-holes can be avoided by the addition of aluminum, put in the form of small shot into the bottom of the ladle before filling it. Ferro-titanium and ferro-silicon are used for the same purpose. All oxides, sulphides and other chemical impurities, also any particles of furnace lining that may be in the fluid steel, will, if given sufficient time, float up into the slag on top. This self-cleansing process, by holding the metal in the ladle before teeming, is held to be very important, and an interval of at least ten minutes, depending upon local conditions, should be allowed for that purpose.

In the present practice the metal is teemed as a rule from the ladle into the ingot forms as quickly as it can be conveyed after the addition of the ferro-manganese, and there is not allowed sufficient time for the cleansing of the steel bath from impurities before teeming. Thirty to forty minutes are consumed before the steel is all run out of the ladle into the ingot molds, but during that time the currents set up in the steel interfere

with and prevent the rising of the impurities into the slag, therefore the importance of keeping the metal still *before* pouring.

Metallurgists agree that the addition of aluminum reduces blow-holes, but increases piping; and piping facilitates segregation. In all rail specifications piping and segregation are treated as unavoidable evils imposed, as it were, by an inscrutable providence upon steel making. The only provision in rail specifications against their mischievous effect upon the soundness of steel is a requirement for discard from the upper part of the ingot.

As the extent of pipe varies with every ingot and may reach all the way from 15 to 80 per cent down into it, the amount of discard would need in fact to be determined for each individual ingot. That is not practicable in the press of the mill operations, and cannot be very well followed up by the inspectors. The amount of discard is therefore assumed at some convenient percentage, but practically is left to the working force of the manufacturer. If the extent of pipe and discard could be readily ascertained for each ingot, it would be an easy matter to compensate the railmaker for the remelting. But this not being practicable, the matter is really left to chance, and all precautions of the railmaker for sound steel and all the precautions of the rail buyer come to naught by this "hit or miss method" to which must be ascribed the largest share of blame for unsound steel rails. Even a discard of 30 per cent is proven by experience to be no real protection.

As pointed out many times by metallurgists, the fundamental requisite for obtaining solid ingots is the maintenance of a fluid top and sinkhead for filling up automatically and quickly any cavities formed in the ingot by shrinkage during cooling. Stated more correctly, cavities must not be allowed to form at all because immediately upon the formation of a cavity segregation takes place, which cannot be cured thereafter by filling the frozen cavity with fluid metal.

In all discussions on this subject, it is admitted that if the ingot were cast with the big end up, and the top of the steel kept fluid so that it shall be the last to solidify, no deep pipe would form and no segregation would occur in the interior of the ingot. There are a number of well-known methods to this end. Some of them are complicated and patented; others are simple and not patented. All of them, however, cause extra cost and labor, and will therefore not be used unless made specifically a part of the contract and paid for.

In the present practice, pipe and segregation, being at the smaller end of the ingot, pass into the rolls first, are closed up and squeezed into the metal and lengthened in the rolling to an unknown extent, forming interior seams and defects which cannot be discovered by inspection. This inferior method of rolling should be prohibited by the specifications. Cropping may or may not remove pipes. It is a mere chance and pretense. Only successive croppings and a microscopic examination of the cropped ends will lead to the discovery of the interior defects, and that it is impossible with the thousands of rails rolled in a mill in a day.

Sound ingots, free from blow-holes, pipes, segregation and internal impurities are, however, only the preliminaries for the rolling of good rails. Wearing quality, great resistance to abrasion, great strength and toughness to resist the violent reversional stresses are necessary, and those qualities depend

*Presented before the New York Railroad Club, May 21, 1915.

not only upon the chemical composition of steel but most importantly also upon the fineness of grain, which is developed in the process of rolling.

In practice the number of passes are made as few as possible so as to have for the rolling train the largest possible output in a given time. That does not put the kind of work upon the plastic steel that will break up the coarse crystals, which form during the higher heat in the ingots and blooms. There is also considerable doubt as to whether the so-called continuous process, that is, forming the rail in one continuous operation from the blast furnace or mixer to the finishing pass does not produce a sleazy metal unsuited to the formation of fine grained texture.

All existing specifications permit the rails to be finished at too high a heat which is evidenced by the high shrinkage allowance at the saws ($5\frac{1}{2}$ to $7\frac{3}{8}$ in. prescribed for 33-ft. rail when it should be about 4 in.). This contributes to but is not the sole cause of coarse crystalline structures in the thick part of the rail, that is, the head, just where a fine grain is most wanted to resist abrasion and peening from the heavy driving wheels.

For the high finishing heat the rail-makers have a good excuse in the thin webs and flanges of the heavy rail sections. The flanges would otherwise cool down too quickly and get dark in the rolling, while the head is still at a bright heat. It has been recognized, therefore, that reform must commence with the rail section. Web and flanges should be thicker, and the head if possible thinner, so that the metal may keep a more even heat during rolling and cool more uniformly after rolling, avoiding large internal stresses. In a well-balanced rail section it is easier to break up the coarse crystals of the higher heat, permitting the finer crystalline structure to be produced by the work of rolling at the lower heat, and finish the rail near the point of recalescence (675 deg. C.).

In respect to blooming, roughing and finishing and the number of passes the practice in rail mills is not uniform. The number of passes from the ingot to the finished rail without reheating varies in different mills from 15 to 30, and the time from the ingot to the finished rail from 3 to 6 minutes. More time should be given to the last five or six passes of the rail through the rolls. It is not indifferent, whether the rail passes through the rolls at 10 ft. per second as now, or at a much slower speed. At the higher speed the pressure from the rolls may be sufficient to penetrate through thin metal, as in the web or the base of the rail, but it does not seem to be sufficient for penetration through the $2\frac{1}{2}$ in. of metal in the head. It will produce in the head a fine grain, only near the surface if at all, leaving the interior of the head coarse grained and weak. The fact that thick rolled metal is weaker than thin metal is long established, and allowance is made for it in all specifications for structural material and boiler plates, but no specific allowance has yet been made for it in rail specifications.

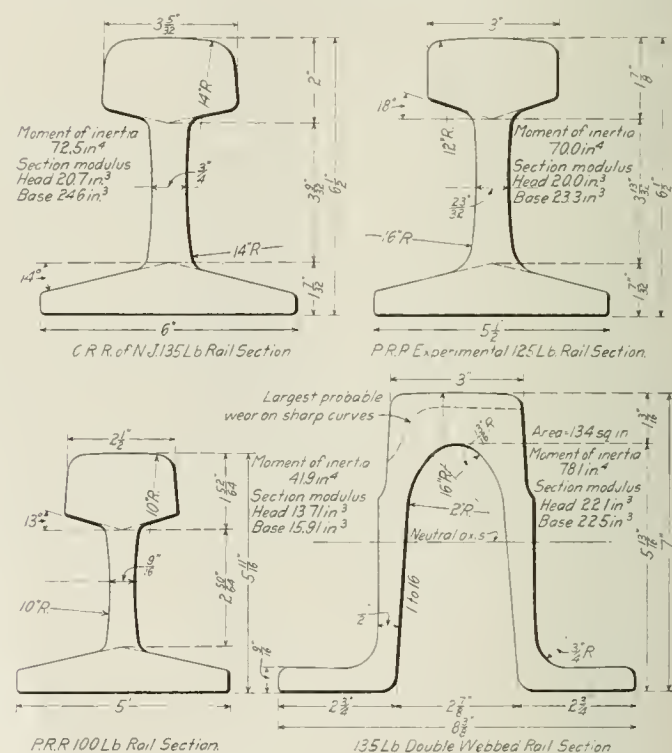
For the rolling of heavy rail sections the speed of the last five or six passes should be very much less than the speed permitted by present practice, which is about 600 ft. per minute. It should not exceed 4 ft. per second to commence with as an experiment. It is plain, that the cost will be greater, because the tonnage run per rolling train will be less. The railmakers will therefore not volunteer to change their practice. The merits of this method of rolling rails is disputed by some mill men for lack of sufficient experiments, but at least the great need of such experiments needs to be emphasized.

For the further control of quality of steel the minimum number of grains or pearlite cells per square inch of rail section should be guiding. It is fully as important as any tensional or bending test or as the drop test. The aim should be a minimum of 70,000 pearlite cells per square inch, nearly uniform over the whole section. It is objected that the measuring of cells in high carbon steels is not an easy matter, because of their undefined condition, but I am informed that steels finished at the proper heat, like tool steels, do not present that difficulty. Fine grain is the best evidence of properly worked steel, whether high carbon or alloy steel. Fineness of grain (70,000 per sq. in.) is

sometimes attained in present practice, in the smaller rail sections, say under 70 lb., but rather by accident than by design. As a rule the grain is finer in the base and web than in the head, for the reasons already stated.

The drop test, as ordinarily prescribed in rail specifications, is crude and not sufficient for judging the quality of the steel. Additional acceptance tests are necessary. From a practical point of view the inspection of rails should particularly concern itself with the following features:

1. At the furnace and ladle, seeing that the proper method and time (minimum 10 min.) is given for the self-cleansing of the steel.
 2. At the ingots, that the larger end be up and provided with a sinkhead.
 3. At the reheating furnace, that ingots are not exposed to an oxidizing flame and come out thoroughly heated at a uniform temperature.
 4. At the rolling train, seeing that the finishing temperature shall be below 700 deg. C., indicated by a dark red cherry color.
- The stiffness of a rail, that is, its capacity to distribute the



Comparison of Proposed Double Web Section with Other Recent Sections

wheel load upon the ties, is measured by the moment of inertia of its section, and the strength of a rail is measured by its section modulus. Each increases faster in proportion than the weight of the rail, so that a 100-lb. rail, although only 25 per cent heavier than an 80-lb. rail, is about 65 per cent stiffer and 50 per cent stronger in bending strength for the same steel. But this is not enough for the 125 per cent increase of wheel loads and for the increased speeds.

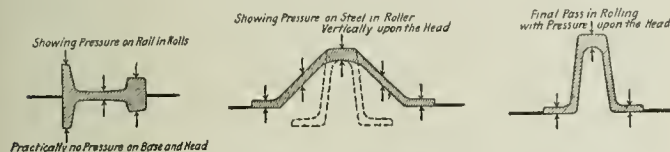
The 70- to 80-lb. rail (with section modulus 10) was found to be strong enough for a wheel load of 15,000 lb. 20 years ago. For the 100-lb. rail (with a section modulus of 15) the wheel loads should be limited to 22,500 lb. Then it would be relatively as strong (on the same tie spacing) as the 80-lb. rail for the 15,000-lb. wheel load, provided the steel were of equally good quality. But as the steel in the 100-lb. section is not of equal quality, the wheel load should not exceed 20,000 lb. For the wheel loads of 30,000 to 34,000 lb. of fast passenger engines now in use on the Pennsylvania and other trunk lines, the rail on the same tie spacing should have a section modulus of 20 to 22, which

would correspond to the 135-lb. rail now in use on the Central Railroad of New Jersey. But even with such heavier rail, the relative safety of the track would not be greater than that on the best European railroads with their lighter wheel loads. That 135-lb. rail is the heaviest in the United States. It is not a good-proportioned section.

The new 125-lb. section, now experimentally used on the Pennsylvania Railroad, has the same strength and stiffness as the 135-lb. section of the Jersey Central. The saving of 10 lb. per yard is the result of a better distribution of metal. The head is lighter, the base narrower and the metal more evenly distributed, insuring better rolling properties.

The carbon is 0.85 desired, against 0.70 desired in the 100-lb. rail with phosphorus below 0.04 in both rails, open hearth steel. The aim is to get for the heavier section a harder rail with longer wearing capacity sustaining a greater wheel tonnage. On some curves the 100-lb. rail does not last more than three months while the 125-lb. harder rail will from present indications, probably have a life of 9 to 12 months. We may conclude that on tangents the life of the harder rail will last probably under the exceptionally heavy wheel tonnage of that road, 10 years against 7 years for the 100-lb. rail. The greater stiffness of rail, indicated by its larger moment of inertia (70 against 42 in the 100-lb. rail) is expected to notably decrease expenses for surfacing and track repairs. About 15,000 tons of these experimental sections have been ordered and laid in the track.

Let us go a step further towards obtaining a fine grained durable rail of heavy section. There are reasons for doubt



Application of Pressure in Rolling the Tee, and Inverted U Sections

whether any amount of care in the rolling of heavier Tee rails will produce in the head where it is most desired, a fine grain, toughness and high elastic limit uniformly throughout. The complaint is general as already stated, that the heavier Tee rail sections do not give as good wear and do not sustain the same wheel tonnage as the lighter rails. The greater *strength* of the heavier rail is necessary to better distribute the heavier wheel loads upon the ties, but its *durability* has been found to be less because apparently the resistance to abrasion of the coarse-grained metal is less.

Heavy rail sections are therefore rather wasteful unless the same fine grain is obtained in them as in the light John Brown rail; and, most important of all, in the head. The limit in the Tee rail for a fine-grained head seems to be the 70-lb. section.

Experienced rollers contend that the form of the Tee rail precludes good results on the large head of the heavier sections. It cannot get sufficient work. The rolling pressure upon the rail is sidewise, at right angles to the axis of the section and to the direction of the wheel pressure, whereas the heaviest pressure during rolling should be at right angles to the top to produce a fine grain in the thick head. The metal in the head is compressed in the most unfavorable direction, that is, crosswise to the strains it will have to bear. There is much difficulty in filling out in rolling the head and base of the rail. The metal has to be coaxed, as it were, into the grooves for the head and base, the web receiving the most work and the head and base the least. As one of the most experienced rail makers remarked to me, if as much work could be put upon the head as now on the side of the web in the rolling there would be very few complaints about rails.

All this leads me to think that a modified and enlarged form of the old inverted U shape or double-webbed section will answer better the purpose of a heavy rail than the Vignol or Tee shape. That section low in height of wrought iron was

used many years ago but could not be properly spliced, so it was abandoned for the Vignol type. In the double-webbed rail the steel receives pressure from the first pass to the last vertically upon the head, producing the desired dense fine grain throughout its thickness. The metal can be first rolled out flat, then bent back to a form as shown in the sketch, and in the last few passes the rail receives its final form. The very method of its rolling should insure the denseness and toughness of the steel.

On the point of economy of track we must consider that unless the heavier rails carry more wheel tonnage than the lighter rails the track expenses will be largely increased. It is important from an economic point of view to increase the wearing quality of the heavier rails. This can only be so if the steel is of finer grain and better quality than that heretofore obtained. I have no statistics on hand of the wearing quality of rails, but an average on tangents and curves of 100,000,000 tons is probably considered a good record for 100-lb. rails. A wheel tonnage of 375,000,000 is reported for exceptionally good 100-lb. rails, lasting 12 years with prevailing passenger traffic on the New York Central. It would seem reasonable to expect a wheel tonnage of 500,000,000 for the double-webbed rail, with the finer grain and greater resistance to abrasion, which surely can be obtained. There are tracks on the Pennsylvania on which the daily wheel tonnage from prevailing heavy freight is 300,000 or 150,000 per rail. The double-webbed rail should last there about ten years on tangents.

An experiment with a few miles of track laid with the double-webbed rail will show results in a year. There is no difficulty in making a splice as strong as for the Tee rail. For switches and frogs, etc., it need not be used. The Tee rail can readily be connected to the double-webbed rail by a special rail joint.

DISCUSSION BY DR. P. H. DUDLEY

I have been able in the last decade to replace Bessemer metal of 0.10 phosphorus and 0.50 carbon, with open hearth steel in which the failures are reduced to less than 1/15 of what they were in the same sections of Bessemer metal. The service tests show that progress is being made, at least in my own practice.

The rail can be loaded only through the wheel load contacts of the passing equipment, therefore, under each wheel specific deflections are produced in the rails in the equilibrium depression. The stremmatograph record of the strains shows that the wheel spacing governs the span of the bending rails instead of that of the flexible crosstie supports. This must be considered in any final mathematical analysis, for it has been established by physical measurements of precision.

The relations of the stresses to the supports constitute the engineering difference between the work of the metal of the rail and of a bridge girder, for the former is a constant section for the length occupied and supported by construction, while the latter is suspended for its full length between the pier supports, and the complexity and massiveness of the structure must increase with the length of the span.

There is, as would be expected, in the different types of locomotives a marked difference in the amount of unit fiber stresses produced per pound of static construction due to the number of wheels and the spacing of the driving and running wheels to subdivide and distribute the total load and the expended tractive effort. The stremmatograph tests prove that the law of mechanics for single deflections in simple beams applies to each and all of the specific deflections in the rail under each wheel contact on their flexible crosstie supports in the momentary equilibrium depression, though with more constraint than for the simple beam.

The unit strains in the rail increase under wheels as the wheel spacing is augmented, and the load on the trailing wheels is reduced to two-thirds or less of that upon the drivers owing to the double spacing between the driver and tender wheels. Even this loading usually produces the maximum strain for the wheels of the locomotive. In designing locomotives for light rails superintendents of motive power space the drivers close together and use smaller drivers close spaced for freight locomotives to reduce the strains in the rail. They do not concentrate great

loads on one or two driving wheels, but use moderate axle loads on three, four or even five pairs of drivers for the modern types of efficient locomotives. The practical effect of the subdivided load is, that as the truck wheels produce the transitory depression of the rail from the trackman's surface to its position in the equilibrium depression for the drivers, we obtain under them the partial results of the constrained beam by the efficient manner of loading the rail by the front four wheel truck, and followed by the trailer and tender wheels.

The New York Central distributed the weight and metal in the sections for girders of greater stiffness than the general practice, believing that it was essential for the highest standard of track that sections should have sufficient stiffness with moderate unit stresses to distribute one-fourth to one-third or more of the wheel effects to the wheel spacing, and relieve each cross-tie of the concentrated major portion of the wheel load as occurred upon the early steel rails, which not only cut under the rail seats but disturbed the ballast and road bed and required constant attention by the trackmen to maintain the tracks in fair operating condition. The New York Central has had an experience of more than two decades with the broad 6 in. 100-lb. rails, and has found them highly advantageous. In the design of its rails the Pennsylvania adhered to the narrow top and deep head, thin web and thin base recommended by the committee of the American Society of Civil Engineers in 1873. These represent the two distinctive types of rail sections.

I designed the stiffer sections to reduce the deflections in the track, but before rolling them I advised the railroad companies that it would be necessary to improve the physical properties of the steel for, as the deflections being less, the length of the area of contact on the wheel would be shortened, and we should broaden the head of the rail in relation to the wheel tread to retain the same relative area of contact. The observations of this favorable wear for nearly two decades demonstrated that it was possible to secure wear and a large bearing area over the entire head of the rail of the 6 in. 100-lb. section.

The safety from rail breakages today is in the combination of the ductility of the metal with the proper section for rolling. The basic open hearth rails for the New York Central Lines with a chemical composition from 0.62 to 0.75 carbon for 100 and 105-lb. rails are made under their elongation and exhausted ductility tests, by which nearly the full value of the ductility due to the chemical composition is obtained. The same section in Bessemer metal of 0.10 phosphorus and about 0.50 carbon and laid in the same place, does not have as great a duration strain factor as in the open hearth steel. The breakages of the Bessemer rails are about 22 times as great as occur in the basic open hearth rails of the same section and locality. Bessemer metal shows nearly as great tensile strength under a static test as open hearth, but for a rapidly applied stress, its duration strain factor is much less, particularly in cold weather.

The subject of the manufacture of rail is far more comprehensive than a discussion which only refers to sound ingots and rolling rails with less than the usual shrinkage allowance. It is not altogether the fine structure in the John Brown rails which gave them such decided resistance to the wheel abrasion as would be understood by the author's paper, but the fact that the mechanical properties of the sections as girders were so small that the metal had but little to do to carry the moving wheel loads. There was another factor in producing the excellent wearing quality of the metal in the John Brown, Barrow, Cammell, and the early American Bessemer rails. The ingots were all teemed in pits in front of the converters which limited the production per 24 hrs. The vessels were often waiting for the pit work and after the vessel was turned down and the metal recarburized it lay in the belly of the vessel for 5 or 6 min. before it was poured into the ladle for teeming ingots. This allowed the oxides and slag to escape from the bath and produced a better quality of steel with less slag inclusions than occurred after the pit teeming was replaced by ingots upon cars.

The question today with several railroads is not wholly in reference to the required composition and sound ingots, but it embraces the broader question of good steel in the furnace from the chemical composition which will produce the essential physical properties of strength, toughness and requisite ductility when in the finished rails as girders. The elongation and exhausted ductility tests of the New York Central Lines for basic open hearth steel show how perfectly the steel from the furnaces has been made, then it must be teemed in ingot molds with the proper relations of length in the mold to its base area, so the interior shrinkage tendency of the setting metal can be practically obviated by charging the ingots as soon as stripped into the reheating furnaces and blooming them from their equalized initial heat. The shrinkage of the hot to the cold metal has not taken place and sound ingots have been produced by the prevention of the interior or minor shrinkage occurring in the ingots by unnecessary reductions of the temperatures of the hot ingot metal before they are bloomed.

Mr. Lindenthal mentions rolling rails until the temperatures are as low as 700 deg. C. This would be lower than heavy sections have ever been rolled, and we know now from the past 4 or 5 years experience in rolling basic open hearth rails with shrinkage from $5\frac{1}{2}$ to $6\frac{3}{4}$ in., and carbon 0.62 to 0.75, that such rails may be cooled so rapidly or rolled so cold when the atmospheric temperatures are near zero and up to 45 deg. above, that some of the transformations from the hot molten metal to the finished product may be delayed in the center of the head and leave a central core of metal of less ductility than the exterior portions. Such rails laid in the tracks have developed interior transverse fissures causing a great many breakages of rails. The temperatures in rolling and cooling upon the hotbeds must be controlled, so that the transformations from the hot set metal to the finished rail are not delayed, to produce metal in the central core of less ductility than its surrounding envelope. To roll the sections of rails of 100 lb. or more to a shrinkage of 4 in. with the temperature down to 700 deg. C. would create greater possibility of delayed transformations in the center of the heads than even occurs at the present time. It is proper to state that the delayed transformations are less in the rails from reheated blooms than in those which are rolled direct from the ingot with their own equalized initial heat. Interior transverse fissures have developed in rails rolled from the reheated blooms, and railroad people are extremely cautious about changing methods of manufacture until they know what the effect of each step in the process will be in the finished manufactured rails.

The half moon and square breaks and the more recent interior transverse fissures in the basic open hearth steel rails which occur, are due to a combination of contributory causes which shows that the study of the entire manufacture of the rails must be considered to insure safety. Sound ingots, with too cold rolling, will not insure sound physical rails with an ample duration strain factor which will not fail in the track.

The present methods of straightening the heavy sections should be replaced by a method which distributes the compression of either the head or base, or lengthening either one uniformly per inch of rail, for the effect of the gags has been the cause of a majority of the broken rails in the track, and particularly the detailed fractures due to the half moon breaks from the base, and final fracture of the section.

The manufactured, finished rail is the product which must be considered, and not alone what might be produced from considering only sound ingots. It does not necessarily follow that sound rails will be made from sound ingots, but the first important step is to make good steel and then give attention to every step subsequent in the manufacture of the rail. There will be a revision of the construction of the mills for the highest quality of the manufactured rail of basic open hearth steel in every essential process or step of its fabrication. To do this it will involve co-operation and investigation by both consumer and manufacturer. Their interests are not antagonistic, but mutual.

EFFECT OF WATER LEVEL ON SUPERHEAT

By M. C. M. HATCH

Superintendent Fuel Service, Delaware, Lackawanna & Western

Any one familiar with locomotive operation is acquainted with the deleterious effects of priming, or working water through the engine cylinders. It washes the lubricated surfaces, is destructive in its action on rod and valve stem packing, causes broken packing rings, cylinder heads, etc. With an engine using saturated steam, these ill effects are very apparent. Even when the priming is not sufficient to cause trouble in any of the above-mentioned ways, the presence of 3 or 4 per cent of moisture in the steam seriously affects cylinder efficiency and is, therefore, most undesirable.

The use of high degree superheat practically eliminates the possibility of priming in the cylinders. If too much water is carried, however, the percentage of moisture worked over into the superheater will be high and, while this will be evaporated before reaching the steam chest, the temperature of the steam as delivered by the superheater will be correspondingly reduced. In other words, the use of the superheater units as tubes of an auxiliary water tube boiler is an inefficient proceeding, resulting in lower cylinder economy, inasmuch as the economies resulting from the use of superheat depend directly upon the final temperature of the steam as delivered to the cylinders.

With this in mind, tests were run on the Lackawanna some

to about 12 per cent, demonstrating beyond question that the practice of running a superheater locomotive with the water high in the boiler, is detrimental in its effect on the degree of superheat, and hence on the economy of the engine.

This curve has been used for some time in connection with instruction work on the Lackawanna, has created considerable comment and interest among the enginemen, and it is believed that substantial improvement has been effected by its use.

THAT TERMINAL PROPOSITION

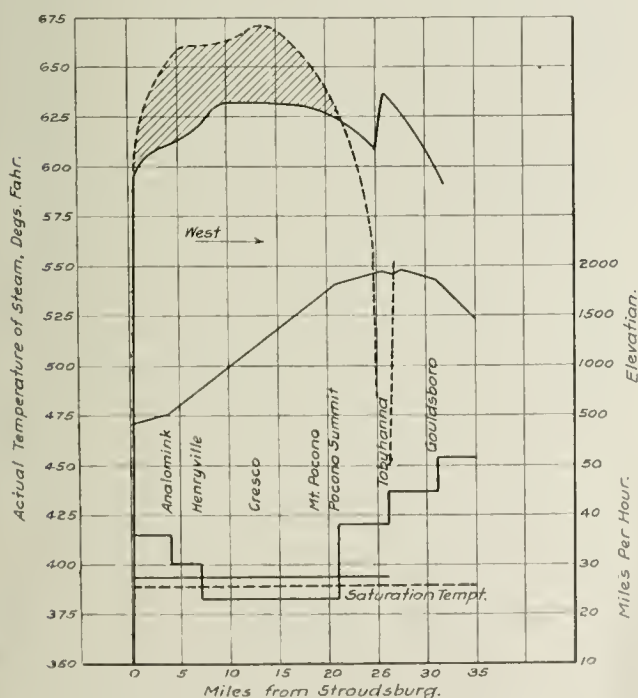
By R. M. BAKER

Pennsylvania Railroad, Bellwood, Pa.

In order that we may approach this question in an entirely frank manner with nothing "up our sleeve," so to speak, suppose we first clean out our desk. How about that box of good cigars with the card tucked away in the corner? We cannot afford to buy that kind ourselves, but a box drops in every once in awhile, usually about Christmas time, and of course a fellow does not like to turn them down. At least that is the way we looked at it when it came, but since then, however, it seems to present a somewhat different aspect and the card in the corner looks bigger than it did. That box cost him about \$4.50; I am no relation, and I never gave them a box of cigars in my life. By accepting it I certainly placed myself under a definite obligation the discharge of which must sooner or later embarrass me. Now I want to look after my company's interests to the best of my ability and have no desire to be hampered by such unnecessary obligations. Lots of good men bigger than I am have fallen down over just such a cigar box. Having gotten rid of it, I am in position to say to my subordinates, "You must not accept gratuities of any kind from either shippers or consignee," and I have taken the first and most important step toward the successful operation of a terminal yard.

The terminal official recognizes three distinct duties: to the public, satisfactory service; to his company, efficient and economic operation; to the employees under him, justice. In pleasing the public there is only one answer to "How can all complaints be eliminated?" and that is, "It can't be done." A definite system of shifting local sidings which will provide for some regularity in the time at which such shifts may be expected and an honest effort to adhere to such a system will avoid many complaints. Shippers will in time arrange their work to conform to and respect such a schedule, and while exceptions may be necessary they should be exceptional and not regular.

In shifting industries the thing of first importance is not speed, but safety. This embraces not only care that workmen in or about the cars are not injured, but that proper care is exercised that the lading of cars partly loaded or unloaded is not damaged. Next in importance is courtesy to patrons, from yourself first, but also clear down to the extra brakeman. Never in the presence of one of your men, or at any other time for that matter, make a slighting remark about a patron or his peculiarities. Also, never tell a patron, even on the telephone, that you have other things to do beside shift his one-horse operation, because if you do it will make him mad and he may go straight to the superintendent, and then you will have to do what he wanted done and catch "thunder" beside. Make him feel that your railroad thinks a lot of him (it does if you don't) and is doing their best to please him; for, after all, the patrons are paying your salary, not the stockholders. Of course the courtesy may have to be all on your side, but if it is, it brings the best results and naturally is in the greatest demand. Make a friend of your patron. He is trying to run a business just as you are, and what benefits him in turn benefits you. Give him the best information you can when he asks for it. Were we ever asked this question, "Will I get any cars this afternoon?" How often did we answer, "I don't know," when we did know or could have found out with little effort. "Oh, well," we say, "I got into trouble once for telling a shipper that he would get cars and then



The Effect of a High Water Level on Superheat

time since to determine, if possible, just what the effect of high water is on superheat, and the chart shown was made up from these tests. The locomotive under observation was a heavy anthracite-burning Pacific type, hauling the westbound Lackawanna Limited, between Hoboken and Scranton, a train weighing about 450 tons, and operating on an exacting schedule. The curve shows only the results obtained while climbing the eastern slope of the Pocono mountains, as it is here that the engine is working hardest and the differences in superheat are most apparent. All conditions, with the exception of the water level, were kept as nearly constant as possible, and the results are believed to be consistent. The solid line is plotted from observations taken when three full gages of water were carried continuously, while the dotted curve was taken with $1\frac{1}{2}$ gages, or about one-half a glass, in the boiler. The material increase in superheat under the latter method is very striking and amounts

could not give him any, and since then I tell them all, "I don't know." That is not the way to look at it, is it? That shipper needs the information or he would not have asked for it and if you positively do not know and cannot find out at the time, make a memorandum of it and give him the information as soon as it can be gotten, even if the answer is, "No, sir." "No" is a better answer than "Don't know." I have often wondered how much business is influenced one way or another at a competitive point by the personality of the terminal people and their attitude toward the shipper and consignee.

In order to satisfy yourself that this practice of courtesy to patrons is being carried out by those under you, drop around when one of the crews is shifting a plant track and without being seen, observe how the work is being done. Maybe you will only need to listen to learn why complaints from that particular shipper are so frequent; perhaps he has not come across with the cigar box and there is a little uncivil war on between him and the shifting crew. Such things have happened.

When complaints do come give them the consideration they deserve, for the chances are there is some justice in them. For example, a shipper in open cars made this complaint: "I do not object to removing from a car an ordinary fall of snow, but I certainly do object to unloading almost a car load which has been shoveled in." By prompt action six other cars almost full of snow were found in the yard and possibly six similar complaints avoided.

Another way in which the interests of both the shipper and the company may be equally served is in encouraging him to be specific in his requests for cars and then endeavor to fill his order just as nearly as possible, and not with the first car the crew gets a hold of. Do not let them place an old leaky car for flour, and at the same time a new car for brick, because it is more convenient. The brick people will not object, but the claim department may have a flour claim to pay in a month or two. Again they asked for a 60,000 capacity and received a 50,000 or an 80,000 capacity car. Three railroad companies suffered when we placed that Great Northern for a shipment to Tampa, Fla., instead of getting the Atlantic Coast Line car back of it. The l. c. l. transfer is a great place to get cars started out of route. Of course it is inconvenient to change cars at a point of this kind, but a little anticipation may sometimes avoid some penalty per diem and foresight is what we are paid for. Sometimes a large car received under load is allowed to be reloaded with a smaller shipment to avoid a shift and the car started possibly on a long journey three-fourths full—false economy.

Nothing pays bigger interest on the money invested than a light claw bar suitable for removing protruding nails from the floor and sides of box cars before placing for loading. Actual counts of bent-over nails have shown an average of from 65 to 75 per car, and we heard of one car which had a total of 363 bent nails on its four door posts alone. These figures are not recent, but the subject is a live one and will continue to be so, for on every nail hangs the possibility of a damage claim.

From satisfactory service, his duty to the public, we come to the yardmaster's duty to his company, namely, efficient and economic operation of his yard. Why don't we tell the other fellow to run the job for a day or two and go out and see how orders similar to those we have been giving work out on the ground, and whether we are railroading on paper or not. Maybe we can find out at the same time which crews have too many brakemen and which have not enough. Drop out of sight and see whether the brakemen and enginemen are saving brake shoes and themselves by stopping against the bumping blocks.

Consider a draft collision, a run-through switch, a car dropped off the end of a track or a similar accident as a distinct reflection upon your management. Make it a rule thoroughly understood by all that a brakeman must carefully test his brake before a car is cut loose and he must remain on it until it stops. In one yard with a splendid record for careful handling of cars under adverse grade conditions trainmen themselves state that their good record is due in no little part to a vigorous enforcement of this rule

regarding the testing of brakes. See that a trainman occupies a conspicuous place on the front end of the draft, according to rule, when it is being pushed by an engine and that he knows what he is there for.

Call your conductor's attention to careless methods of doing work, although accidents do not result and insist upon the conductors doing the same with members of their crews, recommending for discipline any who refuse to profit by such warning. The man should be punished, not for the accident, but for the carelessness or violation of rule from which the accident results.

Encourage suggestions from your conductors as to methods of doing work. No one person ever knew it all. The ideal organization is the one in which there is an equal division or responsibility as well as work and an equal division of interest is the natural result.

This brings us to the yardmaster's third duty: justice to the employees under him even when justice means discipline. Railway employees in train service are practically all in the ranks of organized labor and have working agreements with their companies which must be respected and strictly adhered to whether they seem right in principle or not. Nothing is gained by attempting to evade what seems to us unjust. However, study those rules until you know just what they mean and how they apply to conditions in your own jurisdiction. Not every claim made by an employee under these rules is a just one, and if you are to adjudge it you must be quick to recognize a frameup from a legitimate complaint. If you are in the wrong be quick to rectify it. Nothing can be gained by arguing the point. However, if you believe yourself right stay with it until your judgment is either confirmed or over-ruled by someone higher up. Men usually know whether they are in the right or not, or else are willing to be shown. They are also quick to learn whether you know what you are talking about and always respect the man who cannot be hoodwinked. If the man is "from Missouri," show him, don't bluff him. Strictly adhered to, many of the rules become an aid rather than a hindrance to your work. Be friendly toward all but do not make companions or intimate associates of those under you, for, whether you wish it or not, your intimacy will look like favoritism to others, and favoritism breeds trouble.

Railroading is a science, yes several sciences combined. We should have room on our desk for at least one good railway magazine. It will broaden our horizon and give us a better insight into this, the greatest business in the world and the one upon which so much other business depends.

Higher officers should give communications from their yardmasters the prompt and careful attention which the importance of their work deserves. Do not issue instructions relative to yard work without first consulting the yardmasters affected thereby. Be careful that investigation papers which contain criticisms of the yardmaster's work are not referred to trainmen, as nothing will give the ordinary trainman more pleasure than to peruse such papers. Do not allow men under a yardmaster's jurisdiction to run to your office with matters of minor importance which have not been first taken up with him, and do not then decide such matters without taking the yardmaster into consultation. Remember that there is no carpet in the yardmaster's office to awe the trainman and his attitude toward the yardmaster is much more belligerent than toward you. If your yardmaster is to be successful he deserves whole hearted support, as his success is your success, and his failure your failure. Allow him to exercise to the fullest extent the executive ability by which his success is brought about and he then cannot complain when results are demanded.

BELGIAN RAILWAYS CLOSED.—It is reported that great unrest prevails among Belgian railway officials, who have attempted to hold meetings to express their grievances, but were prevented in time by the German authorities. Various lines are closed to ordinary traffic. There is a lively transport of troops and wounded, the latter being distributed all over Belgium. Some have been brought even from Alsace.

American Railway Tool Foremen's Convention

Safety First, Maintenance of Pneumatic Tools, Grinding and Distributing Tools and Standard Reamers Discussed

The seventh annual convention of the American Railway Tool Foremen's Association was held at the Hotel Sherman, Chicago, Ill., July 19 to 21, inclusive, Henry Otto, tool foreman, Atchison, Topeka & Santa Fe, Topeka, Kan., presiding. Prayer was offered by Rev. O. M. Caward. The address of welcome was made by Robert W. Bell, general superintendent of motive power, Illinois Central. President Otto in his address spoke of the opportunities the tool foremen have to increase the efficiency of the local shop by conscientious and careful work in the tool room.

R. W. Bell, among other things, said: "There can be no better plan for reducing shop costs than through efficient tool service, and it must be apparent to you that tool foremen have a direct influence on the efficiency of the many workmen employed in your shops who, if not supplied with good safe equipment to work with, are liable to waste much time, and in many cases work under hazardous conditions. The importance of good tools in railroad shops was never realized as it is today."

SAFETY FIRST

E. J. McKernan (A. T. & S. F.):—There has been a great amount of money spent in making safety improvements to prevent personal injuries to employees, but this cannot be accomplished unless the co-operation of each and every employee is obtained. While the men are showing more interest in the matter there is still need for greater co-operation. The shop should be maintained in a clean and sanitary condition, as an unhealthy man is more liable to be careless and thus injure himself or his fellow workman. Employees, other than those assigned to the work of applying or removing belts, should not be allowed to handle them, as serious accidents have occurred to those inexperienced in this work.

Too much care cannot be exercised in mounting and taking care of grinding wheels. There have been numerous accidents caused by improper inspection of wheels; wheels mounted on improper sized spindles; wheels mounted with only one flange; flanges having uneven bearings causing the wheels to crack; flanges used of different diameters; loose wheels; improper method of truing up the wheel; forcing wheels on taper arbors; wheels running at improper speed; wheels running out of true, and improper rests used for emery wheels permitting the work to pass down between the wheel and the rest. It has been found to be bad practice to allow any emery wheel to be immersed in water, especially where half of the wheel is immersed and the other half is not. It throws the wheel out of balance. It is also bad practice to grind on the side of an emery wheel. Where men are called on to do a large amount of grinding on emery wheels they should be equipped with goggles.

R. D. Fletcher (Belt Ry.):—From a study of accidents it has been found possible to eliminate only 50 per cent of the injuries by guarding the machinery. The other half is the direct result of carelessness by the men. A great deal can be accomplished by closely watching the actions of each new employee to see, if possible, whether or not he is inclined to be careless. Where such are found they should be carefully instructed and warned against the danger that may result. A large number of machine manufacturers have altered the construction of their machines to reduce to a minimum the possibilities of injury to operators. One very important factor in the elimination of injury to shop employees has been the adoption of the motor driven machinery. The special controlling features for machines have also added a great deal to their safety. The tool foreman is in a position to assist greatly in the Safety First campaign by being sure that unsafe tools are not permitted to be passed out to the workmen.

George Nutt (C. & W.):—It is the duty of every employee,

not only for his own benefit but for the benefit of his fellow workmen to report a dangerous situation immediately to the safety committee or to the foreman in charge. Safeguards which will help to eliminate accidents are good lighting, and white-washed walls and ceilings, which serve a double purpose of being sanitary and giving plenty of light. The gangways should be kept clear and the floors, especially around machinery, should be kept in good condition. It is a good plan to post bulletins as accidents occur stating how they happened and making comment on them, showing how they could have been prevented.

Discussion.—W. G. Reyer, general foreman of the Nashville, Chattanooga & St. Louis, was called on to make a few remarks at the Tuesday morning session. Referring to safety first he spoke of the necessity of operators using the goggles where their work required it, and of the necessity of obtaining a glass that would not break readily. He called attention also to a sign that he had seen in a shop stating, "Safety First is all right, but a careful man is essential." This, he believed, was the key to the safety first proposition.

Other members speaking on goggles, stated that it had been found difficult to have the men wear them consistently. One member stated that employees found using the emery wheels without them were disciplined. Various methods are adopted to keep the goggles in an antiseptic condition. Some use a mixture of alcohol and water; others use a steam cylinder, while some use a mixture of one-half wood alcohol and one-half water for sterilizing, and then rinse the glasses in plain water. Several members criticized the non-use of goggles with eye glasses, stating that the shield does not extend far enough back to fully protect the eyes.

MAINTENANCE OF PNEUMATIC TOOLS

J. J. Sheehan (N. & W.):—When the delicate construction of the working parts of the pneumatic motor and hammer and the narrow margin between efficiency and inefficiency are considered, it will be found that there are no tools in the shop that receive harsher treatment. If satisfactory results are desired, facilities must be provided for the removal of water and dirt from the air before it enters the pneumatic machines. Water can be quite successfully removed by having a suitable sized settling tank with a drain valve close to the point of operation. The most effective strainer for keeping the dirt out of the tool is that made of a double thickness of muslin cloth placed in the air line back of the tool.

Drills and hammers should be standardized, as far as possible, both in styles and sizes, as they may be maintained easier and a smaller number of repair parts are required. It is important to know after a drill has been overhauled, what per cent of its rated energy it will exert. On the Norfolk & Western the repaired motors are compared with the power of a new motor, and if they are not 75 per cent efficient they are thoroughly overhauled. It is found in the pneumatic hammers that if the valve casing is worn .002 in. the hammer will be unfit for service. The valves are purchased .002 in. over size which allows a certain amount of reaming to put them in proper working condition.

R. V. Nabell (Southern Ry.):—In selecting pneumatic tools the economical operation and the low cost of maintenance should receive the first consideration, not the low first cost. As a means of securing better maintenance and higher efficiency from pneumatic tools the operators should be educated to use the tool that is best adapted to the work to be done, and to take the proper care of the tools. All pneumatic tools should be inspected and tested at regular intervals, cleaned and thoroughly lubricated with a good grade of lubricant. Where possible it is desirable

to confine the repair work on pneumatic tools to one mechanic who is thoroughly familiar with them.

A. F. Baker (C. N. O. & T. P.):—Every railroad should have a standard for its pneumatic tools just as it does for taps and reamers. This will reduce the cost of repairs and much delay caused by waiting for repair parts; less material will have to be carried in stock.

GRINDING AND DISTRIBUTION OF TOOLS

G. W. Smith (C. & O.):—On the Chesapeake & Ohio the tire turning tools after having first been ground to the standard gage, are maintained by the operators of the lathe, an emery wheel formed to the standard shape being used for this purpose. It has been found that the dry grinding, if care is exercised and too heavy a cut is not taken, is better than wet grinding. Each machine tool is provided with a cupboard in which a reasonable number of standard shaped tools are kept.

J. C. Beville (E. P. & S. W.):—There is no doubt but that better results could be obtained if all tools were ground by an expert, for it is a question as to whether the machine operators really know how their tools should be ground to produce the best results.

J. C. Hasty (A. T. & S. F.):—Grinding machines should be kept as far from other machinery as possible to avoid dust getting on the wearing parts of the machines. The open grain dry wheel gives the best results for redressing high speed steel. All the lathes, planers, boring mills, shapers, etc., should be equipped with a sufficient number of tools for the class of work performed on the machine. Each operator has a locker in which these tools are kept and locked when not in use. A man is appointed to take care of all tools for machines, chisels, and chisel bars. He collects the tools that require redressing, takes them to the smith shop, grinds them, and returns them to the workmen. When tools become short from redressing they are forged to smaller sizes for use in the tool holders down to $\frac{1}{2}$ in. by 1 in.

Discussion.—While it was generally believed that much better results can be obtained in the machine shop if the tools are maintained by the tool room force, the practice on most of the roads seems to be to allow the machine operators to grind all but the very special tools. However, on the Wabash none of the machine operators or machinists are allowed to grind the tools. The drill presses are equipped with tool boxes containing a set of tools which are charged to the operator; when they become worn they are exchanged at the tool room. On the Santa Fe all the machines are provided with charts showing the speed and feed to be used by each size of drill on the different kinds of material. This insures that the full benefit of a high speed steel drill will be obtained without spoiling the drill. Mr. Pike of the Rock Island, reported the successful welding of high speed tips on soft steel bodies.

STANDARD REAMERS

The committee [E. J. McKernan (A. T. & S. F.) and C. A. Shaffer (I. C.)] reporting on the standardization of reamers for locomotive repair shops recommended that all frame and rod taper reamers in sizes under 1 in., be the commercial standard. In sizes over 1 in., three over-all lengths were recommended, as follows: 18 in., 20 in., and 28 in. The square shank on $\frac{7}{8}$ in. up to and including 1 in. reamers, was recommended to be $\frac{7}{8}$ in.; on sizes up to and including $1\frac{1}{4}$ in., 1 in. square; on sizes over $1\frac{1}{4}$ in., $1\frac{1}{2}$ in. square. The length of the square was recommended to be $1\frac{1}{4}$ in.; the length of the collar $\frac{3}{4}$ in., and the clearance between the end of the flute and the collar $\frac{3}{4}$ in. The taper was recommended to be $1/16$ in. in 12 in. The left hand spiral was recommended because it will eliminate the danger of feeding of the reamer too fast, and will greatly reduce the number of breakages. On reamers under $1\frac{5}{8}$ in. two flutes less than the standard were recommended; on all sizes over $1\frac{5}{8}$ in. four flutes less than the standard were recommended. This will give a much stronger flute and the reamer will have a longer life.

OTHER BUSINESS

The Committee on Special Jigs and Devices in Locomotive Repair Shops, of which C. A. Shaffer (Ill. Cent.) was chairman, presented an interesting report in which a number of useful devices were illustrated and described.

An illustrated lecture on "Getting the Most Out of Tools," was presented by B. W. Benedict, director of shop laboratories, University of Illinois.

The secretary reported a cash balance of \$90.16. The following officers were elected for the ensuing year: President, J. J. Sheehan, Norfolk & Western; first vice-president, C. A. Shaffer, Illinois Central; second vice-president, J. C. Beville, El Paso & Southwestern; third vice-president, C. T. Brunson, Wabash; secretary-treasurer, Owen D. Kinsey, Illinois Central. It was voted to hold the next annual convention in the city of Chicago.

NOTES ON TRANSPORTATION IN EUROPE*

By A. STUCKI

The European passenger cars are all small and are divided into small compartments, each holding a limited number of passengers. Most of the French cars have running boards along each side and doors opening outward from the compartment. The German and Austrian cars usually have an aisle along one side of the car with a door leading from each compartment into it. The Swiss cars as a rule have center aisles, with partitions between each compartment built solid to the ceiling, and doors across the aisles.

In any case, each compartment is independent of the others, has its own lamp which can be set at bright or dim, a ventilator with open and closed positions, a steam heat lever to regulate the heat and curtains to be drawn at night. Each compartment is also marked "Smoker" or "No Smoking," some even are reserved for passengers with dogs. Each compartment often has a small stationary mirror and hinged arm rests, so that the seats can be used as a sofa if the number of occupants permits. On the face of it, there seems nothing lacking as to the comfort of the traveler.

Such a subdivision of the cars, however, also has disadvantages. It is almost impossible to fill the car to its seating capacity. There may be too many second-class passengers and very few of the first-class, or vice versa, so that seats will be left empty no matter how carefully the cars are selected. Then again there may be more smokers than expected, or just the reverse; but the greatest difficulty exists in filling all the seats without splitting up the parties into different compartments, and here, I find, lies the greatest difficulty. These points affect the earnings of the railroad companies.

The other disadvantages affect the traveler and his comfort. Just imagine a group of strangers in one closed compartment. One likes to look at the country, the other wishes the sun kept out; one prefers the door to the aisle open to get some air, while a lady may object to the fumes coming from the adjoining smoking compartment. One may insist on opening the ventilator, while the next one may feel chilly, even with it closed. Later in the evening some may want the light turned down to dim, so as to be able to sleep, while someone else wants to read. For the same reason one may want the curtains drawn, and the other may not, and in the morning the disputes may be renewed in reversed succession. During the winter season differences may come up as to the regulation of the steam heat, and no matter how many rules and regulations exist, the harmony and the comfort of the traveler are bound to suffer.

The fact that in most parts of Europe no baggage is checked free is no doubt responsible for making a store room of the compartment. Invariably I found the hat racks loaded with heavy baggage up to the ceiling (turtle back), and were it not for the good-natured porter, travel would be a curse. He takes

*From a paper read before the Railway Club at Pittsburgh

more interest in his "client" than all the other railroad employees together. He takes care of your baggage, and inquires as to the kind of compartment wanted. He opens the doors as soon as the train backs up to the station, hunts and covers the number of seats wanted, window seats if possible, and you get as a rule any information from him you require in the most pleasant way.

About 20 or 30 minutes are usually allowed to get a train ready to start, and it is my observation that all of that is needed, as each compartment has to be inspected and the number of the seats taken, registered. Besides that the closing of the doors all along the train also takes a good deal of time, not only at the terminal, but also at the way stations. The Swiss center-aisle cars have no doors opening outward, and hence are not subject to the last-mentioned objection. They are similar to our own cars in that respect.

Only the heaviest cars of comparatively recent build use trucks; by far the greater portion use stationary axles, two or three in number. In the last case the middle axle has lateral freedom to accommodate the passing of curves. The fact that the cars are light and that there are no springs in tandem results naturally in a very hard-riding car compared with our own. Lengthwise, however, the reverse is the case. The making up and rearrangement of trains does not require the everlasting bumping so pronounced in closing our heavy and ever-increasing automatic couplers.

The trains are still coupled with the hook, and the slack is taken up by an employee going between the cars and tightening the screws. I often wondered why in a land where the protection of employees in shops and private establishments is made compulsory, the trainmen in coupling are allowed or rather compelled to go between the cars.

I happened to see a hospital car, which was equipped to run in all the European states except Spain and Russia, because I understand they have a different gage. Here the arrangements at the end, not even speaking about the different brakes and signal apparatus, were so manifold that I at once appreciated doubly what the M. C. B. Association accomplished in bringing the many hundred private roads together and getting up common standards for the most important details, while the few state railroads cannot even agree as yet on a common automatic coupler.

The destination of each car in Europe is indicated by a large reversible signboard, fastened to the side of the car body. They are not ornamental, but they are a great comfort to the traveler, and I am sure that we should do the same thing. This would at least avoid the painful duty of classifying the passengers in entering a train of cars with different destinations. It would not be necessary to disfigure the appearance in any way, and signs could be applied similar to those now used on Pullman cars, or, better yet, on the subway cars of our large eastern cities.

SLEEPING CARS

With the exception of the cars owned by the International Sleeping Car Company, which run on some of the fastest express trains, the European sleeper is mainly built like their ordinary passenger car. The interior is like that of our compartment sleepers, namely, an aisle along one side of the car. The compartments of the second class have two berths, one above the other, and a small table, and a small toilet at the end of the car, while the first-class compartments contain single berths and private toilets. All sleeping cars are owned by private companies and the berth can be engaged ahead. Sleeping cars are not provided freely with night trains, as the conventional compartment in the day car is in itself considered a half-sleeping car.

DINING CARS

The dining cars in Europe are owned by private companies. The meals are invariably served table d'hôte, the whole being served at the same time. This reduces the number of waiters,

but it deprives the traveler of individual attention and hurries him unduly, as the courses follow each other very rapidly, in order to get the next setting accommodated as quickly as possible. This in a sense increases the capacity of the dining cars and the earnings of the company. The meals are usually excellently cooked and cost about 75 cents nominally, \$1.50 actually. In our dining cars the capacity is often reduced by slow service.

FREIGHT

Owing to the lack of great masses of bulky freight and comparatively short hauls, the capacity of the European freight car is seldom over 15 tons. Two axles per vehicle are the rule. Often a third one is located in the center, arranged so that it can move laterally to avoid binding on curves.

What has been said about the lack of common standards among the comparatively few state railway systems on passenger equipment holds good to an even greater degree on freight cars.

RELATIVE COST OF TRANSPORTATION

Without going into great details let us consider the fare between Pittsburgh and Chicago (468 miles), taking conditions as a basis and then giving the parallel figures, using the rates of the Prussian state railways—baggage in both cases is supposed to be 75 lb.

A man holding a seat in a Pullman car pays \$2 for it and \$10.50 railroad fare, a total of \$12.50. The baggage is checked and carried free of charge. Our German cousin traveling first class would pay a railroad fare of \$15.68, and for baggage \$2, or a total of \$17.68.

A traveler in our day coaches of a less expensive train will pay \$9.50. In Germany the corresponding mode of traveling would be second class, the railroad ticket being \$8.92, and the baggage charges \$.50, a total of \$9.42.

By far the largest portion of the European traveling public ride in third class cars. The fare is \$5.55, and the baggage charges 50 cents, a total of \$6.05. We have no parallel to this class.

The freight tariffs in Europe are so specialized as to material, as to kind of train, locality and nature of the shipment (local, through or export) that a fair comparison in each particular case is well nigh impossible and it appears to be much fairer to compare the average figures. Comparing the above-mentioned railroad and our group 11 and the official average rate per 100 ton-miles of some years ago, the rate is \$1.23 abroad and \$7.63 for the eastern states.

It must be borne in mind that the bulk of the business transacted is about the same in each case, but the haul is only half as long in Germany. This means that terminal expenses are much greater in proportion, especially since the average shipment is comparatively small, and since a large proportion of the bulky freight is shipped by water.

An additional burden to the German shipper is the charge made by the "spediteur." As said before, the tariff schedules are so exceedingly intricate that it pays invariably to employ an expert in this line to pick the route, to comply with the regulations and to follow the shipment. All this the American railroad does for its customer without charge.

In all questions of fares and tariffs, it must be remembered that the German railroad employee earns just about half as much as our people. In other words, the money value is ordinarily just twice as great, and in looking at it from that angle the figures above given show as follows:

	U. S.	Germany	
		Nominally	Actually
Passenger fare (Pittsburgh to Chicago) —			
1st class	\$12.50	\$17.68	\$35.36
2nd class	9.50	9.42	18.84
3rd class		6.05	12.10
Freight, average rate per 100 ton miles	7.63	1.23	2.46

REASONS GIVEN IN EUROPE FOR GOVERNMENT OWNERSHIP

Since most of the railroads in Europe are now owned by the respective governments, it may not be out of the way to dwell

upon the reasons leading up to that fact. It has been argued by the governments that it is desirable for the industrial, agricultural and commercial development of a country to control and furnish proper means of transportation. This is undoubtedly true, but figures and facts show that our private roads offer the same transportation more promptly and for much less money.

The governments also claim that the revenue derived from the railroads will help to pay current expenses, thus lessening the taxes of the people. This is true on the face of it. None the less, the people now agree that the heavy toll exacted by the railroads comes from the masses just the same, as the cost of transportation is simply added to the price of foodstuffs, clothing, fuel or whatever it may be.

Undoubtedly the main reason for acquisition of the railroads by the respective governments is a military one. This is more or less apparent from the fact that railroads and aerial navigation are centralized, while elevated and street-car lines, subways and typical mountain railroads are left in the hands of private and municipal corporations as a rule. The experience in war-torn Europe for the last few months is possibly the best proof of what has just been stated. Immediately as mobilization began, the trains ceased running on their schedule time to accommodate the movements of the troops, the ammunition and the other war material, and on the morning of the third day the federal railroads of Switzerland, for instance, were bodily turned over to the military department.

I have often wondered whether the same results in emergency cases could not be obtained by special laws and licenses between the government and the private companies.

A very popular argument during the amalgamation period of the railroads in Switzerland was the claim that a great economy would result from doing away with unnecessary offices. This did not work out well; on the contrary, the number now is stated to be greater than before, since each district has a council of its own besides the federal council. For the same reason it has now been found that more direct and more effective business methods which were promised at that time did not realize. On the contrary, it is now a rather difficult matter to settle on any changes and improvements owing to the special interests each district council represents.

RESULTS OF CENTRALIZATION

Government ownership, generally speaking, has helped the weak roads and avoided critical periods which we here usually overcome by receivership and reorganization. At the same time it leaves the formerly prosperous private roads in a less prosperous condition.

It is also interesting to note how completely, down to the smallest detail, the instructions in any one of these complex railway systems are worked out. Each employee or officer is expected to carry out instructions to the letter. This is the ideal and the highest duty of every one, and if carried out, will insure employment for life. That way, every employee can feel that he has done his duty and does not need to care for anything further. This, however, will not produce improvements, reduce labor cost, bring forth fuel and labor-saving devices, not even safety.

I have, for instance, seen a passenger, who jumped on a car just as it started, grabbed by a station employee, and, as he couldn't manage him alone, another uniformed co-worker ran to his assistance. They finally succeeded in pulling off the "criminal." By this time the train was moving at a fair speed and I was very much afraid that an accident might happen as soon as the "trespasser" loosened his grip. This was a center-aisle car with a platform at the end.

As a contrast to such narrow conceptions of duty, let us read for instance the honor column of any one of our railroad employees' magazines and compare the spirit and the results.

One thing is sure, namely, that the government railroads of Europe do not keep pace with the evolution in other branches of

industry and science, and this is undoubtedly one reason why American railroads are often studied by Europe, a country much older than ours.

Another great drawback in Europe is the lack of competition. As soon as a government becomes the manager of the railroads, the rivalry between the different roads ceases, which again spells stagnation to a large extent, but what is possibly more objectionable to the customer is a cold and overbearing treatment, not so seldom noticed. You have no redress, you cannot ship over the other road. By this I do not want to say that, as a rule, their railroad employee is not polite, but real courtesy and whole souled spirit of co-operation is certainly not in evidence. Is it not natural after all? Why should the roads lay special stress on anything which does not bring them special returns?

A peculiar case came to my notice showing again how very little the government railroads are really doing for their patrons. A valise through no fault of the passenger was mis sent and the railroad office was asked by telephone to have it intercepted at the next station and returned. The phone call and the parcel post charges were both collected before the valise was surrendered, with the explanation that the government owns the telephone and parcel post systems and would object to the railroads' performing such service free, as this would minimize the receipts in the other two departments.

OBJECTIONS TO GOVERNMENT OWNERSHIP IN THE UNITED STATES

If all the railroads in the United States were combined into one tremendous system, it would be so unwieldy that it could not be managed in the true sense of the word, and whoever doubts this will please read the paper by A. W. Thompson, vice-president of the Baltimore & Ohio, presented recently before the Engineers' Society of Western Pennsylvania, wherein he shows the obstacles, financial and otherwise, which had to be overcome by constant struggle and almost superhuman efforts.

Such a system could, of course, be kept going by rules and regulations, but the performance of each road would surely suffer. In two excellent articles on "pooling" engines in the November number of the Buffalo, Rochester & Pittsburgh Employees' Magazine, it was brought out that a gain in engine working hours led up to this, but that as far as the performance of each engine, its physical condition and its upkeep were concerned, the results were far superior at the time when every engine had its own individual attention. Therefore "pooling" the railroads would surely have similar results in this respect. Such an immense net of government roads and a still more elaborate system of operating them would in a way lend stability to the undertaking, but this also means stagnation and inability to adapt itself to new conditions as fast as they arise.

In Europe, for instance, the passenger and freight rates and their application to certain territories are hardly ever changed and the industrial conditions are expected to adapt themselves to the railroads and their policies. We over here so far have always taken the opposite view. We believe in extending the industries in those localities where natural conditions will offer the greatest inducements, then we adjust the railroad service to the new requirements. This is undoubtedly one of the reasons why the Canadian government doesn't operate its roads, although it has built some, helped build others and heavily subsidized the rest.

Our political contests are, we all know, fought in a bitter way, simply because the existence of so many employees depends on the respective victory. Suppose we added another million or two of such employees, would not this fight for supremacy become alarming? All competition between the different roads, as to improvements for the comfort of passengers would be relaxed, also as to safety, economy in operation, economy in the shops and the upkeep of the equipment.

When the Hungarian state railways, undoubtedly for just such reasons, had large yearly deficits, they simply raised the rates, and when one of the flourishing Swiss roads, after it went

into the hands of the federal system, had a similar experience, it simply reduced the number of men, number of trains, amount of track renewals, improvements along the lines and stations and beside that held back the introduction of heavier rails; in other words, it cheapened the service.

We believe in improving the service and making it most effective and by this means try to make the two ends meet.

Each individual road so far has laid great stress on carrying the passenger as comfortably as possible and the freight as cheaply as possible. Large sums, if possible, are yearly spent to try out new devices and improve the rolling stock and operation of the road, and to effect economy and safety. This has led up to self-clearing gondolas, automatic couplers, high-capacity cars and power, low percentage of dead weight, heavy rails, low grades, doing away with unnecessary machining and finishing of car and locomotive parts, introduction of labor-saving machinery, constant improvement in the brakes and signal systems and thousands of other details, and as long as the interests of the individual man and road creates such spirit, we must win.

It is true, our competition not seldom leads to gaudy advertising, expensive terminals of "marble halls, Egyptian columns and gilt stairs." Such cases, however, are few in number and are often made self-supporting, in part at least, in using them as office buildings.

Some people think that if we had one immense system, one pattern of box cars, and one pattern of any other kind of cars would suffice and we could manufacture the equipment so much

cheaper. We could, but we wouldn't. The government engineers are always doing things as well as they can be done, while the railroad engineer must always be on the guard to adapt material and workmanship to the requirements, i. e., not to use expensive material if a cheaper one will do and not to finish details unless they are made more effective thereby. The same thing holds good as to inspection and it is my personal observation that material for the government here and abroad invariably costs more than that for private roads.

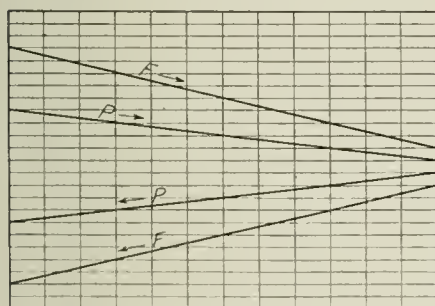
Again if we had established a few standards, who would make further improvements? Under such conditions, could our C. T. Schoen have succeeded in introducing the steel car? Would the Monongahela Connecting road have had a chance to build 200,000-lb. cars as they did, thereby encouraging others to increase the capacity above 100,000 lb.?

RELATION BETWEEN THE NUMBER OF TRAINS AND PASSING POINTS

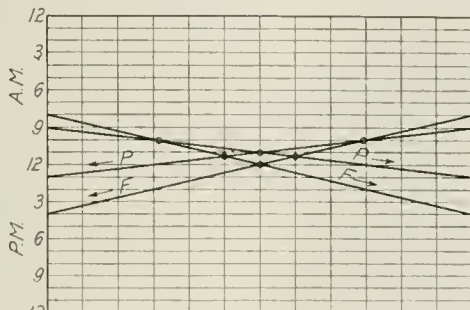
BY PAUL M. LA BACH

Assistant Engineer, Chicago, Rock Island & Pacific, Chicago, Ill.

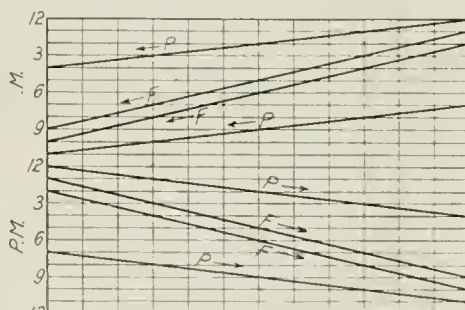
In discussions concerning the economics of railway operation the statement is frequently made that the number of meeting and passing points on a single track line is in proportion to the square of the number of the (round trip) daily trains. That is to say, if the number of trains is doubled, the number of meeting



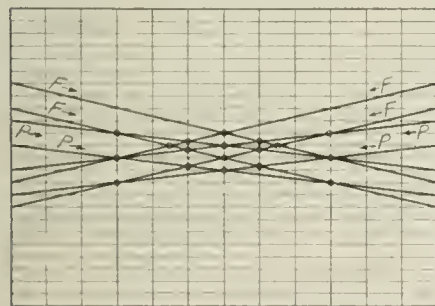
① 1 Passenger train each way per day-30 M.P.H.
1 Freight " " " " -15 M.P.H.
No Meeting or passing points.



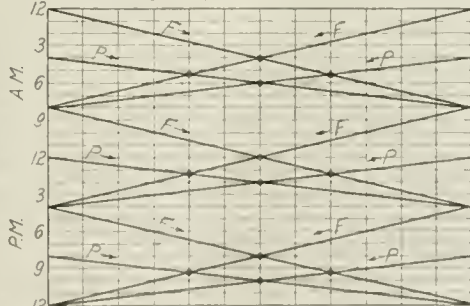
② 1 Passenger train each way per day-30 M.P.H.
1 Freight " " " " -15 M.P.H.
6 Meeting and passing points



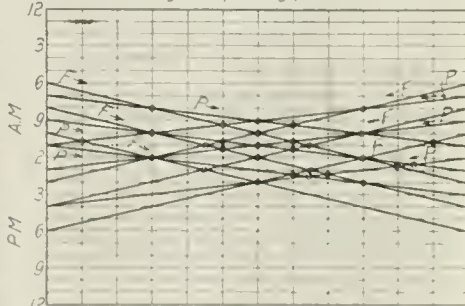
③ 2 Passenger trains each way per day-30 M.P.H.
2 Freight " " " " -15 M.P.H.
No Meeting and passing points



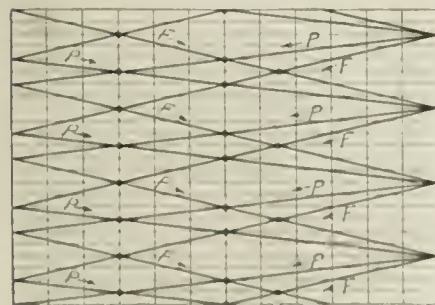
④ 2 Passenger trains each way per day-30 M.P.H.
2 Freight " " " " -15 M.P.H.
20 Meeting and passing points



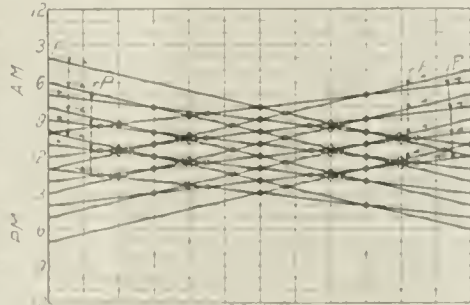
⑤ 3 Passenger trains each way per day-30 M.P.H.
3 Freight " " " " -15 M.P.H.
18 Meeting and passing points



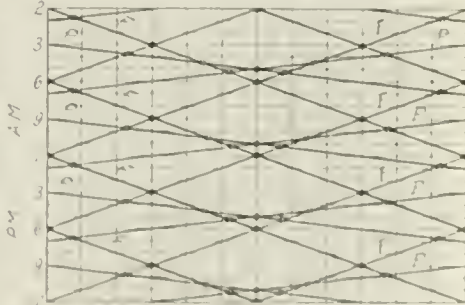
⑥ 3 Passenger trains each way per day-30 M.P.H.
3 Freight " " " " -15 M.P.H.
36 Meeting and passing points



⑦ 4 Passenger trains each way per day-30 M.P.H.
4 Freight " " " " -15 M.P.H.
30 Meeting and passing points



⑧ 5 Passenger trains each way per day-30 M.P.H.
5 Freight " " " " -15 M.P.H.
25 Meeting and passing points



⑨ 5 Passenger trains each way per day-30 M.P.H.
5 Freight " " " " -15 M.P.H.
25 Meeting and passing points

Maximum and Minimum Number of Meeting Points With Different Numbers of Trains

and passing points will be multiplied by four; if the number is tripled these points will be multiplied by nine, etc. At first glance this appears to be correct. Two trains in opposite directions will meet once; four trains may meet four times, etc. The error lies in the fact that in changing from one number of trains to another the operating conditions are not duplicated. If one should have a certain number of meeting and passing points under present conditions and should double the number of trains he might have four times as many meeting and passing points but the chances are that he would have considerably more. It makes a great deal of difference whether the trains are scattered at intervals throughout the 24 hours or are concentrated in a portion of that time.

To illustrate the point the accompanying diagrams have been made on the same principle as density diagrams; the vertical dimension being divided into spaces for each hour and the horizontal distance being the length of an engine district. Passenger train speeds are assumed as being 30 miles an hour and freight 15 miles.

The only general rule that can be formulated is that the slow trains should follow immediately after the fast and be scattered at nearly equal intervals through the day. It is also apparent that increasing the speed will decrease the number of meeting and passing points. To make the rule general, the interval of time occupied by a train passing over the district, divided by 24, should be as small as possible. Under the assumed condition, the following interesting results are found:

TABLE 1

Diagram Nos.	No. of round trip trains per day	Square of the number of trains	No. of meeting and passing points	
			Minimum	Maximum
.....	1	1	0	1
1 and 2	2	4	0	6
3 and 4	4	16	0	20
5 and 6	6	36	18	36
7 and 8	8	64	30	71

In counting the meeting points one half value has been given to points on the lines dividing engine districts and days. As the number of trains increases it is apparent that the tonnage of freight trains will decrease unless there is considerable excess power in the locomotives for the rating, say in Diagram 1. This feature is of considerable importance in making calculations for tonnage ratings in problems of the economics of railway location. According to the older method laid down by Wellington and others, a rating was assumed for one daily train and this was multiplied by ten or twelve as the case might be, but the time spent in meeting and passing will be increased very rapidly and the available running time decreased after a traffic of about eight trains per day is passed, as is shown in Diagram 9, which can be compared with Diagram 7, as both are for the most favorable circumstances. The graphical method of handling such problems is not new, but new applications can be found for it, as it has as many variations as the kaleidoscope.

The proper location of passing sidings on new work is not always an easy matter. By turning the horizontal distance into time and finding the fraction of the whole run between each passing point this may be arrived at. The next step would be to develop a table of accelerations and retardations and plot a time curve. The location of the train when 1/6 of its run (in time) has elapsed could then be fixed or any other fraction that might be caused by the ordinary operation of trains.

ENLISTMENTS FROM THE MIDLAND RAILWAY OF ENGLAND.—The chairman of the Midland Railway recently said that of the 80,000 railwaymen who had joined the colors, 10,200 had gone from the Midland. Among the latter 200 had been killed in action or had died of wounds or disease, 43 were missing, and 609 had been wounded or invalided home. Of the 1,996 members of the Midland Railway rifle clubs in Derby and other towns, 432 had joined the colors, and a larger number would have done so if they could have been spared.

THE SANTA FE'S HARMONY WORK

E. P. Ripley, president of the Atchison, Topeka & Santa Fe, five years ago called a conference of operating, traffic and other officials and expressed to them a new view about railroading.

"I have figured it out," Mr. Ripley said, at that time, "that the hostile public sentiment against transportation corporations is due largely to the fact that the people do not understand the railway situation, and that the men who manage the railroads are not familiar enough with the troubles confronting the people. I want your co-operation in the inauguration of a campaign for the purpose of bringing our officials and patrons into a closer relationship, with the view of changing this feeling of hostility to one of friendliness. I would like to have general managers, general freight and passenger agents, financial and accounting officers, attorneys and others visit the cities and rural communities along our lines, and get better acquainted with merchants, manufacturers, farmers, stockmen, bankers and every other class of people doing business with our company, and ascertain the cause of their discontent. We will tell our story to the people, and ask them to tell theirs to us."

The plan outlined was put into effect, and the work still is in progress, division by division. A Kansas newspaper called it "the Harmony special," and by that name it is known in Santa Fe territory.

"Harmony work has developed into a feature of our business," Mr. Ripley said recently. "The campaign was a success from the start, and now it is a part of every official's duty to perform a harmony stunt when occasion demands."

Here is the plan in detail of the Santa Fe's harmony campaign: One week in every month, half a dozen or more officials of the company are drafted for a trip over a division. The superintendent makes up a short train for the accommodation of the party, and a town-to-town tour is conducted, stops being made long enough at every place to enable the officials to meet the business men and farmers in a convenient room, usually the Commercial club, court house, or city hall. The meetings are informal—a sort of handshaking affair. Sometimes there is a bit of speechmaking, and occasionally a luncheon or banquet is given for the visitors to enable them to extend their acquaintanceship.

The railroad men make it plain to the people that they are on a get-acquainted trip; that they want to improve the relationship between the company and the community visited; that all they have to sell is service, and they want that commodity to be the best on the market; that if there is anything out of gear, they want to know it.

The meetings give the railroad officials opportunity to discuss first hand with their customers the general railroad situation—rates, train service, increased cost of operation and maintenance and similar topics, showing the difficulties with which the carriers have to contend.

Before leaving town the railway officials offer the company's co-operation in the development of the natural resources of the territory traversed by its lines.

For instance, the railway company offers gratis the service of its industrial department, to find new industries; of its colonization department to send desirable people into the community; of its agricultural department to carry on experiments along the line, giving the farmers the results obtained; of its engineering department to pass on plans for public work, especially for bridge construction, and improvements having to do with drainage.

As a result of this harmony movement, there has been a reduction in law suits against the Santa Fe; a decrease in the number of cases before commissions; fewer men in the legislature who want to tear up the track, and generally a more friendly feeling on the part of the people toward the corporation.

The harmony campaign is not a drain on any official's time, as the work is divided in such a way that the extra burden falls lightly on many shoulders. The plan calls for a tour of every division twice a year. There are twenty-four divisions.

The Railway Lines of Syria and Palestine

Resumé of Conditions Before the War; Well Managed Lines of Syria Compared with Run-down Hedjaz Railway

BY LEWIS R. FREEMAN

The well-built and ably managed 500 miles of railway of the Chemin de Fer Damas-Hama et Prolongments, a French company, before the war, was one of the best paying properties in the near East, and with the completion of the Bagdad Railway, of which it bade fair to become the main feeder, its property would have been greatly augmented. According to the plans there were to be two main approaches to the western end of the Bagdad Railway—the Ottoman Anatolian line from Constantinople, which would carry the fast mails, and the passenger and freight traffic of northern and central Europe; and the Beirut-Aleppo line of the Damas-Hama Railway, which would carry the traffic of southern Europe, Africa and the Mediterranean gen-

1906, the Ottoman government guaranteeing a net income of \$4,320 per mile on all of the line between Reyak and Aleppo, a distance of 200 miles. In 1910 the company received a concession to build a line from Homs, on the Reyak-Aleppo branch, to Tripoli, a port of some importance on the Mediterranean. This line, which was 65 miles long and carried no guarantee, was completed in 1911. This completed the Syrian railway system as it exists to-day, and as it will remain for some years, no important extension being under consideration at this time. The total mileage is about 427 of which only 207 miles—the least costly section of the system, that from Reyak to Aleppo—was built under a guarantee. The system throughout is of standard gauge.

The 6,000-ft. climb of the Damascus line over the summit of the Lebanon is one of the most picturesque pieces of railway in the world, and severe engineering difficulties were involved in its construction. Tunnels and viaducts are encountered almost as soon as the train is clear of Beirut station, and the line passes either through one or over the other most of the 40 miles until Reyak is reached in the valley beyond the Lebanon range. To take a railway over this unusually abrupt mountain wall without the use of the rack system, while not impossible, would have been prohibitively expensive. The locomotive begins to climb with the cogs while still in the vicinity of Beirut and of the 35 miles between that city and Mallaka, on the edge of the plain of Bekka, 20 miles are negotiated in this manner. An average grade of 7 per cent is surmounted by the rack in the ascent from Beirut, while the descent on the further side is 6 per cent. The steepest grade surmounted by adhesion is 2.5 per cent. Construction throughout is of the most substantial character, stone retaining walls and drains and other protective work being especially worthy of notice.

This section of the line runs through the independent state of Lebanon, which, in spite of its rough and mountainous character, is most thickly populated and intensively cultivated. Even the local traffic, therefore, has been heavy from the first.

The 50 miles from Reyak to Damascus is by a low and easy pass over the anti-Lebanon range. The spring-fed river which the railway follows down to the rich and ancient city at the desert's edge has a number of fine waterfalls and swift rapids, from which several thousand horse-power in electricity have already been developed to light Damascus and run its tramways. A more ambitious project plans to develop power to operate the railway for 50 miles on either side of Damascus, while other projects in the Lebanon mountains will develop sufficient power to make it possible ultimately to electrify the whole system.

Damascus, which is the focal point for the caravan routes for a thousand miles to the south and east, furnishes enough business alone to have warranted the construction of the railway; nor has the French line suffered at all from the competition of the branch of the Hedjaz Railway, which gives another outlet to the Mediterranean at the port of Haifa. The 60-mile extension of the line into the semi-desert region to the south, terminating at El-Mezirib, has proved a valuable feeder in spite of the fact that it is paralleled by the main line of the Turkish-owned Hedjaz Railway throughout its length. The freight, passenger and other receipts for the Beirut-Damascus-El-Mezirib branch of the line for the year 1900 were \$434,000, or about \$2,700 per mile. In 1911 receipts from the same sources had increased to approximately \$872,000, or nearly \$5,600 per mile.

The 250 miles of road which will tap the Bagdad Railway at



The Railways of Syria and Palestine

erally. The latter route, unless it was strongly discriminated against by the Bagdad Railway, was likely to do much the larger business of the two.

The Chemin de Fer Damas Hama et Prolongments was formed in 1891 by the consolidation of two companies organized the previous year with the purpose of building a railway from Beirut to Damascus, a distance of 90 miles over the crest of the Lebanon mountains. This line was subsequently extended 65 miles farther south to El-Mezirib, the point of departure for the Mecca-bound caravans. In 1905 a concession was obtained from the Turkish government for a railway, starting from Reyak, on the Damascus line, to Aleppo, a distance of 207 miles. The portion of this line from Reyak to Hama had been built some years before. The Hama-Aleppo extension was completed in

Aleppo and give a quick outlet to the Mediterranean at Beirut is expected to prove of great importance when the latter line is opened. That part of the line between Reyak and Aleppo—207 miles—was built under an annual guarantee of \$4,350 per mile.

The construction was neither difficult nor expensive, while the populous and productive country along the route has given

Constantinople and across the Bosphorus. Aleppo is conceded to be the best and most probable seat of the Ottoman government. From the standpoint of the traveler the most interesting point on this line is Baalbek, the site of ancient Phoenician and Roman temples.

Unlike the Damascus-Beirut line which, from uprisings, political disturbances and other causes, has experienced considerable



Freight and Passenger Train in the Lebanon Mountains

an ample amount of traffic from the start. Aleppo itself, which occupies about the same commercial position in northern Syria as does Damascus in the south, has taken full advantage of the improved transportation facilities, and is rapidly becoming one of the most progressive cities of Asiatic Turkey. Indeed, in the by-no-means unlikely event of the Porte being forced out of

fluctuations in receipts, the Reyak-Aleppo branch has yielded steadily increasing returns from the first. These have increased from \$361,000 in 1907 to \$534,000 in 1911, or from \$1,739 to \$2,671 per mile. As the Ottoman government had to make up the difference between these sums and the guarantee of \$4,352 per mile, the gross receipts for each year since the opening of



Switch Back Station on the Climb up the Lebanon Mountains

the line have amounted to about \$900,000. It is more than likely that the next year or two will see the average receipts per mile pass those of the guarantee, putting an end thenceforth to the necessity of the fulfillment of that obligation by the overburdened Ottoman government.

First, second and third-class passengers are carried on all lines of the Syrian system. Fares vary somewhat according to the nature of the country traversed, those over the rack divisions of the Lebanon mountains being the highest. Roughly speaking, they are about the equivalent of $5\frac{1}{2}$ cents per mile, first class; $3\frac{3}{4}$ cents per mile, second class, and $1\frac{1}{2}$ cents per mile, third class. First class passengers are carried in roomy side-entrance compartment cars, which can be made very comfortable for sleeping on the night runs. The second class compartments are less spacious than the first, and generally more crowded, but are also considerably used by Europeans. The third-class passengers are packed closely into corridor cars provided with wooden benches and baggage racks, and, as on most other lines of the East, furnish the principal source of revenue.

The locomotives and rolling stock of the Syrian railways are

building in Turkey, a thoroughly up-to-date road was begun. There was trouble with his Moslem subordinates, trouble about finances and trouble with the nomad tribes along the route; but with the same energy and devotion to the task in hand that had characterized his work in opening up Asia Minor, the resolute German stuck to his task and ultimately completed the 800 miles of line between Damascus and Medina. He was ready to carry it on over the additional 250 miles to Mecca, but the opposition of the desert tribes—who saw in the railway an end of the tribute they had been accustomed to levy upon the pilgrim caravans—discouraged the Ottoman government, and the work was stopped. The construction of a branch running westerly from the main line to the sea of Galilee and the port of Haifa on the Mediterranean, completed the Hedjaz system as it exists to-day.

Five years or more ago Meissner Pasha turned over to the Turkish government a railway which—with the exception of two or three lines in India—was as well constructed as any in Asia. Thanks to the half decade of Ottoman management, the Hedjaz Railway now could not be more fittingly described than in the expression above quoted—"the worst run and the worst



A Portion of the Rack Section in the Lebanon Range

modern in design and well maintained. French, Swiss, German, Belgian and Austrian concerns have each furnished some of the locomotives, and this is also true of the other equipment, materials and supplies. The rails are of Belgian manufacture, that country proving America's most serious competitor at many points in Asia. Neither the United States nor England has supplied rolling stock, machinery or materials of any description.

* * *

In comparison with the finely maintained, up-to-date railway system of Syria, the two lines of Palestine make but a sorry showing. The more prominent of the latter is the much talked of Hedjaz or "pilgrim" line, which is commonly characterized as "the worst run and the worst run-down railway in the world." This line, which starts at Damascus, was begun with the idea of being extended all the way to Mecca and of transporting the great annual flocks of the faithful which had theretofore had to reach the Holy City by way of the Red Sea and Jeddah. The contract for construction was let to Germans, and under the distinguished Meissner Pasha, the general manager of the Baghdad railway, who had already spent a score of years in railway

run-down railway in the world." Within a year or two the Germans were entirely eliminated from the management of the line, and shortly afterwards from its technical departments. The inevitable result was that rolling stock and machinery were soon ready for the scrap heap while the roadbed was scarcely a respectable camel trail. In the matter of replacements, the oriental tendency to graft asserted itself, and not half of the money appropriated in Constantinople ever found its way into new equipment which was probably just as well, for new machinery and locomotives promptly went the way of the old. The occasional employment of foreigners in the engineering department has effected sporadic improvement from time to time, but for the most part the line is in the condition of chaos to which it reverted after the German regime ended. That it is a dismal failure financially goes without saying.

It is just possible that if the Hedjaz railway had been carried on to Mecca it might have met with better success in catering to the pilgrim traffic. The route to Mecca by way of the Red Sea is circuitous and expensive, but the short caravan journey from Jeddah to Mecca is a good deal safer and less costly than

the one from Medina which must be taken if the railway is used. At any rate, statistics covering the last five years show that over 80 per cent of the pilgrims have clung to the old route. As the country through which the railway passes for nearly all of the 800 miles between Damascus and Medina is absolute desert, that ill-starred venture has found very little to contribute to its support beyond its entirely inadequate share of the pilgrim traffic.

Three trains a week leave Damascus for Medina throughout the year, with numerous specials when the pilgrim movement is at its height. The best part of three days is consumed on the

themselves to trains that are scheduled by Arabic time, which changes every day with the sun. At least the time-table is made out according to Arabic time, and if even that were adhered to it would not be so bad, as the difference may usually be roughly calculated and allowed for. As a matter of fact the schedule seems to depend upon nothing but the convenience of the train men, as the writer's own experience would indicate. On the first occasion of his departure from Damascus over this line, acting on the advice of the hotel proprietor, he went to the station an hour before train time—sunrise or 12 by Arabic time—only to



Typical Station on the Jaffa-Jerusalem Line

800 mile journey. A first class car is attached to the train, but rarely has over two or three occupants. The fare is \$35, or about $4\frac{1}{2}$ cents per mile. There is no second class, and the third class fare of about $2\frac{1}{4}$ cents per mile is the highest in Asia for that class of travel. No Christians use the line south of Palestine, for should one do so he would place himself under the suspicion of endeavoring to reach Mecca. Those who have to travel over the northern sections have the annoying experience of adapting

find that it had, for some reason, departed half an hour earlier. Endeavoring to profit by this experience, he allowed two hours leeway on another occasion, and had to wait four. A third time, as no engine could be found that was in condition to take a train out of the station, he had to go back to the hotel and remain another day. Still more annoying was the experience of an Englishman. His Hedjaz railway train had left Damascus on time, but had lost two hours on the twelve-hour run to Haifa.



Railroad and Highway Bridges Near Beirut

There was still time left to catch his steamer, however, until the belated "express"—it is really called that on the time table—pulled up at a wayside station on the outskirts of Haifa and remained there three hours to fill up a couple of flat cars with cabbages for next morning's market. As a result he missed his steamer and had to wait four days for another. This is Turkish railway management.

The 54-mile railway from the port of Jaffa to Jerusalem is somewhat better managed than the Hedjaz railway, but that is about all that one can say about it. It was built a couple of decades or more ago, and has had a checkered career under alternate Ottoman and French management. At the present time it is under French management and doing better than at any other stage in its history. Under normal conditions a railway between Jaffa and Jerusalem should pay handsomely, as much of the hinterland is rich and fertile, while the tourist and pilgrim travel to the Holy City is alone enough to support a properly managed railway. Complications due to various troublesome features of the concession of the Ottoman government, conspiring with the hopeless inadequacy of Jaffa as a port in any but the fairest weather, have been its undoing in the past and are not unlikely to result in its complete collapse in the near future. For days at a time in rough weather no passengers can be landed at Jaffa, and the ever-imminent possibility that the Ottoman government will run a branch of the Hedjaz railway up from Haifa to Jerusalem has thus far made it impossible to put through any kind of a project for harbor works. The railway,



Desert Water Tank on the Hedjaz Railway

which was not especially well aligned in the first place, has never felt justified in making the expenditure necessary to remedy this defect, nor has it even carried its tracks down to the waterfront. The trans-shipment of the Jerusalem freight is, therefore, labor and expensive, while the change is also a troublesome one for passengers. Everything considered, and especially on account of the great expense that would be involved in making even a passable harbor of Jaffa, a railway from Haifa to Jerusalem—even under Turkish management—would prove the best solution of the problem. If this line is ever built, and it doubtless will be before many years, the position of the present Jaffa-Jerusalem line will be similar to that of a bridge which is left spanning a half-emptied river bed after the main stream has changed its course.

Only two classes of passengers are carried between Jaffa and Jerusalem. The first class fare is equivalent to about 5½ cents a mile, and the second class 2 cents. As a large number of European tourists are booked through second class, this arrangement, which throws them in with the lowest classes of Jews, Arabs and Turks, involves considerable hardship.

Several American locomotives were once purchased by this line, but as this happened some years ago, the two or three that still survive are hardly in a condition to awaken any stirrings of patriotic pride in the breast of the American tourist who beholds their battered remains.

WHAT IS THE MATTER WITH THE RAILROADS?*

By E. STENGER

General Manager, St. Joseph & Grand Island

Some years ago the popular cry in the west was, "What is the matter with Kansas?" Now, the nation-wide cry is "What is the matter with the railroads?" There are several things the matter with us, the most important of which perhaps is that we are going broke. Brandeis says we are wasting a million dollars a day, but it was reported that when offered a job as trustee of a railroad to show us how to save the million he declined with thanks. I wonder what is the matter with Brandeis.

While railroad earnings are at their lowest ebb for many years, and while the country is full of unemployed clamoring for work and at a time when everyone is conserving his resources and struggling to overcome adverse conditions, the engineers are demanding an increase in pay and better working conditions, all at an increased expense to the railroads. I sometimes wonder what is the matter with the engineers.

The train men had a full crew bill passed by the last legislature in Missouri which increased the number of brakemen on a train by one and the people rejected it. Now these same train men are in Jefferson City trying to have a law passed cutting the trains in two and thereby doubling the number of train men required to handle the same business. I wonder what is the matter with the trainmen.

The politician goes up and down our land demanding more and more drastic regulation of railroads, lower rates for his favored shippers, higher wages and shorter hours for the men and better service for the traveling public. I wonder what is the matter with the politician since he quit traveling on passes.

There is more delay to traffic in St. Joseph at Fifth and Edmond or Sixth and Edmond streets than is caused by all the railroads crossing Sixth street and besides the city pays the traffic policemen kept on duty all hours of the day at those points while we pay for the watchmen on Sixth street; still it has been deemed the popular thing to clamor for viaducts and subways and "cuss" the railroads generally. I sometimes wonder what is the matter with our newspapers.

To be killed in Europe is now a matter of glory. To be killed in an automobile is a matter of course. To be drowned on a ship is a matter of accident, but to be killed on a railroad is a matter of criminal negligence and as a consequence the land is filled with lamentations and excoriations of railroad managers. I cannot see that the manner of killing makes much difference to the corpse who is the most interested party. I wonder what is the matter with the public.

The Nebraska commission reduced the rates in Nebraska so that Omaha cuts into territory previously served by St. Joseph so that we lose some traffic and earnings. If we should reduce our rates to meet the Nebraska reductions we would lose still more revenue, which leaves us between the devil and the deep sea through no fault of ours. I wonder what is the matter with state regulation.

When the eastern roads asked for a 5 per cent increase the Interstate Commerce Commission refused it but gave them a lot of good advice. They asked for bread and were given a stone. When they attempted to follow the advice both the commission and the courts stopped them and later, when the net revenues had fallen over 20 per cent the commission granted the 5 per cent increase. Sometimes when a gleam of light penetrates my daze I wonder what is the matter with the Interstate Commerce Commission.

The government has for some time compelled us to haul the mails at a loss and then to make the matter worse has added

*From an address before the St. Joseph Railroad Club on January 18, 1915.

the parcel post to increase the burden, and now, by means of the Moon bill, proposes to reduce our mail pay still further. The upshot of the whole matter is that the government is today robbing the railroads by underpayment for mail service and threatens to do still worse. I sometimes wonder what is the matter with the government.

What is the matter with the railroads? Nothing, except that their problems are not yet thoroughly understood.

What is the matter with railroad men? Nothing, except that they have been somewhat remiss in meeting changing conditions.

What is the matter with the people? Nothing, except that they are not yet awake.

PERSONALITY AND EXPERIENCE

By RICHARD BROOKER

Yardmaster, Canadian Pacific, Portage La Prairie, Man.

The operation of a yard is affected by controllable and non-controllable circumstances. The former are included in the organization controlled and directed by the general yardmaster. The non-controllable include conditions such as the layout of the yard, track, and other local facilities, which, like the laws of the Medes and Persians, do not change.

The human element enters into the subject of yard operation more prominently than some might be prepared to admit. The successful yardmaster is the man with a personality, respected and revered by call boy and superintendent alike; providing, of course, that practical experience is added to his personality. Whether this experience was gained from an office stool in a yard office, or while riding the footboard of a switch engine makes little difference; the man is the predominating feature.

If there is one occupation more than another in which the little things count it is that of yardmaster; for in the operation of a yard, constant attention to detail is of paramount importance. "Take care of the pence and the pounds will take care of themselves," is a proverb, the truth of which is apparent even when its terms are translated into car numbers and consist lists; for a whole track full of through loads does not require the care in forwarding that one bad order will. The call boy getting a crew for a train is a mere detail; but if the call is omitted, and the omission is not detected until the train is ready to start, the magnitude of that detail is considerably enlarged. When compiling a list of cars for team tracks, with the directions for spotting it may seem a small thing if one car is omitted, but over on the team track a teamster may be waiting the promised spot-run for the yard engine, are both expensive.

To maintain discipline and secure good results from the staff requires an efficient method of handling the various grades of men needed to operate a yard. Their education is no small matter, particularly in the rush season when the office staff has to be augmented with green men. In large yards the general yardmaster could not be expected to attend personally to the educational end of it; both the education and discipline of the office staff should be assigned to the chief clerk, which person will, in my opinion, when the powers that be fully recognize his worth, form the chief recruiting field for the yardmasters of the future; his training and education in dealing with all the various problems, both inside and out, fitting him for the position far better than the man, who though he be the best of switchman, is uninitiated into the most elementary duties of the office.

No educational code of rules can be written that will so quickly and efficiently produce the desired result, as will a little time spent in oral explanation of the work under discussion. The juniors appreciate their senior's consideration and can question any statement not understood. These personal talks bring out many things which are of benefit to pupil and tutor alike. Many a man with good powers of observation, although young in the service, can offer valuable suggestions with reference to his particular work, which could often be adopted to the benefit of the organization of which he is a part. Another point of importance is that where certain clerical work is performed by one

particular man, the question of understudying that man should not be overlooked; otherwise, should sickness or resignation occur, chaos is the result.

The matter of discipline is a problem materially solved by organization. Firm, fair and considerate treatment invariably obviates friction and creates a feeling of loyalty among the staff and any employee not amenable to such treatment should not be tolerated.

The matter of giving satisfaction to shippers takes considerably more time to accomplish than it does to describe; for it can all be summed up in one sentence—give them good service. It would surprise the uninitiated how quickly the yard staff learns to anticipate the various shippers' requirements. Shippers comprise all sorts and conditions of men, but there are few who cannot be influenced by a courteous and obliging manner. Even the few who are dissatisfied should get the service, anyway. Their money is as good to the company as the others'. The spotting of cars at the freight house is another important feature of the day's work. Less than car lot freight is a great source of revenue and demands constant attention; and although this is more the freight agent's province, and depends largely for its success on the way he handles the merchants, still, if the yard does not co-operate by giving him good service, the merchants will soon be transferring their patronage to other roads. Courtesy often gets the business, but good service keeps it.

The regular movement of cars from the yard should be the aim of all concerned. This is not always the easiest way by any means, but it should be the hard and fast rule, nevertheless. When a string of old loads are pulled from a track, the remaining cars on that track should not be buried from the forwarding end, but should be pulled out onto the head end of the next oldest loads, leaving the track clear for fresh cars. Only about five per cent of the traffic handled, comprising bad orders for heavy repairs, loads to be transferred on account of bad order, cars for icing, errors in billing, etc., demand careful and minute attention. All of the foregoing need the co-operation of various departments, which must be of an expeditious character, if any showing is to be made.

In the making up of trains there is one point which is often overlooked. I refer to what may be called the "purpose" of the train, that is to say, whether the train is to turn at some intermediate yard or go through to the next terminal. It is an easy matter to throw sufficient cars behind an engine to make up the right tonnage, but if there are grades en route which necessitate a reduction, and the important loads are not marshalled, the work of reducing makes considerable switching inevitable, on the part of the train crew, who may probably be blocking other crews in the process; whereas, if the important loads were on rear of train this time would not be lost. When a turn is being built for an intermediate yard, to be used in filling out other trains en route, the important loads should be on the head end, so that the first train filling out gets them.

An important factor for success or failure in the operation of a terminal is the relation existing between the despatcher's department and the yard staff. The yard may or may not be proverbially prompt with trains ordered; they may or may not furnish correct information respecting loads to move, or the despatcher may or may not give the yard a good line-up of incoming trains, including the consist of same; but it is precisely whether they do or not that forms the difference between bad and good working conditions. Failure to have trains ready when ordered gives much trouble to despatchers; and the absence of advice as to incoming trains may mean pulling the pin on work half done.

RAILWAYS IN "BRITISH" SOUTH-WEST AFRICA.—In addition to the restoration of the lines of communication in what may be called British South-West Africa and the rebuilding or repairing of station and other depots, there is a considerable length of narrow-gauge line to be converted to the 3 ft. 6 in. standard South African gauge.—*The Engineer*.

OBSERVATIONS ON FILING CORRESPONDENCE

By C. T. ANDREWS

Secretary to Chairman, Southern Pacific Company

The following observations are offered to fellow railroad employees interested in their office files, especially those who are dissatisfied with the results obtained from their present system. They apply to the use of the Williams Classification, or decimal system of filing, the adoption of which by all railroads has been urged for some years by its authors.* They also embrace a few important features of filing under any system. I make these observations after having installed the decimal system in the chief operating office of the Union Pacific and Southern Pacific systems, and after having watched its operation for more than a year until the unmerging of those two systems. During that time, and with the Southern Pacific files since then, the system has proved very satisfactory. Unlike our past filing systems, the longer it is used the more efficient it becomes.

I do not undertake to describe the decimal system, or to dwell on its advantages, for to do this would take much space and would be to repeat what has already been published in these columns. I only offer my judgment of it, to wit, that it is a good, workable system, correct in principle, and of the greatest usefulness to an office having a large volume of correspondence on a great many subjects. I believe, furthermore, that this classification, or a selection from it of the subjects needed, and following its general plan, will prove satisfactory in a smaller office.

The efficiency of a filing department may be determined by one's answer, applied to his own office, to the following query: What should be the proportion of time spent in hunting things to that spent in filing them? Much time spent in hunting leaves correspondingly less time for filing, and hasty filing causes much time to be spent in hunting. Conversely, careful filing insures quick finding, and quick finding leaves the maximum time for careful filing. The proportion of time spent in hunting files or papers indicates the degree of mastery of the file room work. If one's file service is unsatisfactory, let him ascertain what this proportion is; then let him determine what it should be and give orders accordingly, and whatever is needed to accomplish the improvement will promptly develop, whether it be a better system, a better file clerk, clerical assistance, or something else.

If the adoption of the decimal system is contemplated, it should be well understood before its installation is undertaken. If possible, one experienced in its use and fairly familiar with the office business should be assigned to install it and get it running. If a change is made of filing systems, it is inadvisable to re-index all old files under the new system, however good that system. It is best to set a date, after which all correspondence will go under the new system, and prior to which it will be under the old system. Each active file should bear reference to the old number under which previous correspondence is filed, and to the new number under which subsequent correspondence will be found. Individual files or parts thereof can be brought up from the old system and placed under the new, from time to time, if desired.

In the Williams Classification, which is predesigned to accommodate correspondence on any subject, it is sometimes difficult to decide in which of two or more places a communication should be filed. This is rarely the fault of the classification, when understood, each place having its use. At such perplexing points a file clerk will find it advantageous to record his decision, or ruling, for his future guidance and that of future file clerks. In an important office this is very desirable. A loose-leaf binder will make it possible to keep these rulings and other rulings on special files, in numerical order, and will prove a handy and invaluable auxiliary to the printed classification index book.

It is recommended that the alphabet be utilized to the fullest extent possible, in any filing system. More than half of the files of the average railroad office can be identified by proper name. The simplicity of alphabetically arranging these files commends itself; yet in many offices each of such files is assigned a serial number and laboriously indexed. The Williams Classification provides for the most advantageous utilization of the alphabet, which is one of its best features.

A large office that experiences much difficulty from letters being misplaced or lost, will find a remedy in recording important incoming communications. This helps to locate papers quickly, and to allocate responsibility. The time necessary to record a single communication is negligible, and when a communication is missing it is helpful and gratifying to have a record indicating whether it was received and where it ought to be. These statements are based on experience. A simple record sheet can be devised for this purpose, and the clerical work made very slight. These sheets preserved form a fair chronological record of all important incoming letters.

An important subject, or a subject having much correspondence, may profitably be kept in two sections, one for the papers having enduring or permanent value, such as standing instructions or rulings, the other for papers having a temporary value only. The former usually are in the minority, though their importance is greatest; the latter are the more numerous, or voluminous. The former may be termed the "standing file," the latter the "running file" of the same subject. Under the decimal system the latter are readily kept separate by adding the figures "dash nine" to the file number.

The rule that only a single subject should be included in a communication is generally recognized and adhered to, but the best-intentioned sometimes lapse from it. Again, unavoidably the correspondence will sometimes embrace two or more related phases of a subject for which the file clerk maintains separate files, or one subject will grow out of another. The file clerk must be alert to revert or divert the flow of correspondence into its proper channel (file), also to make necessary cross-references, extracts, or extra copies for other files.

In the preceding paragraph reference is made to separate files for related phases of a subject, and in this connection the observation may be made that as a general thing a unified file is more satisfactory than a minutely subdivided file. It is prudent, therefore, to maintain a unified file wherever practicable, subdividing only when the expediency thereof is developed by experience. And this leads to another observation, that some files kept separate for convenience while active may well be consolidated into a unified file when transferred to storage. The storage section, containing old matter unfamiliar to succeeding new file clerks, should be as uncomplicated as possible.

A word of caution may here be offered to file clerks, not to over-estimate system, nor to become over-dependent on it. There is a temptation to over-enthusiasm for system, which may cause one to *serve it*, more than employ it as a facility. Furthermore, long-continued working under specific and definite rules induces a dependence on such predesigned specifications, a machine-like process of thinking and action, which becomes injurious because it displaces intuition and renders one less able to comprehend new situations and act therein promptly. All should beware of these pitfalls.

Finally, it is to be observed that for every employee there is a satisfaction, amounting nearly to pride, in having a smooth-running filing department. Confusion, impatience and friction are obviated, time is conserved, and work is facilitated and made pleasurable. What is perhaps not yet fully recognized, is that every *user* of the files *contributes* in some measure to the good or bad working of the filing system. To secure best results, *all users* of the files should get acquainted somewhat with their filing system, be interested in it, and co-operate with the file clerk in the little ways they can without inconvenience to themselves.

*W. H. Williams, vice-president, Delaware & Hudson, and John L. Hanna, chairman of committee on handling correspondence, Pennsylvania Railroad.

EFFICIENT CONTROL OF RAILROAD OPERATIONS

By F. L. HUTCHINS

Four functions are required to adequately control any undertaking: (1) Securing complete and accurate knowledge of facts. (2) An analysis of facts to develop the best plan of action. (3) The introduction and maintenance of a plan. (4) Supervision to assure the correct performance of all details of the plan.

Knowledge of facts must be adequate, not only at the inception of the enterprise, but continuously during its progress. Facts are derived from experience; it is upon the experience of the race from the very beginning of existence that many of the facts of the present day depend, but those facts must be supplemented by ever-new facts.

Perfect knowledge of facts can come only through perfect records of experiences; as the records of the past are true so is the knowledge derived from them true; only as present records are exact is the present knowledge exact. As past experiences have been truly recorded, preserved, and available to the present generation, so is its knowledge correct; as present records are made complete and true, so is present knowledge complete and true. Hence it is that the method of making records demands scientific determination; this requirement lies at the base of the science of statistics; in fact, that which often passes for statistics—the tabulation of many figures, the comparison of averages, the setting of aggregates side by side—is not statistics in any sense, for it is only when the original records have been derived through a scientific method that the results can be statistical truths.

To be efficient and successful the inception and conduct of any enterprise must be governed by accurate records; a beginning should never be made until all the facts affecting the enterprise are understood and the probable outcome anticipated. This must be supplemented by accurate records of daily performance if it is to be adequately controlled.

The science of statistics has evolved the laws through which accurate records may be obtained, the principal of which are:

(a) A rigidly exact definition of the facts to be recorded; (b) preparation of a blank upon which the record is to be made; (c) selection of unbiased and careful enumerators to make the record; (d) segregation of the function of sorting, tabulating and aggregating from that of making the records; (e) the use of experts for the analysis of aggregates and extraction of their meanings so that correct knowledge may be had.

In the matter of their records the railroads violate each and every one of these principal laws. A scientific statistical method requires that before the fundamental laws can be complied with there must be a comprehensive plan which includes all of them. In the case of railroads it demands the selection of an expert statistician to have charge, from the making of the original record up to the final analysis.

The method of a record bureau may be outlined as follows: In the first place there must be exact definitions made for each fact that is to be recorded so that the aggregate of any record will be the accumulated instances of the same identical fact, uncontaminated by the admixture of any element not contained within the basic definition; by this means the aggregate will be a single entity, which may be compared with other single entities to establish their relationship and evolve correct conceptions from which alone can come efficient control.

Following the fixing of definitions comes the preparation of the blank upon which the fact is to be recorded. This is no simple matter, as it is too often assumed to be when persons of no experience, or training, are allowed to create blank forms for reports. In form it should be a slip, or card, restricted to the single fact to be recorded; its spaces should be arranged to make for accuracy and ease; in many cases it is possible to so arrange the spaces upon the blank as to make any erroneous entry obvious upon inspection. The required entries should be as simple as is possible; that is, a name, figure, or symbol; it will be found ad-

vantageous in many cases to use a card carrying numbers and symbols which can be punched out to convey the information. The record as to any fact may be fully comprised within a list of questions as shown below, not that every fact requires all of them, for it may be that only one will yield the required information.

- | | | | |
|-------------|----------|------------|----------|
| 1. Where? | 2. When? | 3. Who? | 4. What? |
| 5. Number? | 6. Rate? | 7. Amount? | 8. Kind? |
| 9. Quality? | 10. Yes? | 11. No? | |

Assurance that a record is made of every occurrence of the fact may be had by so arranging the records as to have subordinate ones that must agree in aggregate with a principal one of which they form the parts.

It is obvious that the combined totals of the subordinate facts must agree with the total of the principal fact if the records are correct.

To obtain the most perfect results the record bureau must arrange to have the record pass out of the hands of the recorder, as soon as made, into the hands of persons specially selected by the bureau and subject to its supervision, to be sorted, summarized and tabulated. These persons should be taught the necessity of absolute accuracy in their work; to eliminate all prejudice, and to carefully scrutinize the original records for faults and errors.

The bureau should provide a tabulation sheet for each fact so arranged as to make the totals of the several columns self-improving; it should see to it that the tabulation be made as near the source of records as the situation will permit, but in no case beyond the limit of the division authority. Tabulations should be totaled daily and from these totals there should be daily statements placed before the division officials showing the percentage of efficiency attained, with all instances much above the average, which increase the efficiency percentage, and all those instances below the average, which decrease it.

Such knowledge liberates control from all estimates, biased information, fallacious personal observation and prejudice; it furnishes an accurate basis for adequate control; it points out the places which require study and remedial applications, by which wastes will be lessened and more efficient operation secured.

Duplicate copies of the tabulations going to the record bureau headquarters will be consolidated into aggregates for the whole system from which the higher officials may obtain exact knowledge of the situation, not at the end of a month or two, but from day to day as they may have the need.

Analysis and comparison of the various aggregates from each of the divisions will enable the supervisor of records to deduce the best method of operation, and with this information the executive may require such observance as will raise the efficiency of the system as a whole.

Finally from correlation, comparison and analysis the statistician will be able to point out the weak places, the possible prevention of wastes and improvements in methods; with such guidance the authorities can have experts study the operation on the ground and determine the best course of action in each case.

As a straight line is the shortest distance between two points, and as the scientific method makes the shortest path from the original record to its aggregate for the entire system, it makes for the smallest expense—an expense that will be very much less than that now entailed by the circuitous, duplicated, uncoordinated and misleading reports of the present day.

Having all the facts it is a comparatively simple matter to adequately control the details of operation, to eliminate the "rule of thumb" method, to obviate the necessity of that most fallacious method, personal observation, and to exercise that definite control, by the record, which is the function of the governing head.

Common sense is the wisest dictator, and common sense is but another name for that rarest of things, complete knowledge of facts and their relationships.

EXTENSIBLE TRAP DOOR FOR PASSENGER CARS

The Pennsylvania Railroad has built high station platforms at its New York terminal, at Manhattan Transfer, Rahway and North Philadelphia, and has similar platforms under construction at Wilkesburg and Johnstown on its Pittsburgh division. It is often impossible to build tangent platforms, owing to the physical conditions at stations and a difficulty has arisen in connection with the adoption of the high platform where it is built on a curve, owing to the gap between the end of the car and the platform.

With a view to overcoming this difficulty the Pennsylvania has equipped for trial a steel vestibule car with an extensible trap door patented by Elwood H. Sickels, 213 Woodside avenue, Narberth, Pa., which is designed to bridge the gap between the car and the station platform. The operation of this device is practically automatic. When the trap is down the opening of the vestibule door causes the sliding portion to extend be-

attached to the top plate bracket *F*. When the trap is extended, owing to the fact that it is supported at one side on lug *F'*, and at the opposite side on the usual angle iron ledge, the extended portion is prevented from deflecting when a passenger steps on it. Spring catches *G* and *H* of the usual type are used to hold the trap door down when the door is closed and to hold it up against the vestibule door when it is raised for the use of the steps.

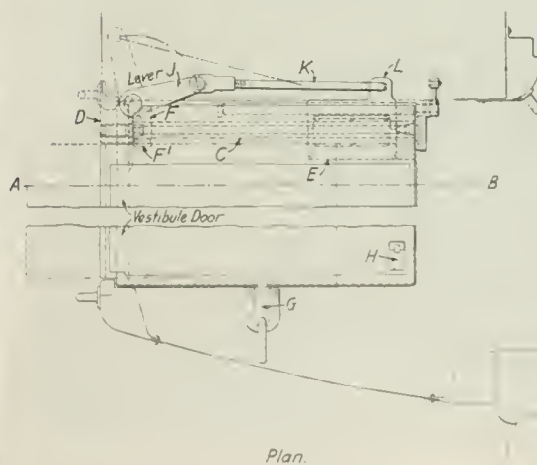
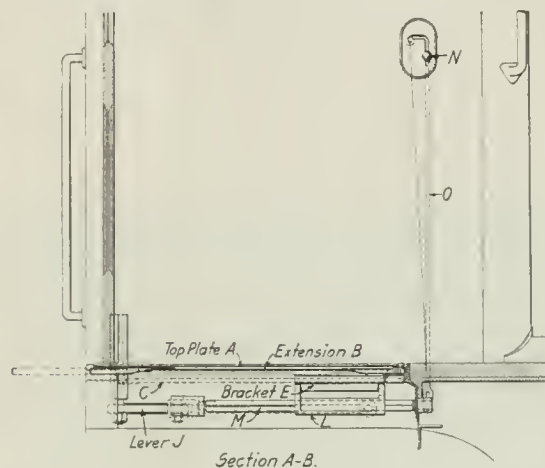
The operating device consists of a bell crank lever *J* attached to the bottom of the vestibule door, the connecting rod *K* and the cam *L* which slides on the square shaft *M*. The rod shown at *O* is attached to the end of a lever which turns the square shaft. The upper end of this rod extends through a slot in the end of the car and is provided with a knob by means of which it may be raised to the position shown by the dot and dash centerline, or returned from that position to its normal position as shown in the drawing. In the latter position the cam *L* on



Trap Extended at a High Platform

yond the side of the car; closing the door returns it to its normal position. When the trap is to be raised for the use of the step, or when the brakeman opens the door while the train is moving the trap should not be extended. To provide for this feature a small handle is set flush in the end of the car body, by means of which the connection between the door and the trap extension may be disengaged.

The extension trap in outward appearance is like the ordinary trap, and consists of a rubber covered top plate *A* and an extensible portion *B*, which is built in the familiar panel pattern and acts as a support for the top plate. The two parts are hinged on the rod *C* so that they act together when the trap is raised for the use of the step. The hinge rod is hollow and accommodates the flat springs which are adjusted at the bracket *B* to obtain the proper tension. The extensible portion of the trap is supported by bracket *E*, which slides on the hinge rod and lug *I*



Details of Sickels Trap Door Extension

the square shaft engages a taper lug on bracket *E*, through which the trap extension is moved by lever *J* and connecting rod *K* when the door is opened. When the knob *N* is in its upper position the cam is disengaged from the bracket on the extension and opening the door has no effect upon the trap. The cam is so designed, however, that when released its front finger is always in position to prevent the trap from being extended independently, thus making it impossible for the trap to be out when the door is closed. The trap is so arranged that it is impossible to raise it when extended, due to interference between the corner of the extension and the hinge bracket *D*. The trap is designed with a uniform extension to take care of the gap at platforms built on curves as sharp as 6 deg. On lighter curves the extension may slightly overlap the platform, the latter, of course, being kept a small step below the floor of the car. Owing

to the varying height of car floors above the top of the rail, due to differences in springs, etc., it has been found impossible to maintain the car floor level with the station platform.

It is unnecessary to provide extra trainmen to attend to the operation of this trip, as with the small hand lever set in proper position, the opening of the vestibule door, whether accomplished by the trainman or passenger, will cause the trap to extend. Owing to the fact that the top plate does not slide, it is impossible for passengers to be thrown by the extension.

CAR LIGHTING GENERATOR WITH UNDER-FRAME SUSPENSION

An electric car lighting equipment has recently been brought out in which the generator is suspended from the underframe of the car instead of from the truck. The deep center sill generally used on all-steel and steel underframe equipment has limited the space available for applying the generator to such an extent that it is difficult to obtain the proper clearances for the generator and the driving belt with truck suspension.

The general appearance of the generator and its suspension and the method of attaching it to the underframe is shown in Fig. 1. The successful operation of this type of suspension de-

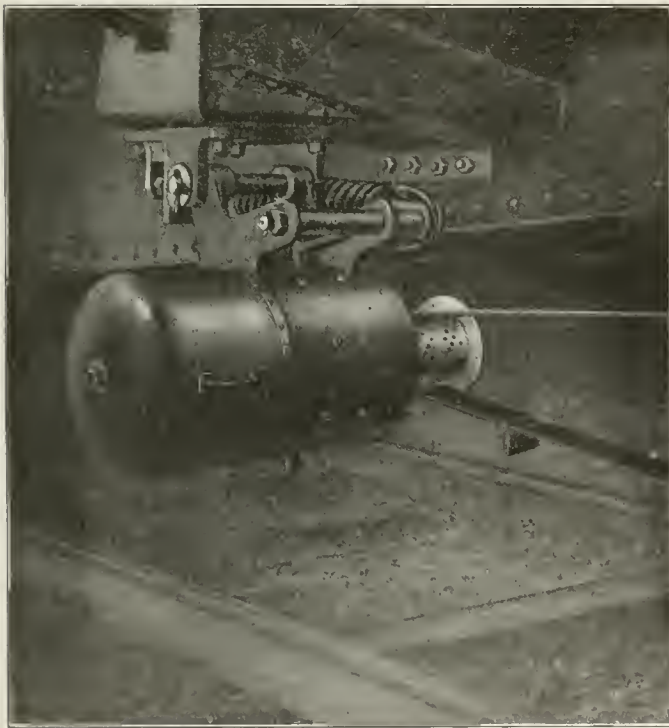


Fig. 1—Generator and Its Suspension Attached to Coach Underframe

pends on the ability to maintain a uniform belt tension through the comparatively wide range of adjustment necessary to take care of the curving of the truck. The method of securing uniform belt tension will be understood by referring to Figs. 2 and 3. Cast on the generator frame are two carrying lugs *A*, which are pivoted to supporting lugs *B* on the suspension casting by a bar, the end of which is shown at *C*. One end of the tension spring is secured to a bracket *E* on the suspension casting, while the other end engages with the lug *D* on the generator frame. The tension of the belt is the result of two varying factors, one of which is the horizontal component of the weight of the generator, and the other the tension of the spring. When the generator is hanging as shown in Fig. 2 with its center of gravity directly under the supporting bar *C*, the weight of the generator has no effect on the tension of the belt, but the tension of the spring has its greatest effect, since the lever arm *CX* is greatest. When the generator is swung

into the position shown in Fig. 3, the effect of its weight is a maximum, while the effect of the spring is decreased due to the shortening of the distance *CX*. The parts are so designed that the combined effect of these two factors is practically constant in all positions. Ample latitude is provided between the two extreme positions shown to take care of belt stretch and the varying location of the axle due to the curving of the truck. The spring is assembled on a carrier under tension.

A simple means of lining the generator with the car axle is provided. The hole for the supporting bar in the lug *B* is slot-

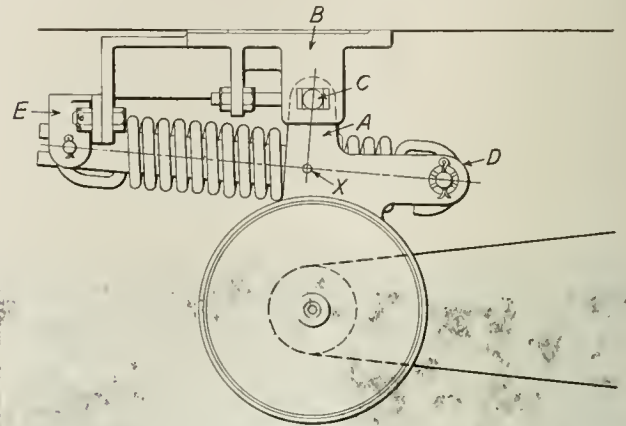


Fig. 2—Generator Position When Spring Effect Is a Maximum

the position of the bar in the slot being readily adjusted and locked by means of a bolt and lock nuts.

The increased belt clearances obtained with this equipment have made possible the use of a type of belt fastener which operates properly on small pulleys. A small armature pulley has therefore been used and a ratio higher than usual obtained between the axle pulley and the armature pulley. The increased speed of the generator thus produced has made possible the design of a generator of lighter weight. This saving together with the reduction of the weight of the suspension itself has resulted in a total reduction for this type of equipment of nearly 900 lb., and the truck has been entirely relieved of the unsprung and unbalanced weight usually suspended from one end of its frame.

The underframe suspension has made possible a considerable

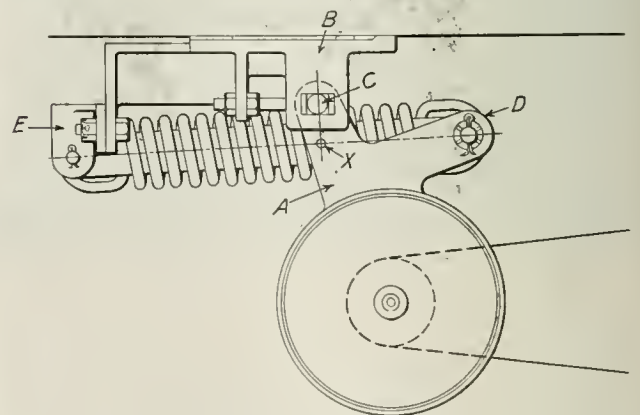


Fig. 3—Position of the Generator When Weight Effect Is a Maximum

increase in the clearance between the generator and the track, and the moving parts of the suspension are still further removed from the track by being placed above the generator. The effect of snow and ice in severe weather conditions is therefore considerably reduced. The suspension of the generator from the car body also produces more favorable conditions with regard to wear since the moving parts, both of the generator and the suspension, receive the full benefit of the truck springs. This equipment is manufactured by the Safety Car Heating & Lighting Company, 2 Rector street, New York.

General News Department

The Erie has announced that surplus strips of right of way adjacent to the tracks between Chicago and Marion, Ohio, are to be leased to farmers.

Governor Henderson of Alabama has vetoed the anti-tipping bill passed by the state legislature on the ground that he did not believe the law could be enforced and that its constitutionality was doubtful.

The Grand Trunk Pacific now uses oil-burning locomotives exclusively on passenger trains throughout the line from Jasper to Prince Rupert, 719 miles. This is the main line on the mountain section, and passes through some of the finest scenery in the Canadian Rockies.

A demonstration of the Gollos automatic train control system will be held on the Chicago, Burlington & Quincy between Sugar Grove and Big Rock, Ill., about 40 miles from Chicago, on August 3 and 4. The installation is to be given exhaustive tests, beginning this week, under the observation of inspectors of the division of safety of the Interstate Commerce Commission.

All of the fast westbound Lchigh Valley freight trains out of New York and Philadelphia during June arrived on time at terminals. Deliveries of this fast freight at Buffalo and Suspension Bridge, which are made to the Lake Shore, the Wabash, the New York, Chicago & St. Louis, the Michigan Central, the Grand Trunk, and the Pere Marquette were made on or before schedule time every day in June.

The demurrage bureaus at Chicago, Milwaukee, Peoria, Minneapolis, Duluth and Butte have been abolished, effective on July 31, and their work will be taken over by the individual roads. The bureaus at Kansas City, St. Louis and Denver are to be continued for a time, although some of the lines have withdrawn as members. The bureaus in the territory east of Chicago and north of the Ohio river were abolished in 1910.

In the news item headed "Southern Railway's Accident Record" in the *Railway Age Gazette* of July 23 it was said that the Southern Railway had carried "16,500" passengers in the year ended June 30 with no passenger killed in a train accident. This should have been, of course, 16,500,000, the point being that this company, operating over 7,000 miles of railroad, had not a single passenger killed in a train accident during the past year.

In connection with double track work in Virginia and North Carolina during the past fiscal year the Southern Railway has eliminated 54 out of 73 grade crossings. By the building of underpasses 20 were eliminated, by overhead bridges 19, and by changing the direction of public highways 15. The 19 which remain are so located as to make their elimination physically impossible or they involve prohibitive damages to abutting property.

The Liberty bell, which was sent from Philadelphia to the San Francisco exhibition, made the journey in a car specially designed and equipped for it by the Pennsylvania Railroad. The car was attached to a special train, carrying the escorting city and state officers, which was in charge of the Pennsylvania Railroad's representatives through the entire journey. The steel gondola car on which the bell rests was equipped with specially designed springs, and festooned with electric lights which brilliantly illuminated the bell at night.

Riley E. Phillips, runner of the bankers' express from New Haven to New York, has completed fifty years in the continuous service of the New York, New Haven & Hartford. As the ranking of engineers he was the recipient of congratulatory messages from officers and fellow employees. He was born in 1846 in Westport, Conn., and served in the 15th Connecticut Volunteers through the civil war. Mr. Phillips entered the employ of the New York & New Haven July 18, 1865, as fireman. At that time the road operated 73 miles and owned 31 engines.

The Pennsylvania Railroad announces that there was no truth in the report that the fast freight train that was derailed near

Metuchen, N. J., on July 25, was loaded with war munitions. Many of the New York daily papers published an account which said that the train contained explosives and that an officer or employer of the road had said that it was only a miracle that the Atlantic Coast Line express, consisting of 11 cars, had escaped destruction, since it had passed the freight train but a moment before the wreck. The company says that as a matter of fact there was no car loaded with explosives of any kind, or even with highly inflammable material, and that the car on which the broken axle occurred was loaded with flour.

The Cincinnati, Hamilton & Dayton is to pay pensions to employees. According to the regulations, announced by General Manager J. M. Davis, with the approval of the receivers, employees who have completed 50 years' service will be retired and will receive 1 per cent of their average salary or pay during the 10 years preceding retirement for each year of service; that is to say, 50 per cent of their average income during the last 10 years. Leave of absence, unattended by other employment, or dismissal followed by reinstatement within one year, will not be taken into consideration on the personal records, nor will furloughs on account of compulsory reduction of forces be counted as a break in the continuity of service for computing a pension record.

A prize of \$50 has been awarded by Major Robert U. Patterson, of the United States Army Medical Corps, payable from the William Howard Taft fund, to James Haley, a brakeman on the Buffalo, Rochester & Pittsburgh, for first aid work by railroad employees. The second prize—\$25—was awarded to Clarence J. Widner, a conductor on the Buffalo, Rochester & Pittsburgh. Brakeman Haley was on a train when he noticed some boys playing with a little express cart on a high bank, and as the train passed, the cart rolled down the bank and threw one of the boys under the train, crushing his leg. Haley made a tourniquet from a woman's apron string and a stone and so prevented the boy from bleeding to death. Conductor Widner applied first aid to a cook in a dining car, whose cheek had been cut through by a can exploding, and prevented the man from bleeding to death.

Car Service Rules Amended

Secretary W. F. Allen announces the adoption by the American Railway Association by large majorities of the amendments to the per diem and car service rules proposed at the meeting of the association last May. Per diem rule 14 is amended so that a road failing to receive empty cars promptly from a connecting line shall be responsible for double the per diem on such cars after the first day for which reclaim is made.

Car service rule 5 is amended so as to require the delivery, with every car, except cars of private ownership, of a continuous home route card or substitute. A car need not be considered as delivered by a connection unless accompanied by the card.

Five Years of Safety First on the North Western

R. C. Richards, chairman of the Central Safety Committee of the Chicago & North Western, has issued a bulletin giving figures showing the results of the safety first movement on this road during the past five years, since the organization of the safety committees. For the fiscal year ended June 30, 1910, the number of employees killed was 107, and the number injured was 8,629. In the five years ended with June 30, 1915, since the safety first committees were organized, the number of killed has been respectively, 90, 70, 69, 63 and 36, and the number of injured, 7,135, 5,907, 6,412, 5,912 and 5,203.

As compared with five years on the same basis as the year ending June 30, 1910, this represents a reduction of 207 in the number of employees killed, a decrease of 38.7 per cent; a reduction of 12,576 in the number of employees injured, a decrease of 29.1 per cent; a decrease of 3 in the number of passengers killed, or 5.4 per cent, of 1,091 in the number of passengers in-

jured, or 23½ per cent; of 216 in other persons killed, or 18.4 per cent, and 252 in other persons injured, or 8.3 per cent. There was an increase of 5 in the number of car repairers killed; of 769 in the number of car repairers injured, and of 6 in the number of unclassified employees injured. This represents a total decrease of 426 in the number of persons killed, or 24.1 per cent, and of 13,919 in the number of persons injured, or 27.4 per cent. All injuries to employees are counted where the injured person lost more than one day's time. No passenger was killed in a train accident on this road during the last two years, during which time approximately 66,000,000 passengers were transported. The mileage of road on June 30, 1910, was 7,953, and on June 30, 1915, was 8,423. Mr. Richards says in the bulletin: "If we could operate the railroad for two months in the last fiscal year as we did in April and June, without an employee being killed, why cannot we do it for six months this fiscal year?"

Department of Public Policy and Relations

The executive Committee of the Associated Railroads of Pennsylvania and New Jersey, which consists of R. L. O'Donnell, general superintendent of the Pennsylvania Railroad, chairman; J. B. Fisher, superintendent New York division of the Pennsylvania Railroad; C. H. Ewing, general superintendent of the Philadelphia & Reading; F. Hartenstein, assistant to general manager of the Lehigh Valley, and P. C. Allen, division superintendent of the Baltimore & Ohio, conducting the campaign against the full-crew laws, recommends a permanent "department of public policy and relations."

The committee's report contains the following:

"In the judgment of your executive committee, the results of this campaign prove conclusively that the railroads should take active measures to identify themselves, in a proper manner, with matters of public interest. They should not become active in political affairs, but they should organize to protect themselves against the enactment of vicious legislation and, at the same time, lend their aid and influence in the passage of proper laws. This will protect not only the railroads but the public as well, who suffer from the financial burdens imposed by ill-advised legislation.

"The foundation for a move of this kind has now been laid. The conviction is strong that our recent campaign went far towards establishing a firm and proper understanding between the railroads, their great body of employees and the public. The interests of all are closely inter-related. Their association is so intimate that there are no hard and fast dividing lines. The public has not always realized this, and possibly railroad officers have not appreciated it as they should. The opportunity for correcting this condition is now presented. The people have demonstrated that, when properly informed, they will support the railroads when their cause is just. They are awakening to the fact that vicious legislation enacted against railroads reacts on themselves.

"The railroads should press forward for what is right and proper. They should do this courageously and without apology, for none is necessary. They should be equally careful not to ask for assistance in obtaining anything to which they are not fairly entitled. They should proceed in the open and depend upon frank publicity as their greatest protection. Fair and honest propositions thrive through publicity—unfair and dishonest propositions are destroyed by publicity.

"In the opinion of your committee, there should be a permanent organization created, which could be known as the 'Department of Public Policy and Relations,' to represent the railroads in matters of public interest and in such other respects as may be deemed proper along the lines adopted by this committee in the recent campaign. The creation of this organization should be made known to the public at the start, and the purposes for which it was established specified.

"If the formation of a general organization of this kind is approved by the railroads interested, it will, of course be necessary to create a similar local organization on each railroad to assist in carrying on the work outlined by the officer in charge of the Department of Public Policy and Relations.

"Your committee strongly recommends that prompt action be taken looking towards the creation of this general organization

and similar supporting organizations on the railroads interested. The details will, of course, have to be worked out later.

"As an indication of the necessity for action along the lines suggested, your committee desires to call attention to the recent creation by the four brotherhood organizations, comprising employees in the train service, of a committee known as the Joint National Legislative Board, to represent the organizations in legislative matters; and similar local committees are being formed at many points. It is, therefore, not only fair, but essential, that the railroads should likewise organize, only on broader and more comprehensive lines.

"The railroads, in addition, should do everything consistent and proper to foster more friendly and intimate relations with business interests in the territory through which they operate by broadening their many business connections, and by giving greater attention to matters of local interest. They should also keep their local representatives and officers in more intimate touch with their security holders residing in local territory.

"In making the foregoing recommendations, your committee is not unmindful of the efforts made in the past to handle matters such as we suggest be handled in the future by the proposed Department of Public Policy and Relations."

Meeting on Plans to Minimize Empty Car Movement

The committee of twenty-five appointed by the president of the American Railway Association, consisting of 15 transportation officers and 10 mechanical officers, representing various sections of the country, in accordance with a resolution adopted at the meeting in New York on May 19, to meet with the Committee on Relations Between Railroads and the Executive Committee of the Master Car Builders' Association and "develop some workable plan to minimize the movement of empty cars in good and bad order," held its first meeting at Chicago on July 26. The committee received and discussed a large number of suggestions which have been made to accomplish the purpose for which the committee was appointed, including, it is understood, several of the plans which are now in effect on different roads and which have been described from time to time in the *Railway Age Gazette*; and adjourned to meet again at the call of the chair for further consideration of the subject.

The committee as appointed, includes the following 15 transportation officers: A. Hatton, general superintendent of car service, Canadian Pacific; Charles Ware, general manager, Union Pacific; W. B. Storey, vice-president, Atchison, Topeka & Santa Fe; H. E. Byram, vice-president, Chicago, Burlington & Quincy; A. C. Ridgway, chief operating officer, Chicago, Rock Island & Pacific; J. T. King, general superintendent of transportation, Atlantic Coast Line; A. J. Stone, vice-president, Erie; J. A. Middleton, vice-president, Lehigh Valley; W. C. Kendall, superintendent car service, Boston & Maine; J. A. Somerville, superintendent of transportation, Missouri Pacific; G. T. Slade, first vice-president, Northern Pacific; E. E. Betts, superintendent of transportation, Chicago & North Western; N. D. Maher, vice-president, Norfolk & Western; A. W. Thompson, third vice-president, Baltimore & Ohio; P. E. Crowley, assistant vice-president, New York Central; A. R. Whaley, vice-president, New York, New Haven & Hartford; and the following mechanical officers: H. M. Curry, mechanical superintendent, Northern Pacific; T. H. Goodnow, assistant superintendent car department, Chicago & North Western; W. H. Lewis, superintendent motive power, Norfolk & Western; F. H. Clark, general superintendent motive power, Baltimore & Ohio; G. W. Wildin, mechanical superintendent, New York, New Haven & Hartford; D. F. Crawford, general superintendent motive power, Pennsylvania Lines West; J. J. Hennessey, master car builder, Chicago, Milwaukee & St. Paul; James Coleman, superintendent car department, Grand Trunk; F. F. Gaines, superintendent motive power, Central of Georgia.

American Association of Demurrage Officers

The semi-annual meeting of the American Association of Demurrage Officers was held at Milwaukee, Wis., on July 21, with 16 members present. Most of the time of the meeting was spent in discussing a plan for a re-codification of the demurrage rules and of various explanations and interpretation of the rules

in the interest of simplification. It was believed that without changing any of the provisions such a re-codification would greatly simplify the rules and eliminate possibilities for misunderstandings. A tentative set of rules was formulated at the meeting and a copy furnished to each member to consider in preparation for an adjourned meeting on the same subject to be held possibly next month.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday of each month, Pittsburgh.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 14-16, 1915, Chicago.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SIGNAL AFFILIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, September, 1915.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.—John J. Kantzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Genl. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, 1st Tuesday in month, except June, July and August, Hotel Astor, New York.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- TRAVELLING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-10, 1915, Chicago.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1141 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADIAN RAILWAY CLUB.—J. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—L. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Menadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The New York State Public Service Commission, Second district, reports that all of the principal roads have issued revised tariffs regulating the sale and use of party tickets and fixing the charges for special trains. The most important change is the reduction of the requirement as to the minimum number of fares to be paid when special baggage cars are used, from 40 full fares to 25 full fares. This change takes effect August 15.

The Baltimore & Ohio with a view to bringing growers in touch with profitable markets, has issued a booklet containing lists of apple and peach growers in Maryland, Virginia and West Virginia and of the larger dealers in the markets of New England, New York, Philadelphia, Baltimore, Pittsburgh, Cleveland, Chicago, Cincinnati, Louisville and St. Louis. In the case of growers, the post office address and variety of fruit grown are given; while in the list of dealers the street address is given.

The Chicago-St. Louis roads have served notice that they will withdraw the \$12 round-trip summer excursion rate between Chicago and St. Louis on August 25. The rate was originally published to apply from St. Louis to Chicago and return. The Business Men's League of St. Louis protested against the rate because it took people to Chicago, while correspondingly low rates were not made to St. Louis. After a conference between the passenger officers and representatives of the league the rate was made effective in both directions.

Having in mind particularly the needs of women who travel without male escorts, the Oregon-Washington Railroad & Navigation Company has appointed women assistants in its city ticket offices in Portland, Seattle, Spokane and Walla Walla. It is expected that this innovation will be so popular that the making of preliminary arrangements for journeys will become a pleasure, and that women who travel will no longer have any inclination to call on their male friends for assistance. This new arrangement went into effect June 20, and if it meets expectations it will be extended to other places on the Union Pacific System.

On Sunday, July 25, the Wabash established three new lines of sleeping cars to Hot Springs, Ark., Houston, Tex., and El Paso, Tex., in connection with the St. Louis, Iron Mountain & Southern, the Texas & Pacific and the International & Great Northern. The cars for Hot Springs and El Paso will be run on the "Banner Limited," leaving Chicago at 12:02 p. m., and the car for Houston will run on the train leaving Chicago at 11:55 p. m. A new train to be known as the Morning Banner Limited, was put in service on the same day from St. Louis to Chicago, leaving St. Louis at 9:01 a. m., daily, and arriving in Chicago at 4:53 p. m.

SWITZERLAND.—The main standard gage lines in Switzerland naturally depend mostly upon international traffic. For a while, although international passenger traffic fell off enormously after the beginning of the war, so that only a very much reduced timetable was in force, the heavy freight traffic between Italy and Germany to some extent compensated the Gothard, and also the Loetschberg-Simplon line for the loss of passenger traffic.

ECUADOR.—Notwithstanding the continued financial stringency from which Ecuador is suffering, a considerable amount of new railway and other construction is being carried out. The greater part of the work is in the hands of American firms. The Curaray railroad, which is being built from Ambato to the navigable waters of the Curaray river, a tributary of the Amazon, is making good progress, and may be completed before the end of the summer. In the meantime, so as to be in readiness for the traffic which is confidently expected to present itself, the contractors are building a large number of cars and putting together several locomotives in their own shops. Already a small private railroad adjoining the Curaray line at a place called Naranjo and which is destined to bring to it considerable traffic, is completed and fully equipped. Hitherto local transportation has been carried on by water; but the advent of the railroad will now cause all carrying to be conducted by road, and the whole district will benefit accordingly.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Complaint Dismissed

Alton Box Board & Paper Company v. Illinois Terminal et al. Opinion by the commission:

The rates on straw from points on the Missouri, Kansas & Texas to Alton, Ill., are not found unreasonable. (35 I. C. C., 1.)

Pect Brothers Manufacturing Company v. Illinois Central et al. Opinion by the commission:

An import rate of 33 cents a 100 lb. on coconut, copra, palm and palm-kernel oils in carloads from New Orleans to Kansas City, Mo., is not found unreasonable or discriminatory. (34 I. C. C., 624.)

W. J. Echols & Company et al. v. Ahnopee & Western et al. Opinion by Commissioner Harlan:

The commission finds that the carriers have not justified proposed increased rates on cheese from producing points in the Green Bay and Lake Winnebago sections of Wisconsin to points in Arkansas, including Fort Smith, Mena and Pine Bluff. It is found, also, that the rates now in effect between the points in question are not unreasonable. (34 I. C. C., 644.)

Cleveland Salt Company v. Pennsylvania Company et al. Opinion by the commission:

The commission finds that charges for the storage of a carload of salt at La Grange, Ga., were not shown to have been unreasonable or discriminatory. The carriers do not ordinarily impose storage charges for profit, but to prevent congestion of their terminals. On that account storage charges of public warehouses do not afford a fair test of the reasonableness of storage charges imposed by carriers. (34 I. C. C., 638.)

Chamber of Commerce of the City of Milwaukee v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Harlan:

The complainant alleges that the rates on grain and flaxseed from certain points in Iowa, Minnesota and South Dakota to Milwaukee, Wis., are unreasonable, and subject that place to a disadvantage, and compares these rates to the rates from the same points in Minneapolis. The commission notes, however, that this comparison leaves out of consideration the rates on these commodities from the territory of origin to other points to which rates are made with relation to the rates to Minneapolis and to Milwaukee. In *Chicago-Duluth Grain Rates*, 27 I. C. C., 216, and in earlier reports, the commission has passed upon the rates on grain and the relationships that should obtain between such rates to Minneapolis and to the ports on Lakes Superior and Michigan from the territory named, and nothing in this case is persuasive that the rates to Milwaukee or their relationships to the rates to other places should now be disturbed. (34 I. C. C., 581.)

Rates on Coal to Omaha, Neb.

In re coal rates from Illinois mines to Omaha, Neb., and other points. Opinion by the commission:

The commission finds that the carriers have justified a proposed increase from \$2.05 to \$2.25 a net ton, in the rate on bituminous coal from points on the Southern Railway in the Belleville district in Illinois to Omaha, Neb., and points grouped therewith. (34 I. C. C., 623.)

North Bound Rates on Hardwood from the Southwest

Opinion by Commissioner Hall:

In *Northbound Rates on Hardwood*, 32 I. C. C., 521, the commission held that the carriers, with few exceptions, had justified certain increased rates on hardwood from southwestern points of production to northern destinations. Upon a reconsideration of the case, in the light of the reargument based thereon, and on the record in *Rates on Lumber from Southern Points*, 34 I. C. C., 652, it is now held that the conclusions expressed in the former proceeding should not be changed. (34 I. C. C., 708.)

Rates from Danville, Va.

City of Danville, Va., et al. v. Southern Railway et al. Opinion by Commissioner Clements:

The commission finds that the general adjustment of rates between Danville, Va., and points in the west, east and south is not unreasonable or discriminatory, but in view of readjustments in rates from the west to points in North Carolina and in South Carolina, and the establishment to such points of rates on grain and grain products and on flour lower than the class rates, the carriers will be expected to establish corresponding rates on those commodities to Danville. A rate of \$2.20 a net ton on bituminous coal to Danville from points in the Pocahontas fields of West Virginia is found unreasonable, and a rate of \$2.10 is prescribed for the future. (34 I. C. C., 430.)

Conference Ruling

The commission has issued the following conference ruling:

A company owns and leases cars to railroad companies on a mileage basis and ices and re-ices such cars at various points on the carriers' lines at the expense of the carriers. Inasmuch as the furnishing of cars and the icing of cars are duties imposed upon carriers under section 1 of the act, and following the principle laid down in conference ruling 208 (B), it is held that passes may lawfully be issued to the officers and employees of the car company when traveling solely for the purpose of furnishing or icing cars for shipments over carriers' own lines, but may not lawfully be issued to or used by the officer of the car company when not traveling in the performance of a bona fide service for the carrier.

Rates on Wheat from Hillsdale and Litchfield, Mich.

F. W. Stock & Sons v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Hall:

The through rate on wheat, all rail, from Minneapolis, Minn., via Chicago and Hillsdale and Litchfield, Mich., to New York, and to other points taking New York rates is one cent a 100 lb. higher than on flour. The aggregate rate on wheat shipped from Minneapolis, milled in transit at Hillsdale or Litchfield, and forwarded thence as flour to New York, is 1.7 cents higher than on flour. The commission holds that this aggregate rate is prejudicial to the complainant engaged in milling wheat into flour at Hillsdale and Litchfield, to the extent that it exceeds by more than the established transit charge, the rate in effect on flour from Minneapolis to New York and to other points taking the New York rates. The decision in *Federal Milling Company v. Minneapolis, St. Paul & Sault Ste. Marie*, 27 I. C. C., 696, is cited and followed. (34 I. C. C., 481.)

Grain Elevation Allowances at Kansas City

In re grain elevation allowances at Kansas City, Mo., and other points. Opinion by Commissioner Hall:

The commission finds that the defendants have justified proposed cancellations of tariff provisions for the payment of an allowance of one-fourth cent a bushel now made to elevator operators at St. Louis, Des Moines, Fort Worth, Kansas City, Omaha and other points, chiefly in the Missouri river territory, for elevation of grain and seeds destined to all points west and southwest of the Missouri river, and in Louisiana west of the Mississippi. Cancellations were not proposed on shipments to the Mississippi river crossings or points taking the same rates, or to points east thereof, or upon any shipments when for export. The carriers contended that the elevation in question is commercial rather than transportation elevation as defined in *In re Elevation Allowances to Elevators*, 10 I. C. C., 309, and that there is little occasion for transfer of grain at a terminal market. (34 I. C. C., 442.)

Rates on Fuel Oil to Points in Arizona

Pacific Creamery Company v. Southern Pacific et al. Opinion by Commissioner McChord:

In its original report in these cases, 29 I. C. C., 405, regarding the rates on fuel oil from California producing points to Creamery and Gilbert, Ariz., and the rates on fuel and refined oil from eastern and western producing points to all points in Arizona, the commission made certain readjustments in rates, but the

order in the case was later set aside, because it was felt that the matter had not been given sufficient consideration.

On a rehearing it is now found that the \$6 rate charged by the Southern Pacific on fuel oil from California oil-producing points to Creamery and Gilbert, Ariz., should not exceed \$5 a ton from Los Angeles and \$5.50 from Bakersfield.

Lower rates are also prescribed on refined oil and fuel oil from Bakersfield and Los Angeles to Hayden, Tucson, Douglas, Phoenix and other points in Arizona. The rate on distillate must not exceed 80 per cent of the rate on refined oil. (34 I. C. C., 586.)

Rates to Spartanburg, S. C.

Spartanburg Chamber of Commerce v. Southern Railway et al.
Opinion by Commissioner Clark:

Upon complaint against the reasonableness of defendants' class and commodity rates to Spartanburg, S. C., from eastern points, both all rail and ocean and rail; from Buffalo-Pittsburgh territory; from Ohio and Mississippi river crossings and points in Central Freight Association territory; and from Virginia cities, the commission finds:

The ocean-and-rail rates from eastern points to Spartanburg via Charleston, S. C., are discriminatory in so far as they exceed the ocean-and-rail rates to Charlotte, N. C.

All-rail rates from the east to Spartanburg are discriminatory in so far as they exceed the all-rail rates to Charlotte by more than the rates to Spartanburg from the Virginia cities exceed the rates to Charlotte from the Virginia cities.

A fourth section application seeking authority to charge joint through rates from eastern points to Spartanburg higher than the combinations on Norfolk, Va., is denied.

Rates from Ohio and Mississippi river crossings and points in Central Freight Association territory to Spartanburg on traffic moving through Ohio river crossings and Asheville, N. C., are discriminatory in so far as they exceed the rates to Charlotte.

Rates from Buffalo-Pittsburgh territory and from the Virginia cities to Spartanburg are not shown to be unreasonable or discriminatory. (34 I. C. C., 484.)

Lighterage and Storage Regulations at New York

Opinion by Commissioner Meyer:

The railways operating lines which enter New York City from the west and from the north filed tariffs, to become effective January 1, 1915, which proposed changes in their regulations governing charges and service in connection with the delivery and receipt of freight at that terminal. The effect of practically all of these proposed changes would be to increase the charge for the service rendered, either by a direct increase in the rate or by the discontinuance or reduction of service rendered for the rate now in force. The operation of the proposed tariffs was suspended until May 1, 1915, and by a later order until November 1.

The commission finds that the carriers have justified: a proposed reduction of the period of free storage on the New Jersey shore from 10 to 5 days as to domestic inbound freight for delivery at New York; a proposed increased charge of one cent a 100 lb. for each 10 days or fraction thereof for storage on the New Jersey shore of freight for New York delivery after the reduced free storage period; proposed increased charges for handling and storing heavy iron and steel articles, cooperage stock, and sawed stone; a proposed charge of 3 cents a 100 lb. on less-than-carload lots of westbound freight lightered or floated with a carload or more of lighterage free freight, and proposed increased charge for staking, wiring, or cleating shipments of lumber, telegraph poles, etc.

They have not justified: a proposed reduction of the period of free storage on the New Jersey shore from 10 to 5 days of domestic inbound freight destined for coastwise transshipment; a proposed reduction of period of the free storage at railroad pier stations of domestic inbound freight from 3 to 2 days; a proposed reduction of the period of free storage of export less-than-carload freight at railroad pier stations from 10 to 2 days; a proposed charge for loading to or unloading from lighters at other than station piers or vessels of the carriers; a proposed discontinuance of the allowance to shippers or consignees for loading and unloading cars on floats; a proposed minimum charge of \$3 for each lot of westbound less than carload freight lightered or floated with a carload or more of freight which is carried

lighterage free; proposed increase charges for lightering heavy articles; a proposed increase of minimum weight from 10,000 to 20,000 lb. for free lighterage of dressed poultry, butter, cheese, and eggs, and proposed increased charges for towing freight to certain points outside of the free lighterage limits.

As to proposed increased rates in support of which no testimony was offered, it is held that the respondents have not sustained the burden of proof imposed upon them by law, and that such increased rates are not justified.

It is also held that where a terminal service has heretofore been treated by the carriers as a part of the transportation service covered by the freight rate and regularly performed by them, they may not now segregate the service and assign to it a separate charge without taking into consideration, in order to justify such charge, the entire through service of which it forms a part and the compensation heretofore received for such through service.

The tariffs in question are in some respects ambiguous, and also not sufficiently uniform. They will have to be cancelled. Reference is also made to the necessity for a thorough revision of the tariffs governing terminal charges and practices at New York, and it is suggested that a joint tariff, containing such rules as are common to all the carriers, would be greatly preferable to the present diversity. The commission believes that for the convenience of the public, as well as that of the carriers, such a tariff should be issued, or that the rules in tariffs separately issued by the carriers should be harmonized, and that in the preparation of such tariff or tariffs opportunity should be taken not only to harmonize the construction of rules and to clarify the meaning of such as are obscure, but also to eliminate all such features of unjust discrimination or other impropriety as are found to exist in either the present or the suspended rules. (35 I. C. C., 47.)

Trap or Ferry Car Service Charges

Opinion by Commissioner Clements:

These cases relate to certain proposed charges by the carriers for "trap-car" or "ferry-car" service in that part of the country west of New England, north of the Potomac and Ohio rivers, and east of the Mississippi river; and also that part west of the Mississippi river and east of the Rocky mountains, including southwestern territory. The term trap or ferry, strictly speaking, is applied to a car placed at an industry having a private siding, and there loaded by a shipper with less-than-carload shipments, and hauled by a carrier to its local freight or transfer station for handling and forwarding of contents; and also is applied to a car loaded with less-than-carload shipments which is hauled to and placed upon the private track of an industry by the carrier from a local freight or transfer station. Where such cars are loaded to a prescribed minimum, the carriers usually make no charge for the service.

In the east the name "ferry" is given to a car used as above described, and in the west the name "trap" is applied.

The proposed charges, in trunk line territory, except Buffalo, N. Y., and points taking Buffalo rates, and Pittsburgh, Pa., are 2 cents a 100 lb., minimum \$2 a car; in central freight association territory, including Buffalo and Pittsburgh, 4 cents a 100 lb., minimum \$4 a car, with a graduated scale of minimum charges for cars of less than 10,000 lb. loading, and in the territory west of the Mississippi river, including western trunk line, trans-Missouri, and southwestern territories, 4 cents a 100 lb., minimum \$4 a car. The charges proposed by the various carriers, however, are not absolutely uniform.

(The commission's report discusses in detail the elements of the trap-car service, and the charges proposed by the various carriers, etc., which were discussed at the hearing. It will not be necessary to consider these in this abstract because the matter was discussed in the columns of the *Railway Age Gazette* as follows: April 2, 1915, page 761; April 9, page 804; April 23, page 905; April 30, page 950.)

The commission finds that the carriers have not justified the proposed charges.

It maintains that the carriers did not give the matter due consideration and that the tariffs were prepared without proper investigation. It also declares that under the proposed schedules the trap-car service is not to be uniform, for the reason that one carrier proposes to furnish one kind of service and another carrier another and different kind of service, although both carriers

serve the same terminal. It is manifest that if the proposed tariffs are allowed to become effective, they will result in numerous gross discriminations; many of them contain unlawful provisions and ambiguous language open to various interpretations; the tariffs do not agree, even at the same terminal, with respect to the charges proposed; and many of them contain exceptions which eliminate from the proposed charges traffic of vast territories, states, cities, and individual shippers.

The carriers contended that the charges for trap-car service were proposed in response to suggestions of the commission in *The Five Per Cent case*. The commission notes that, while in that case it called attention to the large possibilities for increased net revenues that were afforded by special services which the carriers of the country had been rendering, whatever statements it may have made afford no justification for the hasty preparation and filing of tariffs without proper consideration to avoid ambiguities, conflicts, and unjust discriminations, with which these tariffs in the main appear to abound.

Trap-car service has come to be an organized and definite part of the railroad transportation system. Facilities have been located and operated with a view to the maintenance of the service. The service has measurably assisted industrial development generally. By co-operation carriers and shippers have made the trap car an efficient and important instrument for the expansion of both transportation and commercial business of the country. It is not desirable that anything should be done that will seriously impair its efficiency.

Carriers throughout the country have considered, and now consider, their terminals in cities as units for rate-making purposes. Rates applicable to less-than-carload shipments of freight that move outside of terminal districts, or originate outside and move inside, have included the delivery of cars containing them on industrial tracks. The same is true with respect to carload shipments. This rule is applicable without regard to the distance of the haul within the terminal. Rates on both carload and less-than-carload traffic have been maintained with respect to terminal conditions as they exist. Many of the sidetracks of industries are used by carriers as substitutes for adequate freight terminals. The tracks and loading facilities furnished by shippers relieve the carriers' freight stations, necessitating less outlay for expensive terminals in crowded cities, and in other ways aid in the expeditious and economical handling of traffic which the carriers' facilities are not adequate to handle. Carriers assert, and it is generally recognized, that higher charges are imposed for transportation of less-than-carload shipments than for carload shipments of the same commodities, because the former are loaded and unloaded by the carrier, and because the former entail more terminal and office expense upon the carrier. Should not some consideration be given a shipper who loads and unloads his less-than-carload shipments and furnishes a terminal to the carrier besides?

A carrier performs trap-car service within its terminal. It consists largely of switching cars to and from industry sidetracks from and to freight or transfer stations located within the terminal district. Charges for terminal switch movements are generally made upon a per car basis, and they are usually made with some reference to the amount of the service. There does not seem to be any good reason why trap cars should be excepted from the general rule. If charges are made on a per car basis, they may be graded in accordance with the amount of service required and rendered, and need not, therefore, be uniform at all points.

If a consignor orders a car placed on his private track, and he there loads it with less-than-carload shipments, and then orders the carrier to transport the car to its local freight or transfer station for rehandling and forwarding of contents, the consignor has used the facilities of the carrier to dray his shipments. The carrier has rendered a service which is special in character and for which it would seem to be entitled to fair compensation, with due regard to the service rendered. The same character of service is rendered when a car is held at a local freight or transfer station and inbound less-than-carload shipments are loaded into it and it is then transported to an industry sidetrack. If a car is loaded with less-than-carload shipments and is transported between the sidetrack and transfer point outside the terminal district, on or off the line of the industry carrier, or if the car moves between a gateway and destinations, the service at the terminal is not different from that rendered with respect to car-

load shipments moved from or to the same siding. The so-called trap or ferry car service involved is not a free service.

While conditions may properly warrant a reasonable difference in the charges dependent on the amount of the service rendered, there should be no difference with respect to what trap-car service to which charges are applicable shall consist of. If a trap car is defined so as to include every car moving from or to an industry sidetrack loaded with less-than-carload shipments in one schedule, and in another to include only cars that move between the industry and local freight or transfer stations, unjustifiable discriminations can but be the inevitable result. There is apparently no difficulty as a matter of tariff construction in clearly defining what is a trap car subject to the charge, and to apply the charge only when the service that warrants its imposition is rendered.

If the suspended tariffs were permitted to become effective the inequalities and discriminations pointed out in existing tariffs would be increased, and new discriminations of like character would be multiplied. Under such circumstances it is found that the respondents have failed to justify the charges proposed for trap-car service, or the rules proposed to govern that service, named in the schedules under investigation, and they will be ordered canceled.

It is assumed that respondents will promptly correct tariffs now in effect and remove therefrom the ambiguous and unlawful provisions.

Commissioner Harlan concurs in this decision, saying:

"Although the respondents are required by the report and order of the commission in this proceeding to withdraw the tariffs under suspension on the general ground that they are not in harmony with one another, and will result in many discriminations; and also because they propose charges which in some cases have not been shown by the record to be reasonable, the report nevertheless concedes the propriety of a charge for the so-called trap-car service in its most typical form." (34 f. C. C., 516.)

Express Companies Granted Higher Rate

In the matter of express rates, practices, accounts and revenues. Opinion by Commissioner Clark:

In its order dated July 24, 1913, the commission prescribed a uniform schedule of rates, classifications and rules for the express companies. This order went into effect February 1, 1914, and required substantial reductions in the rates then effective. On March 16 (as noted in the *Railway Age Gazette* of March 19, page 641) the Adams, American and Southern Express companies and Wells Fargo & Company, filed a petition for a rehearing and a modification of the order. They alleged that although they had complied in good faith with the order, their revenues were not sufficient to enable them to continue to furnish an adequate service, and that as a whole they were operating at a net loss. They asked that the order be modified so as to permit them to transpose two of the three factors composing the express rate basis: that is, the collection and delivery allowance of 20 cents a shipment and the rail terminal allowance of 25 cents a 100 lb. It was estimated that this change would afford them approximately 3.86 per cent increase in gross revenue.

It was shown that petitioners' revenues from transportation after payment of express privileges decreased from \$71,264,974, in 1914 to \$64,703,119 in 1915, a decrease of 9.21 per cent. Operating expenses during the same period decreased from \$70,011,535 to \$65,835,930, a decrease of 5.96 per cent. The net operating revenue decreased from \$1,253,438 in 1914 to a deficit of \$1,132,812 in 1915. Operating income decreased from \$68,969 in 1914 to a deficit of \$2,380,894 in 1914, a decrease of \$2,449,863.

The number of shipments handled increased from 191,644,891 in 1914 to 193,870,819 in 1915, an increase of 2,225,928, or 1.16 per cent. The average charge per shipment in 1914 was 75.59 cents, while in 1915 it was 67.66 cents, a decrease of 7.93 cents, or 10.49 per cent. Operating expenses decreased in 1915 \$4,111,991, or 5.78 per cent. Operating expenses and taxes per shipment in 1914 were 37.15 cents as compared with 34.60 cents in 1915, a decrease of 2.55 cents, or 6.86 per cent.

In 1915 petitioners handled 2,225,928 more shipments than in 1914, with a decrease in revenue of \$13,680,810 and a decrease in operating expenses of \$4,111,991.

While the financial condition of certain of the petitioners is more favorable than that of others, it clearly appears that as a whole they are operating at a loss. In the original order they were treated largely as one company and are entitled to similar treatment now. The commission therefore finds that the present revenues are not adequate.

The present express rates are composed of three factors: First, an allowance of 20 cents a shipment for collection and delivery service which does not vary with the weight or distance. Second, a rail terminal allowance of 25 cents a 100 lb., which varies with the weight but not with the distance. Third, the rail transportation a 100 lb., which varies with both the weight and the distance and also varies in the different zones. The petitioners ask a modification so as to permit of the transportation of the first and second factors.

This change would result in increases on first-class shipments approximately as follows: 1 to 5 lb., 5 cents each; 6 to 29 lb., 4 cents each; 30 to 49 lb., 3 cents each; 50 to 70 lb., 2 cents each; and 71 to 99 lb., 1 cent each.

By actual count of shipments on two typical days for each company in 1915, petitioners have estimated that they handled during that year in interstate movements and in the states in which the interstate scale has been adopted 119,544,043 first-class and 20,191,646 second-class shipments, each less than 100 lb. in weight; the first-class shipments being 61.66 per cent and the second-class 10.41 per cent of the total number of shipments. By a similar method they have estimated the average weight per first-class shipments of less than 100 lb. to have been 21.36 lb. and per second-class shipment of less than 100 lb. 52.17 lb. during the same period. Using these average weights for first and second-class shipments, the additional revenue per first-class shipment under the proposed plan will be 3.93 cents, and on second-class, 1.79 cents. At the additional revenue of 3.93 cents per first-class shipment of less than 100 lb., the 119,544,043 shipments handled in the year 1915 would have yielded an estimated additional revenue of \$4,700,471. At an increase of 1.79 cents per shipment the 20,191,646 second-class shipments of less than 100 lb. would have yielded an estimated additional revenue of \$362,162, or a total estimated additional revenue from both classes of \$5,062,634. Petitioners' gross transportation revenue for the year 1915 was \$131,173,669. The estimated increase of \$5,062,634 would be approximately 3.86 per cent increase in gross revenue.

While it is true that under the proposed plan the small shipments will bear the greater share of the increase, the commission does not think that any unjust discrimination will result therefrom, because it was on the small shipments that the greater reduction was made by the rates which it prescribed.

With respect to a suggested change in the base rate in zone 1, which is the territory east of the Mississippi and north of the Ohio rivers, where the companies now operating at a loss do the greater portion of their business, the commission notes that it appears that the present 100-lb. rates approximate the rates that were in effect prior to February 1, 1914, and cannot be increased to the extent of providing the necessary additional revenue without destroying the business. To provide for an increase of approximately \$5,000,000 it would be necessary to increase the 100-lb. rates substantially, many of which would then exceed those in effect prior to the effective date of our order, particularly the short haul rates.

No definite objection was made to the petitioners' prayer for relief.

A western state commission suggested, although not on the record, that the relationship of the rates in the west to those in zones farther east is not what it should be, and that if any change is to be made a revision of the whole scheme of rates should be made. The investigation which resulted in the original order was most exhaustive. The present plan has given very general satisfaction and has provoked but little complaint. Petitioners have co-operated earnestly and fairly in an effort to make the new plan a success and to secure uniformity of rates for state and interstate business. "If they are, in face of those efforts, operating at a loss under rates prescribed by us, and it clearly appears that they are, they are entitled to reasonable relief promptly, and without awaiting the result of another general investigation that would consume two or three years."

New scales of rates are ordered in conformance with the findings herein. (35 I. C. C., 3.)

STATE COMMISSIONS

The Illinois Public Utilities Commission has announced a series of hearings to be held beginning on August 2, on proposed advances in the rates for industrial switching from 10 cents a ton with a minimum of \$2 and a maximum of \$4 a car to 15 cents a ton with a minimum of \$6 a car on coal, and 20 cents a ton with a minimum of \$5 a car on other commodities.

COURT NEWS

The hearing before Judge Youmans of the United States district court at Oklahoma City on the application of the Missouri, Kansas & Texas, the Chicago, Rock Island & Pacific, the St. Louis & San Francisco and Atchison, Topeka & Santa Fe, for an injunction restraining the operation of the Oklahoma two-cent fare law, was resumed at Oklahoma City on July 19. The hearing was adjourned last March on account of the illness of the judge. The first witness for the railroads was A. Hermany, auditor of disbursements of the Chicago, Rock Island & Pacific, who presented and explained a number of exhibits showing the separation of the expenses of the road between state and interstate traffic, between passenger service and freight service, and between line haul and terminal expenses. These figures were based on a most exhaustive test of the traffic and operations of the road in order to directly allocate as many as possible of the expense items. Mr. Hermany said that out of every \$100 spent by the roads for operating expenses in Oklahoma \$67 could be directly allocated to state business. He was followed by E. W. Peabody, statistician for the Missouri, Kansas & Texas, and A. L. Conrad, assistant general auditor of the Atchison, Topeka & Santa Fe. W. E. Symons, consulting mechanical engineer of Chicago, also testified regarding the division of expenses.

Validity of Bond Issue on Consolidation

Certain stockholders of the New York Central sought to enjoin the company from issuing 4 per cent interest-bearing bonds to replace and retire outstanding 3½ per cent bonds as an incident of the proposed consolidation with the Lake Shore & Michigan Southern. The plaintiffs' contention was that the new issue would violate both section 141 of the New York Railroad Law and section 55 of the Public Service Commissions Law. The New York Appellate Division holds that the issue is not an issuance of bonds against, or as a lien on, a contract for consolidation or merger, contrary to Public Service Commissions Law, section 55; and that the prohibition in Railroad Law, section 141, against increase of capital and issuance of bonds in connection with a railroad consolidation, being in derogation of the general authority to consolidate, must be strictly construed, and limited to indebtedness already accrued; that is, to principal and past-due interest. (*Continental Securities Company v. New York Central*, 153 N. Y. Supp., 879.)

Stop, Look and Listen Rule

The Vermont supreme court holds it to be well settled in that state that it is the duty of a traveler approaching a grade crossing to look and listen for approaching trains, and, if necessary to enable him to listen effectively, to stop to listen. He must continue to look and listen as he approaches the track until the last moment when the discovery of the train would have availed for his protection. In an action for injuries to the driver of a wagon at a crossing, it appeared that when the plaintiff reached a point 78 feet from the crossing, where he had a clear view along a straight track for at least 1,000 feet, the approaching train must have been within his range of vision. Assuming that his rate of travel did not exceed 2½ miles an hour, or 3½ feet per second, which gave him the benefit of any doubt, and that the train maintained to the time of the accident a uniform speed of 20 miles per hour, or 29½ feet per second, though of necessity it must have been less, when he reached the point 78 feet from the crossing the train was 621 feet away and in full view. From that point on, as he approached the crossing, there was no time when he could not have seen the train, if he had looked, and no time when, in the circumstances, he could have failed to hear its approach, if he had listened attentively. Judgment for the

plaintiff was reversed, the plaintiff's contributory negligence being conclusively shown, and judgment was entered for the defendant.—*Harrington v. Rutland* (Vt.) 94 Atl. 431.

Overflowing Lands—Proof of Standard Methods of Construction of Bridges

In an action against a railroad for overflowing lands by the manner of construction of bridges across streams, whereby the bents were placed at right angles to the rails, the railroad company examined a number of expert engineers on the question of the proper construction of the bridges involved, and especially upon that feature of the construction complained of. It undertook to show that the bridges were properly constructed in that respect, and that such method of construction was necessary for the purpose of safety, and also that this method of construction was recognized as standard by construction engineers, and that it was in general use as such. This evidence was excluded by the trial court, principally on the ground that it was an effort to prove custom and practice. On appeal the Iowa supreme court holds that the testimony should have been admitted, because, while the fact that a particular neglect may be customary does not change its character, standard methods of construction, recognized as such by those experienced and learned therein, may be shown by appropriate expert testimony.—*Thompson v. Illinois Central* (Iowa) 153 N. W. 174.

Hepburn Act—"Knowingly" Giving Unlawful Concessions

The Erie appealed from a conviction of a violation of the Hepburn act. The specific charge was that it had applied to an interstate shipment an "import rate," when a "domestic rate" was the lawful one, and had thereby granted a concession—the import rate being the lower. The "import rate," according to the filed and published tariffs of the company, was applicable "only on property received direct from the ship's side or dock of steamer upon which imported or from customs bonded warehouses or appraisers' stores." The property had been landed at an entirely different dock, and later transported to the dock and warehouse from which the Erie took it. There appeared to have been negligence on the part of the company's agents in not making proper inquiries as to whether the property had been originally landed at the latter dock. But the New Jersey federal district court held that in a case like this negligence is not sufficient to charge knowledge. A company is not guilty of "knowingly" granting an unlawful concession in rates, contrary to the Hepburn act, where it is not shown that it knew, or wilfully remained in ignorance of, the facts which made the rates unlawful. A new trial was therefore granted.—*United States v. Erie*, 222 Fed. 444.

Operation of Sunday Trains

For several years the Great Northern operated on its line between Grand Forks, N. D., and Duluth, Minn., two trains, each way daily, including Sunday, one a day train and the other a night train. It discontinued the Sunday day train. The Minnesota Railroad and Warehouse Commission ordered it restored. The state district court found the order "unlawful and unreasonable and not justified by public necessity or convenience." The evidence showed that the Sunday day train passenger traffic was mostly a traffic of pleasure or convenience, with few instances of necessary travel, and that it rendered the incidental service of distribution of Sunday newspapers. The supreme court of Minnesota, on appeal, holds the order to be unreasonable and void under the facts of the case, on the ground that the compulsion of Sunday labor and of the operation of Sunday local passenger trains is contrary to the legislative policy of the state, although under some circumstances the operation of Sunday trains may be made compulsory. No such question appears to have ever before arisen, and no railroad commission appears ever before to have sought to compel the operation of ordinary local day passenger trains on Sunday. In one reported case in Missouri the state legislature by statute imposed such a duty and the statute was sustained by a divided court, *State v. C. B. & Q.*, 239 Mo. 196, 143 S. W. 785. Three out of the seven judges participating dissented, being of the opinion that the legislature had no constitutional power to compel such Sunday operation, and this although no specific provision is found in the Missouri constitution purporting to forbid it.—*State v. Great Northern* (Minn.) 153 N. W. 247.

Obstruction of Street Delaying Fire Department—Liability of Railroad for Loss by Fire

Action was brought against the Northern Pacific for damage to the plaintiff's building caused by fire. The fire was not started by the railroad. One of the trains, standing on the track five minutes, blocked Central avenue, in Wichita, and delayed the fire department three or four minutes in reaching the fire. By one city ordinance, trainmen were prohibited from blocking any street for more than five minutes, and by another they were prohibited from stopping trains, engines or cars on Central avenue. The train was stopped under the rule of "Safety First," to repair the brake rigging on the locomotive, which had fallen down and was dragging on the track, in which condition it might derail some part or all of the train. It was held by the Kansas supreme court that it was not necessary for the railroad to pull its train off Central avenue, and take the chances of wrecking the train, destroying its property, and of injuring its employees and others, provided it pulled the train off the streets as soon as it safely could.—*Walker v. Mo. Pac.* (Kan.) 149 Pac. 677.

Regulation of Rates—Special Classes—Commutation Rates

In a suit by the Pennsylvania to enjoin enforcement of an order of the Maryland Public Service Commission fixing the maximum charge for commutation tickets, the Maryland court of appeals held that the action of the state in establishing, through the commission, a single fare rate does not exhaust its power to regulate transportation charges, and it may thereafter make any reasonable regulation affecting mileage or commutation rates, leaving them so as to bring a proper return to the railroad for the specific service, independent of the return to it from other services. In determining the reasonableness of a commutation rate, the court held the entire net revenue of a railroad, from whatever source derived, is not to be looked to, though there are cases supporting the contrary view, as *Railway Co. v. Smith*, 60 Ark. 221, 29 S. W. 752; *P. & A. v. Florida*, 25 Fla. 310; *People v. St. L. T. & H.* 176 Ill. 512. It did not, however, consider these cases in accord with the general trend of decision. In *L. & N. v. Railroad Commissioners* (D. C.) 208 Fed. 35, certain passenger rates were complained of, and the evidence tended to show that the operation of the road as a whole was unprofitable, mainly because it was transporting iron and coal at or below cost, and it was there held that the intrastate passenger rate could not be attacked because the entire business of the road did not yield a fair return. In *Railroad Commissioners v. Illinois Central*, 201 U. S. 181, the question arose with regard to certain tolls of the Dunleith & Dubuque Bridge Company, of 25 cents per passenger, for local traffic, when the same charge was not made on through tickets, and it was there held that the fact that the net earnings of the carrier may be large does not of itself justify the commission in fixing a rate at less than is reasonable for the service, all other things being considered. In the commutation rate cases, 21 I. C. C. 428, the Interstate Commerce Commission had under consideration the commutation rates of eight railroad companies running into New York, most of them from points in New Jersey. Commissioner Harlan said that "the carriage of a commuter differs in many respects from other passenger traffic and is an independent, special service"; and, while the commutation rates of the Pennsylvania were then reduced, in so doing no account was taken of the passenger returns from the entire Pennsylvania system, nor of the net revenue from the combined receipts of freight, passenger and express business. The same principles underly the decisions in the Minnesota Rate Cases, 23 U. S. 352, 33 Sup. Ct. 729, *Interstate Com. Comm. v. Northern Pacific*, 222 U. S. 541, 32 Sup. Ct. 108, and *Interstate Com. Comm. v. L. & N.*, 227 U. S. 88, 33 Sup. Ct. 185. The same question was before the Maryland court of appeals in *Public Service Comm. v. U. C.*, 122 Md. 355, where Judge Thomas, on page 390, said: "We cannot adopt the view that common carriers may be required to perform services at rates less than the actual cost of such services, for that would amount to confiscation, and would ultimately defeat the very ends they are designed to accomplish, namely, to subserve the public good and public convenience."

The evidence being insufficient to show that the rate fixed by the commission was unreasonable and confiscatory, it was held that the rate be allowed to go into effect to determine its character by actual experience, subject to the right of the road at any future time to seek its abrogation by judicial action for cause shown.—*Pennsylvania v. Towers* (Md.) 94 Atl. 331.

Railway Officers

Executive, Financial, Legal and Accounting

Roberts Walker, general counsel for the receivers of the Chicago, Rock Island & Pacific, has resigned. He has offered to aid the receivers of the road at any time his knowledge of its legal affairs may be needed, and this offer has been accepted.

Operating

It was erroneously reported in last week's issue that J. P. Falk, general yardmaster of the Chicago, Burlington & Quincy, at Kansas City, Mo., had been appointed superintendent of terminals at Kansas City. Mr. Falk has been appointed assistant superintendent, with headquarters at Kansas City.

W. M. Whitenton, formerly general manager of the first district of the Chicago, Rock Island & Pacific, and later with the Chicago Electrification Committee, has been appointed operating assistant of the Texas & Pacific, reporting to the general superintendent and first vice-president, with headquarters at New Orleans.

John Edward Maun, whose appointment as superintendent of the Central Vermont, with headquarters at St. Albans, Vt., has already been announced in these columns, was born on June 28,



J. E. Maun

1856, at Braintree, Vt., and was educated in the public schools of his native town and at Randolph Academy. He began railway work on May 1, 1876, with the Central Vermont, and served for two years as brakeman, and then for two years as freight conductor on the same road. He was then for one year yardmaster and later for four years passenger conductor on the Mexican National, now a part of the National Railways of Mexico. He subsequently served for 30 years as passenger conductor on the Central Vermont, until his appointment in January, 1915, as assistant superintendent of the

same road, and the following May was promoted to superintendent, with headquarters at St. Albans, as above noted. Mr. Maun represented the city of St. Albans in the Vermont legislature during 1910-1911, and is now mayor of St. Albans.

S. T. Cantrell, assistant superintendent of the Baltimore & Ohio at Cumberland, Md., has been appointed acting superintendent of the Cumberland division, with headquarters at the same place, succeeding C. Lee French, deceased. C. H. Lee has been appointed terminal trainmaster of the Cleveland terminal of the same road, with headquarters at Cleveland, Ohio. W. J. Head has been appointed road foreman of engines and trainmaster of the C. T. & V. district and the Cleveland branch; his jurisdiction as road foreman will extend over engine crews at the Cleveland terminal.

Traffic

C. J. Chisam, assistant general freight agent of the Chicago Great Western at Omaha, Neb., has resigned, effective August 1, to engage in other business.

Edwin F. Smallwood has been appointed division freight agent of the Boston & Maine, with office at Springfield, Mass., and the position of traveling freight agent at Springfield, Mass., has been abolished, and Josiah D. Greene has been appointed division freight agent, with office at Troy, N. Y., succeeding E. W. Abbott, promoted.

O. R. Bromley has been appointed division freight agent of the Michigan Central, with headquarters at Grand Rapids, Mich., vice E. A. Treadway, retired, and Thomas Evans has been appointed general agent, with office at London, Ontario.

Roy Hinchman, formerly agent of the Baltimore & Ohio at Athens, Ohio, was erroneously announced in last week's issue to have been appointed general passenger agent of the Cincinnati, Hamilton & Dayton, with headquarters at Dayton, Ohio. Mr. Hinchman was appointed traveling passenger agent only, but has since been transferred back to his former position.

J. A. Stewart, general passenger agent of the second district of the Chicago, Rock Island & Pacific at Topeka, Kan., has had his jurisdiction extended to include the St. Louis territory, and his headquarters have been moved to Kansas City, Mo. P. A. Auer, assistant general passenger agent at Chicago, has been transferred to the second district, with headquarters at St. Louis, Mo. It was erroneously stated in last week's issue that C. B. Sloat, assistant general passenger agent at Little Rock, Ark., had been appointed general passenger agent of the third district, with headquarters at St. Louis, Mo. His jurisdiction has been extended over the district formerly in charge of George H. Lee, who resigned to become general passenger agent of the Lehigh Valley at New York City.

OBITUARY

J. Frank Chapman, manager and purchasing agent of the Thousand Islands Railway and the Oshawa Railway, with headquarters at Gananoque, Ont., died at his home in that place July 19.

Dr. William H. Stennett, auditor of expenditures of the Chicago & North Western, died on July 22, at the home of his daughter in Oak Park, Ill. He had been connected with the North Western continuously for 43 years.

John Hasbrouck Scoville, a director of the Detroit, Toledo & Ironton, and a member of the stock exchange firm of Maxwell & Scoville, New York, died at his summer home at North Andover, Mass., on July 25, at the age of 72.

Chester Lee French, superintendent of the Cumberland division of the Baltimore & Ohio, with headquarters at Cumberland, Md., died July 17, at Atlantic City, N. J., at the age of 48. Mr. French's death followed an illness of several months' duration.

R. H. Shoemaker, formerly general freight agent of the Dayton & Michigan, now a part of the Cincinnati, Hamilton & Dayton, died at his home in Saratoga Springs, N. Y., on July 28. Mr. Shoemaker was at one time superintendent of the Dayton Short Line, now a part of the Cleveland, Cincinnati, Chicago & St. Louis, and later vice-president of the St. Louis Bridge & Transfer Company.

C. E. Spagnoletti, formerly and for 37 years superintendent of telegraph of the Great Western Railway of England, died on June 28 at the age of 83. Mr. Spagnoletti was inventor of numerous useful devices in telegraphy and railway signalling. He was consulting electrical engineer for the construction of the City & South London Railway, and was president of the Institution of Electrical Engineers (England) in 1885.

Sir Sanford Fleming, civil engineer, scientist, and a former railway builder, died on July 22, at Halifax, N. S., at the age of 88. He was born in Scotland and went to Canada in 1848. Four years later he became an engineer on the Ontario, Simcoe & Huron, now a part of the Grand Trunk, and when the construction work on this line was finished he was appointed chief engineer, remaining in that position for 11 years. In 1863 he was appointed to make a survey of the line connecting the maritime with the upper provinces of Canada and later was in charge of the construction of this line which was opened in July, 1876, and was known as the Interoceanic. He advocated the construction of a line to the Pacific coast and from 1871 until 1880, was engineer in chief to carry out the surveys on lines which now form a part of the Canadian Pacific, and he also planned and built the railway across the Island of Newfoundland. He spent the latter years of his life in literary pursuits and scientific research, and was the author of a number of books on scientific subjects.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE SHEVLIN HIXON COMPANY, Minneapolis, Minn., has ordered one 60-ton three truck Shay locomotive from the Lima Locomotive Corporation.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS will build five Pacific type locomotives at its Beach Grove, Ind., shops, to be completed before the end of the year.

CAR BUILDING

THE ATLANTIC COAST LINE is in the market for 800 box cars.

THE INTERNATIONAL AND GREAT NORTHERN is in the market for 2 coaches and 3 chair cars.

THE BALTIMORE & OHIO's order for 2,000 hopper cars, reported in the *Railway Age Gazette* of last week, was divided as follows: American Car & Foundry Company, 1,000; Cambria Steel Company, 500, and Pressed Steel Car Company, 500.

IRON AND STEEL

THE CHICAGO, INDIANAPOLIS & LOUISVILLE has ordered 6,000 tons of 90-lb. rails from the Illinois Steel Company.

THE BOSTON & ALBANY has ordered 600 tons of bridge steel from the Pennsylvania Steel Company.

THE PHILADELPHIA & READING has ordered a quantity of steel from the Pennsylvania Steel Company for a bridge at Milton, Pa.

THE MINNEAPOLIS & ST. LOUIS and the CHICAGO & NORTH WESTERN have ordered 764 tons of steel for a viaduct at Marshalltown, Iowa, from the Minneapolis Steel & Machinery Company.

THE SOUTHERN has ordered 4,500 tons of rails from Tennessee Coal, Iron & Railroad Company and 300 tons of steel for a bridge over the Rivanna river in Virginia from the Virginia Bridge & Iron Company.

SIGNALING

The Southern Railway has started work on the installation of electric automatic block signals on the line from Orange, Va., to Arrowhead, 36 miles; Elma, Va., to Amherst, 18.5 miles, and Whittle, Va., to Danville, 23 miles. All of this is double track nearing completion, except 9 miles of single track between Whittle and Dry Fork. This is on the main line between Washington, D. C., and Atlanta, Ga., and when completed will make a total of 415 miles protected by automatic block signals out of the 649 miles between Washington and Atlanta.

The Western Maryland has closed a contract with the Union Switch & Signal Company for the new automatic signals, noted in the *Railway Age Gazette* July 16, page 141. The installation extends from Big Pool, Md., to Williamsport, 13 miles, and from Hagerstown, Md., to Emory Grove, 67 miles. On this 80 miles of track there will be 169 signals, 27 highway crossing bells and 36 switch indicators. This, together with the 60 miles of signals put in last year between Cumberland, Md., and Big Pool, completes the automatic signaling of all the single track line between Baltimore and Cumberland.

The Southern Railway is to install a mechanical interlocking plant of 40 levers at Danville, Va., at the connection of the new main line of the Danville division with the Richmond division. In connection with the double tracking of the line, the company will install a 48-lever mechanical interlocking at Charlottesville, Va. This interlocking will include the crossing with the Chesapeake & Ohio, and will have the power-operated home and distant signals. At Embree, S. C., the company will put in a mechanical interlocking at the crossing of the Edisto River Lumber Company's road. Here the signals will stand normally clear for the trains of the Southern Railway.

Supply Trade News

The A. M. Byers Company, Pittsburgh, Pa., has increased its capital stock from \$1,500,000 to \$2,000,000.

The Sauvage-Ward Brake Company, Inc., New York, has recently changed its name to the Smith-Ward Brake Company, Inc.

The Brown Hoisting Machinery Company, Cleveland, Ohio, has taken an order for 38 locomotive cranes for the Russian government.

George F. Alderdice has resigned as assistant general manager of sales of the Republic Iron & Steel Company, to become assistant to the president of the Brier Hill Steel Company.

The Kilbourne & Jacobs Manufacturing Company, Columbus, Ohio, is reported to have received an order from Russia for 500 all-steel cars and to be negotiating for orders for industrial cars to be shipped to France.

The Westinghouse Electric & Manufacturing Company has received an order from the Russian government for \$35,000,000 of shells, and is reported to have also received an additional order for \$62,000,000 worth of rifles.

The Roberts & Schaefer Company, Chicago, has received a contract from the Canadian Northern for the building of two 200-ton capacity, modern automatic locomotive coaling plants for installation at Big Valley, Alta., and at Kindersley, Sask. The contract price is \$21,000.

The Macleod Company, Cincinnati, Ohio, which was announced in the issue of July 9 as having received honorable mention for its exhibit at the Panama-Pacific International Exposition at San Francisco, has more recently been awarded, instead, a silver medal. This has been given for its exhibit of locomotive tire heaters, rivet forges and portable oil burners.

The American Steel Export Company, which has been organized to handle the export trade of the Cambria Steel Company, has established general offices in the Morris building, Philadelphia, in connection with the general offices of the Cambria company. The officers of the company are William H. Donner, president; C. B. McElhany, first vice-president; W. S. Ottinger, second vice-president, and O. Kafka, general manager of sales.

The United States Light & Heat Corporation, Niagara Falls, N. Y., has been incorporated with a capital of \$7,000,000 to manufacture machinery, batteries and apparatus for the production of electric light and heat. It is a reorganization of the United States Light & Heat Company, and will take over and continue the operation of that company's plant at Niagara Falls. G. M. Walker, A. L. Fowle and A. S. Jones, 60 Broadway, New York, are the directors.

The strike of the molders and coremakers which has been in progress at the Depew plant of the Gould Coupler Company for the past 18 months, was called off last Monday evening by the union. The plant has been in continuous operation since a few days after the strike began, but the union maintained its pickets until a short time ago. It is understood that the company has made no concessions to the men, although it is stated that a number of men will be taken back as soon as feasible.

The Roberts & Schaefer Company, Chicago, has issued the following announcement: "We desire to announce that we have voluntarily released our control over the Holmen patents as relates to locomotive coaling plant equipment, and have canceled our agreement with Mr. Holmen. Two years ago we secured control of an improved design of elevating machinery which, while retaining all of the advantages of our previous equipment under the Holmen patents, entirely eliminates the bucket latches, closing springs, and trippers required by those patents. This change greatly improves the service and reliability. The results obtained after two years' operation of many representative plants, warrants us in making this form our standard, which we will hereafter employ in all locomotive coaling stations designed and built by this company."

John Havron, president of the Rogers Locomotive Works, Paterson, N. J., from 1901 to 1908, and more recently an officer of the Walker & Bennett Car Seat Company, died in Jersey City on Saturday, July 25, at the age of 56, from cancer of the stomach. Mr. Havron started his career as a clerk in the employ of the old Rogers Locomotive & Machine Works in Paterson, N. J., in 1881. He gradually worked his way up to the position of secretary of the company, but left in 1893 to go to Chicago as the western representative of the Latrobe Steel Company, Latrobe, Pa. In 1901 when the Hailoran and Smith syndicate bought the Rogers Locomotive Works, he returned to that company as its president and held that position until October 1, 1908, leaving at that time to go with the Latrobe Steel & Coupler Company, with office at Chicago.

Henry S. Hawley, president of the Railroad Supply Company of Chicago, died on July 22, at his summer home in Saunderson, R. I. He was born on August 12, 1851, at Bridgeport,



H. S. Hawley

Conn. From 1874 to 1883 he was actively engaged in bridge contracting and in promoting and constructing railroads, during which time he was identified with the Grank Trunk from Valparaiso, Ind., to Thornton, Ill., and also purchased at Master's sale the Chicago & Southern, now owned by the Grand Trunk. In 1883 he was the promoter of the Chicago & Wisconsin, which was leased to and completed by the Chicago, Wisconsin & Minnesota, and was president of the latter road during its construction from Chicago to Schlesingerville, Wis. This is now a part of the Minne-

apolis, St. Paul & Sault Ste. Marie. He was general agent and purchased a part of the right of way of the Chicago Great Western, and on its completion was appointed general agent in charge of traffic and leases. From 1890 to October, 1893, he was general agent in charge of traffic of the Chicago & Northern Pacific, and later was general agent and treasurer for the receivers of the same road. On July 1, 1897, he was made general agent and treasurer of the reorganized company, which was called the Chicago Terminal Transfer Company, and on February 1, 1899, he was appointed traffic manager, treasurer and assistant secretary of the same road. On June 1, 1902, he was elected president of the Railroad Supply Company, which position he held at the time of his death.

TRADE PUBLICATIONS

ALONG THE LACKAWANNA.—This is the title of an extremely attractive booklet which has recently been issued by the passenger traffic department of the Delaware, Lackawanna & Western to introduce the reader to the various points of interest along the line of the Lackawanna Railroad between New York and Buffalo and its connecting lines to Chicago. The booklet contains a few words about each of the stations or towns passed through on the route and a large number of illustrations of the things of interest which may be seen on the way, the two best of these illustrations showing the skylines of New York and Chicago, respectively.

RUSSIAN STEEL TRADE IN 1914.—Russia's pig-iron production in 1914 is estimated at 4,270,000 metric tons against 4,555,000 tons in 1913. The falling off was entirely in the latter half. The furnaces in Poland were closed by the war while those in the Ural and Moscow districts suffered. In South Russia the pig-iron output was 3,008,000 tons in 1914 and 3,050,000 tons in 1913; that of finished iron and steel, 2,314,000 tons in 1914 and 2,275,000 tons in 1913.

Railway Construction

DALLAS SOUTH WESTERN TRACTION.—This company will build a railroad to be operated with gasoline motor cars from Krum, Tex., through Dallas to Stephenville, Tex. No contracts have been let. There will be five bridges and several depots, shops and car sheds. E. P. Turner is president, and John T. Witt is chief engineer. F. R. Perkins, Dallas, Tex., is engineer in charge.

EDMONTON, DUNVEGAN & BRITISH COLUMBIA.—A contract is reported let to G. H. Webster, Calgary, Alta., for work on a section of 60 miles through the Grande Prairie district of Alberta. (June 4, p. 1181.)

FAIRMONT & HELEN'S RUN.—See Western Maryland.

NEW YORK SUBWAYS.—The New York City Board of Estimate on July 21 adopted the alternate tunnel plan proposed to carry the Fifty-ninth street subway traffic under the East river to the borough of Queens. The other plan was to remodel the Queensboro bridge. Although this action informs the Public Service Commission, First district, that the Board of Estimate believes the tunnel should be built and is prepared to supply the funds based on the \$4,500,000 bid promised by the Degnon Contracting Company, the final decision must be approved by both bodies.

The Holbrook, Cabot & Rollins Corporation has submitted the lowest bid of \$3,741,000 for that section of the Broadway subway beginning at Thirty-eighth street and running north to Forty-second street, crossing under the present subway and running north under Seventh avenue to Fifty-first street.

The Dock Contractor Company submitted the lowest bid of \$1,700,000 for the construction of that part of the Eastern Parkway subway in Brooklyn from a point near Church avenue under Nostrand avenue to Flatbush avenue.

OSARK RAILWAY.—This company has awarded the Blodgett Construction Company of Kansas City, Mo., a contract for the construction of its line from Mountain Home, Ark., to Rothville, a distance of about 15 miles.

PENNSYLVANIA RAILROAD.—The mayor of Philadelphia has signed an ordinance empowering the Pennsylvania to build an addition to its Overbrook yards at Philadelphia. It is said that from \$6,000,000 to \$7,000,000 will be spent on this work.

TENAS ROADS.—The construction of a railroad is proposed from Beeville, Bee county, Tex., to Three Rivers, Live Oak county, a distance of about 25 miles. The railway will connect with the Southern Pacific and the San Antonio & Aransas Pass at Beeville, and may ultimately be extended west to a connection with the International & Great Northern. It will pass through a ranch country now being rapidly converted into farmland. C. O. Williams of Corpus Christi, Tex., is interested.

TIDEWATER SOUTHERN.—This company will extend its line from Modesto, Cal., through Ceres to Turlock, Cal., a distance of about 16 miles. There will be one bridge of two 150-ft. spans and a 2,000-ft. trestle requiring 350,000 ft. of timber. The grading contract has been awarded to A. G. Chatom of Turlock, Cal. The track laying and bridge work will be done by company forces. Byron A. Bearce, Stockton, Cal., is president and general manager.

WESTERN MARYLAND.—A charter has been granted in West Virginia to the Fairmont & Helen's Run Railway, of Baltimore, Md., with a capital of \$500,000, which was organized by Western Maryland interests. The plans call for building a 6-mile line to connect new mines which are being opened up by the Consolidation Coal Company in the Helen's Run fields of West Virginia with the Baltimore & Ohio near Fairmont. The incorporators are all officers of the Western Maryland.

WEST VIRGINIA ROADS.—The question of building a line from Summersville, W. Va., west to Charleston, about 50 miles, is now under consideration, it is said. G. W. Curtin and H. B. Curtin, of Curtin, W. Va., are said to be interested in the project.

YORK & RAPEHANNOCK RIVER.—Application will be made for a charter in Virginia, it is said, by this company with a capital

of \$400,000, to build a line from West Point, Va., northeast to Urbanna, about 15 miles. R. S. Bristow, president, Urbanna; F. H. Sprague, vice-president, West Point.

RAILWAY STRUCTURES

ATHENS, GA.—A contract has been given by the Georgia Railroad to Hinton & Stewart, Athens, Ga., to build a two story brick and steel warehouse at Athens. Work has already been started on the building, which is to be 72 ft. wide, and 130 ft. long, and will cost about \$20,000. A contract has also been given to Hinton & Stewart for grading work in connection with new freight terminals, to consist of a freight house, team tracks, warehouses, etc.

BALTIMORE, MD.—The Pennsylvania has let a contract to the Brann & Stuart Company, Inc., Philadelphia, for the reconstruction of the Charles street viaduct over the Pennsylvania tracks at the Union station.

BATTLE CREEK, MICH.—The Michigan Railway will build a 150-ft. by 50-ft. concrete, steel and brick freight house, including freight tracks, pavement, paving approaches, etc. The Michigan Railway Engineering Company, Kalamazoo, Mich., has been awarded the contract. Work will start about August 1.

CHICAGO, ILL.—J. J. Turner, first vice-president of the Pennsylvania Lines West of Pittsburgh, has been elected president of the Chicago Union Station Company. E. D. Sewall, vice-president of the Chicago, Milwaukee & St. Paul, has been elected vice-president, and W. G. White has been appointed secretary. An executive committee has been appointed to supervise the work of building the new terminal, consisting of A. M. Schoyer, vice-president of the Pennsylvania Lines; E. D. Sewall, vice-president of the Chicago, Milwaukee & St. Paul, and E. A. Howard, real estate agent of the Chicago, Burlington & Quincy.

DAYTON, OHIO.—The Pennsylvania Lines West of Pittsburgh will build a bridge over the Miami river at this place to replace the one washed out by the floods of March, 1913. No definite plans have been prepared at present for such a structure.

LYNCHBURG, VA.—The Norfolk & Western, the Southern Railway, and the Chesapeake & Ohio have made an agreement to construct a new bridge over the James river at Seventh and Commerce streets, Lynchburg. Plans for the proposed bridge have not yet been made.

MANAYUNK, PA.—Bids have been received by the Pennsylvania Railroad for putting up a concrete arch bridge over the Schuylkill river at Manayunk. Action has yet to be taken by the Public Service Commission of Pennsylvania on this proposition, before the contract will be let.

MILTON, PA.—An officer writes regarding the steel bridge which the Philadelphia & Reading will build over the Susquehanna river at Milton, that the bridge will have 14 through plate girder spans from 83 to 96 ft. in length. Contracts have already been let to the Robert Grace Construction Company, Pittsburgh, Pa., for the foundation, and to the Pennsylvania Steel Company for the steel work. Samuel T. Wagner, chief engineer. (July 16, p. 144.)

PHILADELPHIA, PA.—The Pennsylvania Railroad has let a contract to James Stewart & Co., Chicago, for the construction of a 1,000,000 bushel addition to the grain elevator at Girard Point. This addition will double the present capacity of the elevator which was completed about a year ago. (June 18, p. 1460.)

PITTSBURGH, PA.—The Baltimore & Ohio has prepared plans for a complete remodelling of its passenger station at Smithfield and Water streets. Work will be started at once. The entire first floor of the present building is to be used as a general waiting room. The mezzanine floor, now used for the offices of the general superintendent and his force, telegraph office, yard-master's office and conductor's room, will be removed. This will give a general waiting room 60 ft. wide by 76 ft. deep, with a ticket office facing the general waiting room and the concourse. The concourse will be 32 ft. deep and 60 ft. in width. The second floor of the station will be remodelled to take care of the general superintendent's force which will be moved from the mezzanine floor. The baggage, mail and express will be located in new quarters arranged for by renovating the present outbound freight house.

SCRANTON, PA.—The Delaware & Hudson, it is said, will spend about \$225,000 to abolish 16 grade crossings in this city.

Railway Financial News

CHICAGO, ROCK ISLAND & PACIFIC.—Roberts Walker has resigned as counsel for the receivers of the Chicago, Rockland & Pacific.

EL PASO & SOUTHWESTERN.—The Arizona company, which owns and operates the western end of the El Paso & Southwestern, running from El Paso, Tex., to Tucson, Ariz., has made a first and refunding mortgage to secure an issue of 5 per cent bonds, due 1965. The *Commercial & Financial Chronicle* says:

"It is proposed eventually to consolidate the El Paso & Southwestern system, owning approximately 1,030 miles of railroad in New Mexico, Texas, Arizona and Mexico, into one owning and operating corporation under the laws of New Mexico and Arizona; and ultimately to transfer to that corporation the title to all the property in the system which can suitably be connected with the railroad. The present issue of bonds, of which \$8,055,000 have been immediately authorized and will at once be a first lien on the 458 miles on the Western division, will eventually be a first lien on the entire system of over 1,000 miles, the issue of additional bonds after consolidation having been authorized by the corporation commission to retire the existing first mortgage bonds on the Eastern division.

"The present outstanding bonds of the system, including bonds in the treasury, are \$15,792,000. When the operation is completed the outstanding bonds will be \$16,627,000, including bonds in the treasury.

"No additional financing is contemplated at present, and the result of the consolidation will be to place both the title and the operation in a consolidated company, which will be called the El Paso & Southwestern Railroad Company. Thus the objection to having a railroad owned by a holding company will be eliminated, and the number of corporations comprising the system will be reduced from 13 to 4, or perhaps 3. The system will have one first mortgage bond in a substantial amount, instead of several scattered and disconnected bonds in a like total amount."

MISSOURI PACIFIC.—A notice has been sent to holders of the \$3,459,000 Central branch first mortgage 4 per cent bonds, due 1919, asking them to communicate with a committee consisting of Charles A. Peabody, president of the Mutual Life Insurance Company; L. Edmund Zacher, of the Travelers Insurance Company, Hartford, Conn., and Robert Struthers, Jr., of Wood, Struthers & Co.

See editorial comments elsewhere in this issue.

OAKLAND, ANTIOCH & EASTERN.—A financial plan has been adopted by the investigating committee and the approval of the California railroad commission has been asked to the putting through of this plan. The committee says: "If the amended plan is consummated and the bondholders forego the collection of the three years' coupons, and the stockholders make the loan [\$3 on each \$100 shares held], the entire net earnings during that period can then be used to pay for new debt. Should the earnings equal the estimates of Bion J. Arnold, sufficient money will be available during the period to reduce the floating debt to such an extent that the road will be able to continue."

PERE MARQUETTE.—A date for the sale of this road has once again been fixed, the date now being November 15, 1915, and the upset price being fixed at \$14,000, subject to underlying bonds, interest and receiver's certificates.

GUATEMALA RAILWAYS.—In his message to the National Legislative Assembly at its ordinary sittings opened on March 1, the president of Guatemala said in regard to railways that the section of the Pan-American Railway in Guatemala has been finally completed, though its advantages have not yet been felt, owing to the suspension of traffic caused by the civil war in Mexico. Work on the railway of the Altos was interrupted for a time in consequence of the necessity of all available laborers being required for agriculture, but this having passed the construction work has been renewed and is now actively proceeding. Tenders for constructing the Eastern Railway are being considered.

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For railways to carry some of their own insurance is common practice and in many cases profitable. There is one risk, however, that has been let out almost entirely to the insurance companies, and that is the stationary boiler insurance. One road in the middle west, operating over 540 stationary boilers, has recently investigated this problem, being prompted by the fact that the rates on this class of insurance had materially increased since the time it was last placed. It was found that by far the greater proportion of the premiums paid to the insurance companies was spent for inspection, and that a very small percentage was held for the payment of claims, the theory being that with competent inspection there would be very few claims to pay. Believing that as competent inspectors of boilers could be obtained from the mechanical department of the road as could be provided by the insurance companies, this railroad has decided to assume the entire liability and carry its own boiler insurance. The expense incident to the inspections and the claims are to be carried by the insurance department and no opportunity is left for any charges to be shifted to other accounts. The insurance department will act as an individual outside concern, the profits going to the road itself. The plan is worth the consideration of other railways.

Railroad officers generally agree that one of the most troublesome problems confronting them to-day is that of the selection of men and their promotion. The article on this subject on another page supplements in a way the one by George M. Basford, which was published in the RAILWAY AGE GAZETTE of July 23, page 150. Closely allied with this subject of the selection and promotion of men is that of the education and training of employees; in fact in a big way it is practically impossible to consider them apart. Because of the importance of these things it would seem not only wise, but necessary, if anything really worth while is to be accomplished, to have them placed in the hands of some officer reporting direct to the chief executive and having full authority and responsibility in matters pertaining to the selection, training and promotion of all of the employees in all departments. That this step would be fully justified is indicated to a degree by the remarkable results which have followed the inauguration of rational apprenticeship systems in the motive power department or of special educational campaigns which have been carried on in other departments of various railroads in recent years. Unfortunately such movements have not been general and in most cases have touched only one or two departments on any one road. The time would seem to be opportune for developing and inaugurating movements of this kind on a larger scale, including every employee of all departments.

The Selection and Promotion of Men

Why can a railway be run more safely in April and June than in other months of the year? This question is suggested by Mr. Richards, chairman of the Chicago & North Western central safety committee, in a report which was noticed last week, page 209. The same suggestion may be found in the train-accident record for the month of April, printed in the *Railway Age Gazette* of May 21, page 1036. The general fact has been evident from a long series of accident records. There have been many notable train accidents in the United States during the past 20 years, but only three, of the first magnitude, occurred in the month of April. Good weather, a moderate volume of traffic and a minimum number of inexperienced trainmen are three elements in which April often, or usually, has an advantage over the other months of the year. But Mr. Richards appeals quite definitely to the individual officer and the individual employee. He aims to make the matter personal. You cannot control the weather; but can you not take more care to provide against injury to persons or property, when weather conditions are adverse? A moderate volume of traffic tends to make work easy, all around; but why not, in the easy times, train yourself to perform a larger share of your duties automatically, so that when the rush comes on you will not get "rattled"? Knowing the advantages of experience and the benefits from being able to perform all operations with tried men, why not take more pains to instruct new men, systematically? Mr. Richards has opened up a broad subject, one embracing a hundred questions for superintendents, trainmasters, trainmen, and all hands. He is not propounding new problems; but his report suggests the attacking of old ones from a new angle. At his best the engineman, the conductor, the track repairer does everything safely not only in April but in February.

Safety First All the Year Round

Stationary Boiler Insurance

in spite of the cold. At his best he avoids errors and accidents in rush times as well as in slack. Mr. Richards challenges him (and every one) to be at his best all the time.

We publish on another page an article on "The Farmer and the Railroad," which was written by Philip Meinen, a farmer

The Farmer and the Railroad

who formerly lived at Hanover, Kan., and who now resides at Stites, Idaho. This article condenses as much common sense on the railroad problem as we have ever met in a similar space. There is so much common sense in it because Mr. Meinen looks at the railroad business just as he looks, and thinks others should look, at the farming business. He believes it is a poor rule that will not work both ways; and applying to the railway business the rule that he believes should be applied to the farming business, he is quite unable to see why those who plant their capital in railroads should not, like a farmer or any other business man, be allowed to reap where they sow and garner a harvest proportionable to the enterprise and skill with which they cultivate their chosen field. In imagination he puts himself in the railway investor's and the railway manager's places, and frankly recognizes how, if he were in their places, he would like to be treated; and having done this, he advocates, in substance, the application of the Golden Rule. The solution of all of our seemingly difficult economic and social problems would be greatly simplified and facilitated if all classes of the people would approach them in this direct, common sense and honest way. The managements of the railways could do much to get other people to treat the railways as they think the railways should be treated by setting the example of dealing always with other people as the railways wish to be dealt with.

THE TRAP CAR DECISION

The hope of the railroads of increasing their revenues by charging for spotting cars and by cancelling tunnel, lighterage and industrial road allowances, held out by Commissioner Harlan and Special Counsel Brandeis, seems to have gone glimmering, along with the charge that they were dissipating their revenues by "free services" and allowances. But the decision in the trap car case really seems to hold forth an opportunity which may be translated into money.

While the commission orders the cancellation of the tariffs filed by the railways as being hastily prepared, ambiguous and discriminatory, its language is such that Commissioner Harlan no longer dissents. He says the opinion "concedes the propriety of a charge for the so-called trap car service in its most typical form." The majority opinion by Commissioner Clements finds that the trap car has come to be an efficient and important instrument for the expansion of both the transportation and the commercial business of the country, and that it is not desirable that anything should be done that will seriously impair its efficiency. But it notes some important distinctions between various classes of trap car service.

"If a consignor orders a car placed on his private track, and there loads it with less than carload shipments and then orders the carrier to transport the car to its local freight or transfer station for rehandling and forwarding of contents," the commission says, "the consignor has used the facilities of the carrier to dray his shipments. The carrier has rendered a service which is special in character and for which it would seem to be entitled to fair compensation, with due regard to the service rendered." This is substantially the position taken by the *Railway Age Gazette*. The commission also says that the same character of service is rendered when a car is held at a local freight or transfer station, then loaded with inbound shipments and transported to an industry side track. But "if a car is loaded with less than carload shipments and is transported between the side track and a transfer point outside the terminal district, on or off the line of the industry carrier, or if the car moves between a gateway and destination, the service at the terminal is not

different from that rendered with respect to carload shipments moved from or to the same siding." This service, the commission holds, is not a free service.

These distinctions were not made by the railroads in preparing their tariffs, nor by the shippers in opposing any charge for trap car service, and on the record it is not surprising that the commission should have found it necessary to order the cancellation of the tariffs. Commissioner Harlan adheres to the view that any form of trap car service is a discrimination in favor of the owner of a private side track. The majority decision, however, shows that the railroads will be permitted, even expected, to make a charge where a special service is rendered, in which case the shippers will be guided in their decision between the trap car and the dray by the comparative costs of the two methods, while present practices which have been shown to result in advantage to both the railroad and the shipper will in no way be interfered with.

THE RAILWAYS AND THE MANUFACTURE OF EQUIPMENT

To what extent ought the railways to engage in the manufacture of equipment and supplies? On the ground of economy some of them have gone into this to a very considerable extent during the past few years. Has this been a wise movement? Primarily, the business of a railroad is to manufacture and sell transportation, and because of its semi-public character and the difficulties involved in handling more men than are actually required for the carrying on of its business, it would seem that it ought to confine itself as closely as possible to that business.

It stands to reason that ordinarily a manufacturing concern, specializing on a certain line of material or equipment and competing with other companies for the business, will do better work in turning out a uniform product and in cheapening the processes of manufacture than would the railroad which handles this work more or less as a side issue. The argument is often advanced that the selling cost is eliminated when the material is manufactured by the user. True, it is, and yet not a small part of the railroad passenger traffic revenue is contributed by the railroad supply interests. Then, too, it must be remembered that the railway supply companies have been extremely active and have in many cases done remarkable work in developing better materials and better designs, thus saving the railroads untold sums of money which would have been lost if it had been left to the already overburdened railroad officers to develop and perfect these materials and devices. It should also be remembered that the railroad salesman is in many cases a sales engineer rather than a salesman, as the term is usually understood. In most cases these men are technical experts and their duties are largely along missionary or educational lines. In not a few cases railroad supply companies are spending thousands and thousands of dollars each year in educating the railroads to improve their methods and practices in order that the devices which they sell may be given sufficient care and attention to make them most effective. These men are not only of great value to the railways in this way, but ordinarily their experience and training have been so extensive and so broad that they are continually asked for advice as to practices outside of the particular work in which they are specially interested. In the earlier days these sales engineers were used by one or two of the important supply interests only, but in the past few years a considerable number of companies have developed their sales forces along these lines.

Data would be interesting if it were available regarding the exact part which the designers employed by the locomotive and car builders have played in the development of more efficient and effective equipment. Comparatively few railroads maintain a sufficient corps of expert designers to handle this work in anything but a general way and the builders are largely responsible for many of the most important developments and improvements which have been introduced in both locomotive and car design.

On what basis do the railroads compare the cost of material

manufactured in their own plants with the cost of that purchased from the outside? In a manufacturing plant the overhead charge or burden is accurately calculated. On the railroad, with its multiplicity of interests, this factor is far more difficult to calculate and in most cases is arrived at by some rule based more or less on guesswork or rough estimates. Mechanical department officers were greatly disturbed a number of years ago on the publication of the results of an investigation into the burden or surcharge problem which was made on one of the most important western lines in connection with certain betterment work. This investigation showed that the surcharges in a modern railway repair shop averaged about 60 per cent. of the payroll in the locomotive department and 38 per cent. in the car department. It was found, moreover, that these charges, which covered wages paid for supervision, accounting, draftsman, stationary engineers, firemen, electricians, etc., and also taxes, interest on investment, depreciation of buildings, machinery, etc., varied in the different departments of one locomotive shop from 40 to 220 per cent. In comparing the cost of manufacturing material with the cost of buying similar material outside it is essential that the overhead charges for each department or material be calculated separately, as the use of an average figure will undoubtedly be misleading in many cases. If a correct charge is made for overhead, the wisdom of manufacturing material rather than buying it will in many cases be open to even more serious question.

There has been a tendency in some of the foreign countries to manufacture in the railroad shops practically all of the material used by the railroad. This has discouraged the manufacturer in the developing of his business and has stunted the growth of railway supply manufacturing concerns so that they have not been in a position, when called upon, to furnish material for export to other countries. If the railroads in this country should go to the extreme in manufacturing the materials used by them, would it not so affect the supply industries that they would not be in a position to go after and develop foreign business, thus in the end affecting the revenue of our own railroads because of the reduction in freight traffic? The freight revenue from the handling of the finished material is a comparatively small part of the total freight revenues from the raw products which must be supplied to the manufacturer.

Public opinion has been very much against the railroads and they have been harassed and hampered in every direction. The pendulum is now slowly swinging back in the other direction. One important factor in bringing this about and educating the public to a better appreciation of the railroads was the active interest which the railway supply manufacturers took in the educational campaign. Without their sympathy and good will the task would have been a far more difficult one and would have taken much longer to accomplish. From this standpoint is it not to the best interests of the railroads to continue to purchase as much of their finished supplies as possible from outside sources, thus retaining the good will and co-operation of the manufacturing interests?

Finally, and not by any means the least important factor, is that involved in the labor situation. Too much time is now required of the railroad executives in considering the handling and adjustment of labor difficulties. Why complicate this situation by going into the manufacturing business, thus increasing the number of men in the organization and multiplying in a proportion greater than the actual number of additional men required, the danger of friction and loss in the handling of labor? Is it not much better to divide this among the different manufacturers supplying railway materials and have each one handle his own special labor problems?

Doubtless there are other factors which might be considered in the effort to determine the extent to which a railway can profitably engage in the manufacture of its supplies and equipment. The foregoing are sufficiently important, however, to challenge any further tendency along these lines and should receive the most careful attention of railway officers who are considering or have gone into the manufacture of equipment and sup-

plies to any very great extent. The wisdom of so doing would appear to be extremely questionable.

THE COMMISSION AND THE EXPRESS COMPANIES

In granting the petition of the express companies for an increase in their rates, the Interstate Commerce Commission has recognized the truth of the sentiment 'so well expressed by Senator Oscar W. Underwood when he said: 'The proper regulation of business requires that it must be sometimes helped and not always hindered, that we must occasionally say 'you may' and not always 'you shall not.' Two years ago the commission prescribed a uniform schedule of rates, classifications and rules for the express companies, which went into effect on February 1, 1914. The order at that time was considered unusually drastic, but the commission indicated that in its opinion the reduction in rates would so stimulate traffic that the express companies would not suffer unduly. After a year's trial of the rates the express companies asked for a rehearing and modification of the order, showing that while the number of shipments handled had increased 1.16 per cent, their revenues from transportation after payment of the railways for handling express matter had decreased 9.21 per cent. Increased efficiency reduced the operating expenses 5.96 per cent, but the net operating revenue decreased from \$1,253,438 in 1914 to a deficit of \$1,132,812 in 1915, while operating income showed a deficit of \$2,380,894. The commission therefore found that the present revenues are not adequate and granted the changes in rates asked by the companies, which it was estimated would afford them approximately 3.86 per cent increase in gross revenues.

It is noteworthy that no definite opposition was made by shippers. The commission says that the express companies have co-operated earnestly and fairly in an effort to make its new plan of making and publishing rates a success, and that they are entitled to reasonable relief promptly. It has thus manifested a praiseworthy disposition to remedy its own errors, and the express companies, by their attitude during the past two years, have made it easy for the commission to treat them with some consideration. After having got the public into a frame of mind where it was almost willing to see them put out of business, and with reduced rates and the new competition of the parcel post to meet, the express companies took their medicine with as good grace as possible. By exerting every effort to improve their service and to develop new sources of traffic, and by using wisely planned methods of publicity, they have not only maintained themselves in the face of the most difficult conditions, but have even attained a considerable degree of popularity.

BROOKLYN RAPID TRANSIT

The progress of the huge joint undertaking being carried on by the Brooklyn Rapid Transit and the city of New York shows clearly some of the disadvantages that may result from such a partnership. On the other hand, the company's management of its 246 miles of surface lines and 61 miles of rapid transit lines, in which, while, of course, subject to the regulation of the New York Public Service Commission, the company has a fairly free field for initiative, shows progress being made that is marked and in some aspects of national interest.

In the fiscal year ended June 30, 1915, the Brooklyn Rapid Transit earned \$26,428,000, an increase of \$869,000 over the previous year. This increase in revenue, however, is entirely due to the fact that the earnings from the Coney Island & Brooklyn Railroad are included for the entire fiscal year 1915 and were only included for six months in the previous fiscal year. As a matter of fact, comparing like with like and excluding from both years the Coney Island & Brooklyn, there was a decrease in 1915 as compared with 1914 due, as Colonel Williams points out in his annual report to stockholders, to the fact that a general business depression such as was experienced in 1915, with the resulting large number of men out of work in the big cities, affects street railway companies' earnings materially. An-

other reason for the decrease in passenger revenues was the increase in the issuance of transfers as the result of an order of the Public Service Commission increasing the number of transfer points from 721 to 1,008. There was an increase in the number of transfer passengers carried of 10,552,000, with a decrease in the cash passengers of 2,142,000. The financial results of the operation of the company are shown in the table at the end of these remarks.

The rate of wages on street railways is tending steadily to increase partly in line with the higher cost of living, which is most felt in the cities, and partly with the general tendency of wages in all branches of transportation to increase as the labor unions make steady progress in their constant efforts to secure shorter hours or higher wages. The street railway company, therefore, like the steam railroad, must depend on its efforts to get more and more efficient work out of each employee to offset the increased rates of wages. The Brooklyn Rapid Transit's efforts to attain this end have been specially directed toward bettering the condition of its employees and making the jobs which it has to offer more attractive, thus appealing to a higher grade of men. The Employees' Benefit Association of the Brooklyn Rapid Transit, through which the employees' welfare work is largely conducted, now has a membership of 8,000, of which 6,500 are in the operating department.

Mention has been made previously in these columns of the system of compulsory medical inspection and free medical attendance for employees excused on account of illness. This system was established on January 1, 1913, for the men in the operating department, numbering about 10,000. Steady progress has been made in reducing the amount of time lost on account of sickness, and making full allowance for the milder weather of last winter, it is estimated that the reduction in lost time attributable to this system was 8.6 per cent. in 1915. In the first year of operation of the system there was a reduction of 24 per cent. in loss of time as compared with the previous year.

Instruction is being given in first aid work, and first aid equipment cases have been installed in 68 depots, terminals and shops of the company; first aid kits have also been supplied to emergency crews and work crews.

The company has been remarkably successful in arousing an interest in its employees in its safety first campaign. This work has been organized by departments and meetings of committees and of whole departments are held at which safety problems are freely discussed by the employees. The Brooklyn Rapid Transit is also, as has been previously mentioned, conducting a campaign of education in the public schools in Brooklyn and has organized Safety Patrols among the boys and careful clubs among the girls. During the year the company distributed 234,000 safety stories among the school children.

The amount paid for injuries to passengers and damage to property in 1914 was \$608,000, an increase of \$64,000 over the previous year; but this increase was probably largely due to payments for accidents occurring in previous years, there being actually 1,333 fewer accidents in 1915 than in 1914.

The figures for revenue and the facts in regard to treatment of employees, etc., are, of course, in respect to the Brooklyn Rapid Transit as the operating company for the now existing surface and elevated lines of Brooklyn. The building of the New York subways and elevated extensions which is being carried on in partnership with the city of New York is in the hands of a subsidiary company—the New York Municipal Railway Corporation. The agreement between the city and the Brooklyn Rapid Transit provides for an expenditure by the city of about \$100,000,000 and by the New York Municipal Railway Corporation of about \$65,000,000. The new system was to have been ready for operation on January 1, 1917. Two things have occurred to very much hamper this work. On the one hand, the work which is to be done by the company all has to be approved of by the New York Public Service Commission, and every plan and form of contract is subject to the commission's scrutiny and must be approved by the commission

in advance. Colonel Williams, the president, says that in some cases the commission has taken many months to consider contracts submitted to it which should have been passed on in a few days, or at the most a few weeks. This makes the extension of the company's own lines slower than it should be. The letting of contracts by the city for its share of the work has been very much delayed and contracts have been let in such a way as to promise to delay the opening of the most profitable of the new lines. The result is that the city's extension of credit which will come with the opening of the subway lines is delayed and financial hardship is also worked on the Brooklyn Rapid Transit. It is the old story of red tape and delay in municipal management, although in general the present New York City administration has a reputation for better work in this respect than most large city administrations.

The following table shows the principal figures for operation in 1915 as compared with 1914, but it must be remembered that the 1915 figures include a full year's operation of the Coney Island & Brooklyn, while the 1914 figures include only six months operation of this road:

	1915	1914
Transportation revenue	\$26,096,265	\$25,246,452
Miscellaneous revenue	331,421	311,797
Total operating revenue	26,427,687	25,558,250
Maint. of way and structures	2,391,815	2,021,647
Maintenance of equipment	2,401,841	2,315,990
Operation of power plant	1,553,178	1,463,284
Trainmen's wages	4,787,574	4,520,023
Other expen. of operation of cars	1,744,690	1,696,132
Total operating expenses*	14,960,381	13,994,553
Net revenue from operation	11,467,305	11,563,697
Other income	438,715	451,772
Taxes	1,700,035	1,752,880
Interest and rentals	4,693,424	4,946,884
Net available for dividends	5,512,561	5,315,705
Dividends	4,467,318	3,660,048
Surplus	1,045,243	1,655,657

*Included in this figure but not shown separately above are payments for damages, legal expenses, etc.

NEW BOOKS

Public Utilities, Their Present Value and Return; by Hammond V. Hayes, consulting engineer. 203 pages, size 6 in. by 9 in. Bound in cloth. Published by D. Van Nostrand Company, 25 Park Place, New York. Price \$2.

The author's first book on this subject, "Public Utilities, Their Cost New and Depreciation" (reviewed in the *Railway Age Gazette*, of February 13, 1914, page 305), was devoted largely to a consideration of the general principles underlying the ascertainment of the fair present value of a property and to the methods to be followed by engineers engaged in such work. The present book, which is a supplement to the other, deals rather with what is to be done to ascertain the fair present value after the appraisal has been made. The former book emphasized that the same valuation might not hold for purposes of sale, as for purposes of taxation, condemnation, or as a basis for reasonable rates. The present volume is confined to cases where questions of rates are involved and to public utilities subject to regulation by state or government authority. The book covers its subject under the following heads: The Present Controversy; Ascertainment of Fair Present Value; Fair Rate of Return; Replacement Cost; Actual Original Cost; Going Value, and Depreciation. The chapter on the ascertainment of fair present value is divided into discussions of the basis for fair charges for service for a new company, for a previously unregulated company, for non-competitive successful undertakings, for non-competitive unsuccessful undertakings, and there is also a division on the fair value of property of competitive undertakings. The chapter on replacement costs deals with cost of promotion, physical property and going value. In the discussion of going value it is brought out that the latter is not good will, but that it is the difference between the cost as a going concern and the capital cost, and should include such items as company organization, general expenses, legal expenses, taxes and interest during construction.

It is noted that: "Going value, consisting of costs made up as outlined in the present study, is as much a portion of the property of a company in a rate case as in a case of sale." Good will and franchise values are not to be so included.

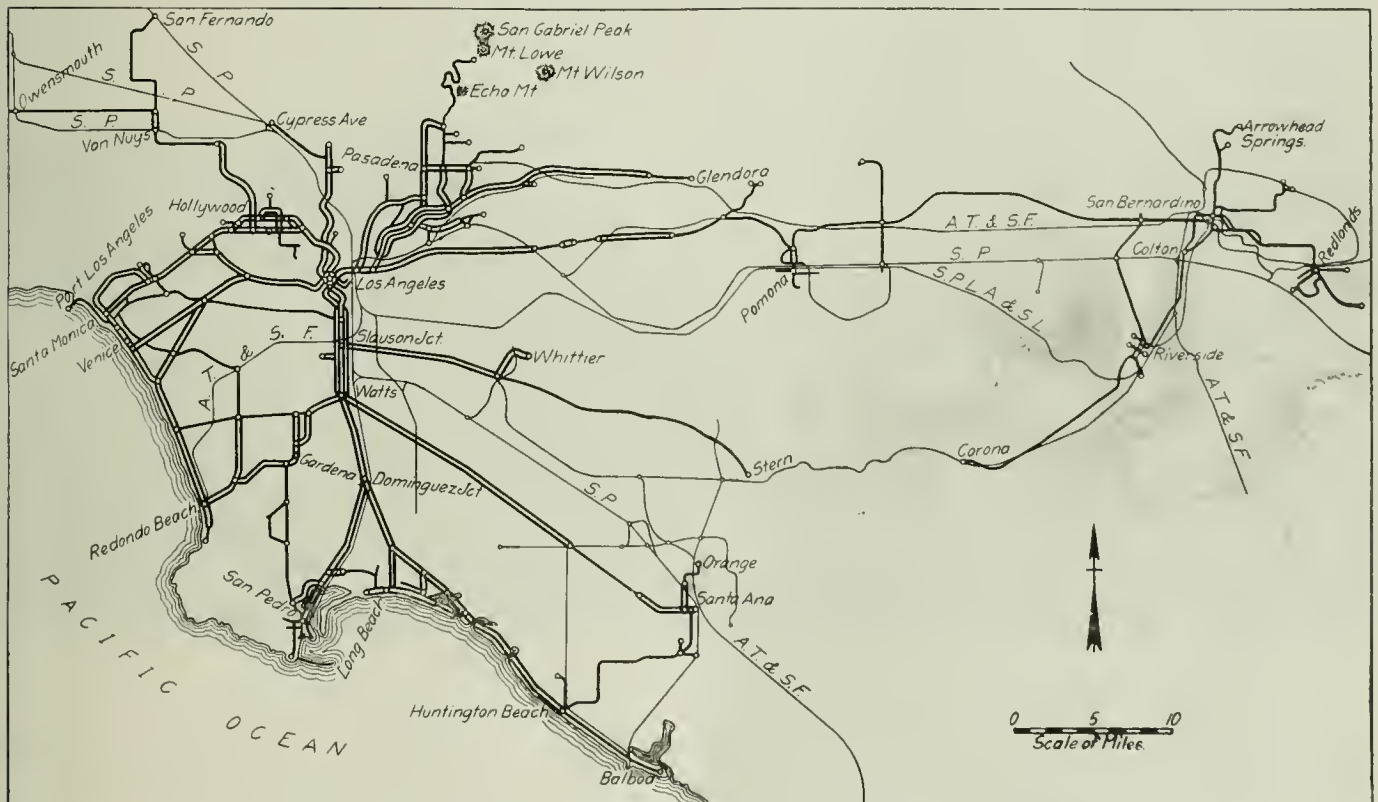
The Operation of the Pacific Electric Railway

A Study from the Standpoint of the Steam Road Man of the Largest Interurban System in the Country

The development of electric interurban railway lines as subsidiaries of and feeders to steam roads has been most pronounced along the Pacific Coast, where both the Hill and Harriman systems have built and acquired a considerable mileage of such roads. The largest electric railway system in the country is the Pacific Electric, now controlled by the Southern Pacific, radiating from Los Angeles and giving the parent steam system an intensive development in this highly productive traffic center. Built originally for passenger traffic only, it now competes actively for freight, and, in spite of the fact that it has not actively solicited such business until with the last four or five years,

separated. The interurban lines were reorganized and have continued under the name of the Pacific Electric Railway Company.

The further development of this system has continued steadily until today practically all of the lines laid out by Mr. Randolph have been built with the exception of a connection between the termini of the La Habra line at Stern and the Riverside line at Corona. The most recent extensions are those from Upland east to San Bernardino, a new line between San Bernardino and Riverside connecting the Riverside-San Bernardino groups of lines with the main system, and that from Harrison to



Map Showing the Single, Double, and Four Track Lines of the Pacific Electric System

its revenue from this traffic amounted to \$1,203,956 for the last fiscal year and is increasing rapidly.

The Pacific Electric Railway Company was originally organized in November, 1901, by H. E. Huntington and associates, to build about 1,000 miles of standard gage electric railways in Southern California, radiating from Los Angeles. Under the direction of Epes Randolph, as vice president and general manager, a comprehensive system of lines was planned into those territories capable of intensive development, and construction began at once. After building the major portion of these lines this system was consolidated on September 1, 1911, with the Los Angeles Pacific, extending from Los Angeles west to the beaches at Venice, Santa Monica and Redondo; the Los Angeles & Redondo, running from Los Angeles to Redondo Beach; the San Bernardino Valley Traction Company lines, serving San Bernardino, Redlands and Highland, and the Riverside & Arlington lines at Riverside. At the same time the interurban and the narrow gage street railway lines in Los Angeles were entirely

Corona, in the vicinity of Riverside, both completed last year. At the present time the Pacific Electric operates 600 miles of line extending from Los Angeles west and south along the beaches from Santa Monica to Newport Beach and Balboa; southeast into the sugar beet country at Santa Ana and into the La Habra oil fields and east through the citrus country about Covina, Glendora, Pomona, San Bernardino and Riverside. Nearly 12 miles of these lines have four tracks and 280 miles double track. The system includes 1,057 miles of operated track.

THE PHYSICAL PROPERTY

Except in the cities, the lines are built entirely on private right of way, and even within the corporate limits of cities and towns the tracks are removed from the streets in many instances. Thus, at Los Angeles the private right of way extends to within seven blocks of the main passenger terminal. The standard track construction consists of 75-lb. Harriman line common standard rail on untreated red wood ties principally in gravel and

crushed rock ballast. Where not so ballasted, the sand or dirt roadway is oiled heavily at regular intervals to compact it. This is especially necessary on those lines along the beaches where the sand drifts badly at times during the long dry season.

Because of the frequent stopping and the heavy braking of trains, and the use of multiple tracks in one direction only, the track creeps badly, having been observed to move as much as 36 ft. on one long trestle in six months. This requires the liberal use of rail anchors, especially on the tracks approaching heavy traffic stations where the pull is greatest. Manganese track construction is used almost exclusively for special work. This road has been a pioneer in the use of solid manganese and employs it almost exclusively for frog and switch work on the lines with heavy traffic. On the other lines built up manganese frogs and switches are installed.

Double tracks are built 15 ft. 6 in. between centers. On the four-track lines, the distance between the centers of the outside tracks is 13 ft. 6 in. The stations vary in size and design from the nine-story general office and passenger terminal building at Los Angeles to the frame or concrete passenger shelters at outlying passenger stops. Regular agents are maintained at

built. These are constructed on 50-ton steel flat cars, and are housed in and feed directly from the high tension power lines above mentioned. Each of these portable substations is equipped with a transformer and a 600-kw. motor-generator set. This equipment is of special value in handling heavy traffic such as the sugar beet rush in the fall, as it can be set out on any siding and cut in on the power line directly wherever the energy may be the most needed.

Power is delivered to the motor equipment by means of simple feed and trolley wires on all lines. For single and double tracks the construction is the same, as it has been assumed that any stretch of single track will eventually be double tracked. The trolley wire is supported on single poles with pipe arms on most of the single and double track sections and span pole construction on four track lines and on most curves, side tracks, station and yard tracks, etc. Catenary construction has been adopted on the lines built recently, with a view to gradually changing over to this form of overhead construction over the entire system. The extension from Upland to San Bernardino is operated at 1200 volts d.c. and the line from Upland into Los Angeles is being changed over to this from 600 volts. All other lines are now operating at 600 volts, but it has been the



The Station at Monrovia, Cal.

all stations of sufficient traffic to justify their employment, including some 40 points, who devote their entire time to the company's business. At most of these places standard stations are provided, equipped with ticket offices, parcel, freight and express rooms, waiting rooms, etc. No general design has been adopted, as in many cases it is desired to harmonize the construction of the station with that of the surrounding buildings in the communities, many of which are suburban towns.

While the road formerly generated its power at its own steam plants, the development of hydro-electric and other power by large power companies has made it more economical to purchase it from these large producers, and the company's steam plants are held in reserve. Power is delivered at convenient specified points on the railway company's lines at 15,000 volts and transmitted at this potential to the various substations, of which there are now 52, the power wires being carried over the greater portion of the system on the railway company's pole lines. These substations are spaced from 6 to 12 miles apart on busy lines and from 10 to 12 miles apart on those of lighter traffic. The equipment installed in the different substations varies with the traffic demands and also with the age of the substation.

The rapid development of the traffic on this system has made it exceedingly difficult to provide sufficient power at all times. To handle peak loads or to allow a substation to be taken out of service for repairs, four portable substations have been

intention to go to 1,200 volts as fast as the overhead construction is changed to the catenary type.

At the end of this year nearly all crossings with steam roads will be completely protected with all-electric interlocking plants, and within another year all other crossings and junction points will be similarly protected. Twelve interlocking plants are now in service, three others are under construction and five more are provided for. Those built recently are all-electric with track circuit approach locking. One of the most modern is that completed at Watts, 18 miles south of Los Angeles, where three busy double track lines converge into one four-track trunk line. This plant now has 76 working and 12 spare levers and is said to control more functions than any other plant west of the Rocky Mountains. Over 1,000 scheduled trains pass over it daily, requiring over 6,000 lever movements. During two hours in the morning and the same period in the evening a train passes over the crossing every 0.85 minute.

Automatic signals are being installed gradually on the busiest lines. Last year three-position light signals were installed on 9½ miles of the Venice Short Line and also on four miles of the Pasadena Short Line. The Venice line was signaled for 1 minute headway at a speedway of 30 miles per hour. Two miles of the Pasadena line was signaled for 45 seconds headway at 20 miles per hour, and two miles for 1 minute headway at 30 miles per hour. To give an idea of the density of the traffic, over 15,000

passengers are carried daily between Los Angeles and Pasadena alone. Between Los Angeles and Long Beach three-car trains are run in each direction at intervals of 20 minutes daily from 8:00 a. m. to 8:00 p. m., with double service on Sundays and holidays. This line also furnishes similar service to San Pedro, traveling over the same rails as far south as Dominguez Junction, in addition to freight traffic, the most of the freight traffic, however, being handled over all lines at night.

The company operates 675 passenger cars, all of which are provided with motors. It also operates 18 express cars which can be operated singly and which have power sufficient to haul as many as five to eight loaded freight cars. The company also operates sufficient freight equipment for its own traffic, although it requires foreign lines to provide equipment for through shipments from points on its lines to the more distant points on the steam roads. It operates 55 electric locomotives in freight service exclusively, 10 of which are in switching and the remainder in road service. These locomotives are operated in two shifts as the business demands, giving practically 24 hours' continuous operation. The newer locomotives weigh 62 tons and are provided with four 250-h.p. motors. They have a tractive effort of 21,000 lb. at 17.6 miles per hour and a maximum tractive effort of 30,000 lb. The freight equipment is fully up to steam road standards. Recent purchases include 90

passenger traffic. The state and the various counties in Southern California have spent large sums of money during the past few years in the construction and improvement of the public roads. This has greatly stimulated automobile traffic and has resulted in the appearance of large numbers of "jitney" busses competing for passengers and express business not only in Los Angeles and the immediate suburbs but to points as far distant as Venice. While it is difficult to see how this can prove profitable and therefore exist permanently, it is cutting into the passenger revenue of the Pacific Electric seriously at this time and is an exceedingly difficult competition to meet, as it is largely unregulated.

Over 3,200 scheduled passenger trains are operated daily in



A Four-Track Line Dividing into the Double-Track Lines at Watts

box cars with steel underframes, 225 steel flat cars and 250 steel dump and gondola cars, all of 100,000 lb. capacity.

New general shops have been planned to be built at Torrance, midway between Los Angeles and San Pedro, to replace older shops in Los Angeles. The company now builds none of its equipment but does all its own repair work, employing about 800 men for this purpose.

TRAFFIC

The revenues of the Pacific Electric for the fiscal year ending June 30, 1914, were \$9,467,483.15, divided as follows:

Passenger revenue	\$7,366,661.40
Baggage revenue	1,277.16
Hire of chartered cars	45,691.80
U. S. mail revenue	18,038.96
Express revenue	144,655.70
Milk revenue	34,503.99
Freight revenue	1,203,956.31
Switching revenue	30,753.04
Miscellaneous transportation revenue	173,600.26
Total transportation revenue	9,019,138.62
Revenue other than transportation	448,344.53
Total	\$9,467,483.15

Approximately one-half the passenger revenue is commuter traffic and the remainder is largely local, although through tickets are sold to all points from the more important agency stations. Wells, Fargo & Company and the Postal Telegraph Company operate over the entire system. United States mail is also carried on a number of the trains, mostly in closed pouches, although railway postal cars are operated over several of the lines.

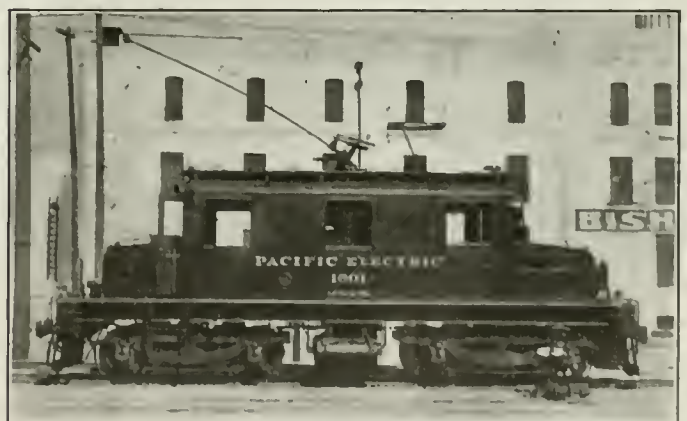
An interesting situation has recently arisen with reference to



A Portable Sub-Station

addition to 62 way freights and 84 express trains. This excludes heavy drag freight trains which are not regularly scheduled but are run as the traffic demands. Over 185,000 passengers are carried daily.

It is the freight traffic in which the steam railway man is most interested. As stated above, these lines were designed and built originally for passenger traffic alone with no thought of developing a freight business. With the building up of new communities removed from other railway facilities, there soon arose a demand for the transportation of building and other materials. This condition combined with the acquiring of these lines by the Southern Pacific has resulted in special attention



One of the Newer Locomotives

being given to the solicitation of freight traffic within the past four or five years. The greatest stimulus was given to this business on December 1, 1913, when the Pacific Electric secured joint rates with the Southern Pacific and the San Pedro, Los Angeles & Salt Lake on citrus fruits, followed by similar rates on other commodities on January 1, 1914. This road also participates now with the Santa Fe in joint rates from certain points on the Pacific Electric lines to Arizona and California points on the Santa Fe. As a result, the Pacific Electric is now enabled

to solicit through as well as local business on an equality with the steam roads, which was essential to it if it was to compete successfully for the transportation of citrus fruits, sugar and similar products, practically all of which go to the East.

About 200,000 tons of freight is handled monthly, of which about 80 per cent. is local traffic, the remainder being delivered



A Regular Passenger Train

to and received from the steam lines at Los Angeles and other connecting points. This traffic is growing rapidly, having doubled within the past four years and is increasing even more rapidly now that the road is permitted to solicit traffic for and from points beyond its own lines. The rapid building up of communities along these lines is also adding to the traffic. As for instance, Torrance, an industrial town, less than three years

titles of sugar beets are raised in the vicinity of Santa Ana. About 500,000 tons are produced annually in the area tributary to the line between Santa Ana and Huntington Beach, 9 miles long, and three large sugar factories are located on this line. Over 3,000 cars of lumber and 1,000 cars of citrus fruit were also handled during the past year and it is estimated that about 3,000 cars will be handled during the present year. This latter business especially is increasing rapidly, resulting from the through billing arrangement and also from the extension to San Bernardino, passing through the well-developed citrus area.

Another important source of freight traffic on the Pacific Electric is the l. c. l. merchandise business. About 25 per cent of the freight handled consists of this traffic. About 45 cars are loaded daily at the Los Angeles station alone. Two l. c. l. freight trains are run over each line daily. All such freight received during the forenoon is delivered at the various stations over the system the afternoon of the same day. All freight received up to 5:30 p.m. is loaded during the early evening and taken out during the night. At the largest stations for which full cars are loaded, this freight is ready for delivery at 7:00 o'clock the following morning. At the smaller stations, where no regular agents are employed, and where freight left on the platforms during the night is liable to loss by theft or from the weather, it is delivered during the forenoon on the return trip. Additional service is given perishable products for the ocean resorts received up to the middle of the afternoon, for which deliveries are made the same evening.

As a result of the through rating, the tonnage turned over to connecting lines at Los Angeles has increased from 10,000



A Drag Freight Train

old, is now giving the road over 100 cars of revenue business monthly. The ability of an electric line to furnish frequent and rapid freight and passenger service results in such communities developing faster and the land being given over to more intensive cultivation than would be the case if they were on steam road lines only, with but one or two trains daily.

The car load business consists principally of oil, rock, sand and gravel, vegetables, citrus fruits, nuts, lumber, grain and hay. The largest individual source of traffic is oil from the La Habra fields which goes to Los Angeles for distribution. Two or three solid oil trains are operated daily, the total shipments for the last fiscal year amounting to 449,565 tons or 10,440 cars. Over 11,000 cars of rock, sand and gravel were hauled last year for building and highway construction.

The next largest source of traffic is vegetables, consisting principally of sugar beets, which furnished 4,224 cars. Large quan-

ties of sugar beets are raised in the vicinity of Santa Ana. About 500,000 tons are produced annually in the area tributary to the line between Santa Ana and Huntington Beach, 9 miles long, and three large sugar factories are located on this line. Over 3,000 cars of lumber and 1,000 cars of citrus fruit were also handled during the past year and it is estimated that about 3,000 cars will be handled during the present year. This latter business especially is increasing rapidly, resulting from the through billing arrangement and also from the extension to San Bernardino, passing through the well-developed citrus area.

OPERATION OF THE PROPERTY.

For operating purposes the Pacific Electric is divided into four divisions. The Northern division includes the lines from Los Angeles to Pasadena, San Gabriel, Glendale, Glendora, Pomona and Upland with 156 miles of main line. In addition to handling a very heavy passenger business, this division also secures considerable fruit traffic from the Glendora and Upland lines. The Western division includes the lines to the beaches

as far south as Redondo Beach and to Van Nuys, Owensmouth and San Fernando in the San Fernando Valley. It handles a very heavy passenger traffic with only local freight and comprises 142 miles of main line. The Southern division is the largest, with 209 miles of main lines, including those to San Pedro, Huntington Beach, Santa Ana and La Habra. While the first two lines handle a heavy passenger traffic, this is primarily a freight division on which originate the oil, sugar beets, various other vegetables, and a considerable fruit traffic. The Eastern division with 102 miles of main line, comprises the lines in the vicinity of San Bernardino, Redlands, Riverside and Corona, connecting with the Northern division at Upland. Previous to the completion of the connection between Upland and San Bernardino last July, this division handled local traffic only. It is now succeeding in developing a considerable fruit and other freight traffic as well.

The operating organization is similar to that existing on steam roads. The general manager is in charge of all departments, with a general superintendent in charge of transportation matters. Each division is in charge of a superintendent, with one or more assistant superintendents; the division organization being based more on the number of employees and the density of traffic than on the number of track miles. The maintenance and operating, engineering, mechanical and electrical departments are each in charge of an executive engineering officer reporting direct to the general manager.

The standard code of the American Railway Association is used in operation, modified where necessary for electric operation. All despatching is done by telephone. The dispatchers give their orders direct to the conductors, who copy them on standard train order forms, giving copies to the motormen. At all outlying points where there are no station buildings, telephone booths are provided under lock and key, cutting in directly onto the dispatcher's wire.

In addition to the passenger and l. c. l. freight trains referred to above, regular milk trains are operated daily with a minimum of 2 cars each. In addition, several points ship milk in car load quantities. These milk and l. c. l. trains are regularly scheduled.

All drag freight trains are run extra and are ordered as the traffic warrants. These trains are run almost entirely during the night to avoid interference with the passenger trains and to secure a more economical power factor. One interesting problem in their operation has been the difficulty in preventing the crews from overloading the locomotives. With steam operation the only effect of this is to stall the train, but an electric locomotive is subjected to severe damage when overloaded.

About 6,000 men are employed in all departments of the Pacific Electric, of which about 1,600 are in passenger train service and 150 in freight and switching service. All the men employed are non-union. While numerous attempts have been made to organize the employes in various departments, the attempts have always been unsuccessful. Train service employes are paid on a graduated scale increasing annually for 5 years. They work on a 10-hour per day average basis, 7 days per week. To train men for this service a school is maintained at Los Angeles, during attendance at which the students and new men are paid \$0.25 per hour for actual time put in and are guaranteed a minimum of \$45 a month.

RAILWAY DEVELOPMENTS IN BULGARIA.—A British consular report says that at the end of 1912 there were 1,388 miles of railway completed to Bulgaria, the number of passengers conveyed being 3,342,000. The weight of the merchandise transported annually averages 2,000,000 tons. The construction of the following lines may be taken in hand during the present year: Radomir-Dupnitsa-Gorna-Jumaja, with extension down the Struma valley to the Greek frontier, Plevna-Lovetch, Dupnitsa-Boboy-Dol, and Gabrovo-Sevlievo. Work is progressing on the survey and preparation of the Mikhailovo-Haskovo-Porto Lagos line.

TRAIN ACCIDENTS IN JUNE 1

The following is a list of the most notable train accidents that occurred on railways of the United States in the month of June, 1915:

Collisions.				Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
Date.	Road.	Place.					
†24.	Western Md.	Thurmont.		bc	P. & P.	6	6
27.	Chicago, R. I. & P.	Platte River.		bc	F. & F.	3	5
29.	Mobile & Ohio.	Lawley.		bc	P. & F.	1	9

Derailments.				Cause of Derailment.	Kind of Train.	Kil'd.	Inj'd.
Date.	Road.	Place.					
3.	Chicago & Alton.	Minier.		Exc. speed.	P.	0	22
5.	Chi., St. Paul, M. & O.	Northline.		Landslide.	P.	1	2
5.	Chi., Mil. & St. P.	Lake City.		Washout.	P.	3	10
6.	Mo., Kan. & Tex.	Dallas.		d. track.	F.	0	3
8.	St. Louis & S. F.	Carrier, Okla.		Exc. speed.	P.	0	52
†9.	Seaboard A. L.	Birmingham.		Malice.	P.	3	15
29.	Erie.	Mahoning.		Acc. obst.	F.	2	0

The trains in collision near Thurmont, Md., on the night of the 24th were westbound passenger No. 11, and eastbound passenger No. 10. The collision occurred on a high bridge and the baggage car of the westbound train fell to the ravine below. The engines were badly damaged, but remained on the bridge, as did all of the rest of both trains. In the baggage car which fell were two passengers, both of whom were killed; and the baggageman, one engineman, one fireman, and a traveling fireman were also killed. Several passengers were injured. The collision was due to a mistake of the train despatcher, who sent conflicting orders.

The trains in collision near Platte River, Mo., on the 27th, were both fast freight trains, and at the time of meeting were running about fifteen to eighteen miles an hour. Both engines and five cars were demolished. One engineman, one fireman and one brakeman were killed, and two other trainmen were injured. The westbound train, several hours late, and inferior to the eastbound, encroached on the other train's time without orders.

The trains in collision near Lawley, Ala., on the 29th, were southbound passenger No. 107 and a northbound locomotive running without cars. Both engines were badly wrecked and were overturned. One fireman was killed and both enginemen and seven passengers were injured. The empty engine was running on the time of the superior southbound train, without orders, the engineman having overlooked the schedule of No. 107.

The train derailed near Minier, Ill., on the third of June was eastbound passenger No. 70, and the tender, two baggage cars and one passenger car were overturned. Twenty passengers and two trainmen were slightly injured. The train was running at about 40 miles an hour, and the tender was the first vehicle to leave the rails, too high speed on soft track being apparently the cause.

The train derailed near Northline, Wis., on the 5th was a westbound passenger. The engine and three cars went off the track and the engine was overturned. The engineman was killed and two other employees were injured. The derailment was due to a landslide, caused by a cloudburst.

The train derailed near Lake City, Minn., on the night of the 5th, was a westbound passenger, and the engine and first two cars fell into the Mississippi River. No passengers were killed. Two trainmen and one other person were killed and eight passengers and two other persons were injured. The cause of the derailment was the weakening of a bridge abutment by a cloudburst.

The train derailed on the 6th, about 7 a. m., near Dallas, Tex., was a southbound freight and the engine and two cars were overturned. The engineman, fireman and one brakeman were injured. The cause of the derailment was soft roadbed.

The train derailed near Carrier, Okla., on the night of the 8th was a westbound passenger, running about 35 miles an hour. Two cars were overturned and 52 passengers were injured. The

[†]Abbreviations and marks used in Accident List:

bc, Rear collision—bc, Butting collision—xc, Other collisions—b, Broken—d, Defective—inf, Unfenced obstruction—unx, Unexplained—derail, Open derailing switch—ms, Misplaced switch—acc obst, Accidental obstruction—malice, Malicious obstruction of track, etc—boiler, Explosion of locomotive on road—fire, Cars burned while running—P, or Pass, Passenger train—F, or Fr, Freight train (including empty engines, work trains, etc)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

derailment is believed to have been due to excessive speed. The tender was the first vehicle to leave the rails.

The train derailed near Birmingham, Ala., on the night of the 9th, was westbound passenger No. 5, and the engine and four cars were ditched. The engineman, fireman and road foreman of engines were killed and nine passengers were slightly injured. The cause of the derailment was the malicious removal of a rail, one rail having been unbolted and taken up and laid across the track.

The train derailed on the 29th, at Mahoning, Ohio, was a south-bound milk train, and five cars were ditched. The engineman and fireman were killed. The derailment was caused by a piece of machinery, which was lying on the track, having just fallen from a train passing on the adjacent track.

THE ALASKAN GOVERNMENT RAILROAD

Plans have been outlined for the first season of actual construction on the United States Government Railroad in Alaska. As announced in the *Railway Age Gazette* of April 23, 1915, the route adopted extends from Seward on Resurrection bay across Kenai peninsula and the head of Cook inlet, ascending the valley of the Susitna river, crossing the Alaska mountains through Broad pass and then descending the Tanana river to Fairbanks, a total distance from Seward of 471 miles. From Seward to the head of the Turnagain Arm of Cook inlet the road follows the line of the Alaska Northern, which the Government purchased

of Knik, at the mouth of the Matanuska river, 77 miles from Kern creek at the head of Turnagain Arm. At Knik the line turns northwest across the valley of the Susitna river. The most difficult part of the work on this end of the line will be the rock cuts and tunnels along the north side of Turnagain Arm between Kern creek and Bird creek. Work may be started later in the season from the Kern creek end and will continue in the tunnels through the winter months.

The first portion of the new line to be built will be from Anchorage, known also as Ship creek, to the Matanuska coal fields; 34 miles of this is main line, while 38 miles will be on the Matanuska coal branch, leaving the main line at Matanuska Junction near Knik. Anchorage is located on navigable water at the mouth of Knik Arm, so that by building this line first, immediate access will be had to the rich coal fields of the Matanuska without waiting for the completion of the line to Seward. The sea connection at Anchorage will also save 117 miles of train haul from Anchorage to Seward. In some seasons ice forms in considerable quantities in the upper end of Cooks Inlet, making navigation rather difficult for three or four months. This detracts somewhat from the advantages of Anchorage as a harbor. The tidal range is from 35 to 40 ft. There is plenty of good available land in the vicinity of Anchorage for terminals.

The town of Knik, located at the head of Knik Arm, is the center of a considerable mining region, which gives promise of a great future. It cannot be used as a sea terminal, because the upper end of Knik Arm is not navigable at low tide. There is considerable good agricultural land in the vicinity of Knik. Seward, the south end of the Government line, will be the winter terminal for the entire line, and will serve the Kenai peninsula the year round. It is located on deep water, on Resurrection bay, and has long been an important port on the Alaskan peninsula. The old dock of the Alaska Northern will have to be largely rebuilt before it will be of service.

It is expected that parties put in the field this year will complete the final location for the entire line between Seward and Fairbanks. The information collected on the preliminary lines run last year is so complete that the work outlined for this season should be completed without difficulty.

The appropriation for carrying on the work this year is \$2,000,000. Because of climatic conditions and the difficulty of getting equipment in to the line, most of the work will be done by station men on small contracts. The experience gained by this method this year will aid in determining the method to be followed in building the remainder of the road later.

Construction work at Anchorage commenced in May, and is now progressing quite rapidly over a distance of twenty miles. So far the material encountered is mostly gravel which is quite easily worked. There are many excellent station men on the ground, anxious for the work at reasonable prices. Considerable clearing has to be done all along the line, as the country is covered with a growth of small hirsch and spruce. Rails are now being contracted for, and it is expected that about thirty miles of track will be laid before winter. During the winter some rock work can be carried on, but earth work cannot be done to advantage. During next season it is expected that the work will be pushed more vigorously.

The entire project is under the direction of the Alaskan Engineering Commission, of which W. C. Edes is chairman, and to whom we are indebted for the information given above.

DANISH STATE RAILWAYS.—The earnings of the State Railways in Denmark during the financial year 1914-15 represent a record figure, amounting to about \$3,105,000. Owing to the extraordinary conditions prevailing, ample sums have been written off and added to the different funds, the net profits thereby being fixed at \$2,295,000, the same amount as the previous year. Last year differed considerably from ordinary years, inasmuch as the war at the outset reduced the income to an unprecedented minimum, but later the traffic grew to such an extent as has never been witnessed before.



Location of the Proposed Government Railroad

for \$1,150,000. It was originally intended by the projectors of this road to follow substantially the same course which the Government has now adopted, but the line ran into financial difficulties very early in its career, and only 71 miles of the line were built. A sale was finally made to the bond holders, who ordered construction work stopped, and rather than pay the \$100 a mile tax, discontinued the operation of trains. During the past four years the road has been operated by a "citizens' committee," using gasoline cars, during the summer only.

The Government intends to use the Alaska Northern this year as far as mile 34. Owing to the poor physical condition of the road it will be necessary to make very extensive renewals and repairs before it will be in shape to use.

From the head of Turnagain Arm the line will be entirely on a new location, turning to the west along the north shore of the Arm to Ship creek, at the mouth of Knik Arm, then in a generally northerly direction along Knik Arm to the old town

How Do You Select and Promote Your Men*

Simple and Practical Suggestions Looking Toward the Solution of a Most Difficult and Troublesome Problem

By ROY V. WRIGHT

Possibly no one problem is of greater importance to the railway executive or industrial manager than that of knowing how best to select men either to enter the organization at the bottom or for promotion to more important positions. We can analyze the properties of materials and predict their performance under given conditions with more or less accuracy. The human element, however, which controls the use of these materials and is by far the most important factor in determining the efficiency of operation of a manufacturing plant or a railway property is far more difficult to analyze and direct with a view to securing maximum efficiency. The necessity of giving greater attention to this element has become more and more evident in the intensive development toward greater efficiency which has been so marked during recent years. The selection of men is such a complicated problem, however, that many executives have gone on as best they could, feeling that science could contribute little toward its practical solution.

Vital as is this problem to a manufacturer or industrial plant, it is far more important to the railway with its forces scattered widely and with the higher executive officers, and many even of the minor ones, unable to keep in close or intimate touch with their subordinates.

In attempting to solve the problem of the selection of men some have looked to experimental psychology, such as is exemplified in Professor Hugo Munsterberg's work and particularly as outlined in his book on "Psychology and Industrial Efficiency." Others have looked into the theory of phrenology, feeling that possibly it might be used to determine the characteristics of different individuals with a view to seeing whether they were fit for promotion or whether by this means men could be selected with any degree of success for performing certain specific classes of work. Then we have had the theories of Dr. Katherine M. H. Blackford, which take into consideration certain physical characteristics, including color (blond or brunette), shape and profile of head, size, structure, texture (fineness or coarseness of fibre or grain as seen in the hair, skin, nails, features, hands, feet and general body build); consistency (hardness, softness or elasticity of bodily tissues), proportion, expression and condition of body, clothing, etc. Dr. Blackford it was who placed special emphasis on keeping three things in mind in selecting a man for a job: First, the type of job; second, the characteristics of the man himself, and third, and possibly equally important, the characteristics of his boss. Some of the claims which are made for this science of character analysis are defined in an advertisement in one of the recent numbers of a popular magazine in the following words:

In this course you learn to judge others quickly and accurately. You learn to know what a man's appearance means—his face, his head, his hands, his eyes, his expression, his walk, his handwriting—everything about him. You do not measure his head or ask him questions or let him know in any way what you are doing. There are no repetitions, no theories, but a clean-cut presentation of the principles underlying human character—with so many photographs, diagrams and charts that you can learn and apply the principles rapidly and easily, etc., etc.

Of how much value are all of these things? How much reliance may be placed upon them? If they are not satisfactory or reliable, is there any practical way of selecting a man for a job or for promotion with a fair degree of certainty as to his fitness for the position? The remainder of this brief talk will be devoted to answering these questions.

Most of you have undoubtedly heard of Dean Hermann

Schneider, of the University of Cincinnati, and possibly some of you are fortunate enough to have had the pleasure of meeting and becoming acquainted with him. He it was who first put into effect in a big way the idea of having practical and theoretical training go hand in hand in engineering education, by securing the co-operation of the machine tool builders and manufacturers of Cincinnati with the university, and in establishing the co-operative engineering courses. The wonderful results which followed this experiment make a long story and doubtless are familiar to many of you. Suffice to say here that the results were so eminently practical and so striking that in one form or another the methods are rapidly being extended far and wide, both in connection with engineering courses, in colleges and universities which are so located as to be able to secure the co-operation of industries, and also in many lines of industrial and vocational training throughout the country.

As a concrete example, let us consider what happened in one large department store. Those in charge felt that the sales force was not doing its best work because the employees were not properly trained, either in general education or as to their knowledge of the merits of the products which they sold, to deal to the best advantage with the leading people of the city who did their shopping in the store. Manifestly there are certain times during the day when it is not necessary to have all of the sales force on duty. Arrangements were made with the city school system to provide instruction during these periods, to those who could be spared, in English, civics and other studies which would develop the employees into bigger and broader men and women and make better citizens of them. Then, too, the employer, who provided and fitted up the schoolroom, saw to it that expert instruction was given in the methods of manufacture and as to the merits of the different products which were sold.

The latest development along this line is the general vocational training movement which is spreading throughout the country. New York City, for instance, has gone into the matter on a large scale and has retained Dean Schneider as one of its chief advisers. In the Woolworth Building, where our offices are located, the representatives of the city school system have made a canvass to find whether a sufficient number of employees can be spared at different times during the day to warrant the fitting up of a schoolroom and the providing of instruction in the building. At the shops of the Baltimore & Ohio on Staten Island, the city is co-operating by providing instruction to the apprentices, the railroad furnishing the schoolroom—an old passenger car—and the Board of Education of the City of New York paying the salary of the teachers, who in this particular case are employees of the railroad, and also for the material used.

I have outlined this development thus fully, not because it has any special bearing on the subject under discussion, but because I want you to have some idea of what Dean Schneider has done and of that for which he stands. He is a man with a hobby, but he is big enough to see over and around it. He has a keen and analytic mind and is capable of sizing a problem up from a broad and liberal viewpoint. He has a splendid supply of patience and is absolutely unselfish in his efforts to help others.

In connection with the work of the co-operative engineering courses at Cincinnati, which have been carried on for a number of years, Dean Schneider and his associates have come in contact with hundreds of young men whom they have had an opportunity of studying critically and whose progress along both practical and theoretical lines they have been able to observe and follow closely. Because of the nature of the work, the students spending alternate weeks in the manufacturing shop and in the

*An address given at a luncheon of railway officers at the Auditorium Hotel, Chicago, Tuesday, June 29, under the direction of the General Railroad Committee of the Chicago Y. M. C. A.

classrooms at the university, the instructors and shop co-ordinators can get closer to the students and know them more intimately than under the usual conditions. Moreover, they have been able to follow many of these men after they left the institution and to observe their progress.

As stated by Dean Schneider in a paper entitled "The Problem of Selecting the Right Job," which was recently presented before the third annual convention of the National Association of Corporation Schools, "one leg of the tripod upon which the co-operative system of education rests is the selection of men for the work for which they are to be trained." The university authorities, on the basis of their study and observation of the individual students, now guarantee to Cincinnati manufacturers for certain jobs men who have finished three years in the co-operative course.

In the effort to determine whether phrenology, physical characteristics or applied experimental psychology had any merit in such selection, a great number of experiments were made on mature students whose characteristics and qualities were well known, but not by those actually conducting the tests. The tests demonstrated conclusively that these systems were not at all reliable and that the only practical and successful way of selecting men is by testing them out on the actual job.

Concerning the tests as to physical characteristics Dean Schneider stated: "This seems to be a development of the old idea of phrenology. It is claimed in this system that physical characteristics indicate certain abilities. For example, a directive money-making executive will have a certain shaped head and hand. A number of money-making executives were picked at random and their physical characteristics charted. We do not find that they conform at all to any law. Also we found men who had the physical characteristics that ought to make them executives, but they were anything but executives. A number of tests of this kind gave negative results. We were forced to the conclusion that this system was not reliable."

As to applied experimental psychology the Dean had this to say: "The science of applied psychology seems to be at the point where chemistry was when it was alchemy; we may hope, however, that Illusion is the First Appearance of Truth."

It is not my intention, and I very much doubt if it was Dean Schneider's intention, to unqualifiedly and wholly condemn these things. It is quite possible that they may contain certain elements of truth. The trouble is that they are being carried to a ridiculous extreme. If on the other hand they are instrumental to some degree in awakening executives to the importance of the problem, they will have served a useful purpose.

Dean Schneider finally concludes, on the basis of the study and testing of about 1,000 mature students, both in theoretical and practical work, that: (1) A worker's failure is as significant as his success and should be analyzed to indicate a new and fitting job; (2) the characteristics developed by analysis of many successes and failures furnish a basis for placement which works better than any plan we know; (3) the method is crude and unscientific; it requires a period of time much greater than other methods proposed, but it insured a reliable verdict.

Knowing of the man and his work as we do, we are pretty safe in accepting his conclusions. Doubtless they agree fairly closely with those of many in the audience who, however, have not been in a position to prove their correctness, not having had the exceptional opportunities for observation possessed by Dean Schneider.

On these conclusions as a basis, how can we go ahead logically to induce the supervising officers to study more critically the characteristics and work of the men who enter the service, with a view to determining whether they are properly fitted for the tasks to which they are assigned? It would seem that in hiring men the initial selection should be made by members of the organization who have some special ability in sizing men up; then if they are closely watched and given a thorough trial on actual work, it should be possible to determine within a reasonable time whether they are the sort of men that will prove satisfactory

and along what lines it will be best to develop and train them.

The trouble under present methods is that a new man taken into the organization is in most cases not given any systematic attention. If he is very bad he is fired. If he is passably good he is allowed to remain, but no one knows with any degree of certainty whether he is the best man for the job, or whether he is capable of doing better work or not.

A simple method of checking the personality and performance of these new recruits will be described. It was not developed and used especially for that purpose, but is admirably adapted to it, as well as for checking men already in the service with a view to determine whether they are properly placed, along what lines they can best be developed and just which ones are best suited for promotion to more important positions. It has been tried out on a large scale with splendid results and is inexpensive to install and maintain. It cannot be successfully inaugurated or followed up, however, unless it has the enthusiastic backing and support of the higher executive officers.

Briefly, the scheme is as follows: Each foreman or supervising officer is provided with a sufficient number of special report cards to cover each one of his immediate subordinates, which he is required to fill in and return to his superior officer. He is not expected to keep any copy of these reports and is called upon at periods, of say six months, to make similar reports on each man. The comparison of the reports for any individual will show whether he has made progress in improving his weak points. If he has not, or has apparently fallen behind, his superior is asked for an explanation and is held responsible either for failure to properly train and develop the man or for lack of accuracy in sizing him up in making his reports.

In this way the foreman or officer is automatically compelled to study his men more closely, and the effect in improving and developing the executive ability of such officers is a most noteworthy feature.

The characteristics upon which a report is made are such as to indicate a man's fitness for holding a position in the organization and as to whether he is worthy of promotion. The items on a report card,* which was used by LeGrand Parish, with standard and concise definitions, are as follows:

EDUCATION: Mental and moral training.
SPECIAL KNOWLEDGE.
EXPERIENCE: Knowledge acquired by actual trial and observation.
HONESTY: Upright disposition or conduct.
MORALITY: Accord with the rules of right conduct.
TEMPERANCE: Moderation.
TACT: Ability to do or say what is best for the intended effect.
RESOURCE: Good at devising expedients.
RELiance: Sure dependence.
FORESIGHT: The act or power of foreseeing.
APPEARANCE: Outward look or aspect.
MEMORY: Mental hold on the past.
ENERGY: Active, effective.
INITIATIVE: The ability or disposition to take the lead.
PERSISTENCE: Steady or firm adherence to or continuance in a stated course of action or pursuit that has been entered upon.
ASSERTIVENESS: Affirming confidently, positive.
DISCIPLINE: To teach rules and practice and accustom to order and subordination.
PROMPTNESS: Quickness of decision or action.
ACCURACY: Correctness.
SYSTEM: Regular method or order.
ORGANIZATION: A systematic and regulated whole.
EXECUTIVE ABILITY: Ability to carry into effect in a practical manner.

A man is graded, as very good, good, medium or poor in each of these characteristics.

This scheme eliminates the "hit and miss" method of selecting men for promotion and was instrumental in locating suitable men with considerable accuracy. Too often when it comes to promoting men a decision is based on the man's recent performance, when he may have done some spectacular piece of work which placed him in the limelight, but which may not give any indication of his fitness for holding an executive position. The men throughout the organization, understanding that these records were being kept, were encouraged to improve and better themselves. Men who were unsuited for the work to which they were assigned were discovered and transferred to tasks for which

*For more complete description of this card see *American Engineer and Railroad Journal*, December, 1908, and *Railway Age Gazette*, July 23, 1915, page 151.

they were better fitted, or if they were found hopeless, were eliminated from the organization.

These report cards were developed ten years or more ago and remained in use several years until Mr. Parish left railway service—long enough to demonstrate their value beyond question. In the light of experience it was Mr. Parish's idea to revise the characteristics, including some which are not shown in the list quoted and eliminating or changing others.

It so happens that Dean Schneider, in making his observations, employed record cards of a somewhat similar nature, but possibly of a broader scope and more closely approximating the ideal toward which Mr. Parish was working. The characteristics noted on Dean Schneider's records were as follows:

Physical strength, or physical weakness. In some occupations physical strength is essential; in others it is not.

Mental, or manual. This may be stated in another way and in rough terms as "head efficiency" as compared with "hand efficiency."

Settled, or roving. Some men work best under a steady routine; others like to move about and see or do new things.

Indoor, or outdoor. Some men thrive best under outdoor work; others prefer indoor work.

Directive, or dependent. Some men assume responsibilities; others evade them.

Original (creative), or imitative. Some men are fertile in making suggestions; others do not possess this quality, but are good at putting them into effect.

Small scope, or large scope. Some men like to fuss with intricate bits of mechanism; others want tasks of big dimensions.

Adaptable, or self-centered. The first might make a good salesman; the second a statistician.

Deliberate, or impulsive.

Manual accuracy or manual inaccuracy.

Mental accuracy (logic), or mental inaccuracy.

Concentration (mental focus), or diffusion.

Rapid mental co-ordination, or slow mental co-ordination.

Some men go to pieces in an emergency, whereas if they were given time to consider the situation they hold together and act wisely.

Dynamic, or static. One man may lack push or determination; others having the dynamic quality possess these characteristics.

Little has thus far been said as to the necessity for providing some adequate means of training the men in all of the departments. Its importance immediately becomes apparent in developing a system such as that outlined above. That it pays generous dividends is indicated on such roads as have installed modern apprenticeship systems for mechanical department employees, or have developed educational campaigns for improving conditions and securing greater efficiency or economy in other departments. It is unfortunate that more attention is not being given to this subject by railroads generally.

In this connection allow me to quote a few paragraphs from an address on "Training of Young Men with Special Reference to the Question of Promotion,"* which was given by George M. Basford before a recent meeting of the Burlington Association of Operating Officers.

"To-day we are looking for the genius and are overlooking the production of good workmen. We are depending upon officers. We need to depend upon men. Trained, properly educated and encouraged workmen will provide good officers later.

"Systematic methods of selecting human material for the organization are imperative. The boys in offices, in shops, and all along the road should be most carefully and intelligently selected. Someone well qualified must be given this responsibility. Then these recruits must be tried out, and those 'making good' must be trained. This word 'trained' represents a new meaning as applied in this connection. It means thorough education of hand and brain and conscience.

"Because of the size of a railroad organization it is necessary to provide easy and automatic methods of discovering ability. It is desirable that promotion should be proposed by co-operative action by subordinate officials and controlled by a very high

official whose authority is complete in this case. Suppose the president of a railroad could find a man qualified for the duty of directing the training and promotion of men. The difficulty in finding such a man emphasizes the importance of the duty. This man should be given a dignified, powerful position, with such a title as Assistant to the President. He should be responsible for methods of recruiting, methods and means of training men, and for a scheme whereby he will personally know that every promotion is based upon merit, with favoritism and politics banned. He should be responsible for and personally approve every promotion in the entire organization."

Mr. Basford then describes the report cards which were used by Mr. Parish and among other things concludes: "Our Assistant to the President need not personally watch all these cards. He should, however, by frequent checks know positively that every department head is watching them, and he should personally keep the records of all important officials. He should also require record cards for a long period to accompany a recommendation for promotion. For example, a vacancy as assistant superintendent is to be filled. The Assistant to the President would call on all interested departments for recommendations and the office would be filled after an intelligent and complete investigation of all eligible men, including the mechanical and track as well as the operating department. The plan should cover every department."

The scheme suggested by Mr. Basford, if put into effect, would do much to make positions on the railroad more attractive to ambitious young men and would undoubtedly develop means for locating such men in the territory served by the road and of getting them to enter its service.

In conclusion the point which I especially wish to make is that it is imperative from the standpoint of future efficiency and economy that each organization should formulate and adopt a policy, which will have the hearty support and backing of the executive officers, as to the selection of men for the different jobs; the proper training of these men in order to make their efforts as effective as possible, and a comprehensive method of selecting men for promotion. If this is done—and it is not a matter which can be accomplished in a week, a month or a year—it will not only increase the efficiency of each individual in the organization to a maximum, but it will encourage loyalty on the part of all the employees and develop an *esprit de corps* which will do much to eliminate friction and labor difficulties and will place any organization which possesses it in an enviable position as to efficiency and effectiveness.

GERMAN RAILWAYS AND THE WAR.—A writer in the London Times, commenting on the important part played by the German railways in war time, describes the ease and rapidity with which huge masses of troops are transported from one front to the other. He says: "Naturally the usual train service in Germany has been considerably reduced. The time-table itself shows a high percentage of trains withdrawn. But the reduced service is perfect, despite the decrease in the number of railway servants, who now include very few able-bodied young men. In the booking offices women are supreme. But trains leave and arrive to the minute, and provide the usual accommodation. There are sleeping and restaurant cars on the important expresses between the principal cities. All the German railways are now worked on one single system, which has been extended to the whole of Belgium under German occupation, as well as to the occupied portions of France and of Russian Poland. Direct express trains, with sleeping and restaurant cars, run from Berlin to Metz-Charleville-Mezières. Similar trains run to Brussels and Lille. With a special permit a civilian can travel there just as he can travel eastward to Lodz. The German time-tables tell him when he can reach places as far west as Noyon, Laon and Chantilly. In fact, the organization is such that, notwithstanding the heavy military burden on the railways, one can travel almost as freely and quite as punctually as if there were no war. In certain towns and fortified areas your passport may be required, but that is all."

*For full text of address see *Railway Age Gazette*, July 23, 1915, page 15.

VENTILATING THE STAMPEDE TUNNEL OF THE NORTHERN PACIFIC

Late in March the Northern Pacific placed in operation a ventilating system at the Stampede tunnel, which required the solution of a number of unusual and interesting problems. This tunnel is located on the main line to the Pacific Coast, at the summit of the crossing of the Cascade Mountains, about 75 miles east of Seattle. The approach grade on the west is 2.2 per cent. for several miles, reducing to 0.7 per cent. at the west portal. On the east slope there is a 2.2 per cent. grade for five miles,



General View of the Ventilating Plant with the Power House in the Foreground and the Fan House in the Rear

changing to 0.2 per cent. at the east end. The summit of the grade is a short distance east of the center of the tunnel, which is 1.95 miles long.

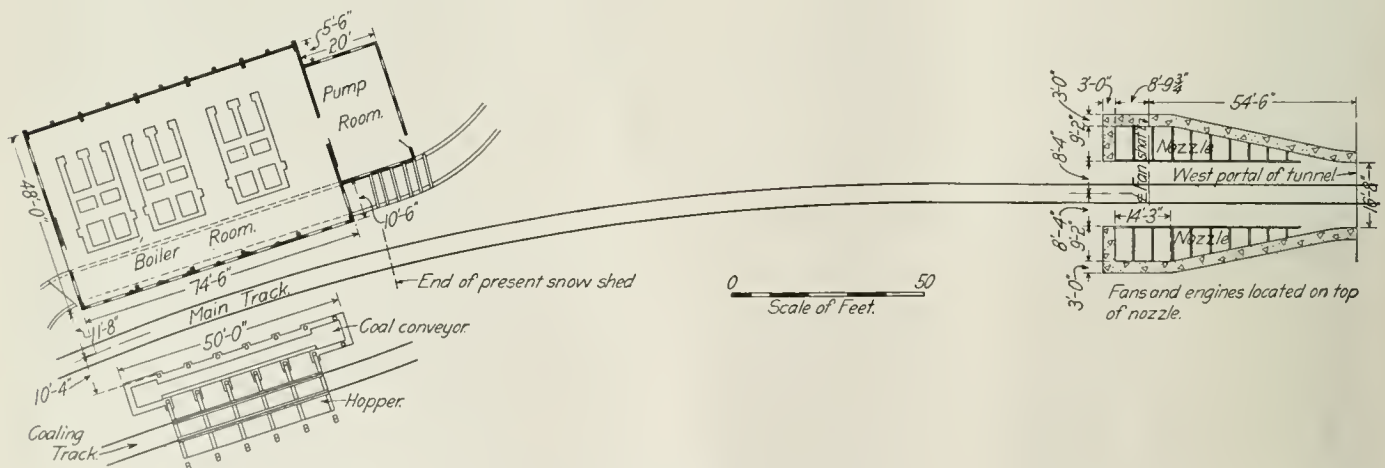
An average of 10 passenger and 10 freight trains pass through this tunnel daily. Most of the passenger and all of the freight trains require helper engines. The rating of freight trains is 2,850 tons westbound, and 2,400 tons eastbound. Such trains are hauled by large Mallet road engines, assisted by two smaller

to 150 deg. The substitution of oil-burning locomotives on freight trains two years ago relieved the smoke conditions somewhat, but did not lower the maximum temperature appreciably.

To relieve traffic conditions on these heavy grades over this mountain a second track has been constructed between Lester and Easton during the last two years, the only break in this being through the tunnel, which is still single track.

In considering the design of a ventilating system at this point, the most serious problem presented was the length of the tunnel. Previous installations have been made in tunnels varying from one-half mile to one mile in length. The Stampede tunnel is almost two miles long. This at once raised the question whether a sufficient nozzle velocity could be obtained to drive the air through the entire length of the tunnel with a train in it with a reasonable expenditure of power. After careful consideration it was decided that such a method required one of two alternatives, either operating the trains slowly to keep the smoke ahead of them by the expenditure of a reasonable amount of power, or if trains were run at their normal speed, the expenditure of a greatly increased amount of power. It was finally decided that the plant should be designed to clear the tunnel of smoke in approximately six minutes after a train had passed through. This insured that every train would enter a clear tunnel, and, also, if for any reason it was stalled in the tunnel the fans would have sufficient capacity to keep the smoke moving through the tunnel, supplying the crew with fresh air.

The presence of the summit of the grade, a short distance east of the center of the tunnel presented another problem. Theoretically, a set of fans would be required at each end, so that the smoke could be driven ahead of a train running up grade in either direction. As it was finally decided to clear the tunnel of smoke after the train passed through, the usual procedure was not followed and only one plant was constructed. As the prevailing natural direction of the wind was eastward it was located at the west portal. It was designed to furnish 540,000 cu. ft. of free air per min. at a velocity of 1,700 ft. per min. in the tunnel. The required impact pressure at the nozzle discharge was figured



Plan of the Power and Fan Houses

Mallet pusher engines, one of which cuts off at the portal of the tunnel and the other passes entirely through it. The helper engines in freight service drop back to the foot of the grade at each side after assisting trains over the summit, while the passenger helper engines go through from Easton, at the foot of the slope on the east, to Lester, at the bottom of the heavy grade on the west, and vice versa.

This frequent train and helper movement created smoke conditions which made relief necessary. The portal at each end is located in a ravine. This fact, combined with the presence of the summit of the grade midway in the tunnel, caused the smoke to remain in the tunnel for considerable periods of time, especially when the wind was in certain directions. Even more serious was the heat problem, the temperature frequently rising

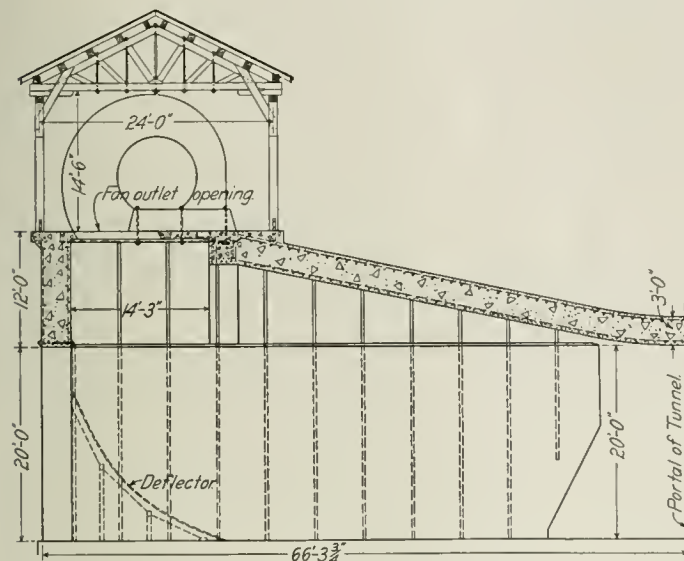
at 4.2 in. water gage. The general type of the nozzle adopted is that devised a number of years ago by Charles S. Churchill and C. C. Wentworth, of the Norfolk & Western.

As stated above, the west portal of the tunnel lies in a narrow ravine. For this reason, while the fan house is located directly over the portal it was necessary to locate the power house 250 ft. back along the track. On the side of the main track opposite the power house, is a short side track leading to a trestle and coal hopper. Coal for the power house is received here and unloaded into pockets. From the pockets it is carried up and over the tracks by a link-belt bucket conveyor and deposited in storage bins directly over the main tracks with a capacity of 450 tons.

The power house is located across the main track from the coal hopper. It contains five Babcock & Wilcox 150-h.p. boilers

equipped with Jones underfeed automatic stokers feeding directly from the storage bins. Auxiliary apparatus includes a No. 12 Sturtevant "Multivane" induced draft fan, driven by a 7-in. by 7-in. vertical engine, a Hoppes feed water heater, and three 12-in. by 8-in. by 12-in. Dean pumps, one of which is for the feed water heater, one for the boiler feed, and one as an auxiliary so connected that it can replace either of the other two.

Steam is conducted from the boiler room to the fan house through a 10-in. steam line. The ventilating equipment consists



Section Through Fan House and Nozzle

of two No. 22 Sturtevant "Multivane" fans, each fan being driven by two 16-in. by 16-in. Sturtevant horizontal center crank engines, direct connected. The fans are 16 ft. long by 14 ft. high and 7 ft. wide, and operate at 220 revolutions per minute. The fans and engines are mounted on a concrete platform carried on a concrete arch over the tunnel.

The fans force the air vertically down onto a deflector, from which it passes into the nozzle. The nozzle is 50 ft. long and 19½ ft. high inside at the rear, reducing to an 8-in. opening at the top and 14-in. on the bottom at the outlet, which gives a total outlet area of 52 sq. ft.

The outer wall of the nozzle is of concrete 3 ft. thick, while



View of the Fan House Over the Tunnel Portal

the inner wall is of 5-in. tongue and grooved timber anchored to the concrete by ½-in. by 3-in. flat steel bars spaced 6 ft. horizontally and 4 ft. vertically. A damper is placed below each fan so that it can be shut off completely when out of service.

This plant was built by force account during the winter of 1913-14. Over 1,000 cu. yds. of concrete were required in the construction of the nozzle and the engine base. Because of the very limited amount of room available and the necessity of preventing

all interference with main line trains, since a westbound train would have to stop in the tunnel and an eastbound train on the ruling grade, the concrete was mixed at the site of the coal dock. It was then hoisted by an Ensley system of spouts and dumped into small cars running on the top of the snow shed extending over the track between the boiler and fan houses. All of this concrete was put in in two weeks, as much as 130 yds. being placed in a single day. During this same time all concrete material had to be unloaded directly from the main line.

The fans were installed during last year. Recent tests showed that they are delivering 540,000 cu. ft. of air per min., with an impact pressure at the nozzle outlet of 4 in. Tests made with a freight train moving at a speed of seven miles per hour showed that the smoke was driven ahead of the train and the temperature did not exceed 100 degrees.

This installation was designed and built under the general direction of W. L. Darling, chief engineer, by S. J. Bratager, principal assistant engineer, in conjunction with F. Herlan, district manager, B. F. Sturtevant Company, Boston, which company furnished the equipment. T. Z. Krum was assistant engineer, and B. C. Rowell, resident engineer on the ground for the railroad company.

THE FARMER AND THE RAILROAD

By PHILIP MEINEN

Farmer, Stites, Idaho

One reads much nowadays in almost every newspaper in the country about farmers urging legislation to lower freight and passenger rates. Before going any farther I wish to say that I am not a railroad man, but am a farmer and believe in justice between man and man or man and company, regardless of wealth on either side.

Now, to begin with, the first thing a farmer will say is that the railroads are making too much money, basing his argument on something he has read somewhere or that someone has told him who doesn't know any more about fair rates and profits than he does, but who is urging lower rates only to be a good fellow and get subscriptions for his paper.

To be frank, we need both the farmer and the railroad company. I say company because many would say let the government handle the railroads. I don't think the government should go into the railroad business and you don't either if you have ever given it any observation and thought.

Let's not overlook the consumer, as he is the prime factor to both the farmer and railroad. Without him the farmer couldn't sell his products or the railroad do any transporting, and his sympathy is not altogether with us farmers, as he accuses us of getting too much for our hogs, cattle and grain and is employed by railroad companies or other city industries for his livelihood.

I have heard farmers remark that the cost of living is too high for the poor people in cities and should be reduced by cutting freight rates and cutting out the middleman's profit. Well, there might be something in that, but we don't do it when we have a chance. For example, at present I am living in the state of Idaho. In the village where I live the farmers have a co-operative creamery running the third year now. They were going to furnish cheaper butter by cutting out freight rates and also middlemen's profits. Before this creamery was there they used to ship their cream to Spokane, Wash., a distance of 195 miles, and ship the butter back. Now they have saved dray charges at both ends of the line, saved middlemen's commissions at both ends and also saved railroad charges both ways, and the result is that we pay the same price as usual, and at times a little more, so there is not much sincerity to the cheaper butter question.

A short time ago I noticed in some paper where a spokesman for the farmer came before a hearing on freight rates, stating that the railroads were getting from six to nine per cent on their investment. He claimed that this was too much

as compared with the farmer who was getting only from three to four per cent on his investment, and further, that the average farm investment in the state of Iowa was \$17,000, and that a man could only earn \$600 a year on that investment, declaring that a man capable of handling a \$17,000 investment was worth more than \$600 a year.

Now surely there is something wrong besides high freight rates. Let's investigate. In the first place, if any man who has \$17,000 invested in a quarter section of land can only make it pay him \$600 a year there is something wrong with the man or the land. If he is not a farmer and does not understand farming thoroughly, as many of us do not, it's the man's fault. On the other hand, if he has paid \$17,000 for a quarter section where the land is not worth more than \$10,000 a quarter section that makes a difference in figuring interest on an investment.

The fact of the matter is this: we have all been anxious to have a farm of our own, thereby causing land prices to rise by high bidding. We'll all have to admit that land is selling too high, which makes it bad for the renter who has to pay higher rent so his landlord can make reasonable interest on his high-priced land, or if a man is buying a farm for himself to live on and has to go in debt for most of it, it makes quite a difference whether he has paid \$100 per acre or \$50 when it comes to figuring interest and revenue on investments. When people get excited over land and pay a great deal more than it is really worth somebody is going to be dissatisfied sooner or later. The selling price of land isn't always the actual value. We have numerous instances of this everywhere. If you have made a bad buy or are a poor manager you might have free railroad transportation and still make a failure of farming. So let's use a little sense and not shift our poor judgment on the railroad company which has nothing to do with it. We are always ready to blame the other fellow when really the fault is our own.

We shall all have to admit that the railroads have helped the farmers more than anything else could have done, by giving them better transportation and cheaper transportation than we used to have in early days when the freight wagons used to be the only way.

Now it is a fact when we go into any country as a home-seeker or for any other business requiring cheap transportation the first question we ask is, "How far from a railroad?" If very far out we usually do not give it any attention, and if we do invest the saying is this, "Well, I got it cheap and will hold on until we get a railroad that will open up a good market for us and then our land will be worth something."

I want to tell you about another case of freighting the old-fashioned way in the state of Idaho, with which I am thoroughly familiar. In the village of Stites the Northern Pacific Railroad has a terminal. The surrounding country is fertile farming land, but 52 miles up the river is a large mineral belt. The mineral belt has no railroad transportation and the old-fashioned horse freighting is too expensive for the mining companies. So they will have to wait until the railroad is extended, which will then open up a great mineral and timber belt and also a great market for us farmers to sell our products to the mining companies at a good price and create labor of all kinds where there is nothing doing now of any importance. I have made the remark many times myself, and have heard numerous farmers make the same remark, that if the railroad should ever be extended to Elk City, which is a small mining town, this would be one of the greatest countries in the Northwest for the farmer, miner and lumbermen.

These are facts, as I am in a position to know. Then why should we encourage a railroad company to spend several million dollars to build, which it would cost at the very least, as it is an expensive road to build, and then come right back at them and say: "You are making too much money, you will have to cut your rates," after they have spent their money in good faith and to the great benefit of the public. Take it

with ourselves. Suppose we bought a bunch of hogs or cattle and were asking a handsome profit on our risk and investment, and the consumer was to come along and say, "No, I can't afford it and furthermore you are making too much on them, you will have to sell them for so much; if you don't we will have to legislate against you." That would be just as fair in the eyes of good reason as going against railroad companies.

Of course this horse freighting does not appeal to the farmers of the Middle West and older settled States, but is still in existence with us in the West to a certain extent. A short time ago I was talking to an old settler from north central Kansas. He was telling me of earlier days when they used to haul corn to Denver, Col., a distance of 500 miles by wagon before they had railroads, and of the hardships they endured, and the prices of their stuff were not any better at that time than they are to-day. And it is from those days that we must figure our rates. Figure the price they received in those days and the cost of hauling, and then figure the price you get now and the rate you pay now. Compare them, and see which you like best, and which is the most profitable to you.

This talk of someone making too much money is no argument. That is mere jealousy, and we don't want to class ourselves with that class. Let us be brighter and broader. Well, you say, the railroad companies are all getting rich. That may be true, but look at the amount of business they do. If their profits are small, or we will go a little stronger and say reasonable, the immense business transacted would make anyone rich. It would be the same if a large number of farmers combined and formed a company, provided they could agree, which is hardly ever the case. If they would buy immense tracts of land and would manage their business as systematically as the railroads do they would also become very rich, not necessarily from large profits, but from the large amount of business done. It is a well-known fact that the railroad officials thoroughly understand their part. If they don't they don't hold their positions long. If we farmers would spend more time studying our own affairs instead of the other man's it would be better for us. It would purify our minds and teach us better management and also how we can produce more per acre, as that is the coming big question.

Now, in conclusion, I wish to say that I don't want you to think that I am giving the railroads all the credit and the farmer all the blame, but there has been a great amount of unnecessary complaining by the farmer. Whenever it is necessary and possible to lower rates the results are usually accomplished by the proper persons applying to the proper authority. What we should do is to have a get-together good old time oftener, and get better acquainted with one another, and that ill-feeling would not exist so much. There are good men on both sides, and if we understood one another better the feeling would be more friendly and it would be beneficial to everybody concerned. So let us break away from the old idea of playing the other fellow for a robber and a crook when we are just as much to blame.

RAILWAY EXTENSION IN THE CANTON PROVINCE OF CHINA.—A recent British Consular report says that little railway construction was undertaken in Canton Province during 1914. The Canton-Hankow Railway at the end of the year was open as far as Wu Shek, a distance of 121 miles from the Canton terminus. It was hoped to complete the next section of 19 miles to Shiukuan by May last. The total length of the section to be built by the Canton Company is 214 miles, which will take the line to Ichang, just across the Hunan frontier. Prospects of a continuation beyond Shiukuan in the immediate future without outside assistance are remote, as capital is said to be exhausted. Receipts more than cover expenses and upkeep, and are expected to increase considerably with the extension of the railway to Shiukuan. The Canton-Samshui Railway, though only 32 miles long, has had a good year in spite of damage done to the roadbed by floods, which, for a considerable time, stopped traffic six miles from Samshui.

Precedent Versus Progress in the Stores Department

Excessive Increase in Unused Material Due to Adherence to Precedents in Methods of Control and Accounting

BY GEORGE G. YEOMANS

The investment of the average railroad in unused material is rapidly increasing. In 15 years it has increased 283 per cent. This rate is out of all proportion to the increase in any of the units of operation, which render a stock of material necessary.

The official figures of the Interstate Commerce Commission show the following increases to have taken place during the same period:

Miles of track.....	50 per cent.
Freight car miles (10 years).....	50 per cent.
Total car miles (partly estimated).....	57 per cent.
No. locomotives in service.....	70 per cent.
No. cars in service.....	82 per cent.
Tons moved	167 per cent.

Reduced to a "per mile of track" basis, the percentage of increase is as follows:

Unused material	155 per cent.
Freight car miles (10 years).....	10 per cent.
Total car miles (partly estimated).....	15 per cent.
No. locomotives in service.....	14 per cent.
No. cars in service.....	21 per cent.
Tons moved one mile.....	77 per cent.

Why this enormous discrepancy in the growth of the fixed investment in material?

It must be distinctly borne in mind that this is not an increase in the amount of material *used*, but in the amount of material that is not used and which represents a practically permanent investment.

This distinction is important. Consumption of material should be expected to increase in greater ratio than the units of operation referred to, because railroad operations themselves have greatly increased, both in magnitude and complexity. But a stock of material should not increase in direct proportion to the amount consumed, and, while it could not perhaps be altogether limited to the same ratio of increase as those units with which it is here compared, it is reasonable to assume that so great a difference is wholly unwarranted.

It is unfortunate that more exact information on this subject is not procurable. The units with which comparison is instituted are not those of choice, but of necessity, and the comparison is therefore crude, but the discrepancy between cause and effect is so tremendous as to demand serious consideration.

I do not know a railroad executive who will not admit that this investment is larger than it should be, and who is not trying in some way to curb it, but it is evident that the average way is not the right way, for the disproportionate increase continues. A detailed examination of this situation on ten representative railroads in various parts of the country, coupled with results actually obtained in several cases, point to the conclusion that this investment is nearly twice as large as is necessary on the average railroad.

The amount of capital thus impounded is reported as \$240,000,000, and this is undoubtedly the minimum. If 40 per cent of this money could be recovered, there would be \$100,000,000 more of free capital to employ for other purposes.

Analyzed further, this means that the railroads, collectively, have unconsciously expended \$100,000,000 for which no real necessity existed. True, it is not lost. The material which it represents will be used some day or, at least, most of it; but it is idle capital and that means expensive capital. When locked up in stocks of material the carrying charges are seldom less than 15 per cent, and frequently as high as 20 per cent. Thus a further expense of some \$15,000,000 or \$20,000,000 is caused, which is wholly unnecessary.

Why do such conditions exist, and what is the remedy?

Two principal causes contribute to this economic waste and prevent its correction.

1. Absence of exact information regarding the handling of this large investment.

2. A reluctance to depart from long established precedents and customs.

It has come to be generally accepted that the first step toward positive control of this large investment is the creation of an organization to which can be entrusted the care and handling of the stocks and the collection of accurate data concerning them.

Following the example of the pioneers in this reform a majority of the railroads have instituted a "Stores" department, but, as a rule, have placed it in charge of employes whose previous training has all been along the lines of former practice and, through an imperfect conception of the basic principles underlying the effectiveness of such an organization, they have condemned all departures from precedent and expected different results without employing different methods.

Under such conditions the work of the new department has been perfunctory and superficial, for no matter how those in charge of it may strive, they are bound by the dictates of precedent and custom. They must also contend against a natural jealousy over what has come to be regarded as a "vested right" of the individual or the department in the material they use and an equally natural resentment of what is construed to be an abridgment of long enjoyed authority.

The insignificance of the results obtained under these conditions creates a disbelief in the efficacy of the remedy.

The methods of controlling the investment in material are the only ones that have stood still, on the average railroad, since its inception. They are essentially the same today as when the "Stourbridge Lion" made its first trip.

The efforts at improvement have been mainly directed to facilities for the physical handling of the material, which have an important effect on the labor cost, but none at all on the amount of the investment; unless, possibly, to still further increase it.

It is hard to understand why we cling so tenaciously to customs which have produced the very condition which we seek to correct, and blindly follow precedents established under circumstances that no longer exist, but until we realize that they have outlived their usefulness and are ready to discard them in favor of methods which are better adapted to the changed conditions of modern railroad operation, this unproductive and costly investment will continue to increase.

The only methods by which the stock of material on a railroad can be controlled are the same, in all essential particulars, as those employed by any large and successful department store or mail order house. The same basic principles apply in both cases. It is purely a commercial problem, not one of operation or engineering. There must be the same precision of method, the same accuracy of data, that are necessary to the profitable conduct of any commercial business. The law of averages holds just as good in the consumption of material for the ordinary maintenance and operation of a railroad as in any other field of human endeavor, and this law should be intelligently applied in procuring and limiting the supplies for such work, but the averages must be founded on precise and comprehensive knowledge, and not on estimates or imperfect or incomplete information.

Precedent has decreed that the amount of material to be carried in stock shall be determined by the user. The argument is that he is the only one who can decide what his requirements will be. The fallacy lies in not differentiating between

his requirements for immediate use in a given case, and the amount which should be provided for future use in a given period. A sharp distinction must be drawn between these two requirements, for they are essentially dissimilar.

When an engineer is deciding on the strength of a structure, or, in other words, determining the amount of material to be used, he ascertains the ultimate stress to which the members will be subjected, but he does not stop there and perfect his plans. He proceeds to multiply this strain by 4, or perhaps by 5, as a factor of safety, and often adds 5 or 10 per cent to the total thus obtained to cover contingencies and possible errors in calculation.

I am not criticising this practice as it applies to engineering, but I do say that men whose life-long training is along such lines are apt to use similar methods in determining the amount of material to be provided for future use and this is one reason for the discrepancy which has been pointed out, and a partial explanation of the fact that the most disproportionate stocks are usually of material used by the roadway and bridge departments. If the stock of a mercantile establishment was regulated by the estimates of its customers, it would speedily meet with disaster.

Adherence to precedent is also responsible for the lack of exact information, which is one of the primary causes for failure to control the investment in material.

The exigencies of the work demand that material be kept in readiness for use in a multiplicity of places, not only at widely separated points on the line, but at numerous places within the confines of a single large shop or terminal. The custom has been that the labor of handling all this material, which is not in the immediate vicinity of the storehouse, shall be performed by labor gangs in charge of the user.

The physical handling of a stock of material is vital to an accurate accounting, either for its receipt or distribution, and the greater the number of individuals entrusted with it, the less is the likelihood of uniformity and accuracy, and the greater the chance for error and confusion.

Where this custom prevails there is no real precision in the accounting for material, and without this, any adequate regulation of the investment is hopeless.

It is said that the user is responsible for the costs of the work under his jurisdiction and therefore must have entire control of everything entering into them. Granted. But the stock of material never does enter into his costs. The minute it is used, it ceases to be stock, and it is the stock we are dealing with.

The most potent argument for the retention of this pernicious custom is that the work is done by men already on the pay-roll and who could not be dispensed with, and that a separation of the work would involve additional forces and an increase in the labor cost. This argument is very insidious and is too seldom subjected to close analysis. The main difficulty with it is that it is not true. It springs from the very lack of exact information, which the custom itself is accountable for. Where this practice is followed, the actual cost of handling the material is not known, and to say that it will be increased is merely stating a conjecture as a fact.

In every instance where the experiment has been honestly tried the reverse has proved true, and the labor cost has actually been reduced; in most cases sufficiently to cover the added expense which is inseparable from a more precise system of accounting.

It is customary in many places to permit the users to withdraw material from the general stock in anticipation of possible future needs, or as a matter of convenience. This custom is prejudicial to the service. It is an effort to compromise between bad precedent and good practice. It results in duplication of stocks and of labor, complicates the accounting, tends to destroy its accuracy, and renders effective supervision and control of the total investment difficult if not impossible.

The cardinal principles which form the foundation for suc-

cessful control of this investment on a railroad are as follows:

1. The creation of an organization devoted exclusively to that purpose and free from authoritative control of the user, except as to the kind and quality of material to be provided. In that respect the user is supreme, as is the customer in any well-regulated mercantile business.

2. The jurisdiction of this organization must extend to all material not in actual use, and all material released from service for any cause must automatically return to its control.

3. This organization must procure the requisite material from all available sources, including the company's shops, must limit the supply to the actual requirements and be prepared to deliver to the user on demand all ordinary supplies for maintenance and operation, and on reasonable notice all unusual or extraordinary material for betterment or construction.

4. It must have direct charge of all labor necessary for receiving, warehousing and distributing all materials to the user. This is essential to precision in accounting.

5. It must install a system of accounting under which the material is so classified as to facilitate rigid supervision of the amount invested, and so precise in detail as to render supervision of the numerous items effective.

Precision and the inclusion of all material, both in handling and accounting, are the keys to the control of this investment, and one is the complement of the other. To be effective they must be united under a single supervision.

Precision generally involves increased expense and this has been a stumbling-block in the pathway of many who are conscious of doing the best they can, and who cannot convince themselves that the benefit to be derived from more exact methods would be sufficient to pay the added cost. On the other hand, many railroads have recognized its value and made liberal expenditures for more accurate accounting, but have unfortunately followed the line of least resistance when any radical departure from precedent was in question, and have therefore reaped only part of the benefit to which their increased expenditure entitled them.

The few who have studiously analyzed the whole situation in the light of present conditions and have courageously followed their analysis to its logical conclusion, have attained results that they did not originally dream of. These results are not frequently published, because of the reflection they cast on former methods, but they are very real, and they confirm the conclusions previously stated.

The net earnings on one railroad coming under my observation were increased \$1,500,000 in one year, and an average increase of more than \$750,000 was maintained over a period of five years, while the unproductive investment in material was reduced more than 45 per cent, and yet this might have been classed as an average railroad.

There is no reason why the same progress should not be made in handling the investment in material that has characterized every other field of railway operation, but in order to accomplish it, we must abandon the precedents and customs which are mainly responsible for this economic waste, and set up new standards, adopt new methods, establish new precedents; for we cannot reap the highest rewards of progress while we continue to live in the past.

A NEW INDIAN RAILWAY.—The Kalighat-Falta Railway Company will complete a 26-mile 2½-ft. gage railway from Kalighat to Falta, Bengal. The line will run through one of the most densely populated parts of Bengal, the density of population being more than 1,100 per square mile. This is more than double the average density of Bengal, which is 551 per square mile. The only present means of passenger transportation is by hackney carriage or on foot. Almost every foot of the ground through which the line runs is under cultivation, and the only means of transportation heretofore has been the bullock cart, wherefore it is estimated that the freight traffic will be immense.

CANADIAN PACIFIC DRAW SPAN OVER THE LACHINE CANAL

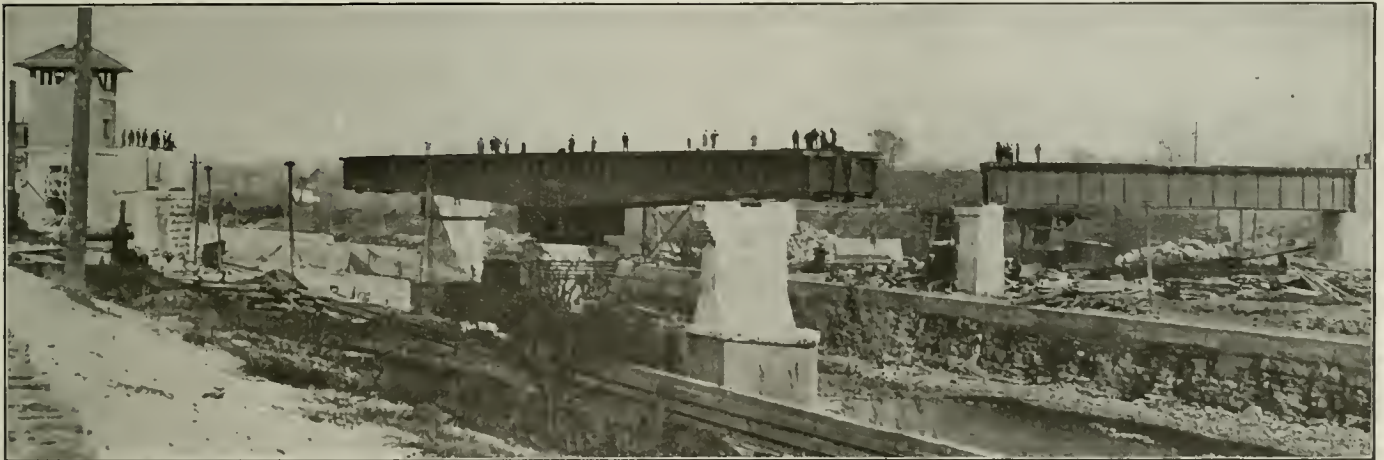
A new electrically-operated double track deck plate girder swing bridge over the Lachine Canal, near Montreal, Can., has recently been opened for traffic by the Canadian Pacific. This bridge is said to be the longest plate girder swing span in existence and is of interest also because of a number of unique features embodied in the design to overcome physical obstacles and to permit rapid construction with minimum interference with traffic. The old structure consisted of a 240-ft. through truss swing span over the canal with a 45-ft. deck girder approach span on the south end to accommodate a highway which is a continuation of St. Patrick street, Montreal. The completion of the double track bridge over the St. Lawrence River, and the double track work between Montreal and Brigham Junction a year or so ago, left this bridge as the last remaining single track structure, necessitating the use of gauntlet tracks over it. Because of the consequent delays to trains, authority was granted in the fall of 1914 for a new double track structure.

The old bridge was supported by a cylindrical pivot pier 18 ft. in diameter and 49 ft. high from top of coping to the rock in the bed of the canal. There were also one intermediate pier and two "T" abutments, all of ashlar masonry. Although the pivot pier was rather narrow for a double track structure, objections to narrowing the waterway of the canal precluded

during a short time in the winter, while navigation was closed on the canal. This necessitated the perfection of arrangements to do the work at the greatest possible speed. Work on the masonry was started December 1, 1914, and was ready for the erection of the steel work on February 8, 1915, the work being carried on by day and night shifts most of the time.

In order to facilitate erection, the old draw span was altered a sufficient amount to permit erection of the center, the loading grillage and the main girders on the upstream side. By this plan it was possible to divert traffic to these girders while the old span was demolished and the girders erected on the downstream side. This operation eliminated the necessity for a temporary structure to detour traffic around the bridge while erection was in progress. The four main girders, each of which weighs 112 tons, were shipped in three sections by the builders, the Dominion Bridge Company, to facilitate handling and shipping. This necessitated field flange and web-splices, which were riveted up after they had been lowered into place by heavy derricks. The new span was operated by hand power for the first time on March 31. The double track was put in service on April 3, while operation by electric power was commenced on April 15.

The bridge is protected by a 16-lever mechanical interlocking machine with power-operated home signals and electric track circuit locking, and is controlled from a signal tower of fireproof construction, supported on an extension of the north abutment.



View of Draw Span in Open Position

the construction of a new pier of greater width. Preliminary studies indicated that a deck structure for the new bridge would simplify the erection. It was also found desirable to provide for a railway track passing under the bridge on the south bank of the canal, thus necessitating an increase in the approach span from 45 ft. to 90 ft.

The girders of the new swing span are 239 ft. 7 in. long and 13 ft. 6½ in. deep at the center, reducing to 8 ft. ½ in. deep at the end, measured back to back of flange angles. The girders for each track are spaced 8 ft. center to center, with tracks 13 ft., center to center. They are supported at the pivot pier on a grillage of loading girders about 8 ft. deep, which transmit the load to a combination center and rim bearing. The total weight of the swing span is 615 tons, while the 90-ft. approach span weighs 143 tons.

The renewal of the superstructure involved extensive changes in the substructure. It was necessary to cut down the pivot pier practically 20 ft. and then provide a new coping with a width of 23 ft., to accommodate the deck girder spans. The north abutment and the intermediate pier had to be increased in width to accommodate the second track. The old south abutment was entirely removed and a new abutment was built a sufficient distance back to provide for the new 90-ft. span. In order to avoid provision for turning the old bridge during the construction of the masonry it was necessary to do all construction work

The structure is also provided with a system of lights as required by the Board of Railway Commissioners, for the protection of shipping on the canal. The new type of bridge gives a much clearer view along the track than formerly, as there is no overhead lattice work projecting above the rail level, and the tower commands a view up and down the canal even when trains are passing over the bridge. The bridge was designed and erected under the supervision of P. B. Motley, engineer of bridges, and J. M. R. Fairbairn, assistant chief engineer.

LINKING-UP THE SUB-CONTINENT. General Botha's victory in the territory heretofore known as German Southwest Africa is of great significance to railway men, for it will doubtless mean the eventual linking-up of the railway systems of the sub-continent in a way that was not possible under the old regime. Thanks to the enterprise shown by the Railway Administration of the Union of South Africa in hastening the construction, firstly, of the Prieska to Upington Railway line, and, secondly, the extension thereof to Kalkfontein, north of Warmbad, in German Southwest Africa, the work of linking-up has already made material progress, and it is now possible to travel by a somewhat circuitous route, it is true—by train from one side of the sub-continent to the other—from Luderitzbucht, in German Southwest, to Lourenco Marques, in Portuguese Southeast, taking Kimberley and Johannesburg en route—*Railway Gazette, London.*

HOW AND WHY FRENCH RAILROADS SELL THEIR SECURITIES DIRECT TO THE PUBLIC

By WALTER S. HIATT*

Is there not a lesson for the railroads of the United States in the way the French railroads sell their securities over the counter to the investing public, thus making easy such investment on the part of people of limited means? Just now the important problem before the American railroad financier is the raising of new capital for railroad development and for the refunding of securities maturing. This problem is all the more difficult because of the return of American railroad securities by crippled European investors.

I am certain that the average small investor in the United States, the person without any financial knowledge, the person who generally in a small town or city puts his money on deposit at the local bank and often without interest or else in the private savings bank or those of the post offices, hasn't the slightest information as to how to buy a railroad stock or bond. Suppose this person with \$50 or \$100, a few hundred dollars at most saved up, would like to buy outright a share or two of railroad stock. Suppose the desire, the inclination is there, what can he do? If he has a friend in a broker's office or in some bank, he may be permitted to buy as a personal favor. This is a condition that exists, as any one can find out by asking the first acquaintance of moderate means he meets in the street how he would go about buying a share of stock or a bond.

France held, or did hold, previous to the war, twenty odd billions of the securities of the whole world. It was the largest holder of such securities after the United Kingdom and the United States. But these securities are not held in France exclusively by the very rich, or the moderately rich, as in the United States. They are held as well by the moderately poor people, by the salaried clerks who earn a thousand dollars a year, by the people who have retired on an income of five or six hundred dollars a year. Although the French are noted for their thrift, their saving bank deposits are small, either in the private or the government savings banks—a little over a billion dollars, as compared to the five billions found in like banks in the United States.

One of the favorite purchases of those whose savings are small is French government bonds. Why? Because the government makes it easy for them to make the purchase. These bonds are put out in \$20 lots. Generally they pay two and a half to three per cent., but just now they are paying five per cent., and about a third of the bill board space of France is plastered to publish the fact.

French railroad securities are also a favorite with the small investor. Why? First, possibly, because the railroads have nearly always paid good dividends, and then because they have made it easy for the small investor to buy. All the investor has to do is to walk into a railroad general office, either in Paris or in some other city along its line, go to the proper window, hand in his money and walk out with his security. He doesn't have to go through the mysterious medium of a bank or a broker's office, though, of course, these latter places sell railroad securities too. Undoubtedly this method of selling railroad securities is a direct benefit to the railroads, in that it makes the public take an interest in their welfare, and then there is the general benefit to the public in that saving itself is encouraged.

Of course, one of the reasons that the railroads are able to sell freely and obtain new capital is that they have the confidence of the public. Only recently I was in the Paris central offices of the Southern Railway (the Chemin de Fer du Midi) and saw posted up a notice that it was issuing new bonds at 3 per cent. People, men and women, were buying them at the proper window just as they would hardware or drygoods. It was surprising that people should be doing this in war time,

when financial markets are troubled and when the end of the war is yet distant. I asked the clerk selling the bonds how it happened that people bought so freely. "Oh, they know we have paid our dividend as usual this year; then they see how we are quoted at the Bourse and know we are offering a good bargain," he explained. "Many of these buyers are our regular customers. They had bonds that we have redeemed this year, so they take this money and put it back into new bonds."

One of the odd sides to this method of dealing directly with the public lies in the fact that that part of the public which has large means prefers to buy of the railroad rather than of bankers and brokers. In past years this latter class has flagrantly betrayed the confidence of the French public, first, in refusing credits to legitimate business, and second, in foisting upon it unsafe securities of North and South American railways.

An agent of London Lloyd's told me recently this story. He happened to be in Paris one day and called on a banker he knew. As he entered the bank he saw a long line of people. "What's the matter? Is there a run on your bank?" he asked. "Not at all, we are putting out a thirty million franc issue of railroad bonds," and the banker mentioned a South American railroad. "But do you know what you are selling? Have you investigated that road?" asked the Lloyd's man. "Certainly," said the French banker. The railroad at the time of this issue had just one engine, a few flat cars and five miles of sloppy track.

The question here raised as to whether standard American railways might not do well to adopt the French system of selling directly to the public is raised because the system works well here and should work well with the American public. In past years a small part of the American public has been encouraged too much to speculate in railroads and the great public, the public of small means, has never been made to look upon them as objects of legitimate investment; or, when the public was given an opportunity to invest, it was in some new railroad scheme that too often wiped out the original investors. The banker was the only holder whose money was secured.

The problem before the American railroad is one that, intricate as are its details, involves, first of all, common sense. The railroads have in late years got down, though tardily, to common sense in dealing with the public in matters of service, and why not deal with this public on the same basis as regards finance?

How rare are the small holders of railroad securities in the United States is astonishing. Let me cite this incident. Two years ago I was present at a meeting of business men of Hoboken and Jersey City, New Jersey, a railroad terminal for many years of the Erie, the Lackawanna, the Pennsylvania, and other railroads. These business men wanted to secure certain minor concessions affecting the interests of the people living in Hudson county. It was moved that a committee be appointed to call upon the local railroad managers. "But they won't listen to you," argued one man. "We've tried that before." "I know a way to make them listen," said one of the men present, a manufacturer. "I own stock in these roads and when I tell the managers that they'll listen all right."

The fact that he owned stock in these roads surprised everybody present, and they then agreed that there was some chance of getting what they wanted. As a matter of fact, when the stock owner disclosed this ownership to the railroad men, he was listened to most respectfully, and he did get what was asked for. Afterwards the manufacturer and stock-owner laughingly told me that he owned but one share of stock in each road, stock that he had bought as a present for his oldest son, as a sort of nest egg, to encourage him to save his money and buy more stock.

AUSTRO-GERMAN SLEEPING CAR COMPANY.—According to Amsterdam advices negotiations are taking place in Berlin for the formation of an Austro-German Sleeping & Restaurant Car Company. Up to the present the Wagons Lits Company, of Brussels, has operated this traffic in Germany.

* Our special European correspondent.

Steel Coaches for Long Island Suburban Service

For Summer Service Only; Exceptionally Low First Cost
and Light Weight Obtained by Building Without Lining

Passenger traffic conditions are such on the electrified lines of the Long Island Railroad that a considerable increase in equipment is required during the summer months, amounting



Interior of Long Island Steel Trailer Cars

to about 25 per cent of the equipment in service during the remainder of the year. In the design of an order of 20 trailer cars built by the Standard Steel Car Company and recently placed in service, full advantage has been taken of these con-

The use of trailers was decided upon after a general survey of the traffic and operating conditions, it being estimated that three trailer cars could be built for approximately the cost of one fully equipped motor car. Furthermore, where motor cars only are used, if the conditions are such that during a part of the year only a portion of the cars are needed, the service must be distributed over all the cars to provide for proper inspection and maintenance of the electrical equipment.

A number of restrictions were imposed upon the design at the outset. The Long Island class MP-54 motor cars with which the trailers are to operate are each equipped with one motor truck driven by two Westinghouse No. 308 motors, having a normal rated capacity of 225 hp. each. It was required that the weight of the trailers should be such that the operation of one trailer car with three motor cars would be well within the capacity of the motors in express service. At the same time it was necessary to adhere to the general dimensions of the motor car as to height, length and width because of station platform requirements and to preserve the uniform general appearance of the train. The strength of the underframe and body was required to be at least equivalent to the strength of the motor cars with which they are to operate. Owing to the fact that additional equipment was needed for summer service only, it was feasible to reduce the weight and cost by the omission of the false floor, inside lining and provision for heating, and a car has been built which has a seating capacity of 80 with a total of 63,000 lb., a weight of only $787\frac{1}{2}$ lb. per seated passenger; a class MP-54 motor car weighs approximately 110,000 lb. and seats 71 passengers, the weight per seated passenger being about 1,550 lb.

The cars are 64 ft. $5\frac{1}{4}$ in. long from face to face of couplers.



Long Island Steel Trailer

ditions not only to produce a car of exceptionally light weight, but to secure a maximum carrying capacity for a moderate outlay and to reduce to a minimum the investment tied up in idle equipment during the winter months.

The over all width is 9 ft. $10\frac{1}{4}$ in., and the omission of inside lining and insulation has made possible an inside width of 9 ft. $9\frac{5}{8}$ in. between posts with a clear width at the posts of 9 ft. $4\frac{1}{2}$ in. An unusually wide aisle has thus been provided. The trucks

are placed 39 ft. 9 in. between centers and the car has a total wheel base of 46 ft. 1 in. The height from the rail to the top of the roof is 13 ft., the ventilators adding 8¼ in. to the clear height.

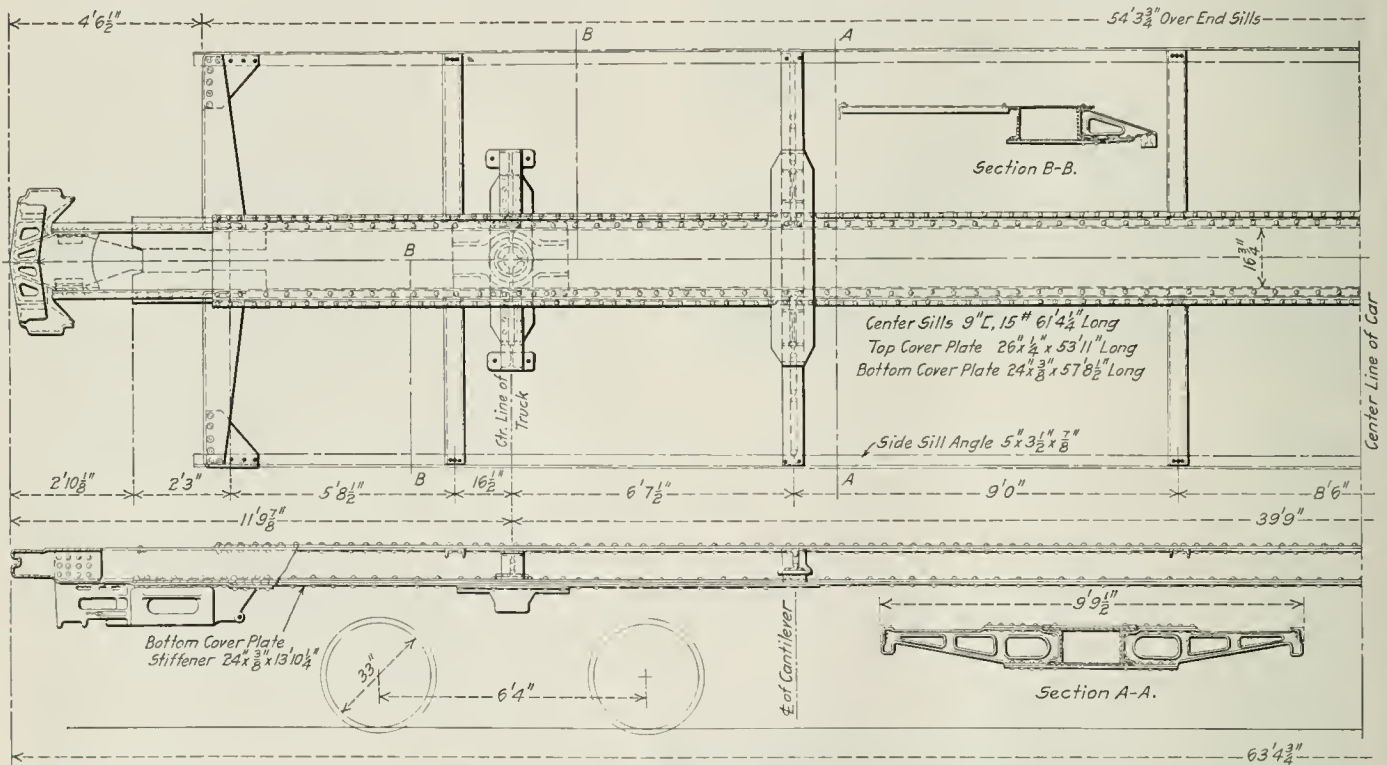
UNDERFRAME

The principal member of the underframe is the box girder center sill which is the same as that used on the class MP-54 motor cars. It consists of two 9-in., 15-lb. channels of 61 ft. 4½ in. long with top and bottom cover plates respectively ¼ in. and ⅜ in. in thickness. Cast steel draft sills which take the Westinghouse friction draft gear, are secured to the bottom of the center sills. Cantilevers extending from the center sill to the side sills of the car are placed 13 ft. 3 in. on either side of the transverse center line. Owing to the light weight of the body of the car, cast steel spiders have been used instead of the usual pressed steel construction, the webs being cored out to reduce the weight. The ends of the center sill are framed and

END CONSTRUCTION

In order to provide ample strength to resist the tendency to telescope in collision, 12-in., 31½-lb. I-beams were used for the vestibule end posts. These are placed between the middle and outer end castings into which they are framed and riveted to the total depth of the casting. The vestibule corner posts are pressed steel, ¼ in. thick and are of a special U-section with one leg longer than the other. They extend from the bottom of the platform end sills to the I-beam posts at the roof and serve as a riveting member for the vestibule end sheet and the roof sheet. The vestibule end posts are tied together by a pressed steel diaphragm which serves as a header for the vestibule end door and an additional tie is provided by the roof sheets.

The body end construction is made up of three truss members; two door posts of pressed steel box section and the combined body corner posts and car lines which extend from body end sill



Underframe of Long Island Trailer Car

riveted to the middle castings of the platform end sills, the length over which is 63 ft. 4¾ in.

The side sills are 5 in. by 3½ in. by ⅞ in. angles placed with the horizontal flanges up in order that they may be used as a direct floor support. They are secured to the ends of the cantilevers and to the body end sills. Additional crossies are provided near the truck centers and at points 4 ft. 3 in. on either side of the transverse center line of the car. These are of channel section placed flanges down and the ends are riveted to the horizontal flanges of the side sills and to the lateral projection of the top center sill cover plate.

The body end sills are of pressed steel placed with the webs out, the ends of the web members being bent at right angles to the body of the sill and bearing against the vertical faces of the side and end sills. The top flanges are tapering, the wide ends providing ample strength and riveting area at the center sills. At the outer ends gusset plates are used to furnish suitable connections to the side sills.

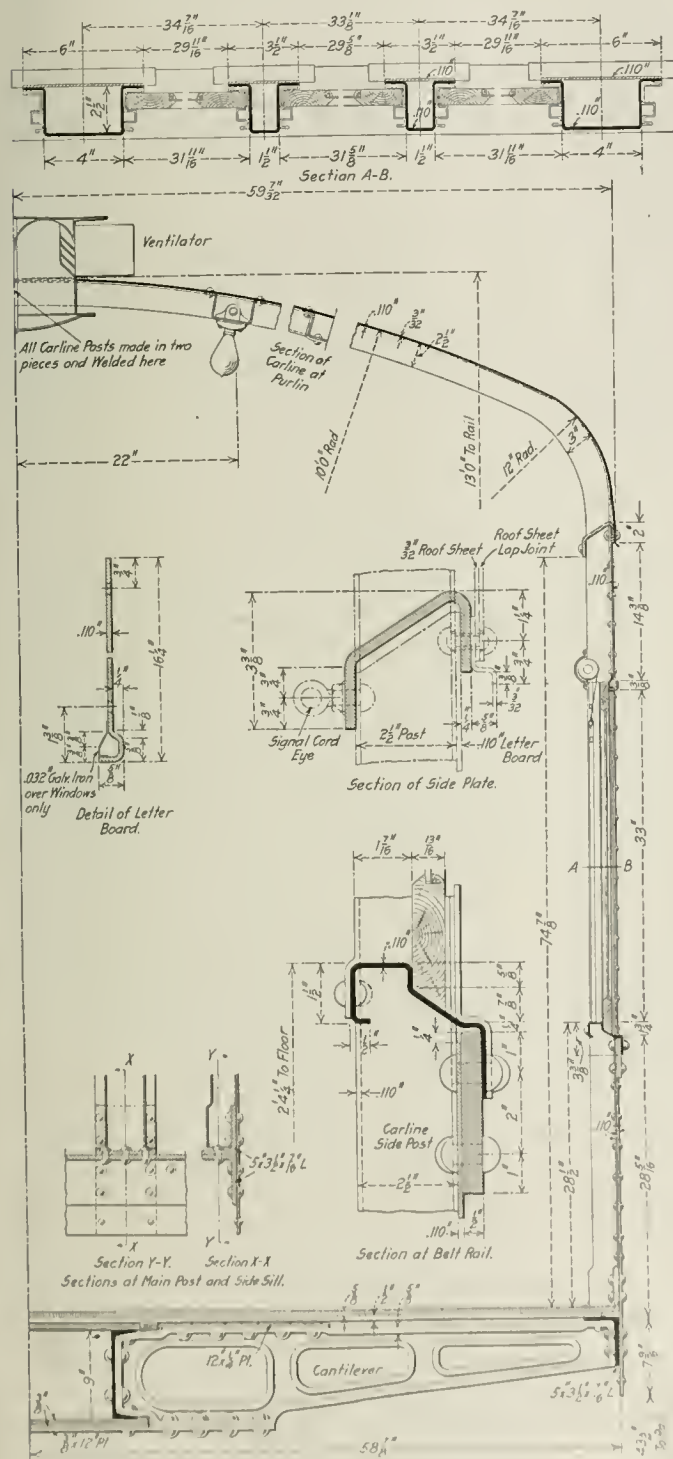
The trucks are provided with inside side bearings and the body side bearings are supported by cast steel struts riveted to the center sills and reinforced on the lower flanges by a transverse cover plate.

to body end sill. In common with the combined posts and carlines of the side frame construction this is made in two pieces to facilitate manufacture and welded on the center line of the car, thus forming a continuous member. The door posts have the cover plate members extending the full depth of the end sill to which they are riveted, the U-shaped members being flanged and riveted to the top of the sill. The door header is of the same section as the posts and ties them securely together. They are further tied at the roof by the combined carline posts.

BODY FRAMING

In order to reduce the weight and cost of construction the arch roof was decided upon. The posts and carlines are combined into single continuous members of U-section with the flanges turned outward for riveting to the side and roof sheets, an arrangement which gives a pleasing appearance to the interior of the car. Owing to the shape of the roof and the fact that but 3/32 in. sheets were to be used the carline construction was inadequate to support the sheets. Continuous pressed steel purlines were therefore placed 21½ in. on either side of the center line. These extend throughout the length of the body from door post to door post. Where they cross the carlines they are

pressed to the contour of the latter with the flanged portion of the section bearing against the leg of the carline and riveted to its bottom face. This construction not only gives strength to the roof and adds considerably to the longitudinal rigidity of the superstructure, but produces the effect of a beamed ceiling and adds to the pleasing appearance of the interior. These pur-

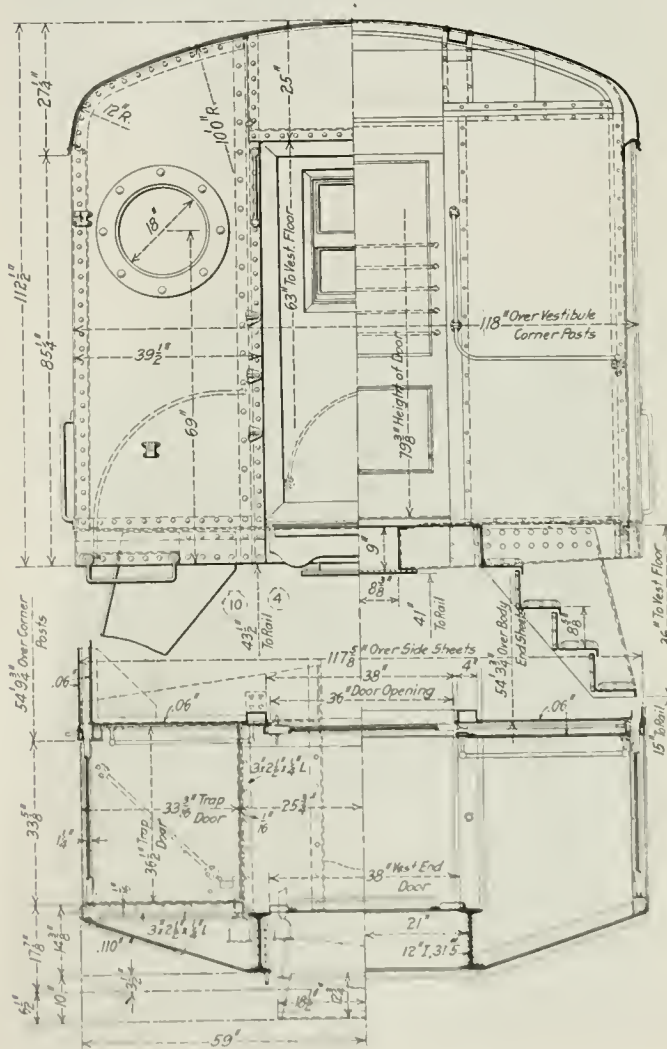


Details of the Body Framing

lines are utilized to carry the conduits for the electric light wiring, the lamp sockets being secured directly to their lower faces. In order to provide the maximum amount of longitudinal stiffness and to impart additional strength to the vestibule end posts and reduce their tendency to deflect at the roof under collision impact, the same spacing was used for the vestibule end posts, the body door posts and the carlines, thus bringing them all in line. Vestibule purlines of the same section as those

used in the interior of the car are placed between the vestibule end posts and the body end posts, and the vestibule is further stiffened longitudinally by increasing the thickness of the roof sheets from $\frac{3}{32}$ in. to $\frac{1}{8}$ in.

The length of the body is 54 ft. 9 $\frac{3}{4}$ in. over the corner posts, and each side frame is divided into five side and two corner panels, the former being 8 ft. 6 in. long from center to center of carline posts, and the latter 5 ft. 10 $\frac{7}{8}$ in. from the center line of the carline posts to the inside of the body corner posts. Each of the side panels contains three windows, which are separated by vertical members of U-section extending from the side plate to the belt rail. The corner panels each contain one window, framed by the carline post on one side and on the other by a U-section post extending from the side sill to the plate. A pressed steel window sill is attached to the carline posts and forms the bottom attachment for the vertical members between the windows. It is flanged over the top of the belt rail and



Vestibule Construction

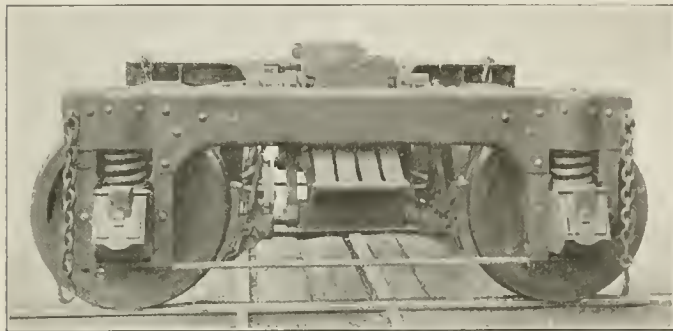
is riveted through to the side of the car. The belt rail is of rectangular section $\frac{1}{2}$ in. thick by 4 in. wide and extends from body corner post to body corner post. The side plate is a special pressed steel U-section extending throughout the length of the car body. The web and outside flange are cut away at the side posts and the inside flange is riveted to the posts. The outside flange extends over the top of the letter board and is riveted between this and the lower edge of the roof sheets.

All framed members have been formed to produce a finished appearance on the interior of the car, and no interior finish has been used with the exception of the pressed steel molding

which covers the curtain rollers just above the tops of the windows.

TRUCKS

The cars are equipped with four-wheel trucks having a wheel base of 6 ft. 4 in. These trucks are of an unusually simple design and weigh 9,400 lb. each, complete. The general features of



Four-Wheel Truck for the Long Island Steel Trailers

the construction are clearly shown in the illustrations. The side frames and transoms are of pressed steel, while the bolster and spring plank are steel castings. By widening the flanges of the transoms at the ends and providing corresponding lateral extensions from the top side frame flanges a very rigid transom and



End View of the Long Island Trailer

side frame connection has been secured and end rails are dispensed with. Steel pedestal castings provided with coil spring pockets are riveted to the ends of the side frames, which are specially formed to receive them. The truck is equipped with a light cast steel spring plank, which is suspended by swing links pivoted on the top of the cross frame. Both the bolster guides and the pedestals are fitted with wearing plates, which may be easily removed and replaced. The trucks are equipped with rolled steel wheels 33 in. in diameter, which are mounted on axles with $4\frac{1}{4}$ in. by 8 in. journals. Ajax metal bearings are used.

FINISH

The floor is finished with the railroad's standard top coated monolith laid in Ferro-inclave sheets. No false floor is provided.

The exterior of the car is painted Tuscan red to conform to the Long Island's standard for passenger equipment. The interior is finished in white and light olive green, white enamel being used above the side plates and the olive green from the side plates to the floor. The seats are rattan covered and have no arms. They were furnished by Heywood Brothers & Wakefield Company, and are low enough to make possible the elimination of foot rests. The cars are ventilated by five automatic ventilators set into the roof on the centerline of the car.

Since the cars are trailers no provision has been made in the vestibule for train control. The cars are provided with bus and control lines, however, for attachment to adjoining cars when operated in multiple unit trains. Current for lighting the cars is taken from the bus line. In making up trains where detachable jumpers are used considerable delay is often caused by the failure to find the proper jumpers at hand. In order to overcome this difficulty the jumpers are integral parts of the wiring of these cars and dummy receptacles are provided for holding the jumper head when not in use. This feature is shown in the illustration of the end of the car.

QUALIFICATIONS OF PUBLIC SERVICE COMMISSIONERS

Experience in connection with public utilities should be made a necessary qualification for public service commissioners. This fundamental truth is the subject of a strong letter which has been sent by a committee of engineers representing the national and local engineering societies to the committee on public utilities of the New York State constitutional convention, now sitting at Albany. Men familiar with the technical, financial, commercial and legal matters, which come before a public service commission, are, of course, best fitted to render valuable service to the public, and the committee declares that there are to be found among those connected with public utility companies men with as broad conceptions of public rights and of the duties to be fulfilled to the public as can be found in other walks of life.

The engineers also urge on the constitution makers that the point of greatest importance in any plan for an organization of the public-utility commissions of the States is the preservation of the principle of continuity already established, in the present Public Service Commissions of the State, whereby the term of office of the members of the commission expire at different times, so that only one member of the commission at a time goes out of office.

Represented on the committee of engineers presenting this letter are the American Society of Civil Engineers, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Institute of Consulting Engineers, the New York Section of the American Institute of Mining Engineers, the Municipal Engineers of the City of New York and the Brooklyn Engineers' Club. The letter, prepared by a sub-committee consisting of Charles Whiting Baker, Gano Dunn and W. W. Brush, says, further:

"If a change were to be made in the public service law so that an entirely new commission would be appointed by each new governor, there would be danger not only that the commissioners would be appointees without the experience and knowledge necessary to formulate and carry on a sound constructive policy, but that the principal employees of the commission would be changed for political or personal reasons with the coming in of each new commission.

"The constitutional requirement we have suggested—previous experience in connection with public utilities as a requisite to a commissioner's appointment—is not to be construed as a rigid limitation upon the governor's discretion in making appointments. The responsibility would properly be upon the governor to judge as to how much experience was requisite to fit a candi-

date for appointment. The value of such requirements, embodied in a statute or a constitution, is that they define the requirement which the governor should have in mind in the selection of candidates. It is not pretended that this requirement or any other which could be framed could prevent the selection of unfit candidates. It is believed that such clauses are of value, nevertheless, in setting up a standard to which most men in the long run will seek to conform.

"There should be one public service commission for the whole State instead of two as at present, it being understood that under such a proposed reorganization the work of constructing and administering the New York City rapid transit system would be transferred to the city, which now owns the system, and would cease to be a State function. New York is the only State which has two separate public service commissions. The reason why New York has two commissions has to do with conditions which existed a quarter-century ago and which do not exist at the present day. By having a single commission for the entire State certain difficult questions as to division of responsibility between the commissions are set permanently at rest."

The committee proposes that each commissioner shall hold office for ten years and that removal by the governor should be made only after the filing of charges and after affording the accused an opportunity to be heard in the matter, provided, however, that at any time within the first six months after making an appointment the governor may exercise the power of summary removal * * *.

NEW PITTSBURGH NORTH SIDE FREIGHT STATION OF THE P. R. R.

By HARTLEY M. PHELPS

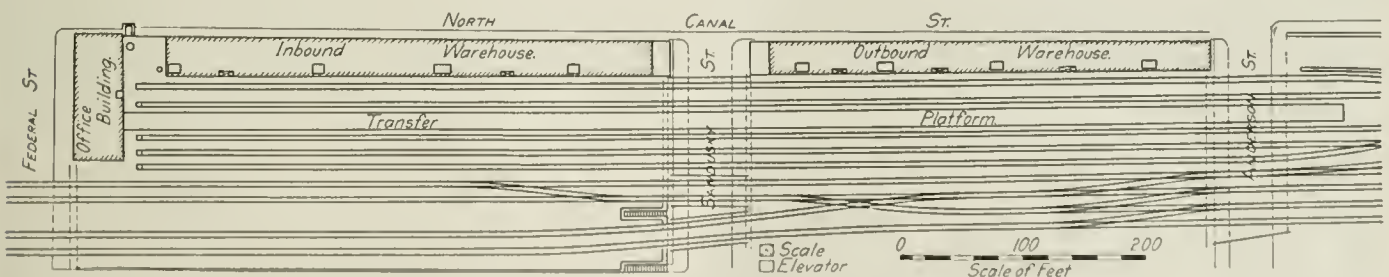
The Pennsylvania Railroad has recently completed a new freight station with inbound, outbound and transfer facilities near the center of the manufacturing district on the north side of the city of Pittsburgh. This station will replace the old Anderson street house, and the transfer station at Ross, 7.8 miles east on the Conemaugh division, and eventually the business now handled at the North avenue house, a few blocks distant from the new

As an indication of the traffic that will be handled at the new station, the Ross Transfer, Anderson street station and North avenue station have handled on an average during the last five years, 3,616 tons of C. L. freight, 348 tons of L. C. L. freight and 456 tons of transfer business daily. No C. L. or L. C. L. business is received or delivered at Ross Transfer, this being exclusively a transfer point. The average tonnage of 219 tons per day handled here consisted of (1) freight moving from points west of Pittsburgh to points on the Conemaugh division or vice versa, (2) Pittsburgh and Monongahela division cars moving to or from the Conemaugh division, (3) shipments to or from points not on the Conemaugh division routed via Black



New North Side Freight Station at Pittsburgh

Lick and the Cresson division and (4) shipments on the Conemaugh division from points west to points east of Freeport and vice versa. At the Anderson street station C. L. and L. C. L. business was forwarded to all points. This station also received C. L. freight from all points and L. C. L. freight from points east of Pittsburgh. No transfer work was done here. The average tonnage at this station for the period named was, C. L. freight received, 1,098 tons, forwarded 387 tons, and L. C. L. freight received, 75 tons, and forwarded, 108 tons. At the North avenue station, L. C. L. business is forwarded to all points on the Pennsylvania system, but received only from the Lines West. Shipments are accepted from the lines east only when specifically consigned to this station. Car load shipments are received from and forwarded to all points on the Pennsylvania system.



Plan of Pennsylvania Freight House and Tracks at Pittsburgh

station, may be transferred to this point. The Anderson street house, which was erected more than forty years ago, had become inadequate for the business which it handled, making the provision of better facilities imperative. An indication of the improvement is the increase in floor space from 8,415 sq. ft. in the old building, to 61,850 sq. ft. in the new. The North avenue house on the Pittsburgh, Fort Wayne & Chicago (Pennsylvania Lines West), built about ten years ago, is still in good condition and has ample capacity to take care of the business in the zone of which it is the center. The shorter distance from the heart of the less-than-car-load freight center of that part of the city to the new station will, however, undoubtedly deflect a considerable portion of the business now going to North avenue to the new location. The new house is located between Federal street, the chief retail business street of the north side, and Anderson street, Sandusky street, intermediate between these two, is carried under the building on the first story level. The entire project, including the construction of the transfer platform and office building, has cost more than \$500,000.

Transfer freight is received from all points west for the east, but very little freight from the east is accepted for the west. The average daily tonnages at this station are as follows: C. L. received, 1,729 tons; forwarded, 400; L. C. L. received, 75 tons; forwarded, 90, and transfer tonnage, 240. A combination of the business of these three stations in the new station at Federal street will eliminate some movements between the stations, some rehandling and the duplication of engines for shifting, station force, etc. In addition, the freight will be handled with greater despatch, therefore better serving the interests of the shippers.

The new structure really consists of four parts, a 3-story office building 41 ft. wide and 110 ft. long facing on Federal street and extending across the end of the inbound house, the transfer platform and the five station tracks; a two-story inbound house 450 ft. long and varying in width from 31 ft. 4 in. to 37 ft.; an outbound house 383 ft. 5 in. long and varying in width from 25 ft. 5 in. to 30 ft. 6 in.; and a transfer platform 1,000 ft. long and 15 ft. 3 in. wide. Provision is made in the design for the addition of a fourth story on the office building and third

and fourth stories on the inbound house if desired. The second story of the houses is carried continuously across Sandusky street, the 60 ft. width over the street being occupied by an office. The width of the building on this floor is 8 ft. greater than the dimensions given above on account of the overhang on the street side, which, in addition to increasing the floor area, provides a shelter for teams loading or unloading at the street doors.

All tracks are elevated over the streets, the grades being such that the second story of the freight house is level with the floors of cars. The subways are of the half-through steel girder type with solid deck on concrete abutments. The surfaces of the abutments are finished with a mixture of marble dust and mortar placed monolithic with the concrete. The appearance of stone work is given to these walls by the impression of strips nailed to the forms which resemble mortar joints. Light steel frames were suspended from the deck of the bridges to which were fastened steel laths plastered with marble dust mortar.

The building is of brick, steel and concrete construction with concrete footings on 16-in. concrete piles extending down through a 15-ft. stratum of filled material. The columns along the north side of the building are spaced 18 ft. center to center and in

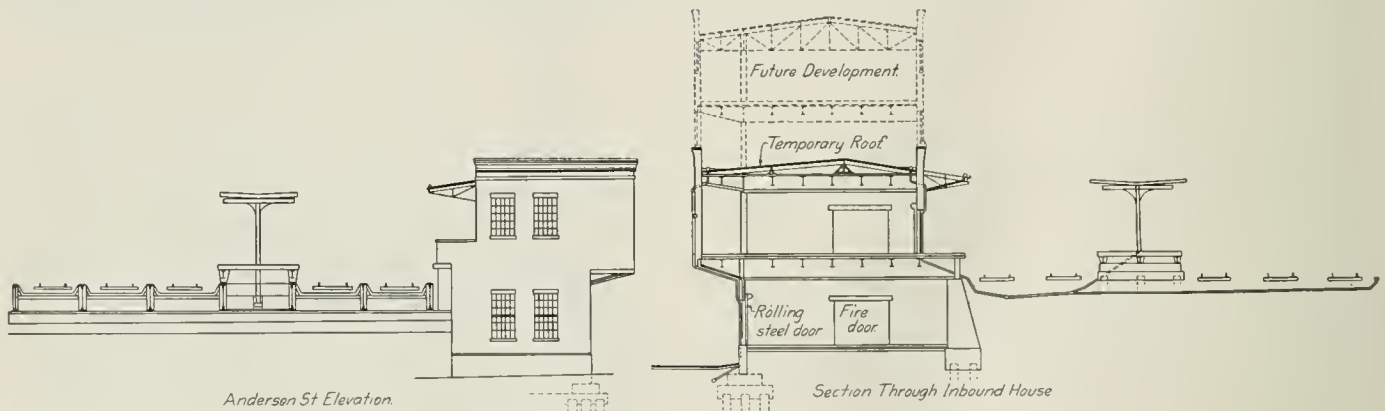
pavement is provided at the east end of the station and is equipped with a 30-ton electric crane for handling heavy freight.

The construction of this building was handled under the supervision of Andrew Keiser, superintendent of the Conemaugh division, and R. L. O'Donnel, general superintendent of the Western Pennsylvania division. The plans were prepared under the general supervision of W. G. Coughlin, engineer maintenance of way.

AUTOMATIC DRIFTING VALVE

An automatic drifting valve for use on superheater locomotives is shown in the drawing. Its operation is controlled by the pressure in the live steam passage of the valve chamber.

The body of the valve has four pipe connections: Pipe *A* leads to the live steam passage of one of the valve chambers or to one of the steam pipes; pipe *B* to the turret, or other source of constant boiler pressure, and the two pipes *C* to the live steam passages of the valve chambers. When the throttle is open the plug piston in the large chamber at the end of the valve body is subjected to the pressure in the valve chamber. The resulting movement of the piston to the left closes communication between the

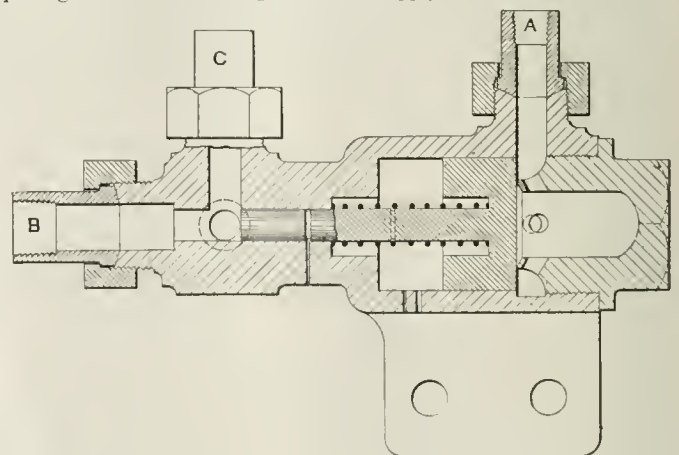


Sections Showing Relation of Tracks to Houses

common with the other columns throughout the building are of an "H" section. A concrete wall 13 ft. high forms the southern wall of the first floor serving also as a retaining wall for the fill under the adjacent tracks. The floors of the station throughout are of 5-in. concrete with a 1½-in. "Truss Con" finish. The lower floor is about 3 ft. 9 in. above the grade of Canal street, which parallels the building on the north, a convenient height for wagons loading and unloading. The floor system at the second story level is extended 8 ft. along the south side to form a trucking platform which is covered by a canopy projecting from the roof. Rolling steel doors are hung between the columns along the entire street base on the first floor and along the entire railroad base on the second floor. Transverse fire walls and fire doors are provided throughout the building; steel window sash of the Fenestra type are used, and the construction is made fire-resisting in every detail. The building is equipped with automatic platform scales, six Otis electric elevators of four tons capacity and two of six tons capacity. Spiral steel stairways connect the warehouse floors. The office building portion is faced with glazed tile, and all window frames are of copper. The ground floor of this portion of the building will be rented for stores and the upper two stories occupied by offices of the Conemaugh division. The warehouse buildings are faced with buff Kittaning brick and have a slightly gabled roof of 3-in. reinforced concrete slabs covered with asphalt paper and pitch and finished with a terra cotta coping.

The transfer platform is of reinforced concrete construction with a "Truss-Con" finish. It is covered by a shelter supported on a single line of steel columns along the middle of the platform. Five station tracks are provided, two between the building and the transfer platform and three between this platform and the first main track. A small team yard with stone block

constant steam supply at connection *B* and the passages leading to the valve chambers. On the release of pressure at *A*, due to the closing of the throttle the spring forces the piston back to the right, opening the communication between connection *B* and passages *C* and admitting a limited supply of steam to the valve



Automatic Drifting Valve for Superheater Locomotives

chambers, which provides a medium for carrying and distributing the lubricant over the valve chamber and cylinder walls.

The device is known as Wood's vacuum breaker. A patent has been applied for and it is being manufactured by the Nathan Manufacturing Company, New York. On service trials its performance is understood to have been highly satisfactory. It may be located at any convenient point on the locomotive, preferably near one of the cylinders.

ELECTRIC LOCOMOTIVES

At the meeting of the Chicago Section of the American Society of Mechanical Engineers, May 14, the subject of electric locomotives was discussed by A. H. Armstrong and A. F. Batchelder, of the General Electric Company, Schenectady, N. Y. Mr. Batchelder gave an illustrated talk in which he briefly described the various mechanical features of electric locomotives. He was followed by Mr. Armstrong who spoke on the performance of these locomotives.

Mr. Armstrong called particular attention to the rating of electric locomotives, stating that the time element is a most important factor in its determination. The motors when operated continuously deteriorate when heated above a certain temperature, although it takes considerable time to reach a dangerous point. It is therefore necessary to know the rating of the electric locomotives, in addition to their starting tractive effort, for short periods of say one hour's performance in addition to the continuous performance. It is important that this be clearly understood at this time when long distances of steam railroads are being electrified. In acknowledging the improvements that have been made in the steam locomotives, it being now possible to get a horsepower with about 15 lb. of steam, Mr. Armstrong claimed that the electric locomotive, notwithstanding these improvements, offered many claims for consideration.

In considering high speed passenger service he called attention to the latest type of New York Central electric locomotive, which will handle a 1,200-ton train at a speed of 60 miles an hour, giving an output continuously without danger from overheating of 2,000 hp.; 2,600 hp. can be obtained for one hour. This engine is able to handle the service of overland trains for any distance at a speed of 60 miles an hour or more.

Referring to electric locomotives for freight service, he called attention to the installation on the Butte, Anaconda & Pacific. This was made for the sole purpose of obtaining more economical operation. The preliminary report indicated that the money saved by putting in the installation would pay 18½ per cent on the capital required to make the change from steam to electric operation. For the first six months the results obtained indicated a yearly return on the capital invested of 20 per cent. This road operates heavy freight trains which average from 3,500 to 4,000 tons, and 4,500 tons is not unusual. Each locomotive unit weighs 80 tons, two units being used to handle the heavy trains on the 0.3 per cent grade. The locomotives have a tractive effort of 26,000 lb. at a speed of 16½ miles per hour continuously. This corresponds to a factor of adhesion of about 6. From investigation Mr. Armstrong stated that it is found to be almost universal practice to give a locomotive a rating calling for a tractive effort on the ruling grade of about 18 or 19 per cent co-efficient of adhesion, and that the electric locomotive was designed to follow this practice very closely, although advantage is taken in the electric locomotive to obtain a greater output for a short time than it can sustain continuously. In heavy trunk line work the difference between the short period rating and the continuous rating is small.

Speaking of the new installation on the Chicago, Milwaukee & St. Paul, Mr. Armstrong explained that this system is a 3,000 volt direct current system, practically the same as used on the Butte, Anaconda & Pacific. The weight of each locomotive unit is 110 tons on drivers and where two are used, as will be the general custom, the total weight will be 270 tons. A continuous 24-hour rating of 3,200 hp. is obtained with these engines and a tractive effort of 72,000 lb. at a speed of 15¾ miles an hour. Mr. Armstrong claimed an increase of 10 per cent in tractive effort for the electric locomotives with the same weight on drivers over that which can be obtained in a steam locomotive on account of the reciprocating and imperfect rotary motion of the steam locomotives.

Over the Belt Mountains where there is an average grade of

.71 per cent for 49 miles, one of these 270-ton locomotives will haul 2,500 tons at a speed of approximately 16 miles an hour. The locomotives for both passenger and freight service are identically the same with the exception that those used in freight service are geared to a ratio of 4½ to 1, while those in passenger service are about 2½ to 1. This is standardization to the highest degree and permits of the minimum number of repair parts. As stated before, electric locomotives are made in two sections, being connected together with an articulated joint for the purpose of permitting the operation of each half singly. This will be of special value in light local passenger trains or for shifting work.

The Chicago, Milwaukee & St. Paul electric locomotives introduce for the first time direct current electric braking of the regenerative type. In other words, the motors are reversible. Going up the grades they receive electrical power, and in going down the grades the train will drive the motors as generators and thus brake the train or hold it electrically and return power to the line. In ascending grades these engines consume from 4,500 to 5,000 kw., and the efficiency of a locomotive under these conditions is about 88 to 89 per cent without considering the losses of the blowers, air compressors and fans and incidental parts of the locomotive itself. In Mr. Armstrong's opinion the benefit of this electric braking on the mountain grades will be not so much in the power returned to the line as the economy introduced thereby in the elimination of derailments due to broken shoes and overheated wheels on the the long down grades.

Referring back to the latter type of New York Central locomotives, Mr. Armstrong stated that there are no bearings on the motors of those locomotives, thus eliminating mechanical friction. This permits of an efficiency as high as 93 to 94 per cent; that is, of the electrical power input to the locomotive between 93 and 94 per cent is returned as mechanical output at the rim of the drivers. The Milwaukee locomotives, on the other hand, will give an efficiency of not much higher than 84 or 85 per cent operating on level track. The profile of the Milwaukee road was such as to preclude the use of the gearless type used on the New York Central.

The Milwaukee electric locomotives have a tractive effort of 72,000 lb. per unit and a starting tractive effort of 120,000 lb. or when run double-headed, a starting tractive effort of 240,000 lb. With the 3,000 d. c. line voltage there will be 1,500 volts on each motor. The electrified portion of the Milwaukee road is 440 miles long, and there will be 14 substations at approximately an average distance of 30 miles apart on the entire road.

WOMEN RAILWAY WORKERS IN GERMANY.—It has been reported from Berne that the Prussian and Hessian State Railways are employing a number of women as line keepers (*Streckenarbeiter*), although this is very heavy work. All women, before being engaged, are obliged to sign an agreement that they will have nothing to do with Social Democracy or with the Transport Workers' Association, that they will never attend Social Democratic meetings, or be in any way associated with the Social Democratic propaganda or efforts.

RAILWAYS IN ASIA MINOR.—The Turkish Ministry of War is reported to have been granted a large credit to build and operate four main and two branch lines, all under military control. The chief of these lines are from Angora to Erzerum, from Erzerum to a point on the Black sea, from Murady to Rodosto, and from a point on the Erzerum Railway to the Black sea.

BETTER FACILITIES ON PHILIPPINE TRAINS.—The Board of Public Utilities Commissioners has handed down a decision ordering the Philippine Railway, on its Cebu lines, to install better lights in its second- and third class coaches and to supply to all passengers individual drinking cups at a nominal cost. The company is also forbidden to permit more passengers than there are seats to ride in the coaches.

General News Department

About 150 machinists, boilermakers and sheet metal workers employed by the Kansas City Terminal Railway went on strike last week on account of a controversy with the company regarding the scale of wages and the employment of non-union labor.

The Chicago railroads were prominent in the lists of contributors to the fund for the relief of families who lost members in the Eastland steamboat disaster of July 24. The large roads gave \$2,000 each and smaller roads lesser amounts. The Traffic Club of Chicago gave \$500.

The Veterans' Association of the Baltimore & Ohio will hold its first annual outing at Berkeley Springs, W. Va., August 12. Z. T. Brantner, president of the association and a veteran of fifty years' service, who is superintendent of shops at Martinsburg, W. Va., has charge of the celebration, for the Cumberland division veterans, who will be the hosts. This association has social and fraternal features, the membership including men of every grade of employment and from all branches of the railroad.

On the night of July 25 the ticket collector on a train of the St. Louis, Iron Mountain & Southern was robbed of \$20, in full view of the passengers; and the robbers, two of them, not masked, then stopped the train and leaped off in the darkness. The train was No. 105, eastbound, and the robbery occurred at Fort Gibson, Okla., about midnight. In the panic attending the appearance of the robbers, the trainmen put out the lights in the coaches, and the darkness is believed to have prevented further activities on the part of the robbers.

The safety bureau of the Union Pacific reports that during the year ending June 30, 1915, the road carried 4,550,949 passengers without a fatality to a passenger. Less than half as many employees of the road were killed during the year as in the fiscal year ending June 30, 1913, which was the last year before the bureau of safety was organized. In 1915 28 employees were killed, as compared with 59 in 1913. In 1915 4,537 employees were injured and in 1913 6,097 were injured. In 1915 229 passengers were injured, and in 1913 333 passengers were injured.

At Yaphank, Long Island, on July 21, a westbound express train of the Long Island Railroad, running about a mile a minute, struck a wagonload of gravel, drawn by a steam tractor, the driver of which was following the somewhat prevalent Long Island fashion of risking his life and his employer's property at a grade crossing by driving over the tracks when it was known that a train was approaching. The crossing has an automatic bell, which was ringing at the time of this narrow escape. The tractor and its two trailers made up a heavy gravel train, weighing 15 or 20 tons, and, says Mr. McCrea, general manager of the road, in reporting the accident, might easily have made a fatal obstruction on the track. Had the train come along 20 seconds earlier, it would have struck the tractor itself, or the middle wagon. Mr. McCrea has complained to the Public Service Commission of the state, calling for relief; but that body replies that it has no authority over traffic on the highway. In this case the tractor was being run by a negro who had no license. It was owned by Frank Arrigoni & Brother, who were hauling gravel for road-building purposes.

The Department of Agriculture announces that Stuten County, New York, has been placed under quarantine on account of the discovery of foot and mouth disease in a herd of cattle near Hornell in that county. The counties of Onondaga, Oswego and Rensselaer and the stock yards at West Albany, as well as large areas in other States, have been released from quarantine. The entire State of Kentucky is now freed from quarantine, except that in the Bourbon Stock Yards at Louisville the management has arranged to limit the handling of animals intended for feeding, stocking and dairy purposes to the new sheep and

cattle division, in which no infection has existed. The same order frees the State of Wisconsin entirely, and reduces the quarantined area in Illinois, New Jersey and Pennsylvania. The status of Maryland, Massachusetts, Michigan and Virginia remains unchanged. An order effective August 2 reduces that portion of Hudson County, New Jersey, quarantined against the foot and mouth disease to an area lying within a three-mile radius of infected premises at Secaucus, near New York City. Allegheny County, Pennsylvania, is released from quarantine with the exception of the Pittsburgh Union Stock Yards at Pittsburgh. Philadelphia County is released with the exception that the West Philadelphia Stock Yards, and that portion of the county lying south of Washington Avenue, Philadelphia, and between the Delaware and Schuylkill Rivers remain under quarantine. The counties of Cook and Lee are the only remaining areas still under quarantine in Illinois.

The Gollos Automatic Stop

The operation of the Gollos automatic train control was demonstrated on the Chicago, Burlington & Quincy, between Sugar Grove, Ill., and Big Rock, on August 3 and 4. A special train carrying officers of the company and a number of representatives of the signal and operating departments of central and western roads left Aurora at 12:30 p.m. each day, returning about 4:30 p.m. The installation over which the demonstration run was made is 6 mi. long and includes 8 ramp locations for westbound movements and 10 for eastbound, on a single-track line.

The system is of the intermittent contact rail type, with the engine apparatus inoperative while running between points of indications. When the engine shoe makes contact with an energized contact rail the engine apparatus is still held inoperative. When a train is standing, the apparatus is in such a condition that the train can proceed only at a predetermined reduced speed. When the engineman opens the throttle, a whistle in the cab is automatically started, which continues to sound until the engine shoe engages a clear contact rail. This rail being fully energized, supplies the current which actuates the control in the cab to permit the train to proceed at full speed, and also stops the whistle. The contact with this shoe is recorded by an automatic apparatus, and the contact also causes the lighting of a signal lamp in the cab. The passage of this rail is acknowledged by the engineman by pressing a button which puts out the lamp and records the fact on the automatic recorder. This is the usual procedure in passing a clear contact rail.

When the contact shoe engages a partially energized contact rail, indicating caution, the engine apparatus is again set for reduced speed and the whistle blows continuously. If, while passing through a block at caution speed, the train in the advance block has moved on, so that the next contact rail is in the clear condition, the cab system will be automatically turned to normal full-speed condition; but if the dangerous condition continues, the contact rail is de-energized and the train will be automatically stopped when the contact shoe strikes the de-energized rail. This stop is also recorded and a chime of two whistles is sounded to warn the engineman of the stop application. If the engineman desires to proceed he unlocks and opens a cabinet box which encloses the instruments and resets the automatic apparatus to caution or slow speed condition. Both the opening and closing of this cabinet and the resetting of the instruments are recorded automatically. He may now proceed at controlled reduced speed until he strikes a clear ramp.

If the engineman has observed a stop signal and stops his train before the engine shoe comes in contact with the de-energized rail, he may pass to the energized rail by holding down continuously a separate button until the rail is passed. The pressing of this button is also recorded and if he should attempt to pass a rail by pressing this button before the train has stopped, a stop application would result.

The functions of the system include automatic speed control

and an automatic train stop; a visible signal to indicate entrance to block section, an audible signal sounded continuously in a caution block; an audible signal sounded continuously in "danger" territory as distinguished from the audible caution signal; and an automatic record of the time a block is entered, the time of acceptance of signals by enginemen; automatic application of brakes when the engine passes a signal indicating stop; the opening of the cabinet to release train brakes; release of train brakes after automatic application, closing and automatic locking of cabinet to again secure integrity of the apparatus and non-interference, and permissible emergency passing of a signal at stop.

The system, which is controlled by the Gollos Railway Signal Supply Company of America, Chicago, was turned over to the Interstate Commerce Commission for tests on July 26.

Summary of Revenues and Expenses of Steam Roads

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for May, 1915, are as follows:

Net operating income of the railways of the United States for May increased \$63 per mile, or 31.9 per cent., as compared with May, 1914. This increase was due in the main to reductions in expenses, which have been effected in all parts of the country. In May, 1914, net operating income per mile was 27.9 per cent. less than in May, 1913.

Total operating revenues amounted to \$237,976,843, an increase from 1914 of \$380,044. Operating expenses were \$167,600,891, a decrease of \$13,787,085. Net operating revenue amounted to \$70,375,952, an increase of \$14,167,129. Taxes amounted to \$11,343,308, a decrease of \$557,253. This left \$58,976,635 for net operating income, available for rentals, interest on bonds, appro-

Total operating revenues of the southern railways per mile of line show a decrease of 6.6 per cent., operating expenses decreased 12.5 per cent., net operating revenue increased 12.1 per cent., taxes decreased 0.7 per cent., and operating income increased 14.7 per cent.

Total operating revenues of the western railways per mile of line show a decrease of 2.0 per cent., operating expenses decreased 7.2 per cent., net operating revenues increased 13.2 per cent., taxes decreased 7.7 per cent., and operating income increased 19.3 per cent.

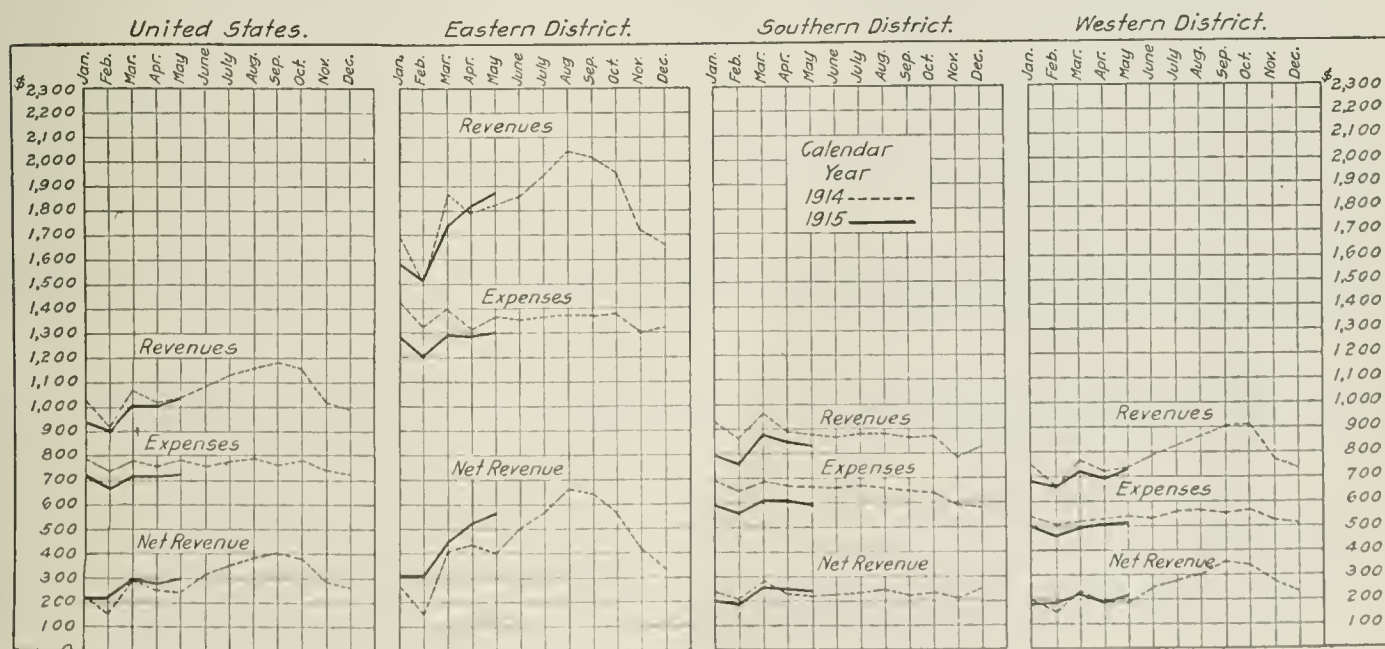
The eleven months of the current fiscal year show a decrease in total operating revenues per mile of line of 6.8 per cent., as compared with the corresponding period of the preceding year, a decrease in operating expenses per mile of 9.5 per cent., an increase in net operating revenue per mile of 0.3 per cent., a decrease in taxes per mile of 2.7 per cent., and an increase in net operating income per mile of 0.8 per cent.

The net operating income per mile increased 11.5 per cent. in the east, decreased 14.5 per cent. in the south, and decreased 2.1 per cent. in the west.

May net operating income per mile was 31.9 per cent. greater in 1915 than in 1914, 5.6 per cent. less than in 1913, 3.3 per cent. greater than in 1912, and 5.0 per cent. less than in 1911.

R. S. A. Convention Arrangements

The committee on arrangements of the Railway Signal Association has announced the completion of arrangements for a special train from Chicago to Salt Lake City for the convenience of members and guests attending the annual convention on September 14-16. The train, which will consist of a buffet-library-



Monthly Revenues and Expenses per Mile of Line in 1914 and 1915

priations for improvements and new construction, and dividends. Operating revenues per mile of line averaged \$1,040, a decrease of 0.8 per cent. This decrease per mile is due solely to an increase in mileage, amounting during the period to about 2,000 miles. Operating expenses averaged \$732, a decrease of 8.4 per cent.; net operating revenue per mile averaged \$308, an increase of 24.1 per cent., while taxes per mile were \$50, a decrease of 5.6 per cent. Net operating income was \$258, an increase of 31.9 per cent. Railways operating 228,818 miles of line are covered by this summary, or about 90 per cent. of the total mileage.

Total operating revenues of the eastern railways per mile of line show an increase of 2.7 per cent., as compared with May, 1914, operating expenses decreased 7.8 per cent., net operating revenue increased 40.1 per cent., taxes decreased 4.5 per cent., and operating income increased 51.6 per cent.

club car, open section compartment drawing room cars, diner and observation car, will leave Chicago over the Chicago & North Western on Saturday, September 11, at 11:55 p.m. It will arrive at Omaha, Sunday, September 12, at 1 p.m., and leave on the Union Pacific at 1:15 p.m., arriving at Ogden, Utah, on Monday, September 13, at 5 p.m., and leaving over the Oregon Short Line at 5:05 p.m., and will arrive at Salt Lake City at 6. It is suggested that those going from points west and southwest of Chicago, who are unable to join the train at Chicago, make arrangements to meet the party at Omaha, and that reservations be requested accordingly. The round trip fare from Chicago to Salt Lake City is \$15, including stopovers at any intermediate points within the final limit of October 31, 1915. The rate for lower berth in standard sleeping car between Chicago and Salt Lake City, one way, is \$8.50; upper berth, \$6.80; compartment, \$24;

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JUNE, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses			Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.			
		Freight.	Passenger.	Total.	Way and structures.	Maintenance of equipment.	Traffic.							
Alabama & Vicksburg	143	\$76,812	\$32,136	\$108,948	17,920	31,952	3,786	46,023	1,938	5,261	106,018	8,755	6,454	14,675
Alchison, Topeka & Santa Fe.	8,513	5,329,353	2,366,161	7,695,514	1,315,008	1,214,442	232,485	2,880,914	6,381	71,894	186,906	403,584	2,761,137	409,173
Atlantic Coast Line	4,702	1,566,140	526,685	2,092,825	342,624	474,025	45,650	880,609	6,381	171,096	3,166,087	97,157	411,944	61,647
Baltimore & Ohio	79	2,602	137,433	139,035	17,178	14,519	870	52,660	1,716	5,010	171,785	49,649	31,936	7,364
Belt Ry. Co. of Chicago	24	236,258	236,258	472,516	24,988	20,839	579	96,166	1,716	5,010	149,131	87,127	13,600	36,023
Bessemer & Lake Erie	205	1,179,742	26,672	1,206,414	66,876	17,464	9,609	223,535	.....	13,155	485,942	735,018	16,781	19,073
Bingham & Garfield	27	166,422	3,132	169,554	14,852	21,226	975	20,348	.....	82	10,385	110,490	3,848	21,680
Birmingham Southern	43	40,632	517	41,149	9,277	13,353	743	20,440	.....	3,023	47,427	110,490	3,848	21,680
Buffalo, Rochester & Pittsburgh	586	740,348	86,744	827,092	136,958	163,660	10,859	255,718	1,398	2,884	593,418	272,322	10,000	263,328
Canadian Pacific Lines in Maine	233	52,760	15,980	68,740	18,697	13,511	4,983	31,333	.....	2,884	72,337	10,000	263,328	14,750
Charleston & Western Carolina	341	95,298	22,171	117,469	12,855	17,408	44,635	.....	4,057	80,201	43,736	3,572	3,364	4,862
Chicago & Alton	1,033	774,218	332,947	1,107,165	122,791	265,702	35,914	393,958	8,613	29,484	816,784	19,414	371,644	408,386
Chicago & Northwestern	8,108	4,185,757	1,874,784	6,060,541	6,809,610	987,302	895,613	2,375,446	53,147	149,480	4,557,713	391,943	1,858,876	300,654
Chicago Junction	24	1,662,543	165,303	1,827,846	21,998	21,207	870	89,475	.....	6,575	104,124	25,179	2,073	23,087
Chicago, Milwaukee & St. Paul	10,071	5,281,112	1,662,543	6,943,655	7,810,870	868,491	1,199,647	2,469,489	67,291	184,935	4,600,293	3,210,577	387,893	565,459
Chicago, Peoria & St. Louis	255	83,914	113,348	197,262	25,885	34,438	5,820	51,375	.....	5,856	112,375	965	3,097	289
Chicago, Rock Island & Gulf	477	127,000	45,460	172,460	39,385	32,931	10,339	83,941	2,015	8,351	176,025	15,461	8,068	37,992
Chicago, St. Paul, Minn. & Omaha	1,753	838,519	453,819	1,292,338	203,268	214,483	29,162	473,381	16,839	36,032	971,742	441,716	359,596	2,052
Cincinnati Northern	246	104,582	16,056	120,638	24,114	34,694	2,641	42,221	.....	3,784	104,744	22,369	16,610	1,351
Cleveland, Cincinnati, Chicago & St. L.	2,381	1,973,678	731,042	2,704,720	243,044	314,431	769,600	1,055,897	25,865	70,711	2,405,249	580,003	128,000	449,435
Colorado Midland	338	84,139	17,981	102,120	30,212	25,813	7,526	50,039	1,225	5,501	20,315	10,636	10,000	3,202
Cumberland Valley	164	181,379	54,836	236,215	39,986	24,276	4,116	75,598	870	10,380	153,495	95,085	5,794	89,291
Delaware, Lackawanna & Western	959	2,764,767	681,889	3,446,656	573,461	594,231	87,600	1,177,596	30,524	79,760	2,534,192	1,304,720	221,567	21,906
Detroit & Mackinac	400	59,167	23,496	82,663	7,956	11,413	1,958	11,413	117	2,565	67,135	21,138	13,602	5,803
Duluth & Iron Range	273	768,415	15,034	783,449	90,844	71,981	1,094	146,638	630	10,353	320,780	481,536	437,884	58,090
Duluth, Missabe & Northern	370	1,264,356	26,432	1,290,788	109,246	114,439	1,811	171,390	3,908	12,996	412,380	894,391	70,330	824,061
Duluth, South Shore & Atlantic	626	191,407	294,702	486,109	76,122	36,833	9,043	90,854	8,771	225,580	69,213	21,344	47,869	64,751
El Paso & Southwestern Co.	1,027	588,375	119,425	707,800	69,930	90,739	18,926	181,116	6,044	28,856	423,191	328,899	293,780	26,835
Elgin, Joliet & Eastern	777	794,043	80,263	874,306	88,360	113,996	5,828	210,513	17,802	20,974	448,671	391,592	32,900	358,692
Florida East Coast	745	228,735	107,151	335,886	51,979	53,703	7,425	158,742	.....	17,802	290,175	110,934	86,791	95,854
Grand Rapids & Indiana	575	262,538	132,826	395,364	59,613	71,248	11,779	165,487	3,232	30,836	700,708	325,824	72,815	54,626
Hocking Valley	351	405,359	66,497	471,856	60,813	90,459	14,633	156,010	1,483	17,375	332,302	180,770	15,472	164,263
Indiana Harbor Belt	110	453,129	137,370	590,500	37,130	20,526	2,763	94,528	3,529	7,596	162,544	87,505	79,418	1,998
International & Great Northern	1,160	58,815	616,843	675,658	136,271	129,641	20,809	316,870	.....	3,529	596,148	20,695	30,000	53,935
Kanawha & Michigan	177	229,433	28,851	258,284	27,736	53,262	3,642	71,843	56	6,550	163,090	101,870	11,761	38,874
Lake Erie & Western	900	405,697	56,470	462,167	67,099	114,653	11,205	176,580	.....	12,499	382,046	103,410	24,000	79,394
Lehigh & New England	296	261,388	1,715	263,103	24,367	34,302	3,152	64,435	.....	7,447	130,956	145,267	8,300	33,770
Long Island	398	328,426	839,248	1,167,674	134,545	150,273	7,817	470,233	6,607	36,907	806,382	538,964	77,645	136,684
Louisiana Western	208	105,663	52,589	158,252	28,476	27,801	7,668	51,398	1,670	6,308	123,421	14,188	12,023	461,191
Louisville, Henderson & St. Louis	200	84,226	124,813	209,039	44,423	17,013	4,860	40,324	.....	4,438	111,059	13,754	17,107	17,808
Maine Central	1,219	653,997	297,734	951,731	154,920	145,906	15,913	350,994	3,232	30,836	700,708	325,824	72,815	54,626
Michigan Central	1,800	1,858,775	888,373	2,747,148	373,914	302,266	62,439	1,046,058	43,328	63,213	1,981,218	1,137,065	121,000	259,952
Missouri & North Arkansas	365	54,264	23,445	77,709	12,571	30,758	4,014	46,141	5,282	100,203	100,203	14,212	19,515	2,273
Missouri, Kansas & Texas System	3,865	1,496,024	656,446	2,152,470	393,248	456,911	53,771	918,773	24,144	87,703	1,910,040	469,091	110,713	357,562
Missouri, Oklahoma & Gulf	334	58,292	15,125	73,417	30,226	44,458	4,998	49,861	163	13,275	142,080	66,054	4,982	198,404
Monongahela	75	113,707	1,877	115,584	23,851	11,231	485	22,300	.....	2,785	60,742	56,957	54,633	9,028
Morgan's La. & Tex. R. & S. Co.	405	183,375	81,794	265,169	69,827	49,995	12,403	147,322	2,070	11,801	292,360	4,291	31,804	93,398
Nashville, Chattanooga & St. Louis	1,231	558,815	201,966	760,781	110,048	147,004	39,761	324,367	7,687	36,297	664,619	172,705	23,842	104,293
Nevada Northern	165	129,623	10,858	140,481	20,278	13,666	567	27,690	37	4,373	66,611	77,416	5,005	5,944
New Orleans & North Eastern	204	216,156	42,745	258,901	27,478	58,710	9,924	89,917	5,753	11,010	201,788	14,882	72,577	11,628
New Orleans, Texas & Mexico	286	67,362	20,964	88,326	17,244	64,792	3,634	51,774	.....	10,340	147,784	1,502	50,831	31,548
New York Chicago & St. Louis	569	903,727	114,040	1,017,767	123,248	157,091	62,076	355,621	5,847	22,060	725,943	332,966	22,500	103,849
New York, Ontario & Western	568	464,640	128,356	592,996	105,239	97,407	10,007	276,040	11,818	18,118	506,175	208,702	23,481	185,217
New York, Phila. & Norfolk	112	355,705	41,725	397,430	31,632	45,263	6,427	63,058	.....	10,456	157,265	28,679	6,540	90,283
Norfolk Southern	900	221,764	75,342	297,106	40,986	76,061	4,765	160,060	4,146	10,214	206,232	131,572	8,177	123,595
Pennsylvania Company	1,757	3,981,191	864,574	4,845,765	650,303	834,051	76,594	1,647,380	59,722	118,257	3,356,940	1,900,229	1,731,843	306,774
Pennsylvania Railroad	4,528	11,735,317	3,257,416	14,992,733	2,007,790	3,115,954	212,779	3,321,955	118,257					

REVENUES AND EXPENSES OF RAILWAYS

FISCAL YEAR ENDING JUNE 30, 1915

Name of road	Average mileage operated during period	Operating revenues				Operating expenses				Net operating revenue (or deficit)	Railway tax accruals	Operating income (or loss)	Increase (or decrease) comp. with prior year
		Freight	Passenger	Total	Maintenance of way and structures	Traffic	Trans- portation	Miscel- laneous	General					Total
Alabama & Vicksburg	143	952,941	397,723	1,493,067	376,690	44,690	570,953	30,465	66,806	1,314,147	178,919	95,241	82,153
Albion, Topeka & Santa Fe	8,513	64,764,400	24,117,973	97,082,746	13,252,019	2,239,174	27,596,115	1,034,461	1,918,616	61,384,299	4,748,259	30,930,100	-165,543
Atlantic Coast Line	4,702	21,064,188	7,853,359	31,535,292	4,572,651	661,514	11,291,110	110,547	880,377	22,904,157	8,632,318	1,689,157	7,038,197
Baltimore & Ohio (Chicago Terminal)	79	.....	8,831	1,533,292	212,220	143,009	657,186	22,578	54,430	1,084,538	470,761	222,783	247,509
Belt Ry. Co. of Chicago	24	.....	.....	190,955	290,741	9,582	1,139,662	.....	73,100	1,704,062	1,464,103	140,587	1,323,516
Bessemer & Lake Erie	214	8,146,082	370,465	8,665,548	639,484	122,476	2,001,288	10,106	142,248	4,759,122	215,585	3,690,770	1,341,469
Bingham & Garfield	27	1,298,287	40,377	1,346,009	172,910	11,497	229,906	904	23,329	561,113	784,896	751,481	-315,017
Birmingham Southern	43	470,980	9,340	796,498	145,302	6,948	298,416	.....	41,599	647,521	148,977	29,191	119,786
Buffalo, Rochester & Pittsburgh	586	8,022,620	1,101,981	9,479,936	2,135,354	141,767	3,144,598	14,658	231,621	6,935,252	2,544,683	230,000	2,314,087
Canadian Pacific Lines in Maine	233	972,071	284,071	1,297,609	227,060	67,031	556,235	.....	43,342	1,093,901	203,708	134,936	68,772
Charleston & Western Carolina	341	1,369,111	309,675	1,767,387	329,144	41,001	640,636	5	52,787	1,361,344	406,043	64,484	341,502
Chicago & Alton	1,033	2,000,547	3,839,893	5,840,440	14,245,624	436,498	5,216,437	115,437	361,520	11,072,707	31,721,917	508,839	2,660,584
Chicago & Northwestern	8,108	51,923,861	20,528,443	80,779,675	10,430,730	1,288,448	29,753,444	604,058	1,764,487	56,371,573	24,408,102	4,516,943	19,883,905
Chicago Junction	24	.....	.....	1,976,651	253,948	12,822	1,093,890	.....	63,661	1,652,207	324,354	23,899	299,810
Chicago, Milwaukee & St. Paul	10,071	63,953,729	17,952,438	81,906,167	91,433,374	1,756,801	35,697,961	722,635	1,862,930	61,971,701	29,463,673	4,746,721	-1,931,729
Chicago, Peoria & St. Louis	255	1,108,937	246,907	1,443,538	231,017	64,870	623,197	.....	58,328	1,281,313	162,224	101,162	202,696
Chicago, Rock Island & Gulf	477	2,087,728	584,889	2,672,617	2,800,445	117,675	1,159,848	121,909	66,260	2,188,174	712,271	93,569	61,038
Chicago, St. Paul, Minn. & Omaha	1,753	11,523,103	4,983,707	17,841,348	19,586,803	34,363	7,637,697	178,411	433,205	12,107,598	5,733,730	4,713,887	311,203
Cincinnati Northern	246	1,271,187	205,096	1,541,551	230,157	31,831	514,597	38,531	44,308	1,159,737	381,614	64,463	316,594
Cleveland, Cincinnati, Chicago & St. L.	3,381	24,525,112	8,306,887	35,824,106	40,721,159	917,630	13,830,859	284,396	769,631	27,018,315	8,805,790	1,549,027	4,572,500
Colorado Midland	338	1,335,632	212,276	1,698,780	287,456	80,885	695,822	13,193	67,015	1,541,176	157,604	109,709	47,895
Cumberland Valley	164	2,087,500	651,776	2,739,276	4,923,323	379,043	981,927	10,314	102,587	2,021,579	877,215	68,836	808,379
Delaware, Lackawanna & Western	959	30,493,030	8,234,927	43,047,005	4,784,780	6,910,327	13,834,369	355,339	308,566	27,411,441	15,633,265	2,105,152	825,100
Detroit & Mackinac	400	693,580	303,072	1,077,317	1,351,505	2,668	398,880	1,138	33,512	793,735	281,582	82,491	201,091
Duluth & Iron Range	273	4,448,612	214,412	4,824,605	731,014	697,278	1,137,880	24,568	108,546	2,761,606	2,062,999	248,658	-8,882,287
Duluth, Mesque & Northern	367	5,858,289	318,110	6,290,072	718,495	803,271	1,176,633	261,196	151,511	2,990,202	3,301,869	326,030	2,974,930
Duluth, South Shore & Atlantic	627	1,813,059	857,607	2,670,666	2,709,978	65,361	1,141,825	45,006	121,867	2,001,335	536,762	107,313	339,342
El Paso & Southwestern Co.	1,027	5,898,826	1,327,353	7,226,179	7,788,736	225,199	2,062,308	70,877	288,998	4,729,225	3,059,511	400,743	2,634,392
Elgin, Joliet & Eastern	777	8,039,190	1,327,353	9,366,543	9,541,355	68,943	2,537,110	.....	231,908	5,298,604	3,242,751	434,700	2,807,787
Florida East Coast	720	2,856,719	1,094,928	3,951,647	697,683	103,826	1,734,561	39,044	201,433	3,418,531	2,094,947	236,090	1,837,999
Grand Rapids & Indiana	575	3,139,189	1,760,610	4,900,000	5,315,747	617,644	894,928	103,952	170,090	4,070,192	1,245,556	274,624	968,444
Great Valley	351	4,912,082	832,733	5,744,815	6,181,153	707,207	1,581,671	110,916	118,671	4,184,370	1,066,783	418,522	1,572,716
Indiana Harbor Belt	110	.....	.....	3,276,224	419,642	33,532	2,027,233	1,483	72,602	2,262,446	1,013,778	92,627	920,433
International & Great Northern	1,160	6,674,082	1,756,044	8,430,126	1,539,783	269,860	4,121,583	35,041	361,452	7,871,449	1,252,177	400,000	806,500
Kanawha & Michigan	177	2,485,446	345,083	2,911,411	3,863,909	704,927	861,266	128	77,775	2,064,072	847,343	137,781	709,527
Lake Erie & Western	900	4,650,492	743,747	5,394,246	5,838,064	160,379	2,627,401	.....	147,036	4,009,746	1,273,903	280,541	992,207
Lehigh & New England	296	2,502,317	15,223	2,517,540	2,646,662	26,226	658,731	45,006	71,036	1,479,800	1,166,860	67,839	1,098,737
Long Island	398	3,777,467	782,128	4,559,595	4,840,746	129,717	5,548,546	84,062	34,338	9,075,765	4,242,317	863,055	3,776,281
Louisiana Western	208	1,370,301	666,183	2,036,484	2,186,500	82,746	680,557	29,832	76,815	1,536,754	649,746	124,907	524,243
Louisville, Henderson & St. Louis	900	1,719,328	333,909	2,053,237	2,186,500	82,746	680,557	29,832	76,815	1,536,754	649,746	124,907	524,243
Maine Central	1,219	7,195,328	3,350,969	10,546,297	11,350,423	173,734	4,245,565	55,367	332,890	8,413,965	3,206,458	644,785	2,561,482
Michigan Central	1,800	20,933,986	8,965,557	29,899,543	31,912,685	342,641	13,566,621	570,446	696,224	24,872,172	8,884,567	1,529,450	7,350,275
Missouri & North Arkansas	365	752,684	343,999	1,096,683	1,181,851	36,970	612,398	70,446	68,458	1,333,045	511,197	121,619	-217,743
Missouri, Kansas & Texas System	3,865	22,397,564	8,096,662	30,494,226	33,498,750	657,215	12,080,338	297,511	1,037,434	22,967,592	9,311,167	1,327,871	8,581,604
Missouri, Oklahoma & Gulf	334	906,513	215,605	1,122,118	1,174,211	51,614	566,873	1,312	106,521	1,279,766	-105,555	70,045	-95,951
Monongahela	72	1,080,679	23,932	1,104,611	1,225,100	206,949	273,942	.....	25,692	619,930	505,162	20,481	320,772
Morgan's La. & Tex. R. R. & S. Co.	405	2,952,565	1,040,400	3,992,965	4,376,736	6,840	1,768,813	18,257	141,496	4,417,456	959,280	708,858	-92,031
Nashville, Chattanooga & St. Louis	1,231	7,470,181	2,517,075	9,987,256	10,936,533	535,037	4,385,938	104,539	9,090,622	18,366,011	1,836,011	318,343	1,516,614
Nevada Northern	165	1,065,751	98,356	1,164,107	1,204,326	6,178	277,968	720	48,379	691,935	512,391	60,265	452,075
New Orleans & Texas Eastern	204	2,625,000	530,609	3,155,609	3,486,255	117,580	1,222,324	69,108	135,829	2,642,493	843,762	176,872	666,151
New Orleans, Texas & Mexico	286	1,150,078	242,981	1,475,591	292,237	45,108	617,810	.....	118,497	1,346,269	129,322	19,092	11,431
New York, Chicago & St. Louis	568	9,616,030	1,313,084	11,413,775	12,411,580	534,017	5,196,031	61,176	245,782	9,063,041	2,350,729	453,767	335,926
New York, Ontario & Western	568	6,073,891	1,546,407	7,620,298	8,026,046	101,817	3,516,756	190,640	100,640	6,542,906	2,383,950	2,445,55	1,941,440
New York, Phila. & Norfolk	112	3,025,334	480,527	3,505,861	3,616,460	52,563	1,618,590	54,041	122,216	3,022,725	793,734	111,477	682,026
Norfolk Southern	900	2,587,837	1,095,437	3,683,274	3,875,875	86,694	1,549,324	989	327,490	2,642,493	801,998	76	

drawing room, \$30. After the convention some of the members and guests will doubtless desire to make a tour of California to visit the expositions at San Francisco and San Diego. If a sufficient number desire to make this trip, one or more Pullman sleeping cars will leave Salt Lake City at 12:30 a.m., Friday, September 17, on the Oregon Short Line to Ogden, thence over the Southern Pacific to San Francisco, arriving there at 9:30 a.m., September 18. It is important that reservations for this trip be made as soon as possible with H. A. Gross, general agent, passenger department, Chicago & Northwestern, 48 South Clark street, Chicago, or W. D. Lifsey, New York Central, New York, and that C. C. Rosenberg, Sec.-Treas., Railway Signal Association, Bethlehem, Pa., be notified also.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting:

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 2-5, 1916, Atlanta, Ga.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago.
- AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill.
- AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 8 W. 40th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.
- AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION.—H. G. McConnaughy, 165 Broadway, New York. Meetings with American Electric Railway Association.
- AMERICAN RAILROAD MASTER TINNERS', COPPERSMITHS' AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, Chicago.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 19-21, 1915, Detroit, Mich.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 21-23, 1916, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June, 1916.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-26, 1916, Chicago.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, Rooms 1116-8, Woodward Bldg., Washington, D. C. Annual meeting, June 28, 1916, Detroit, Mich.
- ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Next meeting, May 19, 1916, Atlantic City, N. J.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 20-22, 1916, St. Paul, Minn.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.
- FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Traffic Manager, R. E. & P., Richmond, Va. Annual session, May 17, 1916, Washington, D. C.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.
- MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.
- MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.
- MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June, 1916.
- NATIONAL RAILWAY APPLIANCE ASSOCIATION.—C. W. Kelly, 349 People's Gas Bldg., Chicago. Next convention, March, 1916, Chicago.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May. Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anlerson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.
- RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.
- RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.
- RAILWAY STOREKEEPER'S ASSOCIATION.—J. P. Murphy, N. Y. C. R. R., Box C, Collingwood, Ohio.
- RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.
- RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 14-16, 1915, Chicago.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, October 19-21, Colorado Springs, Col.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Annual meeting, January, 1916.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Booddy House, Toledo.
- TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Hotel Astor, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRAIN DISPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 21, 1916, Toronto, Ont.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-10, 1915, Chicago.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The summer meeting of the National Industrial Traffic League will be held in Toledo, Ohio, on September 9 and 10. The question of legislation to be urged at the next session of Congress is one of the important subjects to be considered.

At Pinner's Point, Norfolk, Va., the Southern Railway has made extensive additions to its stock pens and other facilities, to accommodate the present extensive export traffic in horses. The French government has recently bought 10,000 horses to be shipped through this port.

According to newspaper reports from Seattle, Frank Waterhouse & Co., of that city, have chartered seven vessels to transport 7,500 freight cars to Vladivostok for delivery to the Russian government. Six thousand cars are to be shipped from New York City through the Panama Canal and 1,500 are to be shipped from Puget Sound ports. The average capacity of the vessels chartered is 150 cars for each trip.

Plans are being made for conferences between the lumber interests and railroad traffic officers for the purpose of working out some changes in the lumber classification. A. Fletcher Marsh, chairman of the traffic committee of the National Hardwood Lumber Association, has sent out a circular letter to members of that association and other lumber interests, announcing that as the result of a conference with Eugene Morris, secretary of the Railroad Classification Committee and of the Central Freight Association, Mr. Morris will be glad to hear from the representatives of the influential lumber organizations of the country as to whether they prefer that the traffic representatives of the railroads should meet with the lumbermen first for local consideration of classifications, or whether a general conference should be called at which the lumbermen of the country could present to the railroads the question of classification. Each association is asked to advise Mr. Morris that such conferences would be of material benefit in ironing out certain questions and whether local conferences should or should not be first called. The letter states that many lumbermen have already strongly expressed the opinion that while lumbermen may not be able to agree on all matters they will all agree that they cannot stand an advance in freight rates, but should have help in being able to remove the largest amount of material from every acre logged.

The Continuous Railway Voyage

[From the New York Times.]

The Interstate Commerce Commission is as up-to-date as England in applying the doctrine of the continuous voyage. A shipment intended to move from Kansas to Oklahoma was not sent direct; it was shipped in the first place to another town in Kansas, and then was rebilled to Oklahoma at an interstate rate. The Commission declares that "first billing to an intermediate point of a shipment that is really intended to reach a destination beyond is simply a device for defeating the lawful through rate, and is unlawful." It would seem to require a mind reader, or a detective, to tell what the rates are in the numerous cases in which a combination of local rates can be used to make a rate lower than the interstate rate.

When such cases used to arise they were put down to original sin on the part of the railways. Now that rates are government made, the railways must carry at the lowest lawful rate, or fifty Commissions would want to know the reason why.

Imagine the dilemma of the Commission if it sought to apply the doctrine of continuous journey to passenger fares. At the present moment it costs \$6 for a round trip to Atlantic City from New York, but \$5 from towns across the river in New Jersey. Would it be lawful to sell a tunnel ticket to a traveler desiring to buy a \$5 ticket to the New Jersey abode of bliss? Would it be lawful for a railway in New Jersey to decline to sell a \$5 ticket if the buyer came from New York to get it? Must passengers and shippers file affidavits of intention when they apply for lawful and public rates?

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has decided, in the complaint of the Mobile Cotton Exchange and others, that on or before October 1 next, rates by railroad for the transportation of export cotton must be no higher to Mobile than to Savannah or other South Atlantic ports or gulf ports. This order applies to points of origin in the territory lying east of the line of the Louisville & Nashville through Decatur, Birmingham and Montgomery. The carriers are also ordered to establish two scales of rates, one for shipside delivery, no higher than the present rate, and one for station delivery, which shall be at least 3 cents per 100 lbs. less than the shipside rate, and the shipside rate must apply to any dock in Mobile which is served by any of the roads which are defendants in this proceeding. The rate from a station in Mobile to a dock or wharf must be not over three cents per 100 lbs. The carriers are required also to issue through bills of lading to any dock in Mobile at which any of the defendant carriers make shipside delivery.

Rates on Ore from Baker, Ore.

Columbia Gold Mining Company v. Oregon-Washington Railroad & Navigation Company et al. Opinion by the Commission:

The commission finds that the carrier has justified the cancellation of a joint rate on ore and concentrates in carloads from Baker, Ore., through Portland, Ore., to Tacoma, via. the Northern Pacific from Portland, leaving applicable a combination rate based on Portland higher than the rate cancelled and also higher than the rate applying on the Oregon-Washington's through line. (35 I. C. C., 42.)

Rates on Low-Grade Cedar Logs

Nebraska Bridge Supply & Lumber Company v. Nashville, Chattanooga & St. Louis et al. Opinion by the Commission:

The commission finds that the rates on low-grade cedar logs in carloads from Burrows Switch, Guntersville, Stevenson, Huntsville, Bridgeport and Montague, Ala., and Belvidere and Jasper, Tenn., to Atlanta, Ga., are unreasonable to the extent that they exceed rates contemporaneously in effect on common logs in carloads from and to the same points. Rates for the future are prescribed accordingly. (34 I. C. C., 86.)

STATE COMMISSIONS

The Michigan Railroad Commission has authorized the Pere Marquette to discontinue the operation of trains on the Kalkaska branch from Spencer to Stratford, effective on August 14.

The Public Utility commissioners of New Jersey have denied the application of people in Long Branch, Asbury Park and other places for an order to require the Pennsylvania railroad to run more passenger trains between Trenton and the seacoast.

The Louisiana Railroad Commission has suspended its order of June 23 requiring the railroads of the state to report accidents on blanks identical with those used by the Interstate Commerce Commission. It appears that the Interstate Commerce Commission has adopted new forms, which the Louisiana Commission will consider more in detail before deciding to conform to the federal regulations.

The State Railroad Commission of Texas by a recent order requires the general free concentration of cotton. The order says: "Railroad companies are required to concentrate cotton and cotton linters, without additional charge, at the option of the owner or shipper, once at any available point in Texas in line of shipment from origin to destination, and a second time, without additional charge, at Houston, Beaumont or Aransas Pass, or at the port of destination, and before delivery at the wharf; and to carry the concentrated cotton or linters forward to ulti-

mate destination at the request of the owner or shipper, made during the season of shipment and not afterwards; it being understood that the identity of cotton or linters through concentrating point need not be maintained."

COURT NEWS

The Missouri Pacific has filed suit in the United States district court at Lincoln, Neb., to have the Nebraska two-cent fare law declared null and void.

The hearing before Judge Youmans, of the United States district court at Oklahoma City, on the application of the railroads for an injunction against the Oklahoma two-cent fare law was adjourned on July 31, until September 6, because the state was not ready to complete the cross-examination of certain of the railroad witnesses.

Traffic organizations of Sacramento, San Jose, Stockton and Santa Clara, Cal., have secured an order from the United States district court, at San Francisco, directing the United States government, the Interstate Commerce Commission and six railroads to show cause why an interlocutory injunction should not be entered to prohibit the taking effect of new tariffs filed by the railroads accordance with an order of the Interstate Commerce Commission under which the cities mentioned do not have the benefit of "terminal" rates.

Duties to Passengers at Stations—Excessive Damages

Action was brought against a railroad for injuries sustained while attempting to board a train at a flag station. While the plaintiff was trying to reach her coach she stumbled over a log and the jury awarded her punitive as well as compensatory damages. The trial judge had instructed the jury that she was a passenger, and that to a passenger a railroad owes the highest degree of care. It was held by the Arkansas Supreme Court, on appeal, that this instruction was improper, as placing too high a degree of care upon the defendant. A railroad is not liable for the same high degree of care in maintaining its station premises in safe condition as it is in maintaining roadbeds, tracks, cars, and other appliances in such conditions, where the highest degree of care is called for. Some of the decided cases seem to lose sight of this distinction. The evidence, at most, pointed to nothing more than negligence, and mere negligence, however gross, is not sufficient to warrant the infliction of punitive damages.—*Chicago, R. I. & P. v. Owens* (Ark.), 177 S. W. 8.

Consignor's Liability for Freight Charges

In an action against the consignors for freight charges the defense was that the goods were shipped on condition that the consignee should pay and the company had neglected to collect. The New York Appellate Division holds that testimony offered by the consignors of the company's agreement to accept the goods on condition of collecting the freight charges from the consignee was inadmissible, as being parol evidence tending to vary the terms of a written instrument, namely, the bill of lading. Nor did the mere fact that the charges were not to be prepaid establish an agreement on the part of the railroad to accept the goods on condition of collecting the freight charges from the consignee.—*Pennsylvania v. Reifel* (N. Y.), 154 N. Y. Supp. 203.

Liability for Injury to Passenger Shot by Another Passenger

A porter wrongfully assaulted a passenger, P., who, in the course of a prolonged struggle, shot at the porter and accidentally hit another passenger, J. In an action against the railroad for J's injuries, it was held by the Arkansas Supreme Court that the wrongful assault upon P. was the proximate cause thereof, rendering the railroad liable. The servants in charge of the train knew of the difficulty, and should have anticipated that injury might result to other passengers because of the conduct of the porter; and the railroad's duty required it to protect such other passengers from resultant injury whether inflicted by its servants in the assault, or unintentionally by the

assaulted passenger, in protecting himself against the wrongful assault of the servant.—*St. Louis, I. M. & S. v. Jackson* (Ark.), 177 S. W. 33.

Undercharging Passenger—Company May Recover Difference

A passenger bought a return trip ticket between Adams, N. Y., and New York city. The tariff rate was \$13.56, but through a mistake the agent charged only \$7.50. The passenger used the ticket and the railroad subsequently sued him for the difference. The defendant claimed misrepresentation on the part of the agent, inducing the defendant to buy. Under the decided cases, this would be no defense in regard to freight rates, and the Jefferson County Court holds that the same rule applies in passenger rates. The railroad has no option, but must demand and collect the tariff rates. New York Public Service Commission Law, section 31, provides that no common carrier shall receive compensation for transportation of passengers, freight or property less than authorized by the act. The company was therefore held entitled to recover the difference.—*New York Central v. Shelmidine* (N. Y.), 154 N. Y. Supp. 235.

Passenger Killed Resisting Arrest

A disturbance having arisen on a train, the conductor asked an officer to arrest one of the passengers. The passenger resisted arrest and was killed by the officer. Action was brought against the railroad for his death, on the theory that it was caused by the alleged false statement made by the conductor to the officer that the deceased had been making a disturbance. The Kentucky Court of Appeals held that, assuming it to be true that the conductor falsely stated to the officer that the deceased had been guilty of boisterous conduct, and requested the officer to arrest him, that was not the proximate or direct cause of the death. If the deceased had submitted to arrest, as it was his duty under the law to do, whether the charge against him was true or untrue, he would not have lost his life.—*Chesapeake & O. v. Whitaker* (Ky.), 177 S. W. 443.

No Duty to Guard Yards or Cars Against Children

Action was brought for the death of a seven-year-old boy found dead in a gondola car in the Northern Pacific's yard at Helena, Mont., the car door having fallen upon him. It was alleged that the car was out of repair, the appliances for keeping the door in place being broken or missing; and that because of this defect the car was a dangerous instrumentality, and because of its shape and the fact that large holes had been burned in its sides, it was unusually attractive to young children, and constituted an implied invitation to them to go on the company's property. This is the first time the Montana Supreme Court has had occasion to make direct application of the doctrine of the turntable cases. Every court, it said, which applies the turntable doctrine predicates liability upon the negligence of the landowner—his failure to discharge a duty which he owes to the injured person. Some of these courts treat the injured party as a trespasser, but excuse the trespass because he was tempted into the place of injury by the wrongful act of the landowner in maintaining the attractive nuisance. Others treat the injured child as rightfully upon the premises by virtue of an invitation impliedly given by the maintenance of the dangerous and attractive instrument; while others hold that a landowner who maintains on his premises an instrumentality of the character of an unguarded and unlocked turntable, with knowledge of its attractiveness to children of tender years, of its potentiality for harm, and the probability that such children will be attracted to it, shall not be heard to say that a child of that class, attracted to and injured by the device, was wrongfully where his childish instincts naturally led him to be. Under either theory of the doctrine, the court held that an instruction to the jury that if an owner of property maintains exposed thereon something which is peculiarly and unusually attractive to children, and such children are attracted by such thing, they are not trespassers, was erroneous, because it omitted the element of knowledge by the owner that the device was dangerous and alluring to children. Aside from the turntable doctrine, it was held that in the absence of a statute or ordinance requiring it, a railroad owes no duty to guard its yards or cars so as to prevent children from going on them, even if it has on previous occasions assumed such a duty.—*Martin v. Northern Pacific* (Mont.), 149 Pac. 89.

Railway Officers

Executive, Financial, Legal and Accounting

Charles L. Lowe, assistant secretary and assistant treasurer of the Chicago & North Western, has been appointed auditor of expenditures, with headquarters at Chicago, succeeding Dr. W. H. Stennett, deceased.

Osmer Charles Hill, whose appointment as general superintendent of the Kansas City Terminal Railway, with headquarters at Kansas City, Mo., has been announced, was born on May 7,

1873, at Hiram, Ohio. He was educated in the public schools and the academy at Hiawatha, Kan., and went one year to Washburn College at Topeka, Kan., and one year to the state university at Lawrence, Kan. He entered railway service on April 5, 1895, with the Chicago, Burlington & Quincy at Hannibal, Mo., and worked as brakeman until 1900 when he was made conductor. In 1903 he was made conductor and brakeman for the Wabash at Moberly, Mo., and in 1904 he was brakeman for the El Paso & North Eastern at El Paso, Tex. In the latter part of 1904 he returned



O. C. Hill

to the Chicago, Burlington & Quincy and worked as switch foreman at North St. Louis, Mo., until 1906, when he went with the Missouri, Kansas & Texas as conductor and brakeman at Parsons, Kan. In 1907 he again returned to the Chicago, Burlington & Quincy, this time as night yardmaster at St. Louis, Mo., and was subsequently general yardmaster at St. Joseph, Mo., from September, 1910, to January, 1913; general yardmaster at Kansas City, Mo., from January, 1913, to September, 1913; general yardmaster at Galesburg, Ill., from September, 1913, to January, 1915, and assistant superintendent at Kansas City, Mo., from January, 1914, to July, 1915, from which position he is now promoted.

Operating

E. C. Huffman, formerly assistant superintendent of the Sioux City division of the Great Northern, has been appointed superintendent of the Breckenridge division with headquarters at Breckenridge, Minn., and J. A. MacKinnon, superintendent at Willmar, Minn., has been transferred to the Sioux City division with headquarters at Sioux City, Iowa.

L. L. Brown, chief dispatcher of the Pacific system of the Southern Pacific at Sparks, Nev., has been appointed acting assistant superintendent succeeding George Geiger. F. F. Small has been appointed chief dispatcher at Sparks, Nev., vice Mr. Brown, and G. G. Porter has been appointed assistant chief dispatcher succeeding Mr. Small.

M. H. Cahill, superintendent of the Baltimore & Ohio at Baltimore has been appointed superintendent of the Cumberland division with headquarters at Cumberland, Md., succeeding C. Le French, deceased. P. C. Allen, superintendent at Philadelphia, succeeds Mr. Cahill, and S. T. Cantrell, formerly assistant superintendent at Cumberland, who has been serving as acting superintendent of the Cumberland division, has been transferred to Philadelphia to succeed Mr. Allen.

W. H. DuFrance, superintendent of the Louisiana division of the Texas & Pacific, has had his headquarters moved from Alexandria to New Orleans, La., and the New Orleans division, of which J. H. Elliott, recently appointed general super-

intendent, was division superintendent, has been divided between the Louisiana and the Eastern divisions, under the jurisdiction of Mr. DuFrance and of Mr. W. M. Lynch, superintendent of the Eastern division, with headquarters at Marshall, Texas.

C. A. Vermillion, superintendent of car service and telegraph of the Spokane, Portland & Seattle, with headquarters at Portland, Ore., has had his jurisdiction extended to include the Spokane & Inland Empire and the Great Northern Pacific Steamship Company. A. J. Davidson, superintendent of the Portland division, has had his jurisdiction extended to include the Vancouver division and the Oregon Trunk, succeeding F. A. Brainerd, who has been granted an indefinite leave of absence on account of ill health.

Traffic

W. B. Knight, chief of the tariff bureau of the Missouri Pacific-Iron Mountain system, has been appointed assistant freight traffic manager, with headquarters at St. Louis, Mo. The office of chief of tariff bureau is abolished.

Engineering and Rolling Stock

J. A. MacRae has been appointed mechanical engineer of the Louisville & Nashville with headquarters at the South Louisville shops, effective August 1.

Joseph Peter Heinzer has been temporarily appointed road foreman of engines of the Northern Pacific at Pasco, Wash., in place of Robert Erwin Wilkinson.

M. C. Blanchard, office engineer of the Atchison, Topeka & Santa Fe at Topeka, Kan., has been appointed engineer of the Eastern district, Eastern lines, with headquarters at Topeka, and E. H. Olson succeeds Mr. Blanchard.

Joseph Weidel has been appointed valuation engineer of the Atchison, Topeka & Santa Fe, with headquarters at Chicago, succeeding H. C. Phillips, who recently resigned to become assistant secretary of the president's conference committee on the federal valuation of railroads.

G. J. Bell, division engineer of the Atchison, Topeka & Santa Fe at Marceline, Mo., has been appointed engineer of the Western district, Eastern lines, with headquarters at Newton, Kan., W. C. Baisinger, division engineer at Chanute, Kan., succeeds Mr. Bell and H. A. Hatch succeeds Mr. Baisinger.

M. C. Bryan, division engineer of the Los Angeles division of the Atchison, Topeka & Santa Fe, Coast Lines, at San Bernardino, Cal., has been transferred to the Albuquerque division, with headquarters at Winslow, Ariz., and W. H. Oliver, division engineer at Needles, Cal., succeeds Mr. Bryan. W. L. Bradley, division engineer of the Valley division at Fresno, Cal., succeeds Mr. Oliver, and E. E. Ball, division engineer at Los Angeles, Cal., succeeds Mr. Bradley.

Purchasing

E. J. Price, traveling storekeeper of the St. Louis & San Francisco, has been appointed general storekeeper, with headquarters at Springfield, Mo., succeeding H. M. Powell, resigned, and R. A. Jacobs succeeds Mr. Price.

OBITUARY

J. J. Moran, formerly master mechanic of the Houston & Texas Central at Ennis, Tex., died on July 29, at Marlow, Okla., at the age of 66 years.

SWEDISH RAILWAY OPENED.—The Swedish State Railways have announced that the railroad from Karungi to Haparanda, on the Russian frontier, is open for traffic. It was previously necessary to make the journey by wagon.

IMPROVEMENTS AT GLASGOW QUEEN STREET STATION.—The North British Railway Company has entered upon a scheme of improvements at Queen Street Station, Glasgow, which will involve an expenditure of about \$200,000.

LIGHTING ITALIAN RAILWAY CARS.—The Italian Ministry for Posts and Telegraph, on December 26, 1914, made an agreement with the state railways for the electric lighting of all the mail cars and compartment cars used for the transportation of mails, and for the oil lighting of all mail cars provided with the proper apparatus, whether such cars are owned by the post office or the railways.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE GILCHRIST-FORDNEY LUMBER COMPANY, Laurel, Miss., is in the market for a light locomotive.

THE RICHMOND, FREDERICKSBURG & POTOMAC, which was reported in the *Railway Age Gazette* of July 9 as being in the market for 6 Pacific type locomotives, has ordered these locomotives from the Baldwin Locomotive Works.

CAR BUILDING

THE NATURAL GUANO COMPANY, Aurora, Ill., is inquiring for two flat cars.

THE AMERICAN STEEL & WIRE COMPANY is said to be inquiring for 100 tank cars.

THE NEW YORK CENTRAL is said to be inquiring for 1,000 gondola cars for its own use.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS is building 200 36-ft. box cars in its own shops.

THE CHESAPEAKE & OHIO has ordered 50 caboose cars from the American Car & Foundry Company.

THE CHICAGO GREAT WESTERN has ordered 500 reinforcing sills from the American Car & Foundry Company.

THE CUBAN CENTRAL has ordered 50 15-ton narrow-gage box cars and 25 15-ton flat cars from the Standard Steel Car Company.

THE GADSDEN CAR WORKS are reported to have ordered 600 center constructions from the Mount Vernon Car Manufacturing Company.

THE CINCINNATI, HAMILTON & DAYTON is said to have ordered 500 center constructions from the Haskell & Barker Car Company. This item has not been confirmed.

MACHINERY AND TOOLS

THE LEHIGH & NEW ENGLAND has issued specifications for 27 machine tools for its new shops at Pen Argyle.

SIGNALING

THE CHICAGO, BURLINGTON & QUINCY is installing automatic block signals between Savannah and Galena Junction, Ill.

Light Signals on the St. Paul

The Chicago, Milwaukee & St. Paul has placed an order with the Union Switch & Signal Company for material for 130 miles of single-track, automatic block signaling, which will be installed by company forces on the Rocky Mountain division in Montana, the district which is now being electrified. The installation will consist of changing two existing D. C. sections from Lennet to Three Forks, 78.5 mi., and from Piedmont to Butte Yard, 35.5 mi. over to A. C. operation and the addition of 16 mi. of new signaling from Butte Yard to Finlen. Semaphore signals will not be used, Union model 14, three-position, light signals having been adopted as being more readily adaptable to the adverse conditions due to the propulsion power line, which interferes somewhat with the view of engineers. The propulsion current will be 3,000 volts, D. C., taken from an overhead conductor. The signal feeder current will be 4,400-volt, single-phase, 60-cycles. The power for the signals will be secured from the electrification sub-stations, which will be located from 28 to 42 miles apart, the system being arranged so that power can be fed between such stations in either direction. Sectionalizing line switches will be installed in the signal power wires at the railroad stations, which are from four to nine miles apart. Impedance bonds of 500 amperes per rail capacity will be used except on the 2 per cent grade, where 1,500-ampere per rail bonds will be installed.

Supply Trade News

W. Van Ausdall, an electrical engineer of Cincinnati, Ohio, has been appointed superintendent of the C. & C. Electric & Manufacturing Company, Garwood, N. J.

The Canadian Car & Foundry Company, which has been working on an \$83,000,000 order for steels for some time is now reported to have received an additional order for \$71,000,000.

S. J. Turreff, heretofore superintendent of construction of the Federal Signal Company, Albany, N. Y., for its western district has been appointed office engineer with headquarters in New York.

Thomas Cantley, vice-president of the Nova Scotia Steel & Coal Company, Halifax, N. S., has been elected president of that company succeeding R. E. Harris who has resigned to become a member of the Nova Scotia Supreme Court. The vice-presidents of the company now are J. D. McGregor and D. W. Ross.

W. E. Moore, vice-president and general manager of the West Penn Traction properties, has resigned his position with the various West Penn companies to go into business under his own name, as consulting engineer, with an office in Pittsburgh. As Mr. Moore's successor has not yet been appointed, he will continue with the company until the staff can be reorganized.

The Spray Manufacturing Company, Boston, Mass., recently incorporated to construct spray cooling systems, gas scrubbers, odor and fume condensers, etc., has changed its name to the American Spray Company, as it will engage in general engineering work involved in the use of spray systems. The management of the company remains unchanged.

TRADE PUBLICATIONS

NATIONAL PIPE.—Bulletin No. 20, recently issued by the National Tube Company, Pittsburgh, Pa., is an index to bulletins 1 to 20 which have been issued by this company. The bulletin represents an index of considerable detail, the idea being to offer pipe information readily accessible to the reader. The last two pages of the bulletin give a detailed list of the bulletins to which reference is made.

CHICAGO GREAT WESTERN.—The passenger department has just issued an illustrated booklet entitled "Modernizing a Railroad," setting forth some of the various improvements effected by the railroad since its reorganization. These include the expenditure of some \$17,000,000 for installing new and heavier rails, double tracks, straightening, regrading and rebalasting the roadbed, building new bridges, purchasing new all-steel passenger cars and larger and heavier locomotives, automatic block signals, telephone train despatching, etc.

FIRE ALARM AND SIGNAL CALLS.—The McFell Signal Company, Chicago, Ill., has issued two folders describing several new types of the McFell fire alarm signal system, which are electrically operated and are designed for a variety of different uses. They also describe the McFell direct signal call system designed for communicating promptly with the members of the superintending force of a large plant or office building, whose duties call them to different parts of the establishment and who by this system can be readily located by the signal sounding in each department.

LOCOMOTIVES FOR PLANTATION SERVICE.—Record No. 80, recently issued by the Baldwin Locomotive Works, is devoted to the subject of locomotives for plantation service. In the booklet there are shown 29 different designs of locomotives suitable for this kind of work. They vary in type and capacity from light, four-coupled engines, suitable for switching service and short hauls, to large engines of the Consolidation type, which are qualified for road service. Information is given covering the hauling capacity of each locomotive illustrated, as well as the other principal general dimensions.

Railway Construction

ALAMANCE, DURHAM & ORANGE.—Graham, the county seat of Alamance county, N. C., and Thompson's township, according to report, have voted \$55,000 bonds to aid the construction of this electric line, which it is proposed to build from a point in North Carolina, southeast via Burlington, Graham and Haw River to Saxapahaw, thence east to Chapel Hill, and northeast to Durham, about 50 miles. Junius H. Harden, president, Burlington. (March 12, p. 493.)

CANADIAN GOVERNMENT RAILWAYS.—An officer writes that a contract has been awarded to the John W. McManus Company, Ltd., Memramcook, N. B., for the construction of a spur line of railway from a point on the main line of the Intercolonial, about 1.8 miles east of the station at Bathurst, N. B., to a point at or near the Bathurst Lumber Company's mills, a distance of a little over two miles. The contract is to be completed by October 1, 1915. C. B. Brown, chief engineer, Moncton, N. B.

FENTRESS & MORGAN.—This is the name of a line which is reported under construction from the head of Island Creek in Morgan county, Tennessee, to the confluence of Daddy Creek and Obed river, 3 miles. It is said that the line will be ultimately 18 miles long, and that it will traverse territory being developed by the Tennessee Mineral & Lumber Company, Harriman, Tenn. It connects with the Cincinnati, New Orleans & Texas Pacific at Nemo, Tenn.

FLORIDA, ALABAMA & GULF.—This line, which now connects with the Louisville & Nashville at Galliver, Fla., and runs north via Baker, Blackman and Wing to Falco, Ala., about 31 miles, will be extended to connect with the railroad of the Horseshoe Lumber Company, at Falco, over which it has been granted trackage rights. The railway will thus be enabled shortly to run its trains to Andalusia, Ala., 22 miles farther. Thomas A. Johnson, receiver, Pensacola, Fla.

GARYVILLE NORTHERN.—It is reported that the Lyon Cypress Lumber Company, Garyville, La., has chartered a railway by this name to build about 35 miles of line. The work will be done by company forces.

GEORGIA ROADS.—A proposition has been submitted to the Americus Chamber of Commerce by T. B. Ragan, president of the Hawkinsville & Western and others of Hawkinsville, Ga., to build a line between Americus, Ga., and Hawkinsville, as an extension of the proposed line to be built from Byromville west to Americus, about 25 miles, by the Georgia Lumber Company, Byromville, Ga. (See Americus, Flint River & Gains, July 2, p. 38.)

KANAWHA, GLEN JEAN & EASTERN.—A contract has been let to Board & Duffield, Charleston, W. Va., for building the Dun Loup branch of this line from the main line to the mines of the Dun Loup Coal & Coke Company at Dun Loup, one-half mile. Construction work is now under way, but track will not be laid before September 15. V. S. Veazey, chief engineer, Glen Jean, W. Va. (June 4, p. 1181.)

KANKAKEE & URBANA TRACTION.—This company will extend its line from Ludlow to Paxton, Ill., following the Illinois Central tracks. The contract for grading will probably be awarded about October 1. There will be one steel plate girder bridge.

KETTLE VALLEY RAILWAY.—This company has awarded a contract to A. Guthrie & Co., St. Paul, Minn., for the building of snowsheds on its line along the Coquihalla river in the Hope Mountains. There will be about 7,500 lineal ft. of sheds, requiring about 13,000,000 ft. B.M. of timber. The work has been started.

MERIDIAN & DEEPWATER.—An officer writes that work on the construction of this railway, which is to be built from Meridian, Miss., east via Causeyville, Blankstown, Yantlev, Ala., and Pennington, to Myrtlewood, will be resumed in December of this year. S. A. Neville, Meridian, Miss., is vice president. (September 15, 1911, p. 544.)

NEW YORK SUBWAYS.—The Public Service Commission, First district, has awarded contracts as follows: To Holbrook, Cabot & Rollins Corporation, the contract for Section No. 3 of Routes Nos. 4 and 36 of the Broadway subway in Manhattan; this section extends from 38th street northerly under Broadway to Times Square, thence northerly under Seventh avenue to 51st street. To Rodgers & Hagerty, Inc., for Section No. 3 of Route No. 12, of the Eastern Parkway subway in Brooklyn; this section extends from about Nostrand avenue easterly under Eastern Parkway to Buffalo avenue. To Post & McCord, Inc., for Section No. 1 of Route No. 49, the Culver elevated line in Brooklyn which extends from a point near 37th street over Gravesend avenue to a point near Bay Parkway or 22d avenue produced.

The Public Service Commission has laid out Route No. 61, providing for a new tunnel under the East River from 60th street, Manhattan, to the Queensboro Bridge Plaza in the Borough of Queens, where it will connect with the new rapid transit lines in that borough running to Astoria on the north and to Corona on the northeast. This action was taken in pursuance of resolutions adopted by the Board of Estimate and Apportionment, mentioned in this column last week, asking that the tunnel route be substituted for the original route over the Queensboro Bridge. The new route will be operated by the New York Municipal Railway Corporation in connection with the Broadway subway in Manhattan and the new lines in Queens, over which this company will have trackage rights. The Degnon Contracting Company proposed the change from the bridge to the tunnel and said it would submit a bid for its construction not to exceed \$4,500,000, and that it would agree to complete the work within two and one-half years.

Snare & Triest have submitted the lowest bid of \$611,563 for the station finish construction on sections No. 1 and No. 2 of the extension of the Queensboro subway from the Jamaica avenue to the Queensboro bridge Plaza.

PELIHAM & HAVANA.—A survey has been made and construction work is to be started soon, it is said, on an extension to be built from Darsey, Fla., southwest to Havana, about five miles. The company now operates a line from Cairo, Ga., southwest to Darsey, Fla., 19.3 miles.

SCRANTON & BINGHAMTON (Electric).—This company, it is said, plans to build an extension to its lines from Foster, Pa., to Brooklyn, a distance of about five miles.

TENNESSEE RAILWAY.—An officer writes that a contract has been awarded to the Harriman Construction Company, Harriman, Tenn., for the construction of an extension of the main line from Oneida, Tenn., toward Petros, 8 miles, with branch lines 3 miles in length. When this line is completed, but 3 miles more will be needed to carry it to Petros. The main line will have a maximum grade of 1.4 per cent., and a 14 deg. maximum curve. On the branch lines the maximum grade will be 3 per cent. and the maximum curve 16 degrees. There will be a number of timber bridges. The road expects to carry a large amount of coal and timber. It will, in all probability, be built for the most part by convict labor. C. W. Butts, chief engineer, Oneida, Tenn. (July 9, p. 81.)

TROY RIVER FRONT COMPANY, INC.—A company by this name has been incorporated to build a short railroad along the river front at Troy, N. Y. The company expects to apply for a franchise at the next meeting of the common council. The Hudson Navigation Company, Pier 32, North River, New York, is interested.

RAILWAY STRUCTURES

ARGENTINE, KAN.—On July 19 a car repair shed of the Atchison, Topeka & Santa Fe was destroyed by fire. There were also 24 cars destroyed and 12 cars damaged. The total estimated loss will not exceed \$50,000. The cause of the fire is unknown.

BUFFALO, N. Y.—The New York Central, it is reported, will build a reinforced concrete dock to cost \$30,000 on the Buffalo river adjoining the dock of the Eastern Grain & Elevator Company.

CHICAGO, ILL.—The Illinois Central will build an 11-stall brick turntable pit roundhouse and several other buildings at this place to cost about \$15,000. The contract has been awarded to Leyden-Ortseifen Company, Chicago.

DEERING, ILL.—The Chicago & Northwestern is taking figures on the rebuilding of the foundation of its three-track bascule bridge at this place.

EDDYSTONE, PA.—The Philadelphia & Reading has awarded the American Bridge Company a contract for fabricating and erecting a single track 67 feet single span through plate girder bridge over Eddystone avenue.

ISLAND CREEK, N. Y.—An officer write regarding the bridge to be built by the Delaware & Hudson over Island Creek, Albany county, N. Y., that plans are now before the Public Service Commission, Second district, but that these plans have not yet been passed upon.

KENSINGTON, ILL.—The Illinois Central has awarded a contract to the Railroad Water & Coal Handling Company, Chicago, for water facilities at this place. The work will include a pent stock, pipe lines, etc., and will cost about \$8,000.

KEWANEE, ILL.—The Chicago, Burlington & Quincy will build a one-story brick, tile roof passenger station at this place. The contract has been awarded to Joseph E. Nelson & Sons, of Kewanee.

MACON, GA.—The Georgia, Southern & Florida has awarded a contract to the David Shaw Company, Macon, for the remodeling of the company's general offices on Fifth and Plum streets, at a cost of \$10,000. J. A. Griffin, engineer, M. W. & S., Macon.

McMINNVILLE, TENN.—The Nashville, Chattanooga & St. Louis, it is said, will build a bridge at this point. The bridge will be 100 feet long, and will have a 60-foot steel girder with concrete foundations and reinforced concrete approaches. There will also be a 4-foot sidewalk on each side. H. McDonald, chief engineer, Nashville, Tenn.

NEW YORK.—The Public Service Commissions of the first and second districts have issued a joint order requiring the elimination of grade crossings over the New York Central and the New York, New Haven & Hartford at 241st and 242nd streets in the Borough of the Bronx. The tracks are to be shifted and a viaduct constructed over them so that the full effect of recent grade crossing improvements at Mount Vernon will be enjoyed.

READING, PA.—The city engineer of Reading has approved plans of the Philadelphia & Reading for three concrete bridges to be erected at Center avenue, Fourth street and Schuylkill avenue, to cost about \$75,000.

SAN ANTONIO, TEX.—The International & Great Northern has purchased 108 acres of land, 5 miles out of San Antonio, as a site for shops, yards and roundhouses. It is stated that approximately \$500,000 will be expended. The plans for the buildings have been drawn and work will be started soon. O. H. Crittenden, chief engineer, Houston, Tex.

SPARTANBURG, S. C.—The Southern Railway has authorized the remodeling and enlargement of its passenger station at Spartanburg, S. C., and bids for the work are now being asked. The changes include the rearrangement of tracks, some paving, the construction of umbrella sheds, a passenger subway, and an underground waiting room and a bridge to carry Church street across the tracks. The extension of the station will be of brick, on a stone base. It will have a tile roof, and its architecture will conform to that of the present building. There will be separate waiting rooms for white and colored passengers, there being connected with each of these rooms a men's smoking room and a women's retiring room. There will also be lunch rooms for both white and colored persons, a ticket office, telephone office, baggage room and mail room. The contract for the passenger subway was awarded some time ago, as noted in the *Railway Age Gazette* of April 16, 1915, page 871, to M. M. Elkan, Macon, Ga., and R. B. Tufts, Norfolk, Va., and it is reported that these contractors have also been awarded the contract for the construction of the concrete bridge on Church street over the tracks.

UTICA, N. Y.—The New York, Ontario & Western on July 19 started construction work with company forces on a five-stall engine house on Pleasant street in this city. The structure will cost \$12,500, and will be built of brick and concrete with a timber roof. J. H. Nuelle, chief engineer, Middletown, N. Y.

Railway Financial News

ARTESIAN BELT.—The contest over the control of this Texas road has resulted in the ousting of J. O. Terrell from the receivership by order of the Appellate Court at San Antonio. The railroad was built by the late Dr. F. C. Simmons, a patent medicine manufacturer of St. Louis, who owned a 250,000-acre ranch in the territory through which the line runs. Since the death of Dr. Simmons the road has been operated under the direction of the West Texas Bank and Trust Company, which is the executor of his estate. The appointment of Mr. Terrell as receiver was made recently by the district judge of McMullen county upon application of Boston stockholders. By the decision of the Appellate Court the property has again been placed in control of the West Texas Bank and Trust Company. The line extends from Macedonia, Texas, on the Sunset Central, south to Christine, 43 miles.

BOSTON & MAINE.—The Board of Directors on August 3 voted to join with the lines under lease to the road in an application to Governor Spaulding, of New Hampshire, for a special session of the Legislature of that State to consider a new bill for the reorganization of the Boston & Maine system.

CHICAGO & EASTERN ILLINOIS.—The following is the protective committee for the general consolidated and first mortgage 5 per cent. bonds: Harry Evans, chairman, president of the Continental Insurance Company; J. Howard Bagardus, secretary and treasurer of the Stamford Savings Bank of Stamford, Conn.; Herbert H. Dean, of Edward C. Smith & Co.; Samuel F. Streit, of H. T. Carey & Co., and Frank B. Weeks, of Middletown, Conn., ex-governor of Connecticut.

NEW YORK, NEW HAVEN & HARTFORD.—The attorney general complying with the order of the United States District Court, filed in court at New York, August 2, the bill of particulars asked for by the defendants in the suit of the government against 13 present and former directors of this road, charging conspiracy to monopolize interstate commerce. The document fills 63 printed pages, and is made up of 188 paragraphs. The most notable acts charged are those connected with the action of the directors of the railroad company in their management of steamboat lines on the Sound, and their alleged unreasonable acts in competition to drive out of business the Joy Steamship Company. Illegal acts are charged also in connection with the action of the Standard Oil Company and the Florida East Coast Railway in stifling steamship competition. The sending of steamships *Yale* and *Harvard* to the Pacific coast is declared to have been a part of the unlawful policy of the New Haven directors to monopolize water transportation in the East. Lewis Cass Ledyard, one of the directors, is charged with getting Mr. Mellen, in 1912, to write a letter deceiving the United States attorney.

The bill quotes a resolution said to have been adopted by the directors of the New Haven road April 17, 1913, which says:

"That no officer of the New Haven make any address or response to a toast or otherwise that shall in any way refer to the business of the company or its policies, or its prospects unless the same shall first have been submitted to and approved by the Executive Committee; that no officer give any information regarding the business of the company, its policies or prospects except through an authorized publicity department of the company provided for such purpose; direct interviews between officials of the company and representatives of the press being prohibited."

The bill states further that Director E. D. Robbins, before the return of the indictment under the Sherman law, cooperated with other directors in removing the books and records of the Billard Company to Canada and forming the "St. Lawrence Securities Company."

ROCK ISLAND COMPANY.—Vice Chancellor Emery, sitting in Newark on July 29, appointed Chauncey S. Parker, of Newark, receiver of the Rock Island Company.

ANNUAL REPORT

BROOKLYN RAPID TRANSIT CO.

BROOKLYN, N. Y., July 27, 1915.

To the Stockholders of

The Brooklyn Rapid Transit Railway:

The passenger earnings of the system for the year ending June 30, 1915 (excluding for the purpose of this comparison the newly acquired Coney Island & Brooklyn Railroad Company's lines), failed for the first time in the history of the Brooklyn Rapid Transit Company to show a substantial increase over the passenger earnings of the preceding year, and instead there was a decrease. There were two main causes for this result:

First—The general depression in business and industry affecting Brooklyn as well as other portions of the country, reflected in a large number of men and women out of work and a tendency towards economy in expenditures.

Second—The very liberal increase in transfer facilities which went into effect on June 1, 1914, under order of the Public Service Commission, whereby the total number of transfer points on surface railroads in the system was increased from 721 to 1,008. The first year of operation under this order shows an increase of 10,552,274 transfer passengers carried, and a decrease of 2,141,700 cash passengers. This situation presented not merely a loss in revenue, but occasioned an increase in expense by reason of the increased service required for the transportation of the large number of additional transfer passengers.

The figures as given in the year's accounts, however, and as herewith reported, show an increase of \$869,437.06 in passenger and other earnings, due to the inclusion of the operations of the Coney Island & Brooklyn Railroad Company for the entire fiscal year as against six months' operation of those lines during the preceding fiscal year. The increase in operating expenses was \$965,828.71, of which \$456,018.38 (nearly half) was due to charges to maintenance of way and structure and maintenance of equipment, and \$267,551.52 to trainmen's wages.

Interest charges were reduced by the conversion of Refunding Bonds into stock, and were somewhat increased by rapid transit improvements placed in operation. The net result shows an increase of \$196,856.26 in net income, and in addition the system's reserves for depreciation were credited with \$256,384.55, as against a debit in the preceding year of \$53,190.75.

Dividends at the rate of 6 per cent. were paid on the amount of capital stock outstanding during the year, namely, \$74,520,000, leaving a surplus for the year over dividend requirements of \$1,045,243.12.

A summary of the financial results is given in the following table:

COMPARATIVE STATEMENT OF THE RESULTS OF THE OPERATIONS OF THE BROOKLYN RAPID TRANSIT SYSTEM FOR YEARS ENDING JUNE 30, 1915 AND 1914.

	1915.	1914.	Increase or Decrease.
Gross Earnings from Operation	\$26,427,686.66	\$25,558,249.60	+ \$869,437.06
Operating Expenses.....	14,960,381.37	13,994,552.66	+ 965,828.71
Net Earnings from Operation	\$11,467,305.29	\$11,563,696.94	— \$96,391.65
Income from other sources	438,715.01	451,771.65	— 13,056.64
Total Income	\$11,906,020.30	\$12,015,468.59	— \$109,448.29
Less Taxes and Fixed Charges	6,393,459.18	6,699,763.73	— 306,304.55
Net Income	\$5,512,561.12	\$5,315,704.86	+ \$196,856.26
Surplus at Beginning of Year	9,732,588.50	7,904,606.63	+ 1,827,981.87
Coney Island & Brooklyn R.R. Co.'s Surplus at Time of Acquisition.....		506,625.76	— 506,625.76
Total	\$15,245,149.62	\$13,726,937.25	+ \$1,518,212.37
Other Credits to Surplus During Year:—			
Miscellaneous Items.....	4,131.20	30,653.36	— 26,522.16
Settlement of B'klyn City R. R. Co.'s Suit		582,566.72	— 582,566.72
Sale of easement to B'klyn R'y Co.....		738,986.59	— 738,986.59
Total	\$15,249,280.82	\$15,079,143.92	+ \$170,136.90
Of this amount there has been appropriated:			
Accounts written off.....	12,327.56	2,315.30	+ 10,012.26
Adjustment of Taxes prior years.....		10,801.78	— 10,801.78
Adjustment of Expenses prior years.....	35,088.74	*948.67	+ 36,037.41
Succession and Depreciation	45,062.12	174,339.01	— 129,276.89
Amount set aside as Reserve		1,500,000.00	— 1,500,000.00
Loss from operation of Employees' Restaurants	9,445.97		+ 9,445.97
Loss from operation of Surface Cars over Man Bridge.....	58,071.98		+ 58,071.98
Dividend on B. R. T. Co.'s Stock outstanding	4,467,318.00	1,660,038.00	+ 807,270.00
Total Appropriations.....	4,627,314.37	5,346,555.42	— 719,241.05
Balance Sheet Surplus.....	\$10,621,966.45	\$9,732,588.50	+ \$889,377.95

*Credit

PROGRESS OF WORK ON RAPID TRANSIT LINES UNDER CONTRACTS WITH THE CITY.

Under the contracts of March 19, 1913, between the City of New York and the New York Municipal Railway Corporation (a constituent company of the Brooklyn Rapid Transit System), the city is to expend upward of \$100,000,000 in the construction of rapid transit lines, and the Company is to expend in contribution toward the cost of such lines and in the equipment thereof, and in extensions, enlargements and reconstruction of existing rapid transit railroads, about \$65,000,000. The contracts contemplated that all of these new lines, and the extension and reconstruction of existing lines, should be completed and ready for operation on the first day of January, 1917. More than half of this period has now elapsed, and it looks as if the most important part of the enlarged system would not be ready for operation until a considerably later date than January 1, 1917. The chief line, in the consideration of net revenue, is, of course, the Broadway-Manhattan Subway, with its connections to Queens and Brooklyn. Rapid progress has been made on those sections between Trinity Place and 26th Street, some of them being nearly completed, and all are at least three-quarters built. In the case of the other section, however, the contractor is not required to finish until some months after January 1, 1917, and the so-called Times Square section has not yet been let. The Board of Estimate has decided to make the connection with the Queens lines by a tunnel under the river instead of over the Queensborough Bridge, which will mean further delay, and in the case of the East River tunnel from the Battery to Brooklyn the contractor has until January 16, 1918, to complete. There is no way of operating the Broadway Subway, even as to those sections which may be completed on scheduled time, until connections are ready for operation between this line and either Brooklyn or Queens, for there is no other way of getting equipment into the subway. Obviously, it will not be desirable to postpone the operation of the Broadway Subway until the East River Tunnel from the Battery to Brooklyn is ready for operation, or until the connection is made to Queens either over the reconstructed Queensborough Bridge or through a tunnel, and the only hope of obtaining even a partial operation of the Broadway Subway is by the speedy completion of the connection on Canal Street with the Manhattan Bridge, and the contractor for this section has until March 16, 1917, for the performance of his contract. If this short section could be completed in advance of the time stipulated in the contract, that portion of the Broadway Line between lower Manhattan and probably 34th Street could be placed in operation shortly after January 1, 1917.

The prospect, however, is that a large part of the city's investment in the Broadway Subway (probably not less than \$20,000,000) will remain idle, owing to the delay in letting contracts for certain sections, with the treble results of:

First, adding to the cost of construction by the interest on the idle investment;

Second, withholding from joint account the net revenue which would come from the operation of the line, and

Third, depriving the people of the improved means of transportation.

Moreover, no contract has yet been let for two comparatively short sections of subway which will connect the Brighton Beach Line with the Manhattan Bridge and Centre Street Loop—a simple extension of facilities which would be of great advantage to the six miles of tributary population between Prospect Park and Sheepshead Bay.

Nor has any contract been let for the 14th Street-Eastern Line, which will be of tremendous benefit to the people of the Eastern District of Brooklyn (now deprived of rapid transit). A portion of this route has not yet even been legalized.

The company, on the other hand, has proceeded as expeditiously as conditions would allow to carry out its obligations to the city. It will be remembered that the contracts made necessary the approval of the Public Service Commission to every detail of construction and equipment work performed by us, whether on our own lines or on those of the city. Every plan, every form of contract, every award of contract, and every dollar of expenditure are subject to the Commission's scrutiny, and must be approved by the Commission in advance. This arrangement makes for great delay, and in some cases the Commission has taken many months to consider contracts submitted to it which should have taken a few days or at the most a few weeks. Under these conditions our progress is necessarily slow, even in the extension and enlargement of our own facilities, and we cannot, of course, proceed with the equipment of the city-owned lines until they are substantially completed.

This entire situation involves serious consequences, both to the city and to the company, other than the substantial increase of costs which delay always occasions. At the time the contracts with the city were made it was the expectation of both parties, founded upon careful expert examination, that, while for a few years after initial operation the enlarged system which one of our companies is to operate would not earn full interest on both the city's and the company's investment, it would in a comparatively short time be self-supporting, and the city would then have added to its borrowing capacity upwards of one hundred millions of dollars, and in addition be the recipient of one-half of the divisible profits. That expectation was based upon the assumption that all the enlarged system would be placed in operation on or before January 1, 1917, whereas it looks now as if only the less profitable, or the unprofitable, new lines would then be in operation, and that the returns from the profitable lines would be indefinitely delayed. In the present financial condition of the city this result will mean not only that the city's credit will in the intervening period be too close to the debt limit to permit of expenditures for other municipal improvements, but that the taxpayers will be called upon for a longer period to make up more substantial deficits than were originally contemplated, and this at a time when taxes are a particularly heavy burden. It is true that by the terms of the contracts into which we have entered with the city, these deficits in meeting the city's interest during temporary operation are, contrary to all rules which apply to public service corporations generally throughout the country, chargeable to the city's construction account, but they must be paid by the city, either through direct taxation or through the issue of additional corporate stock not heretofore set aside for rapid transit purposes, and to the extent that additional corporate stock is issued for these deficits other municipal improvements must be postponed, or in some way not now discernible, the city's debt-making power must be expended.

In the case of the company, while it is assured of its preferential earnings, it must charge against earnings its new investment as put into operation, and if this investment is represented, as it will be very largely for the first few years, in construction and equipment work on lines which are the least hopeful as money earners, its net income will diminish.

It is extremely essential, therefore, from the point of view of the city and its people, as well as for the interests of the company, that every effort be made to expedite the completion of all these new rapid transit

facilities, and the facts are stated and given emphasis in this report because of our very sincere conviction that neither public officials, taxpayers nor property owners sufficiently appreciate the present situation and its consequences.

The following is a synopsis of the progress of rapid transit work during the year so far as our relation to it is concerned:

CENTRE STREET LOOP.

The work of reconstruction of tracks and structures in Centre Street Loop, included in Modifying Agreement No. 2 with the city, was completed during the year, and equipment of all four tracks has been finished except a certain portion of the signaling. The additional tracks were placed in operation from time to time during the year. Additional power equipment was also installed in the temporary sub-station at Centre and Walker Streets.

THIRTY-EIGHTH STREET CONSTRUCTION.

The work of construction in 38th Street, in the Borough of Brooklyn, included in Modifying Agreement No. 1 with the city, has been practically completed at Fourth Avenue and 38th Street; the remaining work between Fifth and Tenth Avenues is well under way and will be completed during the present calendar year.

SEA BEACH LINE.

The reconstruction of this line and the equipment thereof was completed during the present fiscal year, except station buildings, which will probably be finished before autumn. The tracks between Fourth and New Utrecht Avenues were completed by January 1, 1915, and between New Utrecht Avenue and 86th Street by May 1, 1915. That portion of the line between 86th Street and Coney Island has been equipped with third rail and temporary terminal facilities, provided at Coney Island. Operation with new subway cars over this line was begun on June 1, 1915.

FOURTH AVENUE SUBWAY.

The city completed during the year track laying in this subway, between the Manhattan Bridge and 65th Street, to an extent that permitted operation on two tracks, which was begun June 22d, connecting at 65th Street with the Sea Beach Line, and forming in this way a complete route from Chambers Street, Manhattan, to Coney Island, via Fourth Avenue and the Sea Beach Line. Tracks and equipment of the Fourth Avenue Subway are incomplete, and signal equipment has been installed on only a portion of the two tracks in operation. Connections, however, have been completed at 38th Street and Fourth Avenue to permit taking cars out of service for inspection.

BROADWAY-MYRTLE AVENUE CONNECTION.

This connection was completed and operation thereover begun July 29, 1914.

LUTHERAN CEMETERY LINE.

The main portion of this line was finished and operation begun over the same on February 22, 1915. At the westerly end of this connection a temporary construction was provided pending the erection of new structure at Myrtle and Wyckoff Avenues, forming part of the third tracking of the Myrtle Avenue Line. Temporary arrangements have been made with reference to yard tracks at the east of this line pending the completion of the permanent yard.

LIBERTY AVENUE ELEVATED EXTENSION.

The steel structure of this line has been completed and track laying practically finished. Some work remains to be done on the station structures and it is expected that this line will be ready for operation some time during August or September of 1915.

JAMAICA AVENUE ELEVATED EXTENSION.

Contract for the steel structure of Section 1 of this line was let in March, 1915, and contract requires completion thereof by February, 1916. Section 1 is about one-half of the total line, extending from Cypress Hills to Richmond Hill. Plans for the second section are awaiting a definite determination with reference to street lines, to be fixed by the city, which has also caused some delay to Section 1.

ADDITIONAL TRACKS, EXISTING LINES.

The third tracking work on Fulton Street, from Sackman Street to Nostrand Avenue, has been practically completed so far as erection of structure is concerned. Contract for stations has been let, all of which will probably be completed before the end of the calendar year. The work on the lower section, from Nostrand Avenue to the Brooklyn Bridge, is awaiting the approval of plans by the Public Service Commission.

The third tracking work on Broadway, for that portion between Have-meyer Street and Myrtle Avenue, is well under way and will probably be completed by the end of this calendar year. Steel for the second section from Myrtle Avenue to East New York is being fabricated, a portion of which is being delivered.

Plans for the third tracking of the Myrtle Avenue Line were approved by the Public Service Commission within a few days, and bids for construction will soon be invited.

CAR EQUIPMENT.

A total of 300 cars have been ordered, 160 of which have been delivered, 100 of the latter being now equipped and in operation.

Delivery of the remaining 140 cars will be made during the present calendar year.

SIGNAL EQUIPMENT.

In addition to the signaling contracted for with reference to Centre Street Loop, contract has been closed which will cover signaling for practically all the rapid transit lines involved in contract with the city. This contract provides for immediate installation of signaling as construction work proceeds, and also provides for the contractor making certain experiments with a system of Cab Signal and Speed Control which, if satisfactory, will mark a great advance over signal methods heretofore in use.

POWER ADDITIONS.

Numerous additions to power equipment were installed in existing sub-stations, and two new sub-stations were constructed, one at 64th Street and Fourth Avenue, equipped with two 2,000 K. W. Rotary Converters, and one at Ozone Park, for the new Liberty Avenue Line, equipped with two 1,000 K. W. Rotary Converters.

New transmission lines were also installed.

EXPENDITURES UNDER CITY CONTRACTS.

The New York Municipal Railway Corporation's expenditures for con-

struction and equipment to June 30, 1915, under the city contracts, were as follows:

On account of contribution to city-owned lines.....	\$10,582,892.05
On account of equipment of city-owned lines.....	3,596,219.92
On account of additions, extensions, and improvements of existing railroads.....	15,831,747.81
Total	\$30,010,859.78

RESULTS OF TEMPORARY OPERATION OF RAPID TRANSIT LINES UNDER CITY CONTRACTS.

The arrangement with the city, whereby the pooling of earnings between existing rapid transit lines with their extensions and the city-owned lines was to go into effect as new lines are added from time to time, was described in detail in the annual report for the preceding year. This temporary operation and pooling began on August 4, 1913, and the results for the year ending June 30, 1915, and for the entire period from August 4, 1913, to June 30, 1915, are given below:

RESULT OF OPERATIONS OF NEW YORK CONSOLIDATED RAILROAD COMPANY, LESSEE, UNDER THE PROVISIONS OF CONTRACT NO. 4, DATED MARCH 19, 1913, BETWEEN THE NEW YORK MUNICIPAL RAILWAY CORPORATION AND THE CITY OF NEW YORK.

	Year ending June 30, 1915	For the period Aug. 4, 1913 to June 30, 1915
REVENUE:		
Passenger Revenue.....	\$8,370,004.24	\$16,023,760.08
Chartered Cars and Misc. Transp. Revenue.....	1,115.10	2,350.02
Advertising	63,966.66	129,815.83
Other Car and Station Privileges.....	46,056.73	96,282.15
Rent of Buildings and Other Property..	27,266.70	53,752.78
Rent of Tracks and Terminals.....	44,515.98	77,666.63
Miscellaneous	7,631.19	7,919.62
	\$8,560,556.60	\$16,391,547.11
DEDUCTIONS:		
Rentals	91,050.78	174,479.33
Taxes	525,189.87	1,060,243.28
Operating Exp., exclusive of Maintenance.....	3,396,054.00	6,456,997.02
Maintenance Fund.....	1,026,389.42	1,967,034.43
Depreciation Fund.....	256,597.32	491,758.56
Proportion of Company's Preferentials..	3,591,000.92	6,786,447.66
	\$8,886,282.31	\$16,936,960.28
Deficit* in Company's Preferentials.....	325,725.71	545,413.17
Interest† Paid by City on Its Cost of Construction of Property Placed in Operation Plus Sinking Fund at Rate of 1 Per Cent per Annum.....	404,661.45	714,721.93
Total Deficit	730,387.16	1,260,135.10

*To be made good from future net income before payment of city's interest and Sinking Fund charges.

†Deficits in city's charges during temporary operations to be added to the cost of construction of city-owned lines.

ADDITIONS, IMPROVEMENTS AND MAINTENANCE.

Exclusive of expenditures on rapid transit lines under contracts with the City of New York (referred to above) there was expended for additions, chargeable to Capital Account, \$1,133,446.06, which are classified in detail in Table No. 3 attached.

The charges for maintenance of way and structure and of equipment were \$4,793,655.73, being an increase over similar charges for the preceding year of \$456,018.38, and exceeding the charges of any year in the history of the system. The actual expenditures were less than the charges by \$256,384.55, which amount was credited to Reserves.

Among the principal maintenance and construction expenditures during the fiscal year (other than construction expenditures on rapid transit lines referred to above) are the following:

TRACK AND STRUCTURE.

On the surface lines 83,930 feet of single track were relaid with standard 7-inch 105-lb. rail, and 96,072 feet of single track were overhauled; 154 pieces of special work were installed, repaired or renewed; 145,797 square yards of improved granite block pavement on concrete foundation were laid, and 781 square yards of wood block pavement, in addition to which the city laid at the expense of our companies 45,383 square yards of improved pavement.

A double track line consisting of 5,921 lineal feet of "T" rail construction was built in Stillwell Avenue from the West End Line, near Avenue "R" to a connection with existing tracks in Stillwell Avenue, north of New York & Coney Island Railroad.

On Hegeman Avenue, between Hopkinson and Rockaway Avenues, a double track line, comprising 1,578 lineal feet of track, was laid with 7-inch girder rail.

On New Lots Road, between Williams and New Jersey Avenues, 2,363 square yards of recut granite were installed.

The special work lay-out on Prospect Park Plaza at Ninth Avenue and Fifteenth Street was renewed, with extensive changes in alignment, etc., to accommodate the plans of the Park Department for improvement of the Plaza.

Many riveted joints of surface tracks were replaced by seam-welding process.

On the elevated lines renewals were made as follows:

51,658 lineal feet of rail,
1,425 lineal feet of steel guard rails,
35 switches,
28 frogs,
4 crossings,
16,789 ties,
39,630 lineal feet of timber guard rail, and
140,508 lineal feet of 2x6-foot walk.
22,593 lineal feet of elevated structure were repainted.

All elevated stations between St. Marks Avenue and 65th Street were given a general repair and repainting; similar work, although not so extensive, was done on the stations on the Lexington Avenue Line from Greene Avenue to Reid Avenue, on the Myrtle Avenue Line from John-

son Street to Knickerbocker Avenue, and the Broadway Line from Van Sicklen Avenue to Crescent Street.

BUILDINGS.

An extension of the shop building was constructed at Fresh Pond Road; an enlarged and improved school room for the instruction of motormen and conductors was provided in the 58th Street Car Barn, and various improvements and repairs have been made to many buildings.

POWER STATIONS AND TRANSMISSION LINES.

At Williamsburg Power Station a cinder catcher was installed in the flues for eighteen boilers located on the first floor; six underfeed stokers with their blowers and coal-handling equipment were installed, and the intake well of tunnel for condensing water was rebuilt.

At Central Power Station seven oil switch compartments were constructed, and additional switchboard and switching equipment installed for the operation of the Fourth Avenue Subway.

At Tompkins Sub-station one 3,000 K. W. Rotary Converter with its transformers, switchboard equipment and storage battery was installed, making the present capacity of the station 8,000 K. W.

At Hudson Sub-station two 2,000 K. W. Rotary Converters with their transformers and switchboard equipment were removed, and replaced with two rotaries of 4,000 K. W., making the present capacity of the station 14,000 K. W. The Rotary Converters removed were installed in the 64th Street Sub-station of the New York Municipal Railway Corporation.

The Sanford Street Sub-station of the Coney Island & Brooklyn Railroad Company, having been shut down, was dismantled and the equipment removed to Ozone Park Sub-station.

At Coney Island Sub-station one 2,000 K. W. Rotary Converter with its transformers, switchboard equipment and storage battery was installed, making the present capacity of the station 6,000 K. W.

There were removed from the system 17.91 miles of overhead D. C. feeders, and 8.95 miles of this were reinstalled in other parts of the system.

Connections were made between the high-tension cables and the conduit lines of the Coney Island & Brooklyn Railroad Company and other companies of the system, which permitted the removal from the conduit line of the Coney Island & Brooklyn Railroad Company of one 3/0 high-tension cable 14,850 feet in length. This cable was reinstalled between the Essex Sub-station and the Ozone Park Sub-station for the operation of the Liberty Avenue Extension.

High-tension cables were installed as follows:

One 350,000 C. M. Sector Cable between the Williamsburg Power Station and the Essex Sub-station—28,650 feet.

Three 350,000 C. M. Sector Cables between the Williamsburg Power Station and the Hudson Sub-station—31,026 feet.

One 350,000 C. M. Sector Cable between the Williamsburg Power Station and the Richmond Hill Sub-station—47,473 feet.

16.40 miles of underground feeders were removed, and 15.51 miles reinstalled in other parts of the system.

80.44 miles of trolley wire were renewed.

Telephone wire to the extent of 4.93 miles was removed.

2,524 trolley poles were repainted, 136 reinforced, 649 reset, 386 installed, and 297 removed.

2.15 miles of conduit lines were constructed.

EQUIPMENT.

462 complete air-brake equipments were installed on surface cars.

300 partial air-brake equipments were installed on surface double truck open passenger cars.

200 partial air-brake equipments—semi-automatic features substituted for straight air features—were installed.

617 improved geared hand brakes, supplementing air brakes, were installed.

112 pairs of new trucks have replaced a like number of old style inferior frames.

559 pairs of improved design maximum traction truck frames were installed under cars which are being equipped with air brakes.

On the surface division 21 single truck closed passenger cars, 201 double truck closed passenger cars, 509 semi-convertible cars, 250 double truck open cars, 432 convertible cars and 22 center-entrance cars were repaired and repainted.

Of the Coney Island & Brooklyn equipment 90 double truck closed cars and 86 double truck open cars were overhauled and repainted.

83 plows and sweepers were repaired.

73 service and freight cars and 945 damaged passenger cars were repaired.

300 pairs trucks were overhauled and strengthened to operate under open cars equipped with air brakes.

541 cars were equipped with wheel guard chains.

In 107 semi-convertible cars longitudinal seats were substituted for Chamberlin chairs.

On the elevated division 31 cars have been repaired and repainted and additional circuit of five lights installed; 594 motor and trailer passenger cars have been repaired and repainted; and 85 damaged passenger cars and 70 service and freight cars have been repaired.

At all machine shops machinery has been safeguarded to avoid accidents, and various additional tools have been installed.

EMPLOYEES' WELFARE WORK.

The broad program of employees' welfare, which has been under development for many years, was substantially added to during the last year. The Employees' Benefit Association, through which these activities are largely conducted, has now a membership of upwards of 8,000, of whom over 6,500 are in the operating branches, while about 1,500 are in other departments of the system.

We expended during the past year, in the maintenance and improvement of the club rooms for employees, in support of the Pension System, in medical inspection service, and in sickness and death gratuities in cases not reached by the Employees' Benefit Association, the sum of \$78,742.47.

The organization of a Brooklyn Rapid Transit Baseball League in the summer of 1914 was a distinct and very popular addition to the social diversions of the employees. The company provided all equipment, including uniforms, hired umpires and paid the ground expenses. A field day, under the auspices of the Baseball League, was attended by more than 5,000 employees and members of their families.

The system of compulsory medical inspection and free attendance for employees excused on account of illness, which was established January 1, 1913, for approximately 10,000 men in the operating department, accomplished during the past year a reduction in the amount of time lost by the operating employees on account of sickness of 13,085 days (or nearly 18 per cent) over the time lost in the year ended June 30, 1914. The milder winter of 1915 accounted for about 7,000 days of the total reduction. Making due allowance for this, however, there still remains a saving of upwards of 6,000 days' work for the year, or a reduction of 8.6 per cent over the sickness record of the year ended June 30, 1914.

The system of compulsory medical inspection was accompanied in its first year by a reduction of 24 per cent in the number of days' work lost by operating employees on account of illness, and it is gratifying to find that this initial record is still being improved upon as the activities of the Medical Inspection Bureau develop. These activities embrace not only the inspection and attendance of operating department employees reporting sick, but free medical attendance for members of the Employees' Benefit Association outside of the operating department; the care of all employees injured in the performance of their duties and entitled to medical attendance under the Compensation Act; the examination of candidates for employment and the periodic re-examination of all motormen.

A system of First Aid to the Injured has been developed to a high state of efficiency. An improved portable First Aid case with equipment for use both by an instructed layman and by a physician has been developed by the physicians of the Medical Inspection Bureau; 68 of these cases have been installed in the depots, terminals, shops and power houses of the company, and supplied to emergency and other crews required to work out on the lines. Wherever a First Aid case has been installed, a sufficient number of employees have been instructed in approved methods of First Aid to insure the presence of some qualified individual at all hours of the day or night when work is going on.

This system of First Aid to the Injured will have an important influence in minimizing the effects of injuries received by employees, particularly as it insures not only the prompt administration of First Aid, but the prompt reporting and treatment of all cases by the physicians of the Medical Inspection Bureau.

SAFETY CAMPAIGN.

On July 2, 1914, there was appointed a Central Safety Committee representing all the departments of the company in which the accident hazard is a material factor. In accordance with a plan of safety organization at that time adopted, each department set up a departmental safety organization, having as its objective the stimulation of a greater interest on the part of all employees in the problem of safety, through active participation in the study of conditions which produce accidents and in the devising of remedial measures.

The company invited all employees to report dangerous conditions and to make suggestions in the interest of safety. Meetings were held, both of committees and of departments generally, for the purpose of discussing the safety problem. So far as practicable, the investigation of accidents actually occurring was referred to the safety committees comprised largely of the rank and file. The employees demonstrated an immediate and vital interest in the safety movement, which was most encouraging. The various departmental organizations were completed during the fall of 1914. Although the period is too short to justify any general conclusions, it is at least gratifying to note that in each of the last six months boarding and alighting accidents, car collisions, accidents in which cars strike persons, and car vehicle collisions, have made a more favorable showing than in any one of the corresponding months of the previous year—and this in spite of the fact that the hazard of accident has been increased substantially by the reconstruction of several of the elevated lines and the construction of new lines, with operation over the same routes proceeding uninterrupted during the progress of the work.

The public safety campaign, conducted in co-operation with the Brooklyn Institution for Safety, was continued in the schools of Brooklyn throughout the year, with the approval of the Board of Education of the City of New York. Stereopticon and moving picture lectures were featured in the school instruction; Safety Patrols among the boys, and Careful Clubs among the girls, were organized. Safety calendars, bearing an appropriate drawing and text for each month, were supplied in the number of 9,000 for every school class room in Brooklyn; 234,000 safety stories were distributed to the school children, together with 415,000 safety buttons.

This educational work covered 159 public schools of grammar grades and below, 14 high schools, and 54 parochial schools. Sixty-eight prize competitions in essays on safety were held. In addition to the work in the schools, 104 safety lectures were delivered to adult audiences, reaching approximately 38,000 people. The attendance at lectures or moving picture performances given primarily for children, including children who may have attended more than one performance, was approximately 340,000.

During the summer of 1914, safety instruction was given in 53 playgrounds and nine summer schools in Brooklyn, and 43 motion picture performances featuring safety were given in the parks. Provision has been made for continuing safety instruction in the playgrounds throughout the present summer.

As in the previous year, the results of the safety work done in Brooklyn have been made available to public organizations and corporations engaged in similar work throughout the country, and substantial evidences of appreciation have been received from many quarters.

ACCIDENTS AND NEGLIGENCE ACTIONS.

The amount paid during the fiscal year for injuries to passengers and property aggregated \$607,700.61, or an increase of \$63,815.48. The legal expense in connection with damages was \$261,153.68, an increase of \$41,394.95. The total payments for damages, including legal expense, were 3.29 per cent of earnings. Of course, these payments represent accidents not only during the current fiscal year, but prior thereto. As a matter of fact, there were 1,333 fewer accidents on the system during the fiscal year than during the preceding year, and 139 fewer actions were brought against the companies. The number of accidents tried in the courts, however, showed an increased of 42 per cent over those tried in the preceding year.

Based upon awards approved by the State Workmen's Compensation Commission we have established reserves adequate to meet future obligations to the dependents of deceased employees.

FIRE INSURANCE.

In the year 1913 the New York Fire Insurance Exchange increased very largely the rates on the system's properties, and this action compelled the companies of the system to place their risks with London Lloyds, where a much lower rate was obtainable. In the succeeding year, however, the local Exchange offered an average rate somewhat lower than Lloyds, and about 20 points lower than the rates fixed in the preceding year, and our insurance was therefore placed with domestic companies for three years under blanket schedule. The average rate as fixed was .25387, which was afterwards reduced by reason of certain improvements made in the risks to .23388. The subsequent inclusion of the Coney Island & Brooklyn Railroad Company's properties may increase this rate slightly. Notwithstanding these low rates the companies of the system are continuing to accumulate an Insurance Reserve Fund, which, on June 30, 1915, had reached the sum of \$787,339.47, an increase of \$188,242.28 during the year. This fund, to the extent of \$736,011.20, is invested in stable securities.

CAR AND STATION ADVERTISING.

Contracts with the Inter-City Car Advertising Company having expired on April 30, 1915, and not being renewed, it was decided to under-

take this branch of business independently, and there was organized the Broadway Subway and Home Boroughs Car Advertising Company, with a capital stock of \$10,000, all of which is owned by the Brooklyn Rapid Transit Company. This advertising company, under the direction of Joseph P. Day, the well-known real estate man, as president, will conduct the car and station advertising and news and vending privileges for the various railroads of the system.

FREIGHT TRAFFIC.

During the fiscal year the freight department shows a gross revenue of \$625,769.97, an increase over the preceding year of \$128,200.81. The net revenue was \$287,355.64.

A small increase in the arbitraries allowed by the trunk lines has been obtained through the 5 per cent increase in rates authorized by the Interstate Commerce Commission.

The volume of freight has been considerably increased through the construction and excavation work incidental to the building of rapid transit lines.

The facilities of the freight department have been used by the contractors for practically all sections of the new rapid transit lines. Such transportation has not only been a convenience to the contractors, but has proved cheaper than other means of transportation, thereby lessening the contractors' cost and incidentally the cost of construction, has permitted the handling of material in much larger quantities and in less time, and has expedited the completion of the work.

There is a constant demand from manufacturers and commercial houses for side track connections in order to obtain deliveries of freight through the trolley or steam car deliveries over our lines.

INCREASE IN NUMBER OF STOCKHOLDERS.

The number of stockholders has increased by 2,514 during the fiscal year—the total number on June 9, 1915, being 8,833.

RESERVE ACCOUNTS.

There has been added to Reserves during the year the following:

Insurance	\$188,242.28
Amortization of Capital.....	256,384.55
Employers' Liability.....	34,995.85

\$479,622.68

but retired property adjustments chargeable to these Reserves—

aggregating

\$390,217.37

have reduced the year's gain in Reserves to.....

\$89,405.31

BROOKLYN RAPID TRANSIT REFUNDING MORTGAGE FOUR PER CENT. BONDS.

Authenticated to July 1, 1914..... \$51,792,000.00

Authenticated during year..... 3,269,000.00

\$55,061,000.00

Converted into stock..... 29,619,000.00

Net Authenticated and Outstanding..... \$25,442,000.00

In Hands of the Public..... \$3,459,000.00

In Possession of the B. R. T. System..... 21,983,000.00

As follows:

*Collateral to \$40,000,000.00 6 yr. 5 per cent. Notes	\$10,000,000.00
Collateral to Bills Payable.....	4,876,000.00
In Treasury B. R. T.....	5,096,000.00
In Treasury N. E. R. R.....	1,046,000.00
Deposited with City of New York by The N. E. R. R. Co.....	15,000.00
Deposited with Trustee of The Nassau Electric Railroad Consolidated Mortgage.	700,000.00
Guaranty Fund Brooklyn City Railroad Lease	250,000.00
	\$21,983,000.00

Detailed statements of operation, statistics and consolidated balance sheet are appended hereto.

Respectfully submitted by order of the Board of Directors,
T. S. WILLIAMS,
President.

*\$301,000 par value of these notes have been converted into New York Municipal Railway Corporation's five per cent. first mortgage bonds, as permitted, prior to January 1, 1916, by the terms of the trust agreement.

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WE GUARANTEE, that of this issue 8,650 copies were printed; that of these 8,650 copies 7,360 were mailed to regular paid subscribers to the weekly edition, 172 were provided for counter and news companies' sales, 972 were mailed to advertisers, exchanges and correspondents, and 146 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 303,650, an average of 9,201 copies a week.

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is pleading ignorance or is trying to throw the blame on some other person he knows that he is raising a false issue. In other words, conscience is an important element in discipline. The superintendent or other superior officer who succeeds in getting the co-operation of the conscience of a delinquent or untrained employe has taken the best possible means of leading that employe toward the highest efficiency of which he is capable. "One hundred per cent is the mark to be attained," says Mr. Porter. Everybody agrees to this, in words. To exemplify it in acts often requires the most strenuous effort on the part of all concerned—energetic team work. And success in team work is greatly promoted when every individual puts aside all pretense, makes no claim to 100 per cent when he knows that the right figure is 90, and frankly estimates his own work on exactly the same basis that the superintendent estimates it. This is the way to cultivate high ideals; and high ideals—of our own, not those of the general manager, or of the safety-first committee—are essential to real proficiency.

The employment of women as ticket sellers is not a new thing, especially at small stations, but the Oregon-Washington Railroad

Women as Ticket Sellers

& Navigation Company has taken a new departure in employing women in large city ticket offices, one each in four offices. Here they will be required, not merely

to hand out a 15-mile card ticket now and then to a farmer, but will have to keep themselves posted in all the intricate details of the passenger traffic department. The general passenger agent's announcement says that his purpose in these appointments was to smooth the way for women customers. Possibly also by working with the women the men clerks will become more proficient in making things pleasant for all customers. Encouraging employees to learn from other employees who are of different temperament is a neglected element in railroad discipline. Men in city ticket offices already stand (or should stand) at the head of the class in courtesy; but the best of us can improve, of course. Copying the best habits of our fellows is a rule which can be applied in all departments. According to the Knoxville *Sentinel*, President Fairfax Harrison, of the Southern Railway, at a big employees' meeting in Knoxville, recently, in urging all employees to aspire to the most honorable records, mentioned by name, as worthy of emulation, a conductor and an engineman who had been among the speakers at the meeting. Why is not this a good idea? An employee who is thus made prominent may have conspicuous faults; most of us have a bunch of them. But the point is that good habits and actions are worthy of imitation, notwithstanding.

The description of a bridge to be built by the Chicago, Burlington & Quincy at Kansas City, published on another page of this issue, is of particular interest because of the use of high elastic limit alloy steel in a structure of moderate size. The specifications for the metal follow very closely those used for the Metropolis bridge of

Alloy Steel in Railroad Bridges

the same road over the Ohio river, a structure involving four spans more than 500 ft. in length and one 723 ft. long, the longest simple span in the world. In this structure, as well as any others which have unusually long spans, the dead loading becomes a very serious problem. The weight of the truss members becomes such a large proportion of the total load that any reduction of the sectional areas to effect a corresponding reduction in the weight is highly desirable. This has led to the use of the harder, stronger alloy steels, the additional cost of manufacture and fabrication resulting from the increased hardness being more than compensated for by the saving in weight. These special steels have been specified for a number of other bridges under construction at the present time, among which may be mentioned those at Memphis, Quebec and Hell Gate. Nickel steel has been most commonly used, although a high carbon steel is being used in the Hell Gate arch and silicon steel has been

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GENERAL NEWS SECTION.....

*Illustrated.

"Every employee competent to hold his job three months knows when his work is 100 per cent." These words, in a brief

Striving for

100 Per Cent.

paper by B. A. Porter, superintendent of the Memphis division of the Yazoo & Mississippi Valley, from which an extract is printed in another column, contain an important truth which is often lost sight of. Its corollary is that the negligent or wrong-headed employee knows his fault, or his breach of loyalty, or his failure to do as well as he knew how; and that in most cases when he

specified for the riveted members of the Metropolis and Kansas City bridges. While these structures collectively represent a large tonnage, when compared with the total weight of all structural steel being fabricated, the percentage of the special steel used is still very small. At the present time any contract for a bridge involving the use of hard steel creates a special problem for the fabricating shop, requiring special equipment and increased supervision. It will be interesting to watch the extent to which future developments in the use of these harder steels will reduce the difference between the actual costs of the fabricated structures of hard and soft steel and permit the use of these special materials for spans shorter than have heretofore been assumed to be economical.

STEAMSHIP AND RAILWAY ACCIDENTS

ACCIDENTS on the railways of the United States are too numerous, but when something suggests comparison between their accident record and the records of other classes of concerns in this country the record of the railways is seldom found to be so bad relatively as most people think. When the lake steamship Eastland turned over in the Chicago river recently about 1,000 passengers were drowned. Never in their history did all the railways of the United States together kill that many passengers in all ways in a year. In only two years of the last ten has the federal inspection service compiled the statistics of steamship accidents so as to show separately the number of fatalities to passengers. These were 1906 and 1914. In 1906 American steamships carried 330,235,959 passengers, of whom 323 were killed in accidents, or 1 in 1,022,000. In the same year the railways carried 797,946,116 passengers, of whom 359 were killed, or 1 in 2,222,000. The railways killed less than one-half as many passengers in proportion as the steamships. In 1914 the steamships carried 318,094,317 passengers, of whom 105 were killed, or 1 in 3,029,000. In the same year the railways carried 1,053,138,718 passengers, of whom 265 were killed, or 1 in 3,978,000. Here again the railways were relatively the safer.

These statistics relate only to "disasters" to vessels, which really should be compared with train accidents. In 1906 the railways killed only 146 passengers in train accidents, or 1 in 5,465,000, and in 1914, only 85, or 1 in 12,390,000. The risk of a passenger being killed in a train accident is several times less than the risk of his being killed in a vessel disaster. The total number of passengers carried by the steamships in the 10 years 1905-1914, inclusive, was 3,388,654,368, and the total number of both passengers and members of crews killed was 3,972. The total number of passengers carried by the railways was 9,252,160,740, and the total passengers and employees killed was 8,832. The steamships carried only 36.6 per cent as many passengers, and killed 44.7 per cent as many passengers and employees as the railways. It is not pretended that these statistics are strictly comparable. In view, however, of the fact that it appears to be commonly assumed that travel by water is safer in this country than travel by rail, they are interesting.

It should also be considered in this connection that steamships have been supposed to be subjected to the strictest regulation in the interest of safety by the federal government. Since government regulation cannot prevent such steamship disasters as the General Slocum and the Eastland catastrophes, it is evident that the confidence of the public that it will greatly improve the operation of railways and other concerns is based on hope rather than on experience. There are still to be found people who can observe and remember, and who are therefore about as willing to trust their lives and limbs to such private greed as was manifested by the owners and managers of the Eastland as to government bureaucratism, red tape and general inefficiency.

Our governments need improvement fully as much as the business concerns they are so busy instructing in the ways of virtue and efficiency.

OUR INEFFICIENT GOVERNMENTS

IN political matters the members of the great American democracy are supposed to be the wisest people in the world. There are certain things about government, however, which they have never learned and show very little disposition to learn. Among these are that the quality of government and the benefits it confers on the public depend only slightly on the number of laws passed, and very largely, indeed, on the kind of laws passed and on the efficiency with which they are administered and enforced; and that the kind of laws passed and the way they are administered and enforced depend mainly on the organization of the government and the efficiency of its personnel.

The fact that the American people have never learned, or at least have never acted in accordance with these important principles, is forcibly impressed on the mind by some event every day. One recent event which should have called it to the attention of everybody was the sinking of the steamship Eastland in the Chicago River, and the consequent drowning of about 900 people. Federal legislation has provided for the regulation and inspection of steamships in the interest of public safety. It has created a bureau, which is now a part of the Department of Commerce, for the performance of these functions. The public has assumed that the legislation is adequate and the bureau efficient. But although the law applied to the Eastland, and it had been inspected by the bureau repeatedly over a long period of years, the boat actually turned over in 20 feet of water while still tied up at her dock.

Those responsible for the administration of the law now say that it is, and always has been, inadequate in that it does not provide for testing the stability of vessels. It is perfectly evident that either the law is inadequate or that its administration has been inefficient. But for the steamship inspection service to say that the law is inadequate or even to demonstrate that this is the case, is not to exculpate the government, but merely to "pass the buck" from one branch of the government to another; from the administrative department to the legislative. If the law is inadequate this is due to the inefficiency of Congress as a law-making body. If it is adequate the failure to so administer it as to prevent this catastrophe was due to the inefficiency of the steamship inspection service. And a pertinent question suggests itself here. If the law is and always has been lame in such an important particular, the steamship inspection bureau ought to have known it. If it knew it, it should have brought the matter to the attention of Congress and recommended a needed amendment. Where is the evidence that it did this? It has not been forthcoming.

There is constant agitation for increases in the functions of government. This agitation is directed especially to making the intervention of the government in industrial and economic affairs more energetic and pervasive. There are abuses in the railway and other lines of business, and people leap from the premise that these abuses exist to the conclusion that government regulation will improve conditions. But there is a hiatus in their logic, as is easily shown by putting it into syllogistic form. Their reasoning put into this form is as follows:

Major premise: There are abuses in business and evil industrial and social conditions result.

Minor premise: The government is competent by means of regulation to remove these abuses and remedy these bad conditions.

Conclusion: Therefore, the government should regulate business.

The major premise is inassailable. But the conclusion does not truly follow from it because the minor premise is fallacious. It is not that government as we have it, and always have had, is competent to regulate business. In almost every case where it has attempted to do so it has shown its incompetency. Based on past experience we ought to make the minor premise read: The government is incompetent by means of regulation to remove these abuses and remedy these bad conditions. We should then come

nearer stating the facts, and the conclusion at which we should arrive would be entirely different.

The science which deals with the subject of economics formerly was called "political economy." It is now usually called "economics." We need to return to the old phraseology for both theoretical and practical reasons. In our analysis of and in our action regarding all matters falling under this general head, we need to recognize the fact that the effect which will be produced by the intervention of government in business affairs depends not only on the conditions in business, but also on the fitness of the government to deal with those conditions. Its fitness, in turn, depends on its organization and its personnel. Our governments have thus far shown themselves incompetent to regulate business in the interest of the public, because in honesty and disinterestedness of purpose they are not superior, and in organization and personnel they are far inferior to the business concerns which they are regulating.

We have had much agitation, not only for increasing the interference of government with business, but even for government ownership and operation of many kinds of concerns. When shall we have an honest, energetic and widespread movement for making our governments competent to perform the functions they already have? Raising them to this plane of efficiency is absolutely prerequisite to raising them to the still higher plane of efficiency where they will be fit to perform large and important additional functions. The advocates as well as the opponents of further increases of government functions ought to be able to unite in such a movement; for by far the strongest argument at present against further increases of government functions is the almost imbecile inefficiency which most of our governments display in most of the things that they now undertake.

THE DIVISION OF RAILWAY INCOME

THE complaint is heard constantly from social reformers, politicians and representatives of organized labor that labor does not receive in wages its fair share of the product of industry or of the increase of that product. Just what is labor's fair share has never been theoretically determined by anybody except the socialists, who claim that it creates all wealth, and therefore should have it all. As a practical matter, the facts show both that labor receives a very much larger part of the product of industry than capital, and that the part it receives is increasing in proportion.

We publish elsewhere a very interesting letter from W. A. Worthington on this subject. He calls attention to a recent report of the National Civic Federation showing that at the present time labor is receiving practically two-thirds of the product of manufacturing industries and capital one-third. He then analyzes the distribution of that part of railway income which is divisible between capital and labor. He finds that of this divisible income labor, in 1904, received 58.73 per cent, and in 1914, 66.01 per cent, while capital in the former year received 41.27 per cent, and in 1914 only 33.96 per cent. Of the increase of the divisible income between 1904 and 1914, labor received \$555,823,662, or four-fifths, and capital \$131,593,690, or one-fifth. The increase in the part of the divisible income going to the railways is shown to have been sufficient to pay a return of only 2.43 per cent on the increase in their investment in road and equipment.

This last figure raises the serious question whether labor did not receive too much of the increase in the divisible income, or what comes to the same thing, whether capital did not receive too little. The increase in the investment of capital is what creates the increase in the demand for labor; and, if capital, when invested in any business, is not adequately remunerated, it will cease to be invested in that business, and thereby the increase in the demand for labor in that business will be arrested. To a certain extent this is what has been happening in the railway industry. The decrease in the reward of

capital invested in railways has caused a marked reduction in recent years in the amount it invested; and in consequence the number of men employed on railways is no larger now than it was eight years ago.

Increases in wages are an unmixed blessing to labor only when they do not encroach on a reasonable return to capital. When they begin to do that, as they already have done in the railway business, they cause periods of retrenchment and of slowing down in the rate of investment which throw men out of employment, thereby nullifying the advantages derived by labor from the advances in its wages.

AN OBSTACLE TO JUST PROMOTION

THE promotion of employees or the selection of candidates for subordinate executive positions becomes a difficult problem whenever an organization assumes such proportions that the individual directly responsible for results cannot know personally the rank and file. It is all the more difficult in a complex organization, such as that of a railroad, and the situation is much the same with all large corporations. This matter has been discussed frequently, but there is one obstacle to the selection of men for promotion which apparently has never been squarely met. Whether or not any system of credits or personal records is in use, the executive responsible for the promotion of men is dependent upon the immediate superiors of the candidates for promotion for the data upon which to base his decisions. This being the case it is well to consider whether the interests of the company always coincide with those of the immediate superior when the promotion of a subordinate is under consideration, and whether under such circumstances the recommendations or reports of the officer may be influenced by his own interests in the matter.

It is frequently said that a man who becomes a successful station agent in a given town is destined to remain there for the rest of his life, for, having once established himself in the good graces of the community, the interests of the company might suffer should another man replace him, in the event of his promotion to a larger or more important station. In a similar manner we find that the department head suffers no little inconvenience from any change in his organization, a result which he feels more keenly when an assistant is taken out of his department. In other words, he finds every inducement to keep his assistants in their respective positions as long as possible, particularly when he cannot advance them in his own department. Furthermore, his superior officer may be of such a disposition that he may feel he does not dare give him a personal knowledge of his subordinates for fear that his department will be disrupted by the superior officer dealing with the subordinates directly. Many an unfortunate man has been put in this intolerable situation.

On the other hand, it frequently happens that a man has outgrown his job, and is having his "light hidden under a bushel" simply because his superior is not as big a man as he is, and he cannot be moved up until his superior is eliminated. How, then, are we to make it to the interest of the superior to call special attention to a subordinate who is possessed of such qualifications as to justify advancement faster than his boss? In the first place, the integrity of the organization must be maintained. No matter how capable the subordinate may be, until such time as he is actually promoted he should not be favored by attention or clothed in authority which would be a source of embarrassment to his superior. Further than this, every effort should be made to avoid humiliating the man over whose head he is advanced. In fact, special attention should be drawn to the credit due him for having developed and trained the man promoted. The importance of this subject justifies a serious study of a method of proper reward for those men who have shown an interest and an aptitude in the development of the workers under them.

LEHIGH VALLEY

THE Lehigh Valley operates 1,442 miles of road, of which 595 is double track. The Lehigh Valley Railroad Company owns directly but 317 miles, 99 of this being the main line from Phillipsburg, N. J., to Wilkes-Barre, Pa. It owns, in addition, the entire capital stock of the Lehigh Valley Railroad Company of New Jersey; the Pennsylvania & New York Canal Company, and the Lehigh Valley Railway Company, whose main lines with its own give it a route from Buffalo to New York, 446 miles in length. It also operates the Lehigh & New York, having an aggregate mileage of 115, under lease. The company traverses the anthracite coal regions of Pennsylvania and no less than 45 per cent. of its total operating revenues in the year just closed were derived from the carrying of coal and coke.

In the fiscal year ending June 30, 1915, the road's total operating revenues were \$42,526,000, or \$355,000 more than in 1914, there having been an increase of \$668,000 in coal freight revenue, an increase of \$464,000 from other freight, but a decrease of \$751,000 in revenue from the carrying of passengers. Operating expenses totaled \$29,947,000, a decrease of \$141,000 from 1914, there having

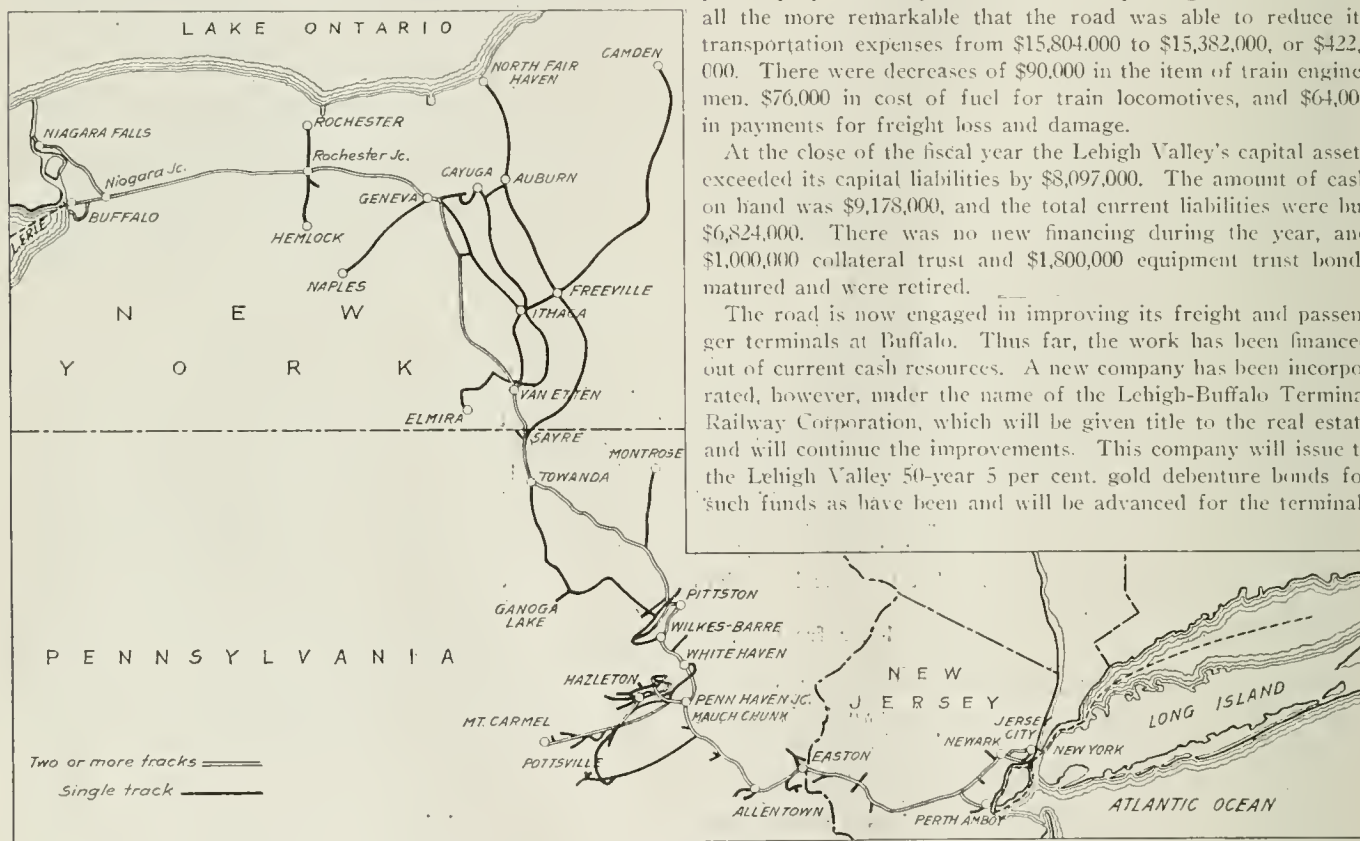
increase of 495,000 tons, or 1.66 per cent over 1914. Of the total tonnage carried, 14,603,000, or nearly one-half, was anthracite coal, there having been an increase in this commodity of 1,038,000 tons. The total ton mileage was 5,326,329,000, an increase of 2.70 per cent. The revenue per ton per mile was .661 cents, as compared with .657 cents in 1914. The ton mileage per mile of road was 3,690,000, an increase of 2.45 per cent, and the freight revenue per mile of road was \$24,386 as against \$23,660 in 1914, an increase of 3.07 per cent. There was but a slight change in the average train load, it being 621 tons.

The passenger revenue in the year just closed was \$4,044,000, or 15.67 per cent less than in 1914. This drop is attributed to the general depression and to the reduced immigrant traffic, of which the Lehigh Valley has received a large share. There were decreases not only in the number of passengers carried, but in the average journey and the average revenue per passenger. The passenger train revenue per mile of road was \$2,801, as compared with \$3,330 in 1914.

In view of the fact that there was an increase in freight traffic and that it is exceedingly difficult to decrease passenger train expenses proportionately to a decrease in passenger business, it is all the more remarkable that the road was able to reduce its transportation expenses from \$15,804,000 to \$15,382,000, or \$422,000. There were decreases of \$90,000 in the item of train engines, \$76,000 in cost of fuel for train locomotives, and \$64,000 in payments for freight loss and damage.

At the close of the fiscal year the Lehigh Valley's capital assets exceeded its capital liabilities by \$8,097,000. The amount of cash on hand was \$9,178,000, and the total current liabilities were but \$6,824,000. There was no new financing during the year, and \$1,000,000 collateral trust and \$1,800,000 equipment trust bonds matured and were retired.

The road is now engaged in improving its freight and passenger terminals at Buffalo. Thus far, the work has been financed out of current cash resources. A new company has been incorporated, however, under the name of the Lehigh-Buffalo Terminal Railway Corporation, which will be given title to the real estate and will continue the improvements. This company will issue to the Lehigh Valley 50-year 5 per cent. gold debenture bonds for such funds as have been and will be advanced for the terminals



The Lehigh Valley

been an increase of \$538,000 in maintenance of equipment expenses and decreases of \$191,000 and \$424,000 in maintenance of way and structures and in transportation expenses, respectively. The operating income for the year was \$10,875,000, an increase of \$451,000 over 1914. Other income, however, decreased no less than \$1,074,000 and was \$1,942,000. This was the result of a reduction in hire of equipment from a credit balance of \$325,000 to a debit balance of \$69,000, a decrease of \$394,000, and a decrease of \$528,000 in dividend income brought about by the inclusion of the Temple Iron Company's dividend of \$685,080 in the 1914 figures. This decrease was reflected in the net income, which was \$6,322,000, or \$734,000 less than in the previous year. The net income, nevertheless, was sufficient to pay the usual 10 per cent dividends, amounting to \$6,060,800, and there was merely a slight decrease in the credit balance of the profit and loss account from \$23,899,000 on June 30, 1914, to \$23,693,000 on June 30, 1915.

In 1915 the total tonnage of revenue freight was 30,269,000, an

and the bonds will be kept in the Lehigh Valley's treasury. Application is now pending before the New York Public Service Commission, Second District, for permission to issue these bonds. The improvements at Buffalo include a new passenger station, the construction of which was recently begun, a new freight station, which, it is expected, will be completed by November 1, and a new steel and concrete coal dock, having a capacity of 500 cars in 10 hours, which will be ready shortly.

The Lehigh Valley has been considered fortunate in the matter of terminals in New York harbor. It is now building a new 1,060 ft. dock, equipped with modern ore handling machinery, at Constable Hook, near Bayonne, N. J., on New York Bay. This dock will be completed early next year and will be in a position to receive foreign ores from vessels of 35-ft. draft for furnaces at South Bethlehem and other places in the Lehigh valley region. It also has under construction a new 730-ft. concrete and steel pier at the foot of Rector street, on the North river front of

Manhattan, which, when completed, will be one of the best railroad piers on the island. A two-story pier will be built at Pier 44, on the East river, primarily for handling flour. The company is also building a new hay pier at 149th street, and has leased all of Pier 5, Wallabout, Brooklyn, instead of one-quarter of it as formerly. These improvements will strengthen the Lehigh Valley in New York considerably.

The Lehigh Valley Coal Company, the entire stock of which is owned by the railroad, had a net income in the fiscal year just closed, from all sources after deducting charges for royalties, sinking funds, depreciation of property and interest of \$1,023,000, an increase of \$458,000 over 1914. It and its tenants mined 8,089,000 tons of anthracite coal, and 258,000 tons of bituminous. The company paid no dividends, but increased its surplus from \$4,226,000 on June 30, 1914, to \$5,108,000 on June 30, 1915.

The following table shows the principal figures for the operation of the railroad company in 1915 as compared with 1914:

	1915	1914
Mileage operated.....	1,444	1,444
Coal freight revenue.....	\$19,195,756	\$18,528,246
Merchandise freight revenue.....	16,005,501	15,541,886
Passenger revenue.....	4,043,799	4,795,147
Total operating revenue.....	42,525,962	42,170,647
Maintenance of way and structures.....	4,483,925	4,674,725
Maintenance of equipment.....	8,207,491	7,669,793
Traffic expenses.....	950,830	1,040,594
Transportation expenses.....	15,382,187	15,804,059
General expenses.....	913,955	898,734
Total operating expenses.....	29,947,388	30,087,905
Taxes.....	1,680,109	1,659,281
Operating income.....	10,874,683	10,423,461
Gross corporate income.....	12,816,895	13,440,150
Net corporate income.....	6,322,445	7,056,660
Dividends.....	6,060,800	6,060,800
Surplus.....	261,645	995,860

NEW BOOKS

The North Eastern Railway, Its Rise and Development; by W. E. Tomlinson. 820 pages, 246 illustrations, 7 in. by 10 in. Bound in cloth. Published by Andrew Reid & Co., Ltd., and Longmans, Green & Co., London. Price \$7.50.

This is an exhaustive history of the various stages of the development of what is now the North Eastern Railway of England, which is especially interesting because one of its component parts was the Stockton & Darlington Railway, the first railway operated with steam locomotives in the world. It thus constitutes in a measure an epitome of railway progress, inasmuch as it affords an opportunity of following within the limits of a single railway system every step in the evolution of transportation by rail, from the horse-drawn coaches and trucks which were run over the wagon-ways prior to 1825, to the electrically operated trains of the present day, for the North Eastern still retains as an integral part of its system portions of some of the early wagon-ways that were used for the transportation of coal.

The plan of the work embraces a brief account of the work done on the early wagon-ways previous to the projection of the Stockton & Darlington, in the days of the experimental period of rail transportation, a chapter on early canal projects in the north of England, a history of the lines amalgamated in 1854 to form the North Eastern Railway and of the early lines which were afterwards absorbed by it, and a history of the North Eastern itself during the first 50 years of its existence, with an appendix giving a short summary of events from 1904 to 1914.

A considerable amount of space is devoted to the early history of the Stockton & Darlington, the early records of which, although this railway is the oldest in the world, the author says are practically complete.

In the preparation of the work the author has had access to special and official sources of information and he has thus been able to present a wealth of interesting detail on the various vicissitudes of early railway planning and building, as well as on the more modern development. Special features are the descriptions of the equipment and methods of operation at different periods, as well as of objects of engineering interest. The 246 illustrations, including maps, diagrams, portraits and views showing the engineering features of the older railways, are unusually interesting and represent a long and patient search, many of them being reproductions of rare prints. The book should be of very great value to all students of railway history.

Letters to the Editor

CREDIT MARKS FOR FREIGHT TRAIN MEN

CLEVELAND, Ohio.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The comment of "H. S. M." in your issue of June 25, on the method of recognizing efficient movement of train crews, that has been adopted by Mr. Lechlides, superintendent of the Baltimore & Ohio, is answered by the statement that the system does, in fact, give recognition to men whose records do not need "clearing up."

Indeed, this is one of the most encouraging features. The men are encouraged to preserve these records, or personal letters that are sent out by Mr. Lechlides for the express purpose of preventing a demerit record. Something will happen, which, on its face seems to indicate that discipline should be administered; or there may be a case of honest doubt; this system makes it unnecessary to leave the decision to hit or miss. The employee has the documents showing that in previous cases, at least, he has acted in the best interest of the company's welfare. This is something more substantial than a book entry.

Railroad men do take pleasure in performing their duties in conformity to the rules and standards of their employers. A clear record is an employee's best friend.

C. H. LEE.

PHILADELPHIA, Pa.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Your correspondent, "H. S. M.," evidently does not know to what extent the "credit" system is used on a number of railways. On the Baltimore & Ohio credit marks are given for any unusually meritorious service. On the Philadelphia Division we have recently started a practice of making credit entry on the record of the engineer who gets the best results as to time and tonnage, i. e., those who produce the largest number of ton miles per hour. Consideration, of course, is given to different conditions prevailing in different kinds of service. * * * *

P. C. ALLEN,

Superintendent, Philadelphia Division.

AN AMERICAN FIREMAN IN FRANCE

PARIS, France.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The arbitration of the enginemen's and firemen's demands in America has interested me greatly. As you say, their principal argument is that their earning power has increased because of the greater efficiency of the locomotives, but I wonder if they would have refrained from asking an advance in wages if their productive power had not increased because many ancient locomotives had been kept in service, and comparatively few modern ones added, as is the case on the Continent?

I am now engaged in firing on the French State Railways. A comparison of the working arrangements and wages in France and the far better working conditions in the United States may be of interest. To begin with, there is no overtime in France, nor is there any 16-hour law. An engineman might be on duty 24 hours; he would have to remain on duty until he had finished his run, and he would not receive a cent of overtime. Payment in road service is by distance, and in switching service by the day of 12 hours, two hours being allowed for the mid-day meal. Coal premiums, figured on a ton mile an hour basis, are paid to engineers and firemen. Fines are imposed for losing time if the crew is to blame, and a bonus is paid for making up time. Nearly all freight trains, including extras, are run on schedules. Engineers of fast expresses make (including premiums) up to 600 francs (\$120) a month, and firemen up to 300 francs (\$60), but their work is double that in the United States. For example, divisions up to 150 miles are doubled every day, the men frequently being on duty 13 to 14 hours. One day off in every 10 is given in any class of service.

The fireman has to clean the fire. At the end of the run

he has to clean out the smokebox, where two barrels of cinders usually collect, clean out the ash pan, which is flat and not self-cleaning like those in America, fill the sandbox (the sand usually has to be carried in buckets from the sand-house), and clean the entire engine, including the polished steel motion work, but not the wheels. The tender is not cleaned and the contrast of a clean engine and dirty tender is peculiar. Inside motion (most of locomotives being of the four-cylinder type) is not cleaned, with the result that the engineer gets a nice oil, grease and dirt bath when oiling. The fireman has to spend fully an hour after coming in to fix up the engine, and it is evident that on a French engine he is the man behind the gun.

There are other things that might be mentioned, such as the poor protection afforded by cabs, the lack of seats and the bad arrangement of cab fittings. Arrangement is a misnomer—the fittings were never arranged—they just happened that way. The tenders are also very poorly arranged, and 75 per cent of the coal must be shoveled forward. A large number of the engines, including particularly those in freight and switching service, are old, having been built in the 'sixties, 'seventies and 'eighties, and have no other brake on the engine than the Le Chatelier water brake, and on the tender only a hand brake, which the fireman has to operate.

Other inconveniences could be mentioned, but these will suffice to show how splendid American working conditions are as compared with those here.

A peculiar arrangement here is that whereby, after 25 years' service, employees are retired on a pension of 1,500 francs (\$300) a year. This takes them away when they are at their best for railway work, and it makes one wonder what an active man of 45 or 50 would do with himself when released from service.

W. G. LANDON.

DIVISION OF RAILWAY INCOME BETWEEN CAPITAL AND LABOR

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The National Civic Federation has recently made public a preliminary report of its committee on the division of the people's income, which effectually controverts the assertion frequently made that labor is receiving an insufficient share of the product of industry and particularly of the increment in such product. The committee's report reaches the general conclusion that labor is receiving an increasing proportion of the product

all operating expenses, excepting labor, and all taxes, the amount remaining being the sum paid for labor, and the sum left for capital applicable to interest on bonds or other debt, dividends, improving property out of income, depreciation, which may not be included in operating expenses, other miscellaneous expenses, and surplus.

The accompanying table shows these results for the fiscal year ending June 30, 1914, as compared with 1904, also the changes which have taken place during this ten-year period. From these statistics the following conclusions may be drawn:

1. Of the divisible railway income labor is now receiving 66.04 per cent., whereas ten years ago it received 58.73 per cent. Capital is receiving for itself and for the other purposes mentioned only 33.96 per cent., as compared with 41.27 per cent. received ten years previously.

2. The return to capital last mentioned represents only 4.17 per cent. upon the railway investment in 1914, whereas this return was 4.99 per cent. in 1904.

3. Comparing 1914 with 1904, there was an increase of \$687,417,352 in railway income available for paying labor and for capital purposes. Of this amount \$555,823,662, or 80.86 per cent. was paid to labor, and only \$131,593,690, or 19.14 per cent. of the total remained for capital purposes. This shows that of the increment in divisible net income during the ten years, labor received four-fifths and capital only one-fifth. As compared with the latter the investment in road and equipment increased \$5,425,160,709, the increment available for capital purposes being only 2.43 per cent. upon the increased investment.

4. As compared with this inadequate return to capital it will be noted that the increase of \$555,823,662, or 67.98 per cent. in payments to labor was accompanied by an increase of only \$399,362, or 30.81 per cent. in the number of employes on June 30. This number may not correctly represent the average number of employes during the entire year, but it is a sufficient indication of the very large increase of payments to labor per individual.

5. Whilst returns to capital were greatly reduced through the necessity of larger proportionate return to labor, they were further reduced by the increased share given to the government as taxes, which increased \$78,835,221, or 127.78 per cent.

6. The statement shows that public services rendered by the railways increased during the ten-year period 60.83 per cent. as to passenger service, and 65.21 per cent. as to freight service, for

	—Year Ending June 30.—		—Increase, 1914 over 1904.—	
	1914.	1904.	Total.	Per cent.
1. Operating revenue	\$3,047,019,908	\$1,975,174,091	\$1,071,845,817	54.27
DEDUCTIONS.				
2. Operating expenses, except wages.....	\$826,890,687	\$521,297,443	\$305,593,244	58.62
3. Taxes	\$140,531,575	\$61,696,354	\$78,835,221	127.78
4. Total deductions for items 2 and 3.....	\$967,422,262	\$582,993,797	\$384,428,465	65.94
5. Net revenue available for wages and other purposes.....	\$2,079,597,646	\$1,392,180,294	\$687,417,352	49.38
DISTRIBUTION OF ITEM 5.				
6. Expended for wages to labor.....	\$1,373,422,472	\$817,598,810	\$555,823,662	67.98
7. Remaining for return on investment of capital, depreciation of road, miscellaneous items, and for improving property out of income.....	\$706,175,174	\$574,581,484	\$131,593,690	22.90
8. Percentage of net income paid to labor.....	66.04%	58.73%	7.31%	12.45
9. Percentage of net income for capital and other purposes.....	33.96%	41.27%	d 7.31%	d 17.71
10. Investment in road and equipment.....	\$16,936,697,840	\$11,511,537,131	\$5,425,160,709	47.13
11. Ratio of net available for capital, improvements, etc., to railway investment	4.17%	4.99%	d 0.82%	d 16.43
12. Number of railway employes on June 30.....	1,695,483	1,296,121	399,362	30.81
13. Mileage of railway operated.....	247,398	212,243	35,155	16.56
14. Public serv. perf. by rys.—number of passengers carried one mile.....	35,258,497,509	21,923,213,536	13,335,283,973	60.83
15. Public serv. perf. by rys.—number tons freight carried one mile.....	288,319,890,210	174,522,089,577	113,797,800,633	65.21
Authorities:—1904 I. C. C. Statistics of Railways of United States.				
1914 I. C. C. Press Bulletin of March 31, 1915, on 1914				

Railway Statistics.

(d) Represents a decrease.

of industry, and that at the present time practically two-thirds of the product of manufacturing industries go to labor and one-third to capital.

In this connection, for the purpose of comparison, an interesting study may be made of the distribution of the net railway income to labor and capital, bearing in mind that railway operation requires an extremely large investment of capital for fixed plant and equipment in proportion to the income received.

From the statistics of railways of the United States, published by the Interstate Commerce Commission, this may be ascertained by first deducting from the gross operating revenue

which the railways received 54.27 per cent. additional gross revenue, paid out 58.62 per cent. more for operating expenses, other than wages, but paid in wages 67.98 per cent. more, and for taxes 127.78 per cent. more, the result of the undue increase in the latter items being to reduce the increased return for capital purposes to an increase of only 22.90 per cent. This is much less than the railways had a reasonable right to expect, and is entirely inadequate to reimburse them for the increase of 47.13 per cent. in investment in road and equipment.

W. A. WORTHINGTON.

Vice-President and Assistant to Chairman Southern Pacific Company.

Underground Cable on the Pennsylvania Railroad*

Railroad Telegraph and Signal Wires Absolutely Protected from the Storms for a Distance of Twenty Miles

By I. C. FORSHEE

Electrical Engineer, Telegraph Department

The Pennsylvania Railroad has this year completed an underground cable installation, including the telephone, telegraph and signal cables, on the New York Division, from Jersey City, where the division offices are located, to Rahway, a suburban point about twenty miles west on the main line toward Philadelphia. This important improvement was decided on after the very severe sleet and wind storm on that division in March, 1914, extending over a distance of seventy miles. This was not the first severe sleet storm which had given impetus to the underground movement, as the memory of the very disastrous storm during the inauguration of President Taft in 1909 was still fresh in the minds of all the officers interested in passenger train movements, and the importance of having at such times reliable telephone or telegraph communications, as well as an operating signal system, played its part in the decision in favor of an underground system.

REASONS FOR UNDERGROUND CABLE.

The following are factors considered in favor of this type of construction:

- (1) Importance of continuous wire service, including train

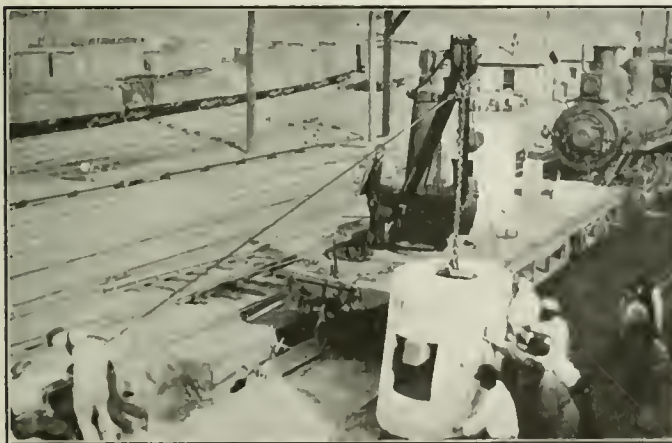


Fig. 1—Monolithic Concrete Manhole

despatching, block, message and way station telephone and telegraph circuits and automatic block signal circuits.

- (2) Freedom from sleet, wind and lightning.
- (3) Improvement in the appearance of the right of way.
- (4) Absence of poles in congested yards, where clearances are small.
- (5) Freedom from interruptions to traffic due to broken poles and wires falling across the track.
- (6) No danger that failures will cause crosses with high tension crossings; freedom from this hazard to property and life.
- (7) Not subject to troubles from induction caused by parallel high tension A. C. power circuits to as great an extent as overhead lines.
- (8) Less liable to interruption in the event of derailments.

IMPORTANCE OF SERVICE

The importance of communication with New York and Jersey City from Trenton and Philadelphia may be understood when one considers that the general offices of the company are located at Philadelphia, company shops and an important transfer point at Trenton, the New York Division offices at Jersey City, and the

Manhattan Division offices at New York. The telephone and telegraph circuits are owned and operated by the railroad company, but there are also Postal Telegraph wires on the line.

There is a total of 250 passenger trains and 150 freight trains each week day over the section between Jersey City, New York and Rahway, and frequently 3,500 messages are sent over the wires in a day between Philadelphia, New York and Jersey City alone, not counting way-station business. Over the section between Jersey City and Summit Avenue (two miles), including the Hudson & Manhattan electric train movements, there is a total of 950 trains a day, and 500 passenger trains over the section between New York, Jersey City and Newark.

The pole lines which were replaced by the underground, had a varying number of wires to provide for the local and long distance service. In the congested districts the local circuits were in cable, and the trunks were open wires. The heaviest line was a line across the Jersey Meadows on "H" poles, where there were 112 open wires and two or three cables. For the greater part of the distance to Rahway a total of 70 aerial wires of No. 9 B. & S. and No. 8 B. W. G. copper, and signal wires on two lines of poles, were replaced by the underground.

DUCT CONSTRUCTION.

The conduit line decided upon was a six duct multiple, with manholes spaced not over 500 feet apart. Three-inch fibre duct was used and laid in concrete, with a minimum covering of two feet of earth.

The concrete, which was a 1-3-6 mix, was three inches thick in the base, three inches on sides and four inches on top, with a separation in the standard section of one inch between ducts, the arrangement being three ducts wide and two high. The thicker section was used on top to afford a better mechanical protection to the ducts and for a wider separation between the 2,300-volt A. C. signal feeders located on top and the telephone cables in the duct. A half-round section of three-inch fibre conduit was laid in the top layer of concrete, with the open side flush with the top, for the purpose of placing the 2300-volt signal wires. Two of these wires, which were stranded, rubber insulated and braided, were placed in the half-round section, where they were covered with hot pitch and protected with re-enforced concrete slabs, two inches thick, six inches wide and four feet long. At the manholes these wires were carried in trunking around the outside. It was not thought advisable to have the high tension wires in the same manholes with the other cables.

The trench was graded and the ducts laid true to line with a minimum grade of three inches per hundred feet, for drainage toward the manholes.

MANHOLES.

Manhole design and construction is a very important part of a satisfactory underground installation and a great deal of care and study was given to this item.

On account of the conditions in many locations, which made it necessary to place the duct and the manholes close to the high speed tracks, a special manhole was developed that was rather unique and which worked out very satisfactorily. These were of reinforced concrete, elliptical in cross section, cast in one piece, including the bottom, sides and top; and were provided with pulling in irons, bolts for the cable racks, drain and openings for the entrance of the ducts. The covers were also of reinforced concrete, with protected edges. The shape of the manholes was such that very strong construction was obtained with minimum weight. They were allowed to season thoroughly before being placed. A wreck train derrick, or a hand derrick on a flat car was used

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for placing them, as shown in Fig. 1. The manholes were usually put in place ahead of the conduit, at the proper grade; so that when the conduit was laid up to them the concrete work could be finished without delay. One is shown in Fig. 2, in place, before the top layer of concrete is finished. An interior view showing the arrangement of ducts, with two pump log outlets for service taps, is shown in Fig. 3. The pump log ducts are run on top of the concrete. The size of the end openings of the manholes is such that the conduit, with concrete covering, is accommodated for nearly every condition of grade; so that it was not necessary to cut out any of these openings except for very unusual conditions. Forms were used inside and outside the manholes to give the proper finish and strength around the ducts.

SHORING AND REINFORCING.

On account of the narrow clearance between the high speed tracks and the duct line in many places, and the character of the soil, and of the banks, often mostly cinders, it was necessary to use tight shoring as shown in Figs. 2 and 4.

Through some sections where the conditions were not as favorable, half-inch or three-quarter-inch square reinforcing rods were used in the bottom and top tiers of concrete, as shown in Fig. 5. This also shows the special jacks used to support the shoring. Reinforcing rods were used when it was necessary to extend the duct run under tracks.

SPECIAL CONDITIONS.

Many special conditions exist on this installation that made it

plates and locked. Drainage openings underneath the duct were provided at intervals of about twenty feet to allow any water entrapped behind this construction to run out into the ditch. Expansion joints were also provided in the concrete, as it is exposed to the sun, and in the winter is many times covered with ice.

For a portion of the distance through this cut the cables are carried on messengers, supported from cable arms, attached to steel poles set in concrete. These are located in an old portion of the cut, through which trains were originally run, but which is now used as a storage yard. The cables are for the most part out of sight from passing trains.

On account of proposed changes in the track at one point, it was not feasible to locate the duct on the north side of the right of way, and there was a retaining wall on the south side on the right of way line, with not enough room between it and the ties for the conduit. The duct here was placed on top of the wall, which was in good condition.

STREET CROSSINGS.

There are numerous undergrade street crossings throughout this district, and at some of them it is proposed to renew the bridges before long. The type of crossing decided upon for these locations was to carry the cables from the ducts on messengers across the streets. The messengers were attached to eye-bolts anchored in the concrete surrounding the ducts, and located immediately over them, so that no additional splices in the cable were necessary on account of this construction. Manholes were usually

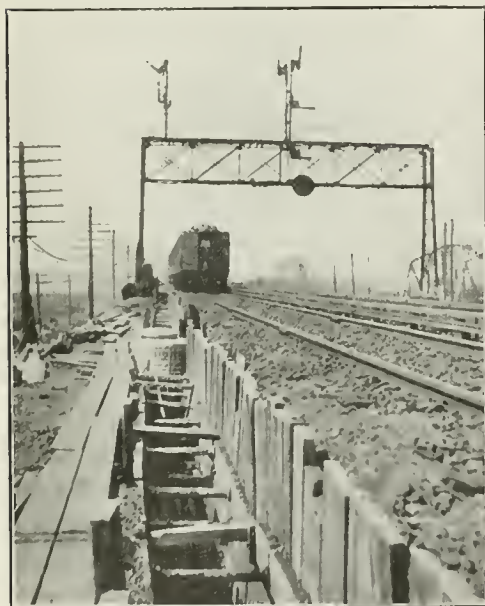
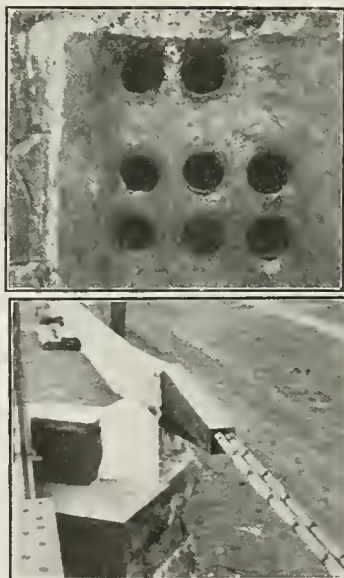


Fig. 2—Manhole and Duct in Place



Figs. 3 and 8—Interior of Manhole with Two Local Outlets. Conduit on Retaining Wall

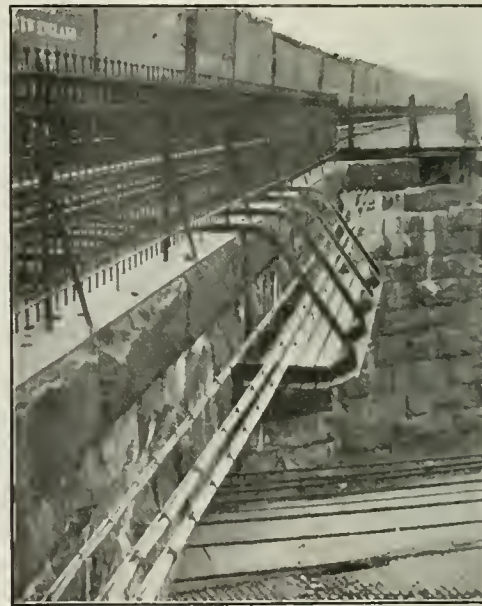


Fig. 9—Trolley Guard at Street Crossing

necessary to devise special construction which would be adapted for a permanent installation, as it cannot be as readily moved as a pole line. In this connection, the plans for any contemplated changes in the track layout were consulted.

One section for about a half mile, extends through Shanley Cut, near Summit Avenue Station, where the tracks lie in a deep trap rock cut. The face of the rocks on either side is very irregular, the tops of the banks on either side are likewise irregular and there are overhead street crossings to contend with. Trap rock is found only about a foot below the top of the ballast, and high tension lines for signal operation were in service here between the tracks. The location and type of construction decided upon for this section are shown in Figs. 6 and 7. Here the ducts were arranged two wide and three high on account of the limited space available between the edge of the half-round brick lined ditch and the rock cliff. Special splicing chambers were provided in these sections, placed on top of the surface, covered with steel

located close on each side of such a street crossing to facilitate matters in the event of the bridges being changed.

The construction on the retaining wall and across a street at an undergrade bridge, together with the method of protecting the end of the aerial cable from mechanical injury, is shown in Fig. 8.

PROTECTION FROM TROLLEYS.

At some of these crossings where aerial cable was used there were trolley lines running underneath. It was necessary to devise a satisfactory protection for the cables to prevent the trolley poles from accidentally hitting the cables, and to keep the cables from fouling the trolley. Such a scheme is shown in Fig. 9.

SUBMARINES.

Two sections of submarine cables, a total of about 2,100 feet, are necessary, and both are located in navigable streams at draw bridges. It was necessary to change the location of one of these and at the other it was necessary to have the channel dredged out to afford a safe covering.

TEST HOUSES.

On account of local conditions it was desirable to have the cables so arranged that the conductors would be accessible for testing and for changing the assignment of cable pairs. Two sizes of concrete test houses were used for this purpose, the large one being shown in Fig. 10. These were built of reinforced concrete, molded in one piece, except the door and ventilator, and made as nearly as possible fireproof. When these are associated with a tower for test purposes, they are so arranged that the cables can be cross connected without looping into the tower. Thus a fire in the tower would not cause any serious interruption

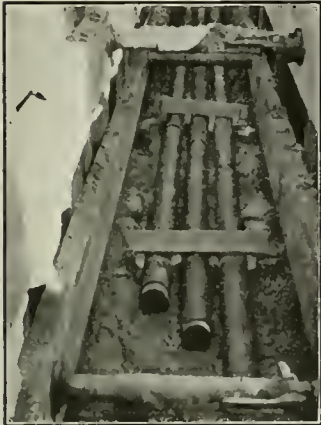


Fig. 4—Forms for Shoring, Spacing Combs and Plugs

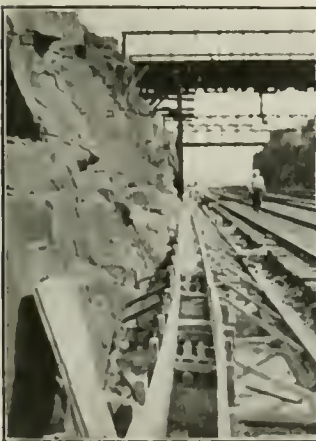


Fig. 5—Re-enforcing Bars in Bottom

in the telephone and telegraph service. They are provided with electric lights to facilitate the work and to dry out any condensation during unfavorable weather conditions. Only telephone and telegraph cables loop into these test houses, no signal wires entering them. There are nine test houses altogether.

COST OF CONDUIT.

On account of the many obstructions met in some districts, the nature of the soil, which necessitated careful shoring, the location of the duct with respect to the tracks, the frequency of the train



Figs. 6 and 7—Construction Through Shanley Cut

movements, causing much loss of time in some sections, the special construction, the difficulty in getting water, materials, and labor to the places required, and the careful inspection of all materials and workmanship, the costs would be of little value for comparison except for the same conditions. The cost per lineal foot of six duct multiple including excavation, conduit, labor, concrete, manholes, cable test houses, reinforcing material, work train charges, engineering and supervision was \$153, exclusive of cables.

CABLES.

Two paper-insulated lead-covered telephone cables are installed throughout. In one the most important through or trunk circuits are carried and in the other the local circuits. These are constructed with a number of different combinations to meet the conditions in different sections, but only three gages of conductors were used—Nos. 10, 13 and 16 B. & S. G.—and all twisted into pairs, with phantoms in all the combinations.

The local cable was provided with a paper-insulated lead-covered test pair in the center, which is in reality a cable within a cable. The maximum diameter of the cables is 2 17/32-inch, but no difficulty was met in pulling them into the three-inch ducts.

The cable was shipped from the factory in maximum lengths of 500 ft. A reel of cable set up and ready to be pulled in is shown in Fig. 11. This also shows the grip used, the cable protector for the manhole top, and the location with respect to the main track.

The conductor splices were all made with tinned copper sleeves and soldered.

The phantoms or quads were tested and connected to give a minimum of capacity unbalance and are consequently commercially free from cross talk between the physical circuits, between the physical and phantom circuits and between the phantom circuits.

A compressed air test was made on all sections of cable, each about a mile in length, to detect the presence of leaks at the wiped joints or between manholes. This was considered a very valuable test, especially on account of some of the cables being continuously under water.

The signal cables occupy only one duct and carry 110-volt A. C.



Fig. 10—Test House

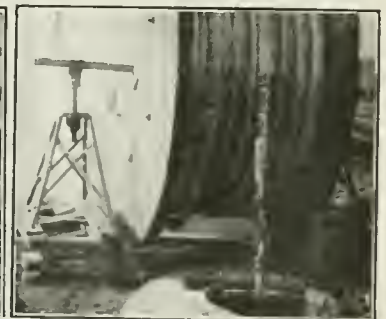


Fig. 11—Reel of Cable Ready to Be Pulled In

for the local circuits. These are rubber insulated and braided, and are spliced and racked on the side of the manholes opposite the telephone cables.

Service taps for the signal system are carried in cypress trunking.

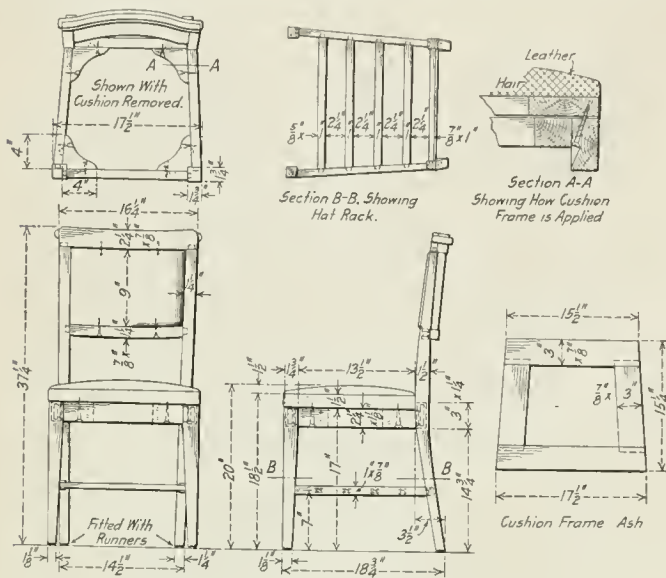
The work on the conduit began Aug. 20, 1914, and the last cable was placed in service in June, 1915. A longer time was required than otherwise would have been on account of a new fill east of Rahway, where it was not considered safe for the conduit line to be laid until the fill had settled.

The poles have now all been cut down and the road presents a much improved appearance. The telephone, telegraph and signal services are all very satisfactory. Extensions of the system are already under consideration.

CASUALTIES AMONG BRITISH RAILWAY MEN AT THE FRONT.—The London and North Western Railway Company reports 1,603 casualties among the members of its staff who are serving with the colors. Of these 209 have been killed in action or drowned, 78 have died of wounds, etc., 80 are missing, 1,073 have been wounded, sick, etc. Of these 30 suffered from gas poisoning. Prisoners of war number 103. Of the 1,073 men disabled 630 have returned to duty. From the North-Eastern Railway Company 7,498 men have joined the colors; 103 have died. *The Engineer.*

CHAIRS FOR DINING CARS

The Canadian Northern has been endeavoring to obtain a satisfactory design of chair for use in dining cars for five years, and out of seven different designs tried out in service during this



Chair Used on Canadian Northern Dining Cars

period the one shown in the drawing has proved much more satisfactory than any of the others.

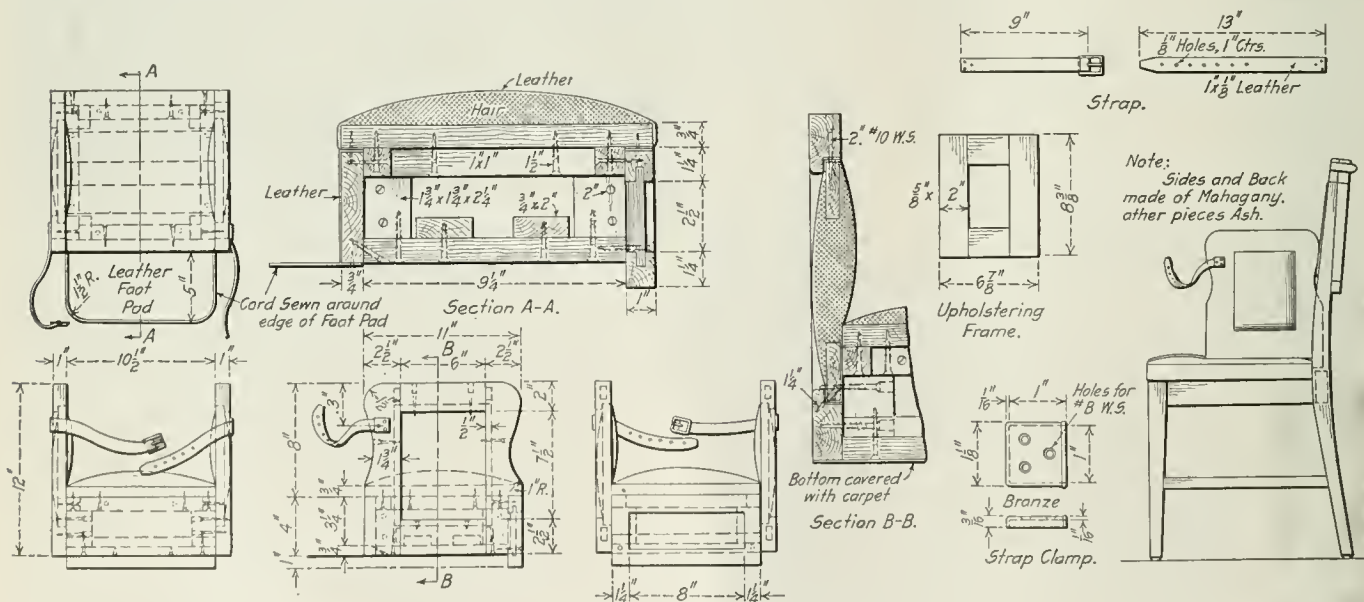
The principal weakness in most chairs is the difficulty of keeping the frames from racking loose. This has been overcome in the Canadian Northern design by bracing the legs by means of the hat rack. This is also appreciated by passengers, as it avoids the

chairs, the back of which forms the back of the combined chair. The designs for these chairs were worked out by A. L. Graburn, mechanical engineer of the Canadian Northern, Toronto, Ont., and have met with marked success in service.

NEW ACCIDENT REPORT FORMS

The Interstate Commerce Commission has adopted, after further revision, the forms for use in reporting railroad accidents monthly to the commission and the new code of regulations for making the reports, which were the subject of conferences with the railways last winter, and has ordered the adoption of the forms for the reports beginning with July 1, 1915. There are four principal forms, lettered V, T, F and R. Form T is on white paper, V on yellow, F on pink, and R on blue. Form T is to be used for all ordinary accidents. Form V contains the oath of the officer sending the report and a summary of non-train accidents. This summary must contain a statement of the total number of man-hours worked, during the month, by employees subject to casualties in the classes named. These classes are: Shopmen, stationmen, trackmen, bridge and building men, "other employees" and "all other persons." These non-train accidents—heretofore called industrial accidents—are to be divided into eleven classes according to their causes. Among these causes are: Working machinery; use of hand tools; flying particles; electric currents; falls of person; handling freight or supplies, and "miscellaneous industrial causes." Form F is a memorandum of fatalities developed from previously reported injuries. Each month a road must report, so far as known, all cases of persons who have been reported injured and who have subsequently died. Form R is a supplement to form T, to be used for showing particulars of rail failures.

Some of the details proposed in the first draft of the regulations have been eliminated. The separate sheets may be signed by any responsible officer, not necessarily by the one who com-



Child's Chair Used in Canadian Northern Dining Cars

necessity of reaching over the heads of others in order to place their hats on the overhead hooks and to remove them when leaving the car. Spring cushions have been eliminated, as it has been found that they are expensive to maintain. The absence of gimp is also noteworthy, the leather being simply folded in, making a clean, smooth surface. These chairs have so far not needed any repairs and are both light and substantial.

The child's chair, which is also shown, replaces the usual high cushion and has been favorably received by patrons of the road. As shown in the drawing, it consists of a box or frame upholstered in leather, and with two side pieces and a leather foot pad. The chair is placed on the seat of one of the ordinary dining

piles the final report. The particulars of the cause of an accident, however, must be given very fully and the statement must include "suggested improvements in procedure, plant and equipment for the prevention of similar accidents." The term Yard Accident is not to include accidents occurring on the main track. All persons, whether causing an accident or injured by it, must be named. Injured employees who are incapacitated for three days or less are not to be counted. Revenue passengers are to be distinguished from those not paying. Any railroad may file at Washington a copy of its rules and regulations, and in reporting cases of disobedience may simply refer to the number of the rule which has been disregarded.

An example of the detail required may be seen in paragraph 15, referring to train accidents, which is as follows:

15. Description of equipment: Give a brief description of damage to equipment, and, whenever possible, in reporting defects in equipment which caused or contributed to an accident, name the manufacturer and the type of the equipment or part, give weight and number or other identifying mark, and state the year of manufacture, and the year of placing in service; state also when, where and by whom the equipment was last inspected. Describe sufficiently the equipment involved and give all particulars necessary to permit its description and classification as follows:

(A) Locomotives and parts:

(a) Description—

- (1) Type, as simple, compound, articulated, etc.
- (2) Wheel arrangement.
- (3) Weight on drivers and total weight ready for service.

(b) Parts—

- (1) Firebox and attachments.
- (2) Boiler and attachments.
- (3) Cylinders and steam chests.
- (4) Reciprocating parts.
- (5) Headlight.
- (6) Pilot.
- (7) Drivers.
- (8) Truck wheels.
- (9) Other parts of running gear as enumerated under cars.
- (10) Miscellaneous parts, naming them.

This and other similar requirements apply to all accidents reported, even those of minor consequence.

It will be seen that in accordance with the requirements in connection with form V, the number of hours worked by all employees each month must be embodied in a statement to go with the accident report. For example, not only shopmen but station men and trainmen are liable to "falls of person" and to accident in use of tools, and must have their working hours recorded. As the new regulations were not received by some of the roads until after July 1, their records of man-hours for the first month may be somewhat lacking in accuracy.

A NEW COAL DOCK FOR THE CINCINNATI, HAMILTON & DAYTON AT TOLEDO

With the opening of navigation on the Great Lakes this spring the Cincinnati, Hamilton & Dayton placed in operation at Toledo a modern coal-handling plant, dock and yard to provide adequate facilities for a steadily increasing coal traffic. Work on this project was not started until December of last year. The new equipment is situated on the Maumee river, at Rossford. The

of concrete dock, the necessary foundations for the machine, the entire reconstruction of the load and empty yards and the fabrication and erection of a new mechanical car dumper with the necessary approach and run-off trestles. A drawing shows a cross section of the concrete dock construction. This type of dock was placed on both sides of the machine foundation. The dock immediately in front of the machine is of the same general construction, except that the batter piles were omitted, and the dock was made a part of the machine foundation, this foundation being of pile construction, capped with reinforced concrete slabs to which the dock is anchored.

The general layout of the plant is shown in the photograph. This machine is designed to handle cars of a maximum gross weight of 280,000 lb., and a length of 52 ft. over couplers. It is of the latest steam-operated type with counterweighted cradle, the steam being furnished by two Scotch boilers, each with a capacity of 250 h. p. The main engines are of extra heavy mill type construction, controlled by Hennebohl throttles. All gears are cast steel, with machine-cut teeth. Sheaves are also cast steel. The machine is designed to handle forty 100-ton capacity cars per hour. An unusual feature in the design of this machine is the placing of the cradle rail at an elevation of 30 ft. above the lake level, which is considerably higher than normally adopted for installations of this kind, this elevation being adopted because of a desire to reduce the amount of lift of cars in the machine to a minimum.

A disappearing barney was provided, which makes it possible to run a car over the barney pit from the load yard prior to the return of the barney from the delivery of a car to the machine. This is accomplished by means of by-pass gates in the barney track, which are operated by the steam cylinder controlling the reversing mechanism of the haulage engine. The barney returning from the machine passes into the barney pit on the by-pass gate nearest the machine, and then runs under the car to the end of the pit. The reversing of the haulage engine raises both by-pass gates, so that the barney in returning comes up behind the car by means of the by-pass gate furthest from the machine. This arrangement avoids the necessity of waiting for the barney car to return from the machine to the barney pit before the car is placed over the pit, and has the effect of keeping a car up to the machine at all times.

Contracts for the foundation and dock work and for the mechanical car dumper were placed about November 1, 1914,



View of Coal Dock From the Lake

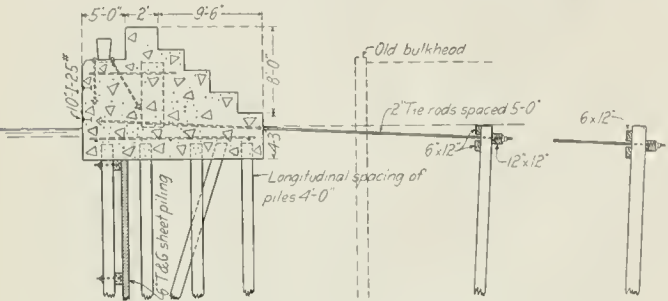
new dock is placed at the harbor line, which is a change in the old arrangement in which the dock was 25 ft. shoreward. This change enables the large freighters plying on the lakes to tie up directly at the dock and load their cargoes more quickly. The terminal is laid out with a yard having a capacity of 230 cars, adjacent to the unloading machine and in which 140 loaded and 96 empty cars can be handled. To the south of the dock is a classification yard with a capacity of 3,000 cars, affording ample space for assembling shipments. The yard plan is shown on the accompanying map.

The plans as prepared called for the construction of 802 ft

and preparations were made for starting the work at the close of navigation. The old machine was abandoned on December 2, 1914, and the dismantling started the next day, simultaneous with the construction of the new dock. The piles in front of the old dock were driven by floating equipment, using steam hammers, while those back of the old dock were driven by land drivers. The piles were driven to refusal to a bed of hard pan and small granite boulders, approximately 31 ft. below the lake level. The cut-off for the dock was made at a point 18 in. below mean lake level. The operation of the floating equipment for driving piles and sheet piling was made possible during extremely

cold weather by using an ice tug to keep the river ice broken and clear of the site of the work.

The construction of the machine foundation was undertaken first, and upon completion of the driving of the piles and sheet piles for this portion of the work, the fill between the old and new docks was placed. The driving of the piles for the dock on both sides of the machine was then started and as the pile driving was completed and the sheet piling placed, the new work was connected with the old dock by means of temporary ties and the fill placed to the elevation of the bottom of concrete.



Section Through Concrete Bulkhead

With the exception of the sand, all of the materials used in the concrete work were brought to the site by rail. The sand was unloaded from boats at the dock site. The mixing plant was located about 1,000 ft. south of the machine, where the storage bins were provided and a heating plant for heating all material was installed. A boiler plant was also installed at the site of the machine foundation. The concrete was transferred from the mixing plant to the site of the work in drop-bottom buckets on flat cars, by means of narrow-gage equipment. The concrete was placed continuously and without reference to the

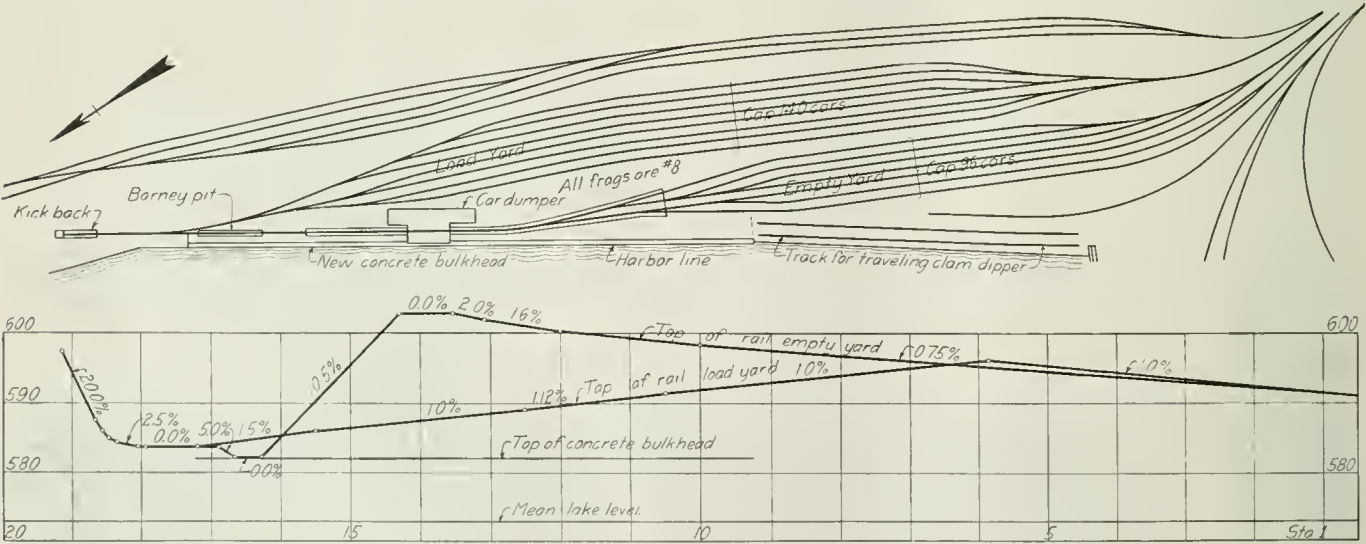
alignment and grades, at an elevation of approximately 8 or 9 ft. above the old yards. The material for all grading and back filling was secured from waste slag and cinder banks and hauled to the site of the work in standard-gage equipment. The reconstruction and raising of the yards were commenced December 6, 1914, and the yards were in condition for operation April 12, at the time the machine was completed. New first quality 90-lb. A. R. A. section rail was laid through switches and on curves, and 85-lb. A. S. C. E. first class relaying rail was used on tangents. The erection of the approach and run-off trestles was handled by the substructure contractor, the material being framed near the site of the work and transferred to final location and erected by means of a locomotive crane.

The construction as a whole involved the placing of the following material:

Piling in machine foundation and dock construction	45,550 Lin. ft.
Tongued and grooved sheeting in machine foundation and dock construction	133,581 ft. B. M.
Reinforcing steel in machine foundations and dock anchorages for dock construction	218,543 lb.
Timber in machine foundations and dock construction	47,407 ft. B. M.
Concrete in machine foundations and dock construction	6,300 cu. yd.
Timber in approach and run-off trestles and kick back trestle	184,925 ft. B. M.
Fill for load and empty yards and river fill between old and new docks	108,000 cu. yd.
New trackwork	15,000 lin. ft.
Of the foregoing estimated quantity of concrete, approximately 1,850 cu. yd. were placed below mean lake level.	

While the improvement as a whole was ready for operation on April 12, 1915, three days prior to the opening of navigation, the machine was not put into active service until April 19, when the first boat was secured. For the two months ending June 19, the machine handled 10,439 cars, or 469,064 tons of coal.

The two months' period of operation above referred to has developed the fact that the machine and yard are capable of handling the coal as fast as anticipated. In one day's run of ten hours, 340 cars were handled, with a total tonnage of 16,393.



Plan and Profile of the Yard Serving the Coal Dumper

weather conditions. This was made possible by having the materials properly heated, and by keeping it warm after it was in place by means of the steam plant located at the machine foundation. Some of the concrete was placed with temperatures as low as 12 deg. F. below zero with no bad effects.

The machine foundation was completed February 8, 1915. The concrete for the barney pit construction was completed March 7, the superstructure contractor started operations on February 2, and the first steel was raised on February 15. The machine was finished, ready for the preliminary test of the cradle on April 9, and the entire machine was completed ready for operation April 12. During the progress of the construction of the concrete docks, machine foundation and superstructure, the railroad company's forces reconstructed the yards to the revised

There were also handled in one day's run of twelve hours 405 cars. These runs involved the handling of 45 to 49 cars per hour for short periods.

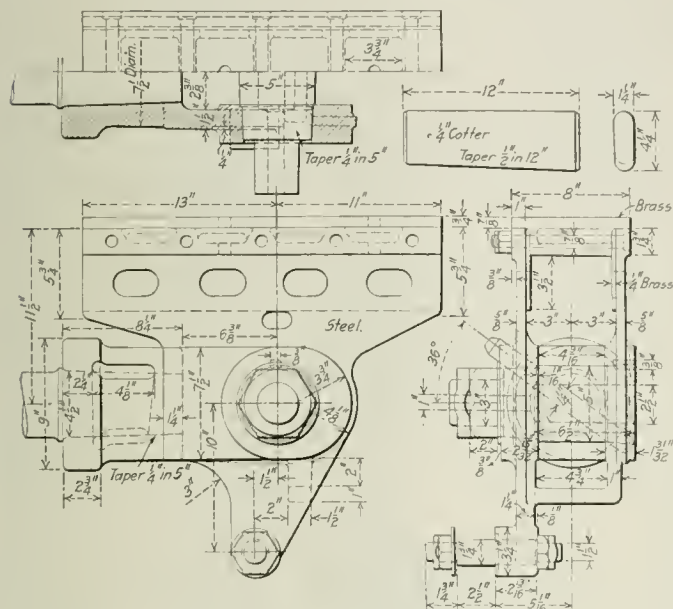
Smith-McCormick Company, of Easton, Pa., were contractors for the substructure and approach trestles, J. C. Carlin, of Toledo O., furnished the greater portion of the filling material, the Pittsburgh Construction Company, of Pittsburgh, Pa., were the contractors for the dismantling of the old machine, and the Wellman-Seaver-Morgan Company, of Cleveland, O., furnished the new car dumper. The design and construction of this plant was under the direction of F. L. Stuart, chief engineer, and the work was prosecuted under the supervision of A. M. Kinsman, engineer of construction; W. S. Bouton, engineer of bridges; A. H. Griffith, assistant engineer and P. Callahan, resident engineer.

Pacific Type Locomotives for the Burlington

A Design in Which Special Attention Has Been Given
to Providing Light Weight in Reciprocating Parts

The Chicago, Burlington & Quincy has recently received 55 locomotives from the Baldwin Locomotive Works. These include 15 Pacific type passenger engines, 15 Mikado type freight engines, 15 2-10-2 type freight engines, five of which will be used on the Colorado & Southern, and 10 Mikado type engines for freight service on the Fort Worth & Denver City.

The special interest centers about the Pacific type locomotives,



Laird Type Crosshead Used on the Chicago, Burlington & Quincy Locomotive

which represent a new design, while those of the Mikado and 2-10-2 types are similar to engines previously built for this system.

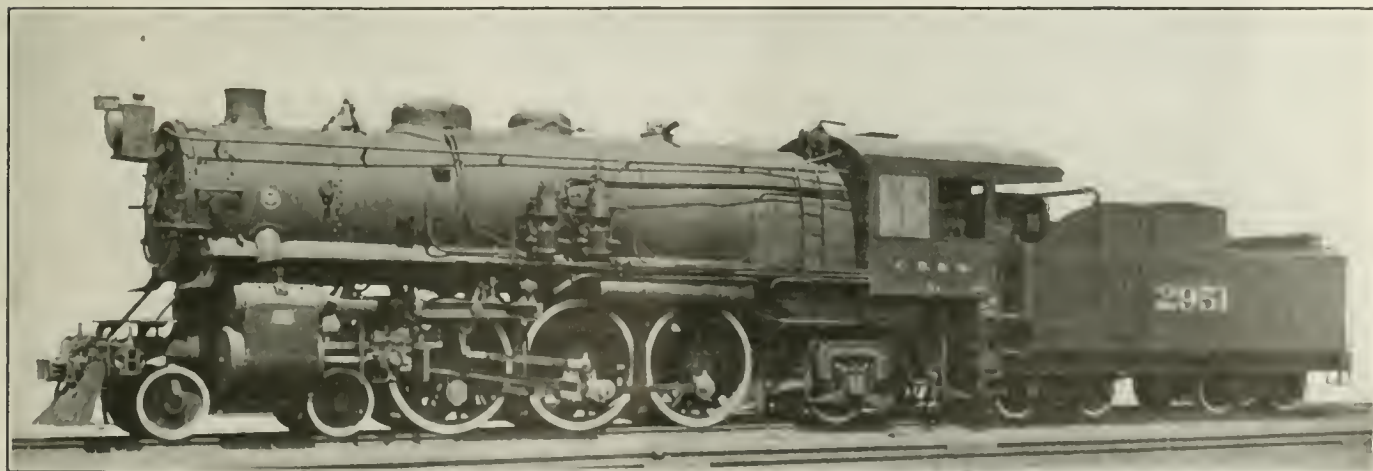
The Pacific type locomotives exert a maximum tractive effort

as far as possible, the dynamic augment on the rail when running at high speeds.

The boiler is of the extended wagon top type with a combustion chamber. The barrel is composed of three courses, the first course being sloped on top and the third course on the bottom. This construction provides ample steam space, and also a free entry to the throat under the combustion chamber. The tubes are of moderate length, and no attempt has been made to crowd them at the expense of circulation. The firebox is equipped with a brick arch, supported on angle irons. The railroad company's standard design of smoke consumer is applied, with four inlet tubes on each side of the firebox. The main dome, which is of pressed steel, is on the second boiler course; the auxiliary dome is on the third course, and is placed over a 16-in. opening in the shell, so that the boiler can be easily entered for inspection purposes.

Reference has been made to the special attention given to the design of the reciprocating parts and machinery. The pistons are of a dished section, and are of .40 per cent carbon cast steel, carefully annealed. They have iron bull rings cast on them. No extension rods are used, but the bull rings are widened, at the bottom, from 4½ in. to 6 in. The piston rods are of Nikrome steel 4¼ in. in diameter, and hollow-bored with 2½-in. holes. They are forced into the heads under a pressure of 35 tons. The crossheads, of the same material as the pistons, are of the Laird type, with bronze gibs. The lug for the union link is cast in one piece with the crosshead body. The crosshead pins are of Nikrome steel, hollow-bored. The main and side rods are also of Nikrome steel, the main rods having an I-section while the side rods are rectangular in section. The main stub is of the strap type with wedge adjustment. The front side rod tapers in depth from 5 in. at the front end to 6½ in. at the back, with a uniform width of 1½ in. The crank pins and side rod knuckle pins are of Nikrome steel, hollow-bored. Walschaert valve motion is used, and the gears are controlled by the Ragonnet power reverse mechanism.

As actually balanced, the dynamic augment, at a speed of 70



Pacific Type Locomotive for the Burlington

of 42,000 lb. and were designed to weigh approximately 170,000 lb. on the driving wheels, with a limit of 60,000 lb. on any one pair.

Special attention has been given to the design of the reciprocating parts and other machinery details, with a view to reducing,

miles an hour, amounts to approximately 38 per cent of the static weight for the front and back driving wheels, and 28 per cent for the main wheels. The proportion of the reciprocating weight that has been balanced is 61 per cent, and this is equivalent, on each side, to 1/202 of the total weight of the

engine. The following actual weights are of interest in this connection:

Piston and rod complete, with crosshead key.....	557 lb.
Crosshead	414 lb.
Main rod	870 lb.
Side rod, weight on front crank pin.....	158 lb.
Side rod, weight on main crank pin.....	490 lb.
Side rod, weight on back crank pin.....	168 lb.
Crank pins, complete { front.....	125 lb.
main.....	295 lb.
back.....	130 lb.

The accompanying table gives some comparisons between the weights of the reciprocating parts of this engine and the two most recent Pennsylvania Railroad passenger locomotives:

DATA FOR RECIPROCATING PARTS OF RECENT PENNSYLVANIA AND BURLINGTON PASSENGER LOCOMOTIVES

Road and type	Cylinders and driving wheels	Boiler pressure, lb.	Piston load lb. (area piston x full b. press.)	Weight, lb.			Total* wt. of reciprocating parts, lb.	Piston load carried, lb.			
				Cross-head	Piston and rod	Main rod		per lb. wt. of rec. parts	per lb. wt. crosshead	per lb. wt. piston	per lb. wt. main rod
Penn., 4-6-2.....	27 in. x 28 in.; 80 in.	205	114,000	491	520	936	1,376	83	320	219	122
Penn., 4-4-2.....	23½ in. x 26 in.; 80 in.	205	89,000	327	408½	720	1,014	87	271	218	123
C., B. & Q., 4-6-2.....	27 in. x 28 in.; 74 in.	180	103,000	414	557	870	1,319	78	249	185	118

*Includes 40 per cent. of the weight of the main rod.

The cylinders are cast from the same pattern as those used on the Mikado type locomotives for the Fort Worth & Denver City. They are fitted with vacuum relief valves, but no by-pass valves are used. The guide for the valve stem crosshead is cast in one piece with the back steam chest head.

The frames are of .40 per cent carbon cast steel, annealed, and manufactured to specifications prepared by the American Society for Testing Materials. The main frames are six inches wide. The rear sections are of slab form, arranged to accommodate the Rushton type of trailing truck with outside journals, which in this case is fitted with three-point suspension links. The frames are braced transversely at the front and main driving pedestals, also by the guide yoke, valve motion bearer, and a

truck, prevents any rocking action on the part of the driving springs from being transmitted to the truck springs, or vice versa.

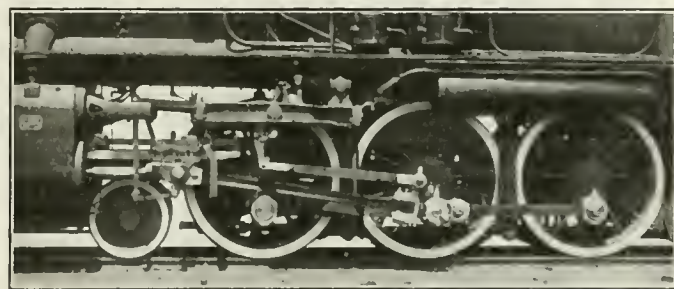
The tender is equipped with a coal pusher, and is carried on equalized pedestal trucks. The wheels are of forged and rolled steel, manufactured by the Standard Steel Works Company.

These locomotives were designed by the builders, in consultation with F. A. Torrey, superintendent of motive power, and C. B. Young, mechanical engineer of the Burlington. The practice of the railroad, as far as details are concerned, has been

closely followed. The principal dimensions and data are given in the following table:

General Data

Gage	4 ft. 8½ in.
Service	Passenger
Fuel	Bit. coal
Tractive effort	42,000 lb.
Weight in working order.....	266,400 lb.
Weight on drivers.....	169,700 lb.
Weight on leading truck.....	47,800 lb.
Weight on trailing truck.....	48,900 lb.
Weight of engine and tender in working order.....	425,000 lb.



Driving Wheels and Rods of the Burlington Engine

Wheel base, driving	13 ft.
Wheel base, total	33 ft. 8½ in.
Wheelbase, engine and tender.....	65 ft. 10¾ in.

Ratios

Weight on drivers ÷ tractive effort.....	4.04
Total weight ÷ tractive effort.....	6.35
Tractive effort × diam. drivers ÷ equivalent heating surface*.....	692.00
Equivalent heating surface* ÷ grate area.....	76.50
Firebox heating surface ÷ equivalent heating surface,* per cent.....	6.50
Weight on drivers ÷ equivalent heating surface*.....	37.80
Total weight ÷ equivalent heating surface*.....	59.40
Volume both cylinders, cu. ft.	18.55
Equivalent heating surface* ÷ vol. cylinders.....	242.00
Grate area ÷ vol. cylinders.....	3.17

Cylinders

Kind	Simple
Diameter and stroke.....	27 in. by 28 in.

Valves

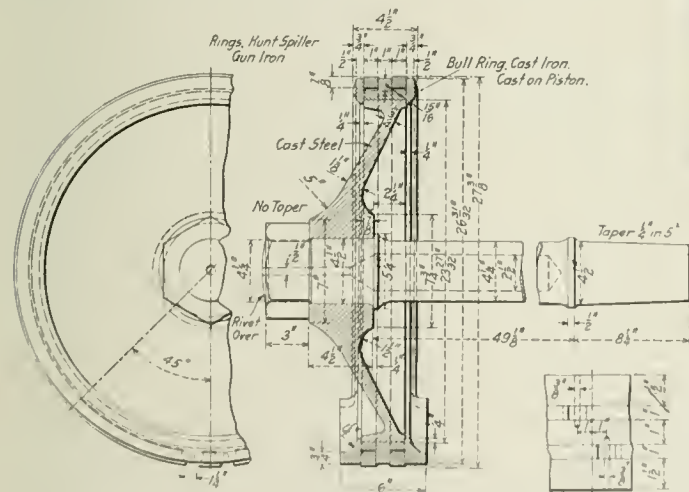
Kind	Piston
Diameter	14 in.

Wheels

Driving, diameter over tires.....	74 in.
Driving, thickness of tires.....	8 in.
Driving journals, main, diameter and length.....	11 in. by 12 in.
Driving journals, others, diameter and length.....	10 in. by 12 in.
Engine truck wheels, diameter.....	37 in.
Engine truck, journals.....	6 in. by 12 in.
Trailing truck wheels, diameter.....	48 in.
Trailing truck, journals.....	8 in. by 14 in.

Boiler

Style	F. W. T.
Working pressure	180 lb. per sq. in.
Outside diameter of first ring.....	108 in. by 84 in.
Firebox, length and width.....	10 in. by 58 in.
Firebox plates, thickness.....	4 in. and 6 in.
Firebox, water space.....	34 in.
Tubes, number and outside diameter.....	34 in.
Flues, number and outside diameter.....	18 in. by 10 in.
Tubes and flues, length.....	33 ft. 8 in.
Heating surface, tubes and flues.....	3,340 sq. ft.
Heating surface, firebox.....	3,340 sq. ft.
Heating surface, total.....	6,680 sq. ft.
Superheater heating surface.....	6,680 sq. ft.



Piston Used on the Burlington Locomotive

waist sheet cross tie placed between the main and rear pairs of driving wheels. At the splice between the main and rear frames is placed a strong transverse casting, which contains a pocket for the rear truck radius bar pin, and also supports the front of the firebox through a vertical expansion plate.

The pedestal shoes and wedges are of bronze. The driving wheel centers are fitted with bronze hub plates, and the driving axles are of chrome-vanadium steel, heat-treated and hollow-bored.

The equalization system is cross-connected between the rear driving wheels and trailing truck. A central vertical link connects two transverse beams. The upper beam is suspended from the rear driving springs, while the lower beam is connected, by means of a vertical link on each side, with the rear truck equalizers. These are placed on an angle, so that they can connect with the truck spring hangers, which are placed outside the wheels. This construction, while maintaining the desired weight distribution between the driving wheels and the rear

Boiler (Continued.)

Equivalent heating surface*	4,490 sq. ft.
Grate area	58.7 sq. ft.

Tender

Weight	158,600 lb.
Wheels, diameter	37 in.
Journals, diameter and length	5½ in. by 10 in.
Water capacity	8,200 gal.
Coal capacity	13 tons

*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

THE WAR TEST OF FRENCH POLITENESS

By WALTER S. HIATT.*

The courtesy of the French railway employee in these times of stress is one of the details that cannot fail to attract the attention of the war-time traveler in France. We Americans are inclined to discount the real sincerity of French politeness and to regard it perhaps as superficial. The excitement of the great life and death struggle of the past 12 months, which surely could not possibly be a more supreme test of French character, has proved, however, that the French element of courtesy has a most solid foundation. Most people, however polite and kind they may be under normal conditions, are likely to forget their politeness in moments of stress. With the French the opposite is true.

Since I have been in France this year I have never seen posted in the stations or office buildings notices that employees must treat travelers with consideration. Yet, here is what happened to me one night while traveling in a train from Orleans to Paris. I wanted to get off at a certain station just inside Paris, but not the terminal station of the railroad. A railway employee happened to get into the compartment which I occupied. He had evidently been working all day and was going to another point of the road to continue his work the next day. The sleep he got on the cushion en route would probably be all that he would get. Before he stretched himself out, I asked him the exact name of the station where I wanted to get out. He told me and then went to sleep. From time to time, however, I noticed that he woke up to look at his watch. Finally, as the train began to slow down for Paris, he got up, looked out the window, waited a few minutes, and then said to me: "You get out here." I thanked him and the last I saw of him he was stretching himself out for a real sleep. He must have gone without a good deal of necessary sleep in order to be sure that I alighted at the right place. There is nothing extraordinary about this incident if it were not that it happens all the time.

That the French railway man has not lost his politeness in all the pressure and overwork accompanying the war is all the more to his credit, because, in perhaps nine cases out of ten, he has some distracting private grief, such as a son, brother or a father wounded or dead in battle. It is hardly necessary to point out that in a country where there are nearly two million dead, wounded or missing, every living individual must be affected.

If anything the French employees are more polite than before the war. They used to seem to me the least bit noisy, curt and self-important. This may have been because formerly my knowledge of French was limited, or again, it may be that the war has brought out fully the true character of the French and that the war and its suffering has made them more ready to respond to the needs of the traveler. But whatever the cause, the big fact remains that they are now as polite as one could hope. In a time when no stranger is looked upon favorably and when every stranger may be a spy in disguise—the French have paid bitterly for their old welcome to the stranger—they give every help to him who is unable to speak the language and is not familiar with French methods of travel. I have even seen a station master pilot a stranger half a block, either to or from the train, in order to set him right, and this in the heart of a big, scrambling crowd.

The railroad man, in being polite, does not appear to be acting

mechanically, as if carrying out company orders, nor does he become familiar by virtue of the service rendered. From the lowest to the highest employee, he does it with a certain air of self-respect and dignity. He acts as if he owes it to himself to be polite. There is no condescension in his manner, and no matter who you are, he makes you feel as if you were an important person, worthy of his every attention.

Thus, lately in Paris, I had occasion to call at the terminal of the Eastern Railroad to obtain a certain printed report. The porter at the street door, probably paid a dollar a day, without having the slightest idea of who or what I was, who saw in me merely a man who needed guiding in the labyrinth of a big and strange office building, showed me half way up the stairs. I might as well have been the company president by his manner. Another porter bowed me into a waiting room and took my message. He didn't look me all over, measure me up and down with a roving, calculating, half-insolent eye, as if to say: "Shall I throw him out or let him wait until he gets tired and goes away himself?" He saw in me an unknown person who wanted something and he made me feel at home by his manner. The clerk who came out treated me in the same fashion, with a slighter shade of reserve possibly, excusing himself for a moment while he went to ask if I might be given what I asked for. He brought the report out to me finally. However, had he been compelled to refuse it, his politeness would have been more gracious yet; he would have "regretted" with such nicety that I would not have gone away disgruntled, angry at the company, nor yet disappointed, but feeling that there were excellent reasons for the refusal.

There is one dull spot in this polished shield of the French railroad man, so far as concerns the traveling public, and that is the adamant attitude concerning the fares of children. It is hard to understand why such should be in a country where children are so loved. It is not so much the fault of the employee as it is of the company rules. The average conductor in the United States is struck blind when he sees children with their parents. If he sees the children at all, he ignores their ages, takes whatever fare is offered and lets this amiable fraud be worked on the company. Here in France, from time immemorial, the ticket collectors (who are not conductors, but rather employees who get on and off the trains at intervals) have been inexorable about children's fares and their politeness is sorely tried in securing their payment. During the war they have not been too careful about whether grown-ups paid first, second, or third class fares, but they have not forgotten to collect every time for children. The mothers who accompany their children, particularly in second and third class compartments, are always provided with sharp tongues and, with the ticket taker as unyielding as the rock of Gibraltar, an argument inevitably ensues. It is always a one-sided one, for a rule is a rule in France, no matter how stupid, and the railroad men enforce it to the letter.

Children over three years of age pay half fare and over seven full fare. So expert are the collectors that they can tell a child's age almost to a month. The strictness about children's fares must be set down as one of the curious sides of French railroad-ing, and as providing the situation in which only French politeness could be equal to the emergency.

STATE RAILWAY CONSTRUCTION IN NORWAY.—The state railway construction in Norway is progressing on a very large scale, although some of the important work now in hand will not be completed at the time originally intended. Thus the Doore railway and the Rauma railway were to have been ready in 1917, but neither undertaking will be completed at that time. According to the railway plan of 1908 the railways which it comprised were calculated to cost \$13,600,000, but the actual expenditure has now been put at \$23,200,000. Alterations and further new lines, which have been decided upon later, were calculated to entail an aggregate expenditure of \$9,400,000, but they will, it has transpired, cost some \$2,700,000 more than originally calculated.

*Our special European correspondent.

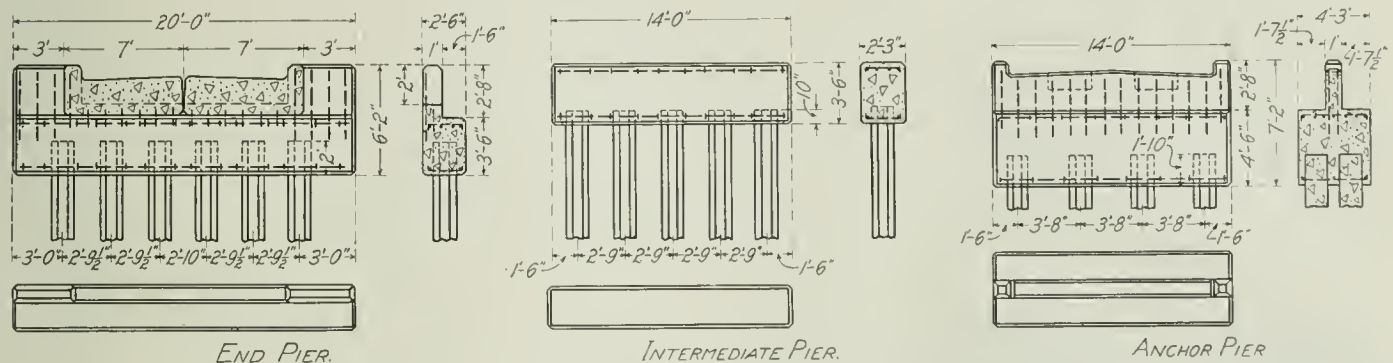
SOLID DECK TRESTLES AND BRIDGES ON THE ILLINOIS CENTRAL

The Illinois Central has recently opened for traffic about 34 miles of second track between Gibbs, Tenn., and Kerrville, on the main line just north of Memphis, the last single-track mileage between Chicago and Memphis. The construction of this second track involved the handling of 1,300,000 cu. yds. of grading and the building of about 9,500 ft. of concrete trestle in addition to other minor bridge work. In the design of these trestles the solid piers which have been used in a number of instances on this road to support concrete slab decks, were replaced by concrete pile bents recently adopted as the road's standard, the cost of the latter being about 80 per cent of that of the former. In order to secure the advantages of a solid deck on two 80-ft. through plate girder structures located between sections of the concrete trestle these bridges were built with concrete slab floors involving a number of interesting details.

The concrete trestle was used in heights ranging from 8 ft.

piles and the caps are 14 ft. long, 2 ft. 3 in. wide and 3 ft. 6 in. deep. The anchor bents have a double row of four piles each with a cap 14 ft. long, 4 ft. 3 in. wide and 4 ft. 6 in. deep, having a center wall 1 ft. thick extending up to the top of the slabs. An open space of 2 in. is allowed between the ends of the slabs and the back walls on the end bents and the center walls on the anchor bents. The heads of the piles are embedded in the concrete cap 2 ft. in the end bents, 10 in. in the intermediate bents and 1 ft. 10 in. in the anchor bents. When built as a double-track structure the end piers are 34 ft. long and the intermediate and anchor piers 28 ft. long, the two tracks being spaced 14 ft. center to center.

The piles used in this trestle are hexagonal with the lower end pointed. They are reinforced with spiral and longitudinal rods securely tied. The piles were made by the C. F. Massey Company, at Memphis, were seasoned 30 days and were driven with a steam hammer, using a wooden driving block and a rope cushion. The soil was clay and the piles sustained little damage in driving. The reinforced concrete caps were built



General Details of the Illinois Central Reinforced Concrete Trestle

to 20 ft. for practically all locations where timber trestles had been used in the old single-track line. In cases where the old structure in the first track had not reached the end of its life the new concrete trestle was built along side with the intention of renewing the wooden structure by a second single-track concrete trestle when necessary. In other locations the old timber construction was replaced by a new double-track concrete trestle.

The standard panel length is 16 ft., although in some instances

in place over the heads of the piles, the material being carried from stationary mixing plants in narrow-gage cars along the edge of the old trestle, where the new structure was of considerable length. For short trestles the material was handled with wheelbarrows to movable mixing boards. The end bent caps required 7 cu. yd. of concrete, the intermediate bents 4 yd. and the anchor bents 11.3 yd. The slabs are of a type used quite generally by this and other companies, the width of each slab being half the width of a single-track structure. About 250



One of the Sections of Reinforced Concrete Trestle, Built on Concrete Pile Bents, in Double Tracking the Illinois Central North of Memphis

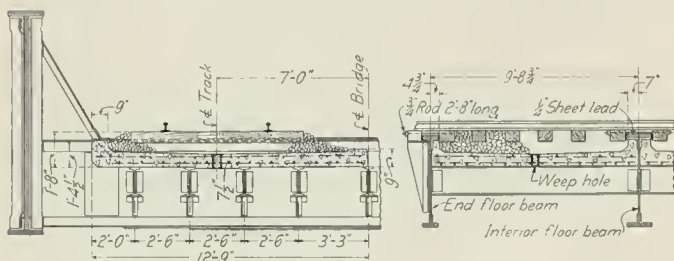
this was varied in order to miss the bents in the old trestle. The bents are of three types, the end, the intermediate and anchor. The anchor piers are located at every sixth bent in trestles of ten or more panels, serving to stiffen the structure. In the single-track structure, the end bents consist of six piles with a cap 20 ft. long, 2 ft. 6 in. wide and 3 ft. 6 in. deep and a back wall extending 8 in. up on the slab at the ends and to the top of the slab at the sides. The intermediate bents have five

of these slabs were cast by the C. F. Massey Company, and the rest were made by company forces in two yards at Fulton, Ky.

The two single-span through plate girder bridges with concrete slab floors are of standard design except for the lowering of the stringers, and the addition of one I-beam stringer at the center of the floor beams. The two slabs which are placed side by side in each panel between floor beams are supported on nine stringers, the tops of which are 1 ft. 4½ in. below the tops of

the floor beams. Each slab is 9 ft. 8 $\frac{3}{4}$ in. long, the spacing between floor beams, and 12 ft. 9 in. wide. The slabs are cast with a curb along both edges to retain the ballast and across the end to fill the space under the flanges of the floor beams. The upper surface of the slab is pitched one inch from each side to the center where a 4-in. drain tile is inserted, being covered by a cast iron grating. The thickness of the slab at the center is 7 $\frac{1}{2}$ in. and the maximum thickness over the curb is 1 ft. 4 $\frac{1}{2}$ in.

The minimum depth of ballast under the tie is 6 in., bring-



Details of Concrete Floor for Through Plate Girder Spans

ing the bottom of the ties 2 $\frac{1}{2}$ in. below the tops of the floor beams. The two ties adjacent to each floor beam are held tightly against the flanges by $\frac{3}{4}$ -in. rods 3 ft. long threaded on both ends which are passed through the ties just outside of each rail and tightened by a nut on each end. The tops of the floor beams are covered by $\frac{1}{4}$ -in. lead sheets and the curb walls around the slabs, the tops of stringers and the tops and sides of the floor



A Portion of One of the Illinois Central Concrete Trestles, Showing the Solid Ballasted Deck

beams which come in contact with either lead, concrete or timber and the top surface of the slabs are thoroughly coated with pitch. A $\frac{1}{2}$ -in. space between the slabs is filled with pitch. The slabs for each of these 80-ft. double-track girder spans required 62 cu. yd. of concrete.

All of the bridge work on this double-tracking project was carried out by company forces under the supervision of the engineering department, A. S. Baldwin, chief engineer; F. L. Thompson, assistant chief engineer, and Maro Johnson, engineer of bridges and buildings.

REDUCING STOCK CLAIMS

By J. L. Coss,

Despatcher, Rock Island Lines, Haileyville, Okla.

The railroads running through the Southwest have been paying out large sums of money each year as damages for stock killed on the right of way. In this particular part of the country there are few communities which support stock laws, and the farmers and stockmen as a rule do not co-operate with the railroads in trying to keep animals off the railroad property. In many cases it seems that they favor allowing the stock to be killed by the roads because they receive full value for it. It costs a railroad about \$300 a mile to fence its right of way and the cost of repairs and renewals is high; while because of the large number of almost-wild animals running at large it is almost impossible to fence against them. The question has often been raised whether it was cheaper to kill the stock or to fence the right of way. However, the conclusion has been that where stock is allowed to enter railway property there is always a chance of derailment of trains.

For the year ending June 30, 1914, the damage to stock alone on seven railroads running through this territory amounted to \$889,693. In order to reduce these payments and eliminate the possibility of accidents, the superintendent of the Indian Territory division of the Rock Island asked the co-operation of all employees. He issued special instructions to engineers that they must not under any circumstances take chances in striking stock and must stop their trains if necessary to avoid it. They must also notify the first section gang where they saw stock, gates open, fences down or any condition which might lead animals to enter on the right of way. The section men are required to go there at once, night or day, drive the stock off, repair the openings, and report. Train and engine men also notify the despatcher of the location of any stock and the despatcher immediately advises all trains and also sends word to the section men to remove the stock. The block operators also place the location of stock on their restriction and clearance cards to trains and when operators block with each other the stock conditions must be given the same as the information concerning trains. The operators also notify the section men of the location of stock. With this concerted action on the part of all concerned there is scarcely a chance for any stock on the right of way to be lost sight of for any length of time.

These measures effected a reduction in the payments for damage to stock from \$6,900 for April, 1914, to \$1,400 for April, 1915. This has been accomplished by the superintendent giving this matter his personal attention and impressing its importance on all employees. Getting the section men out at night to chase stock off the right of way has made them more careful to see that the fences, gates and guards are in good shape. Requiring the enginemen to explain personally before an investigating committee why and how they struck stock has made them more careful. The storekeeper has also been impressed with the necessity and importance of sending out repair fence material when ordered. The despatchers are careful in placing their orders immediately on receipt of advice regarding stock on the right of way, and in getting word to the section men by the first train. At first, the train orders covering advice to trains regarding the location of stock numbered from 15 to 20 a day, while now they run from 3 to 7, and some days none.

WESTERN AUSTRALIAN RAILWAYS.—Western Australia had 2,854 miles of government railway in operation at the close of June, 1913. The cost of construction and equipment to the same date amounted to \$71,580,000. Branches were opened in many directions between 1908 and 1914. The object of these lines is to develop new country, and several additional spurs are in course of construction. The government of Western Australia has its finances well in hand, and while the government railways have undoubtedly given a great impetus to Western Australian industries, they have not been a source of embarrassment to the Western Australian treasury.—*Engineering*, London.

The Unnecessary Movement of Empty Freight Cars

Committee Report of the General Superintendents' Association of Chicago on the Proper Handling of Equipment

The General Superintendents' Association of Chicago early this year appointed a Committee on the Promotion of the Proper Handling of Equipment, consisting of E. E. Betts, superintendent of transportation of the Chicago & North Western, chairman; W. E. Beecham, car accountant, Chicago, Milwaukee & St. Paul; F. C. Batchelder, president, Baltimore & Ohio Chicago Terminal; E. H. DeGroot, Jr., superintendent of transportation, Chicago & Eastern Illinois; L. M. Betts, car accountant, Belt Railway of Chicago, and F. C. Schultz, chief interchange inspector, Chicago Car Interchange Bureau, to investigate the unnecessary movement of empty cars within the Chicago terminal district, with reference to good order empty foreign cars seeking a home route, cars delivered in bad order to fill orders for loading, and bad order empty cars seeking a home route. The committee has made a thorough study of the situation, and has issued a series of bulletins to members of the association, giving detailed statements of cars which it considered had been improperly handled, with the idea that giving publicity to the conditions found would result in an improvement. The committee also submitted a number of recommendations.

A special meeting of mechanical and transportation department representatives of all Chicago lines was held by the General Superintendents' Association on June 2, and the committee submitted the results of its investigation in a report. An abstract of this report is as follows:

REPORT OF COMMITTEE ON PROPER HANDLING OF EQUIPMENT

It is generally admitted that the present practice for handling foreign cars by the transportation and mechanical departments results in great economic losses to the railroads. Under the present practice of using cars regardless of ownership it is of common occurrence that their absence from home lines is indefinitely prolonged. They run without proper mechanical attention from one road to another, their condition growing steadily worse until they become a menace to the safety of trains and dangerous to life and limb. They are then taken out of service. They may be patched up and sent limping home for the owner to rebuild or destroy, or, perhaps, that is done by the road having the old worn-out cripple in possession when it finally lies down and can go no further, but in any event the results are the same—the owner pays the bill and is most injured by the practice of neglect.

Some of the bad results directly chargeable to the failure to keep cars in repair are shown in the increase in per diem expenses and empty mileage and in operating expenses, but undoubtedly the worst features are mechanical, the results of which fall on the owner. He cannot secure the return of his cars that he may keep them in repair, even though he is able and disposed to do so himself, and others will not do that for him. He stands helplessly by, sees his property depreciating physically day by day, its serviceability decreasing, and its life shortened by a practice he himself is a party to but is powerless to stop.

A car absent from the home line, we will say six years (and that is not unusual), becomes afflicted with old defects, some of them owners' defects, others users' defects. The car is finally taken out of service, and is then offered in interchange to a road which is known in our parlance as the "home route." The home route line rejects the car on account of its condition, and, pending a settlement of the question as to who is responsible for its condition and should make the repairs, it is held at the interchange point until the per diem accruing thereon is frequently many times greater than the cost of the repairs would amount to.

In other cases, especially in large terminals like Chicago, the

failure to inspect and properly repair cars, and the attempt to pass them from one road to another in defective condition, creates a heavy terminal expense where belt lines are used as intermediate links, and greatly increases the per diem earnings of idle and unserviceable cars.

The failure to keep cars in repair applies to all railroads in greater or less degrees. Probably no railroad is free from that charge. In some cases it is undoubtedly a studied policy; in others it is chargeable to a lack of facilities, indifference and carelessness of employees, and various other reasons, but in our judgment under any and all circumstances it is a mistaken policy, because the interests of railroads are linked together in this proposition so that what injuriously affects one injuriously affects all.

One of the fundamental principles of the Master Car Builders' rules is that, "Each railway company must give to foreign cars, while on its line, the same care as to inspection, oiling, packing, adjusting brakes and repairs that it gives to its own cars." This virtually makes the attention which a road gives to its own cars the standard for the attention it should give to foreign cars.

If this may be taken as a declaration of principles, it is open to construction by the individual, and is, therefore, of little or no value for the government of such interests as are combined in this proposition, and which the Master Car Builders' Association is supposed to protect and to properly provide for.

The Master Car Builders' rules make owners responsible for, and therefore chargeable with, the repairs to their cars necessitated by ordinary wear and tear in fair service, so that defect cards will not be required for any defects thus arising, and, if we are able to construe this rule properly, it is based on the idea that cars afflicted with defects that owners are responsible for may be returned to the owners for repair, and here we believe is the cause of all our difficulties where the mechanical department is involved, because it virtually permits railroads to avoid making repairs to cars and permits them to be sent home for that purpose. We believe this to be a fatal defect in the Master Car Builders' rules.

We now reach the point where in theory a given rule is just and equitable, while in actual practice the rule works a hardship and economic loss. Theoretically the M. C. B. rules contemplate the proximity of car owners' connections with the line to which a loaded car is last delivered. Therefore, when a car is made empty under such circumstances, the car is to be returned in practically the same condition in which it was originally received.

Box cars are loaded promiscuously by railroads which have no direct connections at Chicago. When they enter the Chicago territory, they are pooled, loaded anywhere and everywhere and their absence from owners covers long periods. Result—The cars lose the channels of "home" (no short-routing being permitted) except by circuitous routes resulting in excess mileage and the handling lines are unwilling to repair them, each railroad basing its justification for the refusal to repair cars upon the short period the cars are in its possession.

In large terminals like Chicago, some one should have arbitrary power to schedule cars for repairs under Rule 120 and check up to see that they are properly made—then the theory and practice under M. C. B. rules 1 and 120 become consistent and effective, and such box cars which have no direct connection with car owners' railroads will be repaired and placed in revenue service. Until a change is made along these lines, our difficulties will continue.

Another principle fully set forth in the Master Car Builders' rules is, that cars offered in interchange must be accepted if in

safe and serviceable condition, the receiving road to be the judge. The owners must receive their own cars, when offered home for repairs, at any point on their line, subject to the provisions of the rules. A car may be in safe condition to handle, but not be in condition for service, and here to our mind is another defect in the Master Car Builders' rules. This rule is open to criticism as being indefinite. It confers a latitude upon the receiving line which everybody recognizes as being eminently proper, as naturally the right to determine the safety and serviceability of cars to suit the receiving line rests with itself, and from that decision there can be no appeal, because this rule says in effect that, if the receiving road is satisfied to accept a car offered in interchange it has the privilege of doing so. If, for any reason, it does not wish to do so, it may refuse the car, and there the matter seems to hinge. There is no standard of principle in such a rule as that, and it can only result in endless disputes, bad delays, useless expense, and just as soon as you appeal from the decision of the receiving line you take away the right conferred by the rule, and the rule then becomes void and of no effect.

Illustrations are not wanting to show in the most emphatic manner that the amount of unnecessary mileage incurred by railroads in moving cars in an opposite direction from home in order to get them home is so enormous as to be almost beyond belief. Among the many cases which serve to emphasize the point is that of a car which was loaded for Toledo, Ohio, via the Pere Marquette and Milwaukee. The car went through to its destination, 340 miles, and when made empty it was returned to the delivering line at Milwaukee. At Toledo it was about 660 miles from an interchange point with the owners. When it returned to Milwaukee it was 1,000 miles away.

The present practice of handling empty foreign cars in an opposite direction from home instead of keeping them moving in a homeward direction according to their initials, is not justified by any requirement or necessity the railroads are called on to deal with.

If we are to secure proper and unrestricted movement of cars, and be able to employ them to their fullest extent, they must be kept in repair by the mechanical department. This seems to be a simple proposition on paper, and, inasmuch as repairs that owners are responsible for can be charged with a profit, we believe, to the road making them, the work should be done, and we can see no reason why it is not, unless the question of facilities, labor, supply of materials and other mechanical disabilities make it impossible. Where that is the case the cheapest, best and most rational thing to do before the car becomes in a dilapidated condition is to send it home direct to the owners and let them repair it, and such a car should not be made to travel two or three thousand miles in order to cover an intervening area of 100 miles or less.

The judgment of the mechanical department is accepted by the transportation department in all cases where the safety and serviceability of cars is concerned. At all interchange points rigid inspection should be maintained. Cars that are offered in interchange under load not in serviceable condition should be transferred and the empty returned to the delivering road, but if the transfer of the shipment is impracticable, some arrangement should be made to send the car through to destination, provided that it is safe, and when unloaded at destination, if it is wanted for a return load, or a load in another direction, the road using the car should make all necessary repairs, or should return it to the road it was received from to be continued in its homeward direction so that the owner may make them.

Individuals will differ as to what is or is not a serviceable condition, and for that reason if it is possible to define it, in a general way, at least, it should be done. There should be a standard of excellence for a freight car which shall govern inspection, and a matter of such vital importance to the railroads should be regulated by certain well-defined mechanical rules.

The remedy for the troubles that afflict the car supply, the handling of cars so far as the transportation department is concerned, is to be found in the movements of empty cars in a home-

ward direction by the shortest and most direct routes, the initials of the cars to be the ruling guide, no other marking, carding rules, or regulations being necessary.

RECOMMENDATIONS

The committee also offered a series of resolutions to be referred to the Master Car Builders' Association and to the special committee of 25 mechanical and transportation officers to be appointed by the president of the American Railway Association, in accordance with action taken at its recent meeting in New York. The resolutions urged that the Master Car Builders' Association considered the adoption of a standard of maintenance for all equipment offerable in interchange, and the elimination of an interpretation issued by the Master Car Builders' Association under date of January 1, 1915, in M. C. B. circular No. 16, under which, the committee declared, "loaded foreign cars may be delivered in bad order to a connection and by it hauled to destination, and eventually, regardless of the length of time, be returned empty to the delivering line, if in the same physical condition, thus defeating the intent of M. C. B. rules 1 and 2, which provide for repairs to such cars." The M. C. B. Association was also earnestly requested to take such further action as will make obligatory the handling of bad order cars strictly in accordance with the present terms of M. C. B. rules 1 and 2, and provide for the handling of bad order cars under the following principles:

Cars to be accepted in interchange, either loaded or empty, must conform to the standard of maintenance to be agreed upon.

A loaded car destined to a point within the limits of the terminal at which it is delivered, or a car which must be transferred on account of bad order (not complying with this standard of maintenance), must be accepted if safe to run and carded with Bad-Order-Return-When-Empty cards, or bad-order transfer cars, such cars to be returned empty to the delivering line.

A car not conforming to the standard of maintenance to be adopted, accepted by a receiving line and taken out on the road, must be repaired by the unloading line when empty, or returned to its owner.

Cars belonging to roads with which delivering line has no connection must not be transferred by the receiving line in order to save per diem or avoid repairs, which may be made under load, when such cars are loaded in a homeward direction.

Another resolution referring to good order foreign cars stated that a condition has arisen whereby foreign cars are not handled in accordance with the present car service rules, that under these conditions, during a slump in business, foreign cars are back-hauled thousands of miles over the various circuitous routes the cars may have traversed under load in order to finally reach their home. The American Railway Association Committee was urged to consider the revision of the present car service rules along the following lines:

All equipment, except box cars, shall be considered as special to the line owning and shall be returned to the owners in home route and a penalty applied for any misuse sufficient in amount to make the diverting of a car prohibitive.

Box cars may be loaded in a homeward direction or into home territory, regardless of the route via which they were received.

Foreign box cars belonging to a direct connection must be delivered to and received by that connection, regardless of whence they came, except cars received in switch service.

All box cars of individual ownership must be accepted by owner at any junction point offered.

Foreign box cars belonging to a road with which the holding road has no connection must be loaded for home or in a homeward direction or into home territory, regardless of whence they come, with the exception of cars received in switch service. Foreign box cars may be returned to the delivering line empty if in a homeward direction, but not otherwise.

In the event there is absolutely no loading of any kind that will take a foreign box car loaded in a homeward direction or into home territory, then provide a means whereby it may be short-routed empty.

Make a reciprocal arrangement whereby one road will haul cars for another empty and equalize on a mileage basis through the medium of some kind of a clearing house. Such an arrangement will provide that cars hauled empty will always be hauled in the right direction, instead of in the opposite direction as at the present time.

The paper and the resolutions were thoroughly discussed at the meeting, but inasmuch as the recommendations involved some radical changes in present methods and the establishment of more and better facilities for making repairs to foreign cars, it was decided to refer the matter to the general managers of the railroads entering Chicago for the purpose of taking a letter ballot. A motion was also adopted recommending the establishment of central repair shops.

As a result of the meeting and discussion, arrangements have been made with the Chicago Junction Railway to take bad order cars owned by lines not having an entrance to Chicago and repair them under M. C. B. rules at owner's expense. An agreement was also reached by which empty cars delivered to fill orders, when properly side-carded as evidence of inspection, will not be returned, but will be repaired by the receiving line, the expense to be charged to the owner, so that they can be used for loading.

SLIDE VALVE LUBRICATION ON THE BUFFALO, ROCHESTER & PITTSBURGH

Conditions attending a leak from a steam chest or a cylinder make it evident that the escaping steam carries oil in suspension, and the generally accepted theory that drops of oil from the lubricator become volatilized and widely diffused in the steam in the steam chests and cylinders thus seems to be confirmed. Accepting this as well established, what portion of the steam supplied to the steam chest touches the face of the valve, or that portion of the seat upon which the face of the valve travels? Probably only a very small percentage, and certainly the steam which does come in contact with the face of the valve and the seat carries no more oil than the much greater portion of the steam which does not come in contact with the frictional surfaces. Moreover, steam which comes in contact with the frictional surfaces probably does not deposit all the oil which it holds in suspension.

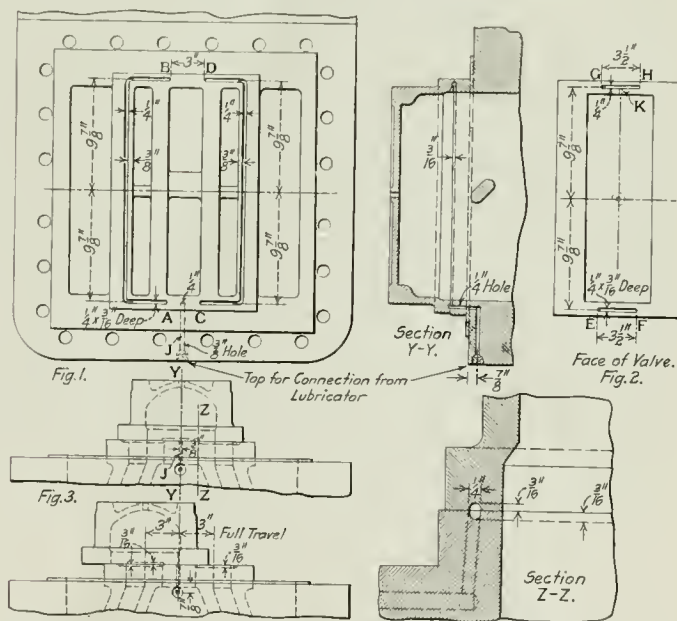
What percentage, then, of the oil supply can we believe performs the desired function of eliminating friction? Some portions of the slide valve face and seat are never exposed to the steam supply. What portion of the infinitely thin layer of oil which we assume is deposited by the steam supply in front of and behind the slide valve is drawn under the valve by its movements, to those unexposed frictional surfaces? Consideration of these questions seemed to indicate the advisability of improvement in the methods of conducting lubrication to the face and seat of slide valves, and the method described herein was devised and thoroughly tried out on the Buffalo, Rochester & Pittsburgh.

Two grooves, *AB* and *CD*, Fig. 1, were chipped in the valve seat and grooves *EF* and *GH*, Fig. 2, were chipped in the face of the valve; *K*, Fig. 2, is a small groove opening from *GH* into the exhaust cavity. With the valve in its central position, the two grooves in the valve face just overlap the ends of the grooves in the seat as shown in Fig. 3, the groove *EF* in the outer side of the valve also lapping the inlet *J* from the lubricator and thus permitting oil-charged steam from the lubricator to flow through both grooves in the seat and into the exhaust passage through grooves *GH* and *K*. The ends of the grooves are so located that communication between the lubricator and either of the grooves in the seat is cut off whenever the groove is not covered by the valve face. The face of the valve is thus brought into contact with saturated steam and oil, the richness of the mixture in oil being much greater than that obtained when the same amount of oil is introduced into the main steam supply and direct application to the frictional surfaces is obtained. Positive and regular feed is insured because

the flow of steam and oil from the lubricator is opposed only by the pressure in the exhaust cavity and by the friction in the pipes and grooves.

A Consolidation type locomotive, No. 331, with cylinders 21 in. by 28 in. and a tractive effort of 37,000 lb. was provided with this arrangement Feb. 1, 1914, and the usual opening for introducing oil into the steam chest was plugged. The engine was run with saturated steam until shopped for general repairs in January, 1915, during which period numerous test runs proved conclusively that the valves could be properly lubricated under maximum steam-chest pressure and short-travel conditions.

While heavy boiler repairs were being made, a superheater was applied to the locomotive, and on June 1 it was turned out of the shop, since when the performance, using superheated steam, has thoroughly justified the belief that this method of oil distribution would make it possible to successfully operate slide-valve locomotives using superheated steam. Up to July 27 the engine had made 5,000 miles without failure or repairs of any sort to the valves. The bearing surfaces of the valves and seats have developed a fine polish and are perfectly normal in contour. The reverse lever can be handled with the same ease as when saturated steam was used with this system of lubrication, and the engine is operated with full steam-chest pressure whenever operating conditions permit. At no time has it been difficult to hold the reverse lever by hand with the latch disengaged and the throttle wide open. The coal and water consumption show as great a reduction when compared with that of similar engines using saturated steam as was accomplished by the use of superheater locomotives equipped with piston valves.



Method of Slide Valve Lubrication in Use on the Buffalo, Rochester & Pittsburgh

During the first 1,500 miles superheat valve oil was used, but the last 3,500 miles have been run with Perfection valve oil, three pints being used during a run of 120 miles in heavy freight service. There appears to be every probability that this allowance can be materially reduced, but as yet no endeavor has been made to determine the minimum amount of oil required, although when using saturated steam it was possible to operate the engine on less oil than was allowed similar engines which were lubricated in the old way.

The steam-chest relief or vacuum valves are plugged and the engine is not provided with a drifting throttle, but in order to prevent the burning of the oil in the steam chest and cylinders and to prevent air or smoke-box gases being drawn into the cylinders, a small amount of steam is supplied through the main throttle while drifting.

This engine has been running regularly in heavy freight service, but on July 24 it hauled an excursion train consisting of

11 well-filled coaches, from Buffalo Creek to East Salamanca, a distance of 60 miles, in two hours, the grade rising 1,200 ft. in the first 40 miles of the run.

This system was developed by H. C. Woodbridge, general manager's special representative of the Buffalo, Rochester and Pittsburgh.

A NEW BRIDGE OVER THE MISSOURI RIVER AT KANSAS CITY

The Chicago, Burlington & Quincy has recently let contracts for a bridge across the Missouri river at Kansas City to replace the old Hannibal bridge, so-called because it was built by the Hannibal & St. Joseph Railway in 1869. This was the first bridge across the Missouri river. It was used for many years by the Burlington, Wabash and Rock Island as an entrance to the old Kansas City Union station, located three-quarters of a mile to the west, and is still used by these roads to reach the new Union station by way of the new Burlington connection around the bluff, south of the old station site. The old structure consisted of single track combination wood and steel through trusses on masonry piers. The superstructure was replaced by Pratt trusses in 1888, which are still in use on the original substructure, although it has been necessary to reinforce the piers extensively with iron rail bands. It is also used as a highway bridge, a plank floor being provided on the track deck and teams being allowed to cross the bridge between trains.

The new structure, which will cost about \$1,500,000, will be located adjacent to the old bridge. In fact, the south ends will coincide, the only difference in position being brought about by the fact that the new bridge will be a square crossing, while the old one makes an angle of about 15 deg., with a perpendicular to the river channel. In consequence the north end of the new bridge will be about 250 ft. up stream from the end of the old structure. There will be a 450-ft. draw span near the south side of the river with two 330-ft. fixed spans to the north, and one 120-ft. span on the south, making five waterway openings between harbor lines as against six in the old bridge. With the exception of the 120-ft. span the superstructure will consist of sub-panel through Pratt pin-connected trusses. There will be two decks, a lower one for two railroad tracks 13 ft. center to center, and an upper deck for a highway 25 ft. above the base of rail of tracks. Low iron is 26.25 ft. above standard high water and 40.53 ft. above standard low water. The clear width of the channel opening on either side of the center pier of the draw span is 200 ft. at standard low water.

The 120-ft. span south of the draw consists of a deck girder

means of a 4 deg. 30 min. curve on an embankment. The viaduct approaches are on 6½ per cent grades.

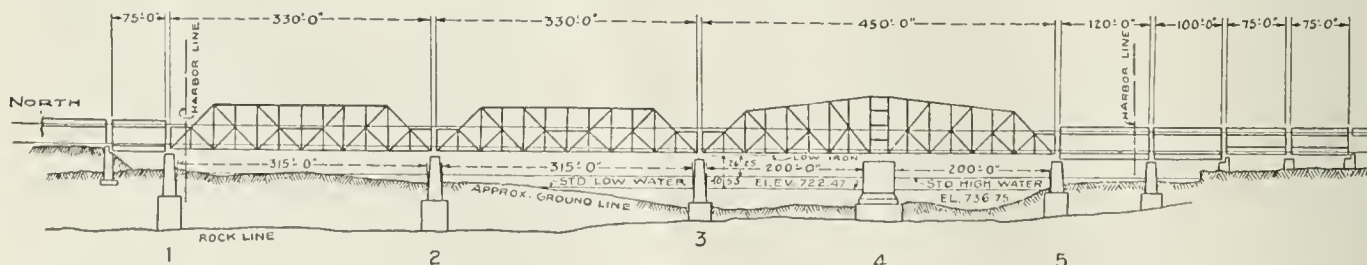
The design involves the use of high loading and high unit stresses, following the same idea as that used on the Metropolis bridge over the Ohio river. The live load on the trusses consists of two Cooper's E-90 engines followed by 7,500 lb. per ft. of track for the near track, and a uniform load of 7,500 lb. per ft. of track for the far track, except on floor, hangers and sub-diagonals, where the load is two E-90 engines on each track. The designing stresses under full dead load, live load and impact are 35,000 lb. per sq. in. for nickel steel eye-bars, 25,000 lb. per sq. in. for tension and 30,000 lb. per sq. in. for compression



Map Showing Location of Bridge

for silicon steel to be used in all main members of the truss spans other than eye-bars, and 18,000 lb. per sq. in. for medium steel to be used in all other parts of the bridge. The steel work amounts to 5,500 tons, and will be furnished by the American Bridge Company.

The piers for all of the main spans will be carried to rock, which is located from 70 to 130 ft. below the base of rail, the



Elevation of the Kansas City Bridge

span for the lower deck and a through girder span for the highway deck. South of this span there will be an approach, consisting of a 100-ft. span of the same type and two 75-ft. through girder spans for the railroad deck, as well as for the highway deck. Access to the latter will be had by means of a viaduct incline downward to a connection with Broadway. North of the bridge there is a 75-ft. approach span, consisting of deck girders for the tracks and through girders for the highway, the latter being continued on a viaduct incline downward on the east side of the railway embankment. The north railroad approach connects with the present alignment 1,300 ft. to the northeast by

surface of the rock dipping downward from south to north. Pneumatic foundations will be necessary. The substructure for the south approach will be on rock foundation, as the elevation of the rock rises rapidly south from the river bank. The north approach is located on flat river bottom and will require pile or spread foundations. The Union Bridge & Construction Company, of Kansas City, have the contract for the substructure and will commence work as soon as the present high water subsides. The design and construction of the bridge is under the direction of C. H. Carlidge, bridge engineer of the Burlington, who furnished the information given above.

Western Railways Get a Small Rate Increase

Advances Allowed on Coal, Coke, Fruit and Vegetables, Denied on Grain, Livestock and Packing House Products

The Interstate Commerce Commission handed down its opinion in the Western rate advance case on Tuesday, August 11. The report is "By the Commission." It held:

1. Proposed increased carload rates on grain and grain products considered as one commodity not justified.
2. Proposed increase from 30,000 lbs. to 40,000 lbs. in the minimum carload weight of grain products justified.
3. Proposed increased carload rates on live stock not justified.
4. Proposed increased carload rates on packing-house products and fresh meats, except as indicated between points on the Missouri River, not justified.
5. Proposed increased carload rates on fertilizer and fertilizer materials not justified.
6. Proposed increased rates on bituminous coal, except as to South Dakota points, justified. The rates on coke here proposed, which are the same as on coal, justified.
7. Proposed increased carload rates on brewers' rice and less-than-carload rates on domestic rice justified.
8. Proposed increased carload rates on broom corn not justified.
9. Proposed increased import rates and proposed increases in carload minima from Gulf ports justified.
10. Proposed increased carload rates on fruits and vegetables justified.
11. Proposed increased carload rates on hay and straw, where not in excess of Class C, justified.
12. Proposed increased any-quantity rates on cotton piece goods, and proposed increased carload rates from points in Texas, not justified.

Commissioners Daniels and Harlan filed dissenting opinions. They agreed with all the increases granted, but contended that others should have been allowed. The report of the commission, including the dissenting opinion, requires a pamphlet of about 190 pages. Following is a brief abstract of some of the more important parts of the report, the language of the commission being preserved so far as possible:

The carriers base their claims to additional revenue upon the grounds of their financial needs and the downward tendency of their net earnings in this western region and contend that commodities singled out by them to bear the proposed increases are not now carrying their equitable part of the costs of transportation.

Both of these contentions are traversed by the protestants, comprising both the state commissions of a number of the states primarily affected and individual shippers. Generally speaking, the protestants contend that the financial condition of the carriers does not warrant the proposed increase in revenue; that the last fiscal year was abnormal, both in regard to transportation and other branches of industry; and that in recent years the carriers in large measure have built up their properties to a higher standard out of operating revenues, and have thereby produced a showing which in so far as it is unfavorable is in great measure illusory. In general, it cannot be said that the protestants in the instant case have alleged that conservation of the carriers' revenues can be effected by the practice of more rigid and appropriate economies, but rather that the carriers have realized and are realizing the benefit of adequate revenues; that their real net revenues have been masked by new methods of accounting; that charging against income what is asserted to be a proper charge to capital and the practice in the past of conferring valuable concessions upon shareholders of record have resulted in an understatement of the real earnings of the carriers.

It was not asserted that the rules of the commission requiring that additions and betterments be charged to capital account were being violated, nor that the higher standards are not justifiable, but rather that the mere change from a lower to a higher standard involved increased operating expenses even under the accounting rules of the commission.

The following table is compiled as indicating roughly the annual increase in the carriers' revenue were the tariffs involved in this proceeding allowed to go into effect:

Grain and grain products	\$2,940,247
Live stock	1,500,000

Packing-house products and fresh meats	1,500,000
Hay and straw	175,000
Broom corn	31,623
Coal	1,226,122
Fruits and vegetables	134,265
Rice	42,000
Import rates	55,000
Total	\$7,604,247

For the 41 roads included in the carriers' exhibits the total freight revenues received in the fiscal year 1914 were approximately \$641,000,000. It appears, therefore, that the increases proposed in the present proceeding would fall within 2 per cent of the total freight revenue.

Inasmuch as the work of railroad valuation by the commission has not as yet sufficiently advanced to afford definite knowledge of the true value of the railroad properties involved in this proceeding, we are confronted at the outset with the problem of finding an appropriate method, if such there be, which might aid in determining the reasonableness and propriety of the proposed increased rates. It is hardly necessary to say that the duty of determining the justice and reasonableness of rates devolved by law upon the commission prior to the authorization by Congress of the work of valuation, and that the commission has been obliged to determine this issue without having available for its use authoritative valuations of the carriers' property. In approaching this problem we shall first study variations in the operating ratio for recent years. We shall next analyze the investments of carriers since 1907 and the concomitant variations in the revenue returns. Our accounting rules have been in force since that date, and the statements of additions and betterments to property and the contemporaneous revenue returns are believed to be substantially accurate. We shall thereafter analyze the variations in the carriers' revenues as compared with the book cost of their property, a procedure hitherto employed, but always with acknowledgment of the unverified character of the book cost in 1907 and the infirmity which its inclusion in subsequent figures of book cost entails. Next in order will come an analysis of such evidence as is of record with reference to valuations made by state commissions, by the carriers themselves in some instances, and by engineers who have testified in this case. Finally, before undertaking the study of increases proposed on individual commodities, we shall scrutinize the evidence bearing upon the financial experience of the carriers as regards their returns and their credit.

THE OPERATING RATIO

The operating ratio for any year, as that term is technically employed in the commission's statistics, is the ratio of that year's operating expenses to operating revenues. That there has been an increase in the operating ratio for the period 1901-1914 is incontestable. The fact is proof primarily that of every dollar in revenue received the amount remaining in the carriers' hands after charging operating expenses, taxes and rentals, is for the 26 roads approximately 20.5 cents in 1914 as against 31.3 cents in 1901.

Employing the basis of the equated traffic unit, all of the comparisons coincide in showing that the revenues received per unit show a decline in this period and that the expenses incurred per unit show an increase. Of perhaps equal significance is the fact that the percentage of variation between the showing based on the carriers' data, the protestants' data and the commission's data is slight.

The increase in expenses per equated traffic unit ranges from 0.56 mills shown by the Commission's figures to 0.62 mills and 0.63 mills shown respectively by the figures of the protestants and the carriers. We shall proceed to canvass the causes contributing to this increased cost under the following heads: Labor costs, taxes, maintenance costs, and various miscellan-

eous items, including, among others, fuel, train supplies, loss and damage claims, and injuries to persons.

Labor.—The commission has had constructed a table which indicates for the period 1901-1914 the ratio of total labor compensation to total operating revenues and to total operating expenses. The table, No. 4, is subjoined.

Year	Railroad witness Wetling, 41 roads. Ratio of labor compensation to total operating revenues. ¹ Per cent.	Commission's compilation, 19 selected roads. ²	
		Ratio of labor compensation to total operating revenues. ¹ Per cent.	Ratio of labor compensation to total operating expenses. ⁴ Per cent.
1901.....	38.2	36.5	58.5
1902.....	39.0	37.4	60.2
1903.....	41.3	³ 39.0	⁵ 62.3
1904.....	41.7	39.9	60.8
1905.....	40.8	39.5	60.5
1906.....	40.5	38.9	60.1
1907.....	40.7	39.6	60.4
1908.....	43.5	41.5	59.7
1909.....	41.6	40.3	59.3
1910.....	42.9	41.5	58.2
1911.....	43.1	41.0	57.4
1912.....	45.0	42.7	58.8
1913.....	44.2	42.4	60.3
1914.....	44.4	42.8	60.0

¹ As shown by pay rolls and thus includes certain labor compensation not chargeable to operating expenses.

² Including the Atchison; Rock Island; Alton; North Western; Burlington; St. Paul; Minneapolis & St. Louis; Katy; Missouri Pacific, and Frisco.

³ Labor compensation includes general officers.

⁴ Labor compensation excludes general officers.

⁵ Chicago, Milwaukee & St. Paul not included.

Taxes.—The amount paid in taxes by the carriers parties to this case shows a material increase as between 1901 and 1914. These amounted in the beginning of the period to about 3¼ per cent of the operating revenues, but in 1914 they absorbed over 4½ per cent.

Maintenance.—There centered around the question of the interpretation of expenses for maintenance more acute differences between the carriers and the protestants than about any or all other items of cost. While the operating expenses have progressively increased in proportion to revenues, with occasional yearly recessions, the relative increase is most marked in the matter of maintenance of equipment. The increase in the ratio of this item to total revenues seems largely traceable to the substitution of heavier locomotives and cars of steel or of steel underframe construction. Some considerable part of the increased outlay upon maintenance of equipment would appear from the testimony to be traceable to the injury occasioned by the use of the heavier steel cars in connection with the older wooden equipment.

Some of the carriers' witnesses contended that heavy repair costs were entailed by the keeping in service of old equipment which their financial condition precluded them from scrapping and replacing by new cars. But it seems not unlikely that while the transition period during which light and heavy equipment are jointly used may necessitate unusually heavy repairs, the repairs normally demanded by the heavier equipment may be larger than had been estimated when its use was projected.

Apart from the question reserved for later discussion of the carriers' practices under the Commission's accounting rules prescribed in 1907, it cannot be affirmed with any degree of certainty that the increased charges for maintenance of equipment are excessive or undue. They seem rather to be a consequence of the general tendency to introduce heavier equipment, of the contemporaneous use of equipment, old and new, and in measurable degree attributable to the carriers' interpretation of the demand for transportation facilities of greater carrying capacity and of greater tractive power than formerly in vogue.

Conclusion.—Unless material modification is required by considerations arising from changes in accounting, or considerations due to financial maladministration of certain carriers included in the groups of roads here studied, the conclusion is substantiated that the attested increase in the operating ratio since 1901 must be attributed primarily to increased costs, each operating in different degree, but practically all in the same

direction, incurred by the railroads in the handling of traffic.

The accounting rules of the Commission, it is alleged by the protestants, allow a certain latitude of construction by the carriers whereby when improvements such as reballasting or laying of new ties are made, some part thereof may be charged to operating expenses. While admitting the possibility of such practices, the moderate increase since 1907 in operating expenses under maintenance of way and structures and the few specific instances where betterments were covered by charges to operation would seem to render it unlikely that any very appreciable effect from this particular accounting practice has affected the operating ratio since that date. Similarly it was urged that car and locomotive reconstruction affords an opportunity within the Commission's accounting rules to charge what are essentially betterments to operating expenses. As indicated previously, we are of opinion that the increased cost for maintenance of equipment is mainly to be ascribed to other causes. The increase in the operating ratio has been a real and not an apparent increase, and is due mainly to augmented operating costs properly charged.

There remains to be mentioned the possibility that particular carriers by reason of financial mismanagement reflected in their operating methods have been uneconomical and wasteful in expenditure, and have thus unnecessarily increased their operating ratios. It does not appear that any uniform relationship can be traced between the present level of the operating ratios of carriers whose financial administration has been culpable and of the remaining carriers. Similarly, instances of notable increases in the operating ratio do not seem to be confined to roads such as the Rock Island or the Frisco. The negative conclusion reached in this connection is but confirmatory of the fact that the general increase in the operating ratio is traceable to deep-seated underlying causes which have affected carriers generally through increased operating costs.

It may be urged that the financial experience of carriers in this period has been that of industry generally; and unquestionably it is true that they often encounter and should be expected to encounter the same ups and downs of financial fortune as affect industry at large. A complete comparison of the relative prosperity of the carriers as against industries in general is not possible from data of record. But, there is force in the consideration that public service industries are under some disabilities from which private industries are exempt. The former may not discontinue operation even though net earnings decline or vanish; nor may they meet rising costs with as free a hand as other industries which advance their prices without the possibility of governmental restraint. Transportation, moreover, unlike many branches of manufacture or commerce, is a quasi public function, indispensable to industry generally. So long as the service is intrusted to corporate administration and the funds supplied by private investors, revenues sufficient to afford a return which will adequately remunerate the investment and secure the facilities required by the community have a justification which does not equally attach to every branch of private undertaking.

RETURN ON INVESTMENT

The rates at present under consideration may be gaged in a measure by comparing recent additions to the carriers' road and equipment with the concomitant changes in their net operating income. The only continuing inducement to invest additional capital in any line of industry is the prospect of net returns. If experience discloses that the return expected is small, the incentive to further investment will correspondingly decrease. If experience demonstrates that increased investment fails, over a term of years, to yield an increased return, the inference is either that the investment was ill judged and not calculated to serve the public, or that the price of the service has not been sufficient to allow an adequate return. The addition of increased income affords a percentage return upon increased investment which for the 41 roads in the carriers' exhibit amounts to 1.2 per cent, and for the 26 roads in the

Commission's compilation, to 0.7. It is, of course, true that the additional investments referred to have been added to or blended with the carriers' pre-existing property, and that no separate or physically distinguishable return can be traced specifically to the last \$1,000,000,000 added to road and equipment.

RETURNS ON BOOK COST OF PROPERTY

The unverifiable character of cost of property standing on the books of the carriers when the Commission's accounting rules were prescribed in 1907 has already been referred to. Subsequent outlay for specific additions and betterments as reported annually by the carriers may, in general, be accepted as more accurate. The basis of book cost, in default of the completion of the official valuation, may be employed, as it has been in the past, as a usable basis for a study of the course and tendency of the returns. The operating income less rentals shows a maximum return upon the cost of road and equipment in the fiscal year 1907. The general level for the six preceding years is higher than for the subsequent period. Roughly speaking, for the 41 roads as a whole, the level for the period 1901-1907 was approximately 5 per cent; and for the subsequent period of 1907-1914 about $4\frac{1}{4}$ per cent.

In view of the facts that the roads covered by the valuations which appear in the record are not sufficiently inclusive, and that the details of methods adopted in making the valuation are not of record, we have no sufficient evidence, taking the case as a whole, upon which to make a finding as to the fair value of the property devoted to the public service of transportation by the carriers which are here seeking an increase of rates.

The engineer of the Minnesota Railroad and Warehouse Commission testified as to value of various roads, using valuations made by several state commissions as his basis, and correcting in numerous details these valuations to accord with his own views.

Without detailed analysis of the methods of this witness, it may be said that he takes the actual market value of land without a multiplier or severance damage, in this way reducing the item of land values in Wisconsin, for example, about 45 per cent. He increases the Wisconsin depreciation of ballast from 20 per cent to 28 per cent; and likewise the Wisconsin depreciation of track laying and surfacing from 20 per cent to 32.72 per cent. For engineering and correlative labor he allows but 1.7 per cent as against 2.9 per cent allowed by the Wisconsin Tax Commission. Such items as interest during construction, organization expense, and contingencies he eliminates entirely on the ground that nothing but "actual property in existence and devoted to the public use" should be included. He likewise makes no allowance for stores and supplies or for working capital.

Without deciding here what are proper items to include in a valuation for rate-making purposes, it is evident that the methods of this witness are extreme in their rigor, resulting in every case in decreasing the valuations fixed by state commissions. We cannot accept the valuations proposed as a tenable basis for ascertaining the fair value of the roads in question.

THE FINANCIAL EVIDENCE

The progressive increase in the ruling rate of interest since 1900 has been demonstrated beyond question, and we do not deem it material to go behind the fact into the causes which have operated to bring about this increase. Railroads in common with industries generally have had to pay a rate of interest higher in 1914 than in 1907, and generally higher in 1907 than in 1900.

From the financial evidence we find that the credit of these carriers as a whole has not suffered an impairment not common to comparable industrial enterprises; that in common with other borrowers, corporate and governmental, these carriers are required to pay on the average a higher percentage than here-

tofore for the use of capital; that these carriers in common with comparable industries generally are paying higher prices for many materials and higher wages for most kinds of labor; that these carriers in meeting increased costs with increased prices for service are subject to certain disabilities not similarly encountered by many other industries; that the relatively equal depression of the carriers' credit with credit generally is not evidence of the adequacy or inadequacy of their present net revenues; that their net corporate income cannot be accepted as a measure of the adequacy or inadequacy of present rates; and that the increasing percentage of bonds to their total capital obligations indicates a growing disinclination to invest in their stocks and a growing unwillingness to accept the prospect of dividends as a sufficient incentive to assume the risks of railroad proprietorship.

From the preceding study of the trend of the operating ratio of the carriers here before us we have found that the relative profitableness of their business, taking the roads as a whole, has declined since 1901, and that the main cause effecting this result has been an increase in expenditures not offset by an increase in receipts.

GRAIN AND GRAIN PRODUCTS

By the tariffs on grain and grain products suspended in this proceeding the respondents proposed increases over current rates of equal amount on grain and the products thereof. The increases suggested are generally 1 cent per 100 lb., and apply as local and proportional rates from most of the region comprised within southwestern tariff committee and western trunk line territories. No increase is proposed in the rates from Minnesota, South Dakota, and northern Iowa to Duluth, Minneapolis, or Milwaukee. Increases are also proposed in export rates, and in the carload minimum on grain products from 30,000 to 40,000 lb. From points in defined territory in northern Iowa, southwestern Minnesota, and southeastern South Dakota to southwestern Missouri river points the increases proposed are from 2 to 4 cents per 100 lb., this excess over the general basis being intended to remove existing disparities in such rates as against rates from the same points to Chicago. The Minneapolis & St. Louis Railroad proposes tariffs establishing through rates to these southwestern Missouri river points in lieu of the existing combinations of locals, the result of which would be reductions ranging up to 4 cents per 100 lb.

The carriers have based their justification for increases upon the unity of the grain and the grain products and upon the unity of the whole territory involved. We find and conclude that they have not justified the tariffs increasing rates on grain and grain products.

An order will be entered directing the respondents to cancel the tariffs here involved proposing increased rates on grain and grain products. Such order will be without prejudice to the right of the Minneapolis & St. Louis Railroad to publish through rates to southwest Missouri River points in lieu of and lower than present combinations of locals. The carriers have justified and may establish increased rates on grain and grain products from points in northern Iowa, southwestern Minnesota, and southeastern South Dakota to Kansas City and related points reasonably and relatively conforming to rates from such points to Chicago.

LIVE STOCK

The proposed increased rates on live stock apply from points in western trunk line, trans-Missouri, and southwestern tariff committee territories, to Fort Worth, Tex., Oklahoma City, Okla., Wichita, Kans., Chicago and Peoria, Ill., and to markets on the Missouri and Mississippi rivers. From Missouri River points to Chicago, St. Paul, Peoria and St. Louis the amount of the proposed increase is generally 2.5 cents per 100 lb. In an effort to make a general rate realignment some rates are not changed, some are increased less than 2.5 cents, and a few more than 2.5 cents. The adjustment proposed makes the rates from Sioux City, Iowa, the same as from Omaha. This adjust-

ment from Sioux City would make the proposed increase in rates on cattle and on sheep in double-deck cars 1.5 cents and would reduce the rate on sheep in single-deck cars by 2.5 cents per 100 lb. From Kansas City to St. Paul no changes are proposed except on sheep in single-deck cars, on which there is an increase of 2.5 cents per 100 lb., nor are changes proposed from St. Paul to Chicago except in the rate on horses. From points in Iowa the proposed increases grade down from 2.5 cents in western Iowa to 0.7 of a cent per 100 lb. in eastern Iowa. Rates for transporting horses which have been on a per car basis, it is here proposed to conform to the normal live stock basis expressed in cents per 100 lb. Rates from interior Missouri points it is proposed to increase similarly to those from the Missouri River. From southwestern territory the increases proposed are generally 3 cents per 100 lb. on cattle, hogs and sheep, and 5 cents, or \$11.50 per car, on horses.

The rates on stock cattle moving from Texas to Oklahoma for feeding it is proposed to increase \$10 per car; to points in Kansas, \$5 per car, and other stock cattle rates it is sought to increase 5 per cent. This will average about \$5 per car. All trainload and 10-carload rates on stock cattle are, as they ought to be, eliminated.

The rates on cattle, hogs and sheep from New Orleans to points in western trunk line and trans-Missouri territories it is proposed to alter from the per car basis to the 100-lb. basis, but the change would result in practically no increase in transportation charges. No increases on live stock have as yet been obtained in intrastate rates or in rates controlled by the intrastate factors.

Taking into view our former decisions, the material modifications in the revenue statistics presented which would result from the segregation of state from interstate earnings, the relation of interstate to intrastate rates, and all the other facts of record, it is our judgment and determination that the carriers have failed to establish the propriety of the proposed increased rates on live stock.

The elimination of trainload and multiple carload rates has been justified.

PACKING-HOUSE PRODUCTS, ETC.

Claiming that market competition and other causes have tended to make present rates subnormal and that special services and costs incident to the traffic justify higher rates than the average on all commodities, the respondents have in this proceeding proposed increases in the rates on packing-house products, fresh meat, fertilizer and fertilizer materials, and green salted hides. Rates given are in cents per 100 lb. unless otherwise stated.

Packing-house products and hides usually take the same rate, and in western classification are fifth class; fresh meats are third class, and fertilizer and fertilizer material are class E. "Packing-house products," except where otherwise stated, will include hides. The proposed increases in the southwest are on a different basis from those in the remaining territory. Including the territory as a whole, increases are proposed from Ft. Worth, Tex., Oklahoma City, Okla., Wichita, Kans., from the packing plants on the Missouri River, from St. Paul and Austin, Minn., and points in Iowa to the Mississippi and Ohio rivers and to Chicago.

Generally the increase proposed is 3½ cents on both packing-house products and fresh meat; and in the proposed rates on packing-house products the fifth-class rating is usually fixed as a minimum.

Upon the whole record we are of opinion and find that the proposed rates on fresh meats and packing-house products between the Missouri River points named have been justified to the extent that they do not exceed the following, in cents per 100 lb., in carloads.

	Packing house products.	Fresh meats.
Between St. Joseph, Mo., and Kansas City, Kans.....	10	12.5
Between South Omaha, Nebr., and Kansas City, Mo.....	16	19.5
Between Sioux City, Iowa, and South Omaha, Nebr.....	10	12.5
Between Sioux City, Iowa, and Kansas City, Mo.....	20	23.5

The most of what was stated in our conclusions with respect to live stock applies to packing-house products. We must find that, with the exception which we have noted as to the rates on fresh meats and packing house products between the Missouri River points, the proposed increases on packing-house products, fresh meats, hides and fertilizers, have not been justified.

COAL AND COKE

It is proposed by tariffs under suspension to increase the rates on bituminous coal from mines in Indiana, Illinois, Kentucky, Alabama, Missouri, Arkansas, Oklahoma, Kansas, Colorado, New Mexico and Iowa, and from the docks on Lakes Michigan and Superior when shipped to points in western trunk line and southwestern tariff committee territories. Some reductions are proposed and the increases are either 5 or 10 cents per ton. The increased revenue is 5.36 per cent of the present revenue on bituminous coal.

From the facts of record we are of opinion and find that, with the exception of rates on coal to points in South Dakota, the proposed increased rates on coal have been justified, and the orders of suspension relating thereto will be vacated.

RICE

The carriers propose increases on both domestic and imported brewers' rice from the Gulf ports and Louisiana, Texas, and Arkansas rate points to basing points on the Missouri, Mississippi and Ohio rivers, and to the interior cities, to which the rates are made on these basing points, continuing the present minimum of 40,000 lb. The increases in the domestic rates range from one-half to 10½ cents, while those on import rates are generally 5 cents per 100 lb.

We are of opinion and find that the rate proposed on brewers' rice in the tariffs under suspension have been justified. The question of the proper relationship between the import and the domestic rates is, however, before us in another proceeding.

Clean rice. The proposed increases are in the less-than-carload rates from Arkansas, Louisiana and Texas points to the Mississippi river and Ohio river crossings, to Chicago and points basing thereon, to Missouri river points and stations west, including Utah common points and Colorado common points; to the Southeastern territory, omitting New Orleans as a point of origin; also from Arkansas to certain stations in New Mexico. The class rates resulting from this cancellation represent increases which range from 7 cents to 62 cents per 100 lbs.

We are of opinion and find that the respondents have justified the proposed cancellation of the existing less-than-carload commodity rates on clean rice, and an order will be issued vacating the suspension of those cancellations.

BROOM CORN

The rates proposed in this proceeding are generally 5 cents per 100 lbs in excess of the existing rates, with the third class as a maximum. No increase is proposed between Kansas points and the Missouri river. We are of the opinion and find that proposed rates upon broom corn under suspension have not been justified.

IMPORT RATES

The tariffs here involved contain import rates from the Gulf ports of Pensacola, Mobile, Gulfport, New Orleans, Port Arthur and Galveston. While rates on some other commodities are sought to be increased, no opposition was offered to the tariffs increasing these import rates except as to those tariffs proposing increases in the rates on fuller's earth and fertilizer materials.

We are of the opinion and so find that the carriers have justified the increased import rates and the higher minimum carloads, and an order vacating the suspension thereof will be entered.

FRUITS AND VEGETABLES

The carriers propose to increase their carload rates upon fruits and vegetables from various producing points in the state of Texas to numerous destinations in other states.

The proposed rates applicable on berries, grapes, peaches, pears, plums, melons, vegetables, cabbage and potatoes have been justified.

In the foregoing discussion of the fruit and vegetable rates from Texas we have named only those articles which constitute the larger part of the movement, but we are to be understood as also giving our approval to the proposed rates when applied to the other produce now taking the same rates as the articles mentioned in this report.

HAY

The increase proposed in the rates upon hay is generally 2 cents per 100 lbs., observing class C as a maximum, but no increases are proposed from Kansas points to the Missouri river. From Iowa and Missouri the present increase is approximately from 1 to 1½ cents. From Nebraska, from Kansas where increases are made, and from Oklahoma, the proposed rates are 2 cents in excess of those existing, although this does not bring them up to class C, while from Iowa and Missouri they are on a class C basis.

We are of the opinion and find that the rates on hay proposed in the tariffs under suspension, save for specified exceptions, have been shown to be reasonable, and an order will issue vacating their suspension. Wherever the rates in the suspended tariffs exceed class C, we shall require that they be canceled by the respondents, who may, if they so desire, in such instances file new tariffs wherein the rates on hay and straw shall not exceed class C.

COTTON PIECE GOODS

Upon the whole record we are of the opinion, and find, that the proposed increased rates on cotton piece goods and on sheets and pillowcases from Texas points have not been justified, and the suspended schedules must be canceled.

COMMISSIONER DANIEL'S OPINION

Commissioner Daniel's dissenting opinion covered about 27 pages of the printed report, and the following abstract therefore is extremely brief, consisting mainly of typical paragraphs lifted from the opinion:

In the essential outcome of the majority's report I am unable to concur, believing that on the record the carriers have in general sustained the burden of proof cast upon them by the statute and are of right entitled to increases in rates productive of revenue far in excess of what they are accorded by this decision.

While it is nowhere explicitly stated in the majority report, I am unable to escape the conviction that the reluctance to find that increased rates have been more generally justified is largely rooted in an unwillingness to find that the revenues of the carriers as a whole are smaller than is demanded in the public interest, and also in the belief that the financial exigencies of many of the carriers are traceable to financial maladministration, and that if due economy and integrity had been uniformly observed the difficulty over the attested decline in revenues would have been readily surmounted.

Among the particular carriers involved in this proceeding the Rock Island and the Frisco have recently attained unenviable notoriety by reason of financial mismanagement and other roads parties hereto, such as the Alton, have in the past been wrecked or plundered. There can be no question of these facts. There can be nothing said in extenuation or mitigation of them. And it has therefore resulted that a widespread disbelief exists in the general integrity of railroad management, and that a skeptical attitude has been assumed by many toward the plea advanced that railroad earnings are inadequate and that increased rates are warranted.

It would, nevertheless appear that, while the severest condemnation of these practices should suffer no particle of abatement, the time had at least come to take a discriminating view of the effect of refusing rate increases otherwise just and reasonable because of a widespread resentment as evils perpetuated in the past by dishonest or designing railroad officers or their

allied financiers. Such a policy visits in large measure the same penalty upon the proprietors of a railway conducted with integrity and honesty as upon the luckless shareholders of a looted road. In either case those who suffer from its effects are not those who have profited by the wrongs perpetrated in the past. It is therefore suggested that the appropriate remedy is the prosecution and punishment of the individual offenders, not the continued withholding of adequate rates to the carriers as a whole. In bank management this distinction has in large measure been recognized. The bank official who misapplies or misappropriates funds can do so only under the shadow of the penitentiary. But because there have been numerous instances of banking defalcations, no one would seriously suggest that banks generally should be prevented by law from raising the rate of discount in case competitive conditions warrant. Similarly in considering propositions involving more or less general increases of rates, the question should be judged in the light of the evidence of the adequacy or inadequacy of the carriers' revenues as a whole, and in the light of the reasonableness or unreasonableness of the particular rates proposed, and neither prejudged nor complicated by considerations of individual instances of corporate mismanagement.

The majority report in the instant case, despite the more unfavorable showing made by the Western roads, contents itself with finding that—

the relative profitableness of their business, taking the roads as a whole, has declined since 1901, and that the main cause effecting this result has been an increase in expenditure not offset by an increase in receipts.

Upon a far stronger showing in the instant case the majority report, instead of finding that the carriers' net operating income as a whole "is smaller than is demanded in the public interest," commits itself only to the proposition that the showing of "operating results and financial conditions of respondents" is "considered," and that certain particular increases are or are not justified. In view of the fact that one of the principal contentions, if not the principal contention, in the case was the general inadequacy of the carriers' revenue as a whole, and in view of the fact that the statute requires that whenever an investigation shall be made, it shall be the duty of the commission to report thereon, stating its conclusions, it would seem to be appropriate to enunciate a conclusion upon the question of sufficiency of revenue. The public and the parties to the case are entitled to a clear, unmistakable finding upon this matter.

There are certain additional considerations in the present case which strengthen the conclusion that a finding of inadequacy of operating income is alone consistent either with the pronouncement in the Five Per Cent Case or the facts of record herein. The aggregate freight advances there proposed were estimated to yield approximately \$50,000,000 per annum additional revenue, or about 5 per cent of the total freight revenue. The increases ultimately permitted are estimated to amount to 50 or 60 per cent of that amount. The total increase in freight rates sought in the present case falls below \$10,000,000 annually and amounts to approximately 1.2 per cent of the total freight revenues. Even with the increases asked for in other related proceedings, the total increase in revenue sought would fall within 2 per cent of the total freight revenues for 1914. In other words, the aggregate increase in freight revenue would be both absolutely and relatively far below the increases proposed in the Five Per Cent Case.

Upon the showing of record in this case as outlined in the majority report, and in the light of what was done in the *Five Per Cent* case, it seems to me impossible to avoid the conclusion that the carriers before us have, as a whole, abundantly demonstrated that their operating income is smaller than is demanded in the public interest; and equally impossible to escape the conclusion that the interstate rates should upon proper showing, be increased and that appropriate changes, if required, in state rates, should be made subsequently.

Findings on Miscellaneous Commodities—As indicated in the majority report, the increase in annual revenue estimated to

accrue, if the proposed rates were justified, amounted to \$7,604,247. The four principal contributors to this amount were (1) grain and grain products, (2) live stock, (3) packing-house products, (4) coal. These four were estimated to yield \$7,166,000, approximately, out of a total of \$7,604,247. The miscellany of minor articles was estimated as capable of yielding but \$438,000 in the aggregate. It is therefore apparent that if a substantial increase in revenue were to be obtained, it would have to come principally from the four major contributors. On only one of the four, and that the smallest, are increased rates found justified by the majority report, and even here only a part, although the greater part, of the proposed increase is accorded. Increased rates are not found justified on all of the minor commodities, broom corn and cotton piece goods being instances in point. The aggregate increases of revenue permitted under the majority report will hardly exceed \$1,600,000, or about one-fourth of 1 per cent of the total freight revenue of these carriers for 1914.

In so far as the majority report finds justified the increased rates on coal, hay and straw, fruits and vegetables, rice, and on certain miscellaneous imported goods, I concur therein, not only on the grounds cited in the majority report, but also upon the ground of the attested inadequacy of the carriers' revenue. I also concur in the finding on broom corn the proposed increased rates are not justified.

In the matter of grain and grain products, it is evident on the record that, taking grain products alone, the proposed increase of 1 cent per hundred pounds is amply justified. The products do not load much more than half as heavily as the grain. The tare weight carried is practically twice as great. The car earnings for the same length of haul are about one-half as great on the product as on the grain. The case presented for the increased rate on grain is more doubtful.

The proposed increase on cotton piece goods appears to me to be justified. The record established that their value per ton is approximately \$600 and that in certain instances they are more valuable than many commodities which take the first-class rate. The increases on cotton piece goods as between various points may be out of harmony with each other, and on that ground their denial may fall within the flexible limit of judgment which belongs to the power to fix rates. But the total increase in revenue to be derived from this increase is not of record, and may not be very material in the aggregate. In the case of live stock and the products thereof the reverse is true. The revenue that the increases would produce is estimated at \$3,000,000 annually, and the principle on which these are denied seems to me to be a novel and a dangerous departure from the established procedure of the commission. Their denial seems to me also to be unwarranted upon the facts of record.

Rates on Live Stock.—It is submitted that these comparisons confirm the accuracy of the conclusion that the present effective rates on live stock are too low.

The majority opinion, however, denies the increase proposed, not specifically because the respondents have failed to meet "the burden of proof to show that the * * * proposed increased rate is just and reasonable," but upon the ground as stated in the opinion of the majority that:

Protestants claim that a large proportion of all live stock here in question moves on state-made rates or on rates controlled by state rates. They further claim that state rates on live stock are generally much more below the level of the interstate rates on live stock than rates on almost any other commodity, averaging perhaps 30 per cent. less. There may be differences of opinion regarding the exact figures, but no one has questioned the correctness of these allegations. Herein is found an important fact which doubtless modifies the surface indications of the above tables very materially. There is no claim made here that the interstate rates on live stock are not adequately remunerative, but rather that the revenues derived both from intrastate and interstate traffic are inadequate.

This novel contention put forward as a reason of denying the increases here sought does not seem to comport with the record

or with the principles frequently announced and hitherto uniformly adhered to by the commission.

Interstate and Intrastate Rates.—It may be conceded that some intrastate rates are lower than some interstate rates, and possibly as to some intrastate rates the expressed opinion of protestants' witness that they are "too low" is correct. But upon this record it can not be affirmed that all intrastate rates, or an average thereof, are generally below interstate rates, and it seems to be conclusively proved that the estimate that 50 per cent of the live stock move on intrastate rates is far from accurate.

But even if the record furnished full and sufficient evidence in support of the allegations which are adopted as the basis of the conclusion of the majority, I could not concur in the holding that the existence of lower intrastate rates requires the commission to condemn increased interstate rates otherwise shown to be just and reasonable. It is true that this commission has always given consideration to state rates. We make comparisons between rates, state and interstate, for the purpose of deciding the question of the reasonableness of rates under investigation. We may condemn an interstate rate which from a comparison with intrastate rates voluntarily maintained by the carriers appears to be unjust and unreasonable, but in so doing we condemn the rate because it is unjust and unreasonable.

What the majority proposes to do is to deny increases in interstate rates because lower intrastate rates have not been increased and that in a case in which it is shown that applications for increases in certain state rates are pending. It is to be assumed that state tribunals will do their duty, and that if state rates are too low, they will permit them to be increased. Should these state tribunals fail to act, then in a formal complaint where the issue is directly presented and where the states may, if they choose, be heard, this commission has the authority and duty to require the removal of any undue discrimination against interstate commerce that may be shown, and in doing so the commission is not bound to reduce interstate rates "below what it may deem to be a proper standard fair to the carrier and to the public."

Inadequacy of Revenues.—I am individually of opinion that our duty in the present case requires us in frankness to make a finding upon the general issue of the alleged inadequacy of the revenues of the carriers collectively. The carriers, the protestants, and the country are entitled to know the conclusion of the Commission upon this point, and not to be left with a confusing mass of detailed evidence and isolated conclusions upon single matters involved therein. The three previous general rate advance cases have unquestionably held that the Commission may make a finding upon this general question and may employ such a finding to determine, in connection with other relevant testimony, the justice and propriety of permitting particular increased rates to become effective. In the present case the general issue is simply not met, and in passing upon particular rates proposed to be increased a novel doctrine is for the first time invoked to disallow increased rates save where the specific evidence relating thereto makes a refusal manifestly impossible. The failure to follow established premises to their legitimate conclusion only beclouds the principles upon which the Commission may be expected to act in future and leaves nothing certain but uncertainty.

In the matter of rate regulation and fixation we have reached a point where one of two courses ought deliberately to be chosen and clearly announced. If, despite increased costs not offset by increased revenue, increases in rates are to be denied, except where in individual instances gross injustice would be occasioned by their denial, the carriers ought to be apprised of this policy, so that they may set their house in order, if they can, against such a situation. If, on the other hand, we are to acknowledge in general, what we are perforce compelled to admit in detail, just and reasonable increased rates should be permitted not grudgingly, but with such fair measure of allowance as will indicate that the transportation industry is

General News Department

The shop of the Northern Pacific at Livingston, Mont., is running full time for the first time since 1909.

On the 30th of July 31,189 tons of coal were loaded into vessels over the docks of the Baltimore & Ohio at Lorain, Ohio, believed to be a record tonnage handled by one machine.

The Vandalia, the Chicago & Eastern Illinois, the Central Indiana, the Evansville & Indianapolis and the Terre Haute, Indianapolis & Eastern have posted notices informing their employees that they have rejected the provisions of the Indiana workmen's compensation law.

The Georgia legislature, after long discussion, has passed the bill to establish a commission to attend to the leasing of the State-owned railroad, the Western & Atlantic, from the time when the present lease expires, which will be about four years hence. The governor is to be a member of the commission.

The board of arbitration which last spring decided the controversy between the western railroads and their engineers and firemen, regarding wages and conditions of employment, has been asked to reconvene to decide disputed points in its award. Both the Conference Committee of Managers and the officers of the brotherhoods have formulated their interpretations of the award, and there are many points of disagreement.

The five larger railroad brotherhoods held a meeting at Altoona, Pa., last Sunday, at which, it is said, one thousand members were present, the chief business being, according to the reports, a discussion as to how best to secure the election to the next legislatures of men favorable to the bills which the brotherhoods desire to have passed. Another large brotherhood meeting is scheduled to be held in Pittsburgh, August 29.

The cause of the derailment of a Denver & Rio Grande fast passenger train at Springville, Utah, on August 2, has been cleared up by the surrender of one Harry G. Hontz, apparently insane. He confesses to the burning of a station at Ulster, Pa., and to the wrecking of signals on the Southern Pacific. A special agent of the Denver & Rio Grande identifies the man as one who had been arrested for wrecking a signal and who was accused of causing a speeder to wreck a mail train.

Mr. McCrea, General Manager of the Long Island Railroad, thinks that the public has actually heeded the railroad's persistent warnings to cross tracks with care. There has been no serious accident at a crossing for sixty days—the days of the heaviest automobile traffic on Long Island during the year. But one person has been injured in these two months, and that only to the extent of a broken arm. But there has been an appalling number of "near-accidents," and he thinks that certain crossings will never be safe unless the gates are kept down and only raised when a vehicle is to cross, or unless wayfarers are required to come to a full stop before passing over the tracks.

In the first six months of 1915 the Pennsylvania Railroad made about 2,000,000 efficiency tests, and 99.9 per cent. of them showed perfect observance of all rules. Over 10,000 tests were made with signals set at stop, and in only 13 cases did the trains fail to stop before passing the signal by so much as a foot. The number of employees killed in the first six months of 1915 was 28½ per cent. less than in the corresponding period of last year—85 this year, 119 last year. This, it is said, was not due to a heavy decrease in train mileage, as passenger train miles were only 6 per cent., and freight train miles 8 per cent. less than in 1914. No passenger has been killed in a train accident on the Pennsylvania since 1912.

Valuation Hearing

The Interstate Commerce Commission will sit in Washington September 30, October 1 and 2, to hear oral argument upon the fundamental principles involved in the work of making valuation of the property of common carriers. It will hear argument on

all questions that may be deemed appropriate to be considered as arising under the valuation act. Representatives of state commissions, as well as the carriers, may participate in the argument, and all parties in interest will be allowed to file briefs.

Railroads in War

The Bureau of Railway Economics has just completed the compilation of a bibliography on the use of railways in war, which should be valuable to anyone interested in determining the magnitude of the influence of railway communication upon modern methods of warfare. The compilation is particularly valuable for the reason that in the case of most countries studies upon this subject are of a more or less ephemeral nature. For this reason the literature is very largely confined to articles in periodical publications, pamphlets, official reports and regulations, etc., which ordinarily are difficult to locate outside of the most comprehensive libraries. Following its usual custom in lists of references of this sort, the bureau gives all available information as to author, language, date and place of publication and reference to the library where the publication may be found.

The list is divided for convenience of reference. A "general" head covers nearly one-half of the references. The remaining part covers the United States Civil war, 1861-1865; Franco-Prussian war, 1870-1871; South African war, 1900-1901; Russo-Japanese war, 1904-1905; European war, 1914-1915; wars in Mexico; wars in the Philippine Islands. To the list of articles having special relation to railway service and arrangements in these several wars are added lists of articles on "Armored Trains" and "Hospital Trains." The references cover upwards of 300 treatises in English, French, German, Spanish and Italian. There are, however, some duplications covering in whole or in part translations into English of articles originally appearing in another language.

A Nineteenth Century Superintendent

[B. A. Porter, in Illinois Central Magazine]

Long years ago, to be exact, in the year of our Lord 1884, Superintendent Frye disembarked from Train No. 6 at Okolona, Miss., a division terminal on the Mobile & Ohio. This was our new superintendent's maiden trip. * * * It required about one minute for the aforesaid Frye to introduce himself to Agent Allen, Chief Clerk Cox, Yardmaster Brown, and the other fifteen or twenty lesser lights who helped to run up an unnecessarily heavy pay roll at this important station.

Superintendent Frye spent three hours on this trip, and if ever a station and yard and roundhouse organization got a trimming Okolona did on this fatal day. I got a promotion. When Frye landed we had a nice "kid" organization. Billie Griffin, messenger boy; Scrap Morris, caller; Skinny Porter, car checker. When Frye left Skinny Porter was assistant chief clerk and had assigned to him the duty of delivering messages, calling crews and checking cars, and to his salary of \$30 there was added \$15, which had formerly been paid to Operator Scales by the government because the negro porter took the maximum and minimum temperature and rainfall; for this increase the new assistant chief clerk was to be on hand at 2:47 a.m. to ticket an early morning train and check baggage.

Mr. Frye also pointed out the fact that there were enough links and pins scattered around the yard to last us nearly a year; that the ink on hand would run the auditor's office for one year; that the stationery would supply Mobile, Meridian and Cairo for one-half year, that we had three warehouse and two cotton trucks more than were needed; that the water tank had been running over for two hours, the pump still running, and the pumper asleep; pointed out many other unnecessary expenses, and wound up his short stay by stopping two truckers and weighing their load of inbound freight with the result that 220 pounds moving on a 72c. rate was added to the revenues.

After Frye left the "kid" organization held a called session. Billie Griffin and Scrap Morris voted "strike"; Skinny Porter, stuck on his new position as assistant chief clerk, voted not to tie the road up, and as a result lost one tooth and had one eye blackened for being a traitor.

Twenty-five years healed this breach and the last time the aforesaid Porter visited his early haunts, Attorney Griffin in a \$5,000 touring car took him for a ride and pointed out his 3,000-acre prairie plantation, and also the handsome residence of Dr. Morris, who was away for the summer in Canada.

The assistant chief clerk, no longer "Skinney," as his belt measure is now 46, plods away and thinks of Frye every day.

Superintendent Frye was correct so far as the necessity for economy was concerned, but in the application of the plan there was no permanent upbuild, such as we have on our line under the present management. Under his system there was no investigation to determine the needs; things were seen to be wrong and instant one or more employees lost out. No one dared to think and suggest; everyone lived in dread as to what would befall him next. The constant desire which is now shown on the part of 90 per cent. of our employees to want to help make everything just a little better, the pride we feel for working for what we believe to be the best railroad in the world, was lacking. No appeal to pride, no co-operation. * * *

The Erie Flood

The flood at Erie, Pa., on the afternoon and evening of August 4 in which, because of the breaking of a dam, about thirty persons in the city were drowned, is said to have caused a longer interruption in railroad service through that city than had been occasioned by a flood before in twenty years or more. The interruption of train service, however, was important more by reason of the magnitude of the traffic—the immense through passenger business of the Lake Shore four-track line and the heavy freight movement over the New York, Chicago & St. Louis—than by the length of time that it took to restore the track—which was only about ten hours. However, this was but a single track, and the restoration of normal passenger service took about eighteen hours, and of the Nickel Plate tracks more than 24 hours. This road had a washout about 300 ft. long, where it was necessary to build a trestle. The Lake Shore had only one serious washout; this was three miles east of Erie, and was about 60 ft. long and 12 ft. deep. Water ran over the tracks for several hours. Traffic was stopped at 8 p. m.; the roadway department was able to begin work about 1 a. m., and trains were put through at 6 a. m. Trains were detained for about 12 hours. The Twentieth Century Limited went through Detroit for the first time. Neither road had any derailments. At French street, Erie, a two-story house, carried off its foundation by the flood, lodged close to the Lake Shore tracks but no serious harm was done to the railway.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Hartman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 8 W. 40th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.
- AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION.—H. G. McConaughy, 165 Broadway, New York. Meetings with American Electric Railway Association.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichy, C. & N. W., Chicago. Next convention, October 19-21, 1915, Detroit, Mich.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual meeting, October, 1915.
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.
- MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May. Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.
- RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.
- RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenbergh, Myers Bldg., Bethlehem, Pa. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 14-16, 1915, Chicago.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, October 19-21, Colorado Springs, Colo.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.—John J. Kaufmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Hotel Astor, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-10, 1915, Chicago.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Koh, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The Baltimore & Ohio has opened a new freight station in Brooklyn, N. Y., with 200 feet water frontage.

Formal announcement is made of the discontinuance of service by the Pacific Mail Steamship Company on November 2. On that date the company will withdraw its five liners. It is reported that they have been sold to a Chinese syndicate.

During the month of June, 1915, the principal fast freight trains run by the New York Central lines between New York and Chicago arrived on time every day, making a perfect record. The record for the month of July was almost as good, but one delay being recorded, and that only 30 minutes.

The forty-third annual convention of the Traveling Passenger Agents' Association is to be held at Boston on October 4 and 5. Special trains will be run over the Michigan Central from Chicago to Niagara Falls, and the Cleveland, Cincinnati, Chicago & St. Louis from St. Louis and Cincinnati to Niagara Falls, thence over the New York Central and the Boston & Albany to Boston.

George Niedringhaus, of St. Louis, announces that definite plans for a \$3,000,000 by-product coke plant, using Illinois coal, will be made public in the near future. Upon this basis the St. Louis Republic urges the construction of docks and terminals for the utilization of the 8 ft. channel of the Mississippi river, with a view to assuring the future of the city as a steel center.

The Pennsylvania Railroad announces that direct through cars will henceforth be run daily from New York City freight stations to all of the more important cities in the Northwest, in the Missouri river territory and in the Southwest, regardless of the quantity of freight offered. Heretofore small consignments to far Western points have been transferred at various junction points en route.

The Nashville, Chattanooga & St. Louis has a new demonstration and lecture car, and with it the Industrial Department of the road has made a tour through the Sequatchie Valley where, during three days, over 2,500 farmers and their wives and children were entertained with stereopticon views and lectures on farm topics, improved agricultural methods, and better livestock. It is proposed to put on the car a motion picture machine to show motion pictures of farm scenes along the road.

Under the direction of the Industrial Department the car is making a tour of the Shelbyville and Sparta branches this week. In this work the road has the co-operation of the agricultural and dairy experts from the University of Tennessee. To aid in the introduction of pure-bred cattle on the farms along its road, this company has bought a herd of shorthorn cattle from a famous breeder, eighteen cows and heifers and four bulls. These animals are descended from stock imported from England, and are said to be recognized as the best breed for beef and milking purposes.

Passengers traveling in chair coaches on the Missouri Pacific-Iron Mountain may now have a light lunch served to them in their seats without the necessity of going into the dining car. This is a recent innovation and, according to officers of the road, is proving popular. A waiter from the dining car passes through the train during meal hours to take orders. This service is in effect on all trains that have dining cars, buffet or parlor-cafe cars. Freight and passenger service have been resumed on the National Railway of Mexico, between Laredo, Tex., and Monterey, Mex., after a suspension of 15 months.

The Southern Pacific now takes canned goods, beans, asphalt and barley from San Francisco and other California ports to New York at 40 cents per 100 lb.; this by rail to Galveston and thence by steamship. The rate applies only to shipments of at least 40 tons. The road has applied to the Interstate Commerce Commission for authority to make the same rate on oats, wheat and rice, with the same minimum. Between the same points the company takes dried fruit in boxes, minimum 30 tons, at 60 cents, and in sacks at 80 cents; and has asked for authority

to make lower rates on wine and alfalfa meal; wine 45 cents and alfalfa meal 50 cents; minimum, in both cases, 30 tons.

The principal railways of Canada, at the suggestion of the Railway Commission, have made a specially low rate—50 cents a ton for any distance up to 50 miles—for gravel in carloads for cities and towns, to be used in roadmaking. The request for a low rate came originally from Western Ontario, J. B. Armstrong, a member of Parliament, making the request of the Railway Commission that a low rate be ordered by the government. Chief Commissioner Drayton reminded the applicants that the commission could not justly require a railway to establish unremunerative rates, or any rate unfairly out of line with a basis high enough to maintain a satisfactory railway service.

Judge Elliott in the Maryland Court, at Baltimore, August 7, denied the application of the Baltimore & Ohio for an injunction restraining the Public Service Commission of the State from enforcing its order requiring the road to continue in use certain season tickets, which are declared by the road to be unprofitable. Of a number of commutation rate questions presented before the Commission recently several were decided in favor of the road and others against it. Judge Elliott held that the public should have the benefit of the lower rates until the Public Service Commission could present further facts and arguments, the question to be left open until the court should be in a position to issue or refuse to issue a permanent injunction.

Ohio coal operators are carrying on before the state commission a contest for the reduction of freight rates. A few weeks ago the Supreme Court approved reductions made four years ago by the state commission, following which approval the Hocking Valley, the principal respondent, filed new tariffs covering the reductions. The operators' complaint having been made before the reduced tariffs were filed, they are now in the position of having difficulty in holding the principal defendant in the case. The commission has held that for the time being, at least, the case against the Hocking Valley shall not be dismissed. In ruling out certain evidence which the railways desired to introduce to show that mining conditions and prices of production as between Ohio and outside coal fields, and not exorbitant freight rates, are responsible for present inactivity in Ohio mining centers, the commission declared the only question before it to be: "Are freight rates on coal within the state unreasonable and discriminatory?"

The State Public Utilities Commission of Illinois announces a hearing in Chicago on August 23 at 10 a. m., on the petition of various express companies for authority to advance certain rates. The scale of express rates applicable in Illinois adopted by the commission on February 1, 1914, proved to be an advance in some instances and a reduction in others. The express companies have proposed an advance, to become effective on September 1, and the commission has scheduled this hearing in order to determine what amounts of advance shall be allowed.

Effect of Proposed Advances in Texas Rates

With reference to state and interstate freight rates in Texas and the effect of the proposed increase in intrastate rates, for which an application is now pending before the State Commission, J. S. Hershey, general freight agent of the Gulf, Colorado & Santa Fe, has given out a statement explaining the views of the carriers. It has been suggested during the hearings before the commission that the increase would tend to divert the movement of traffic from interstate points of origin and that Texas railways would have their revenues curtailed rather than increased by obtaining greater revenues on intrastate than on interstate traffic.

Mr. Hershey says: "I should say, from a Santa Fe standpoint, that the proposed increase, which will affect the earnings of that line greatest, would be upon grain, grain products and hay, cotton, cotton seed products, fruits and vegetables, live stock, stone, sand and gravel. These commodities are all Texas products, and to the extent of their consumption within the State of Texas they surely have no outside or interstate interference, so that whatever increase might be made in the rates by the Texas commission for the movement of these commodities they would not be interfered with in any manner by outside sources. I think this same view of the proposition is manifestly apropos of practically all Texas products to the

same extent that they are consumed in Texas, outside competition within this state being nil. This explanation is made in order to correct any impression which may prevail that the rate adjustment as proposed by the carriers will operate to the disadvantage of Texas shippers and to the advantage of interstate shippers. Certainly no such purpose was in the mind of the carriers when these advanced rates were proposed, and assurances have been given to the commission that there was no desire on the part of the carriers to divert any traffic from its present channels, but the desire was merely to obtain a proper remuneration for the service the carriers were performing."

Twenty Millions in Gold

On Tuesday night last the American Express Company brought into New York City from Halifax, N. S., seven carloads of gold; \$19,534,200, in 700 boxes, which had been shipped by the British government to J. P. Morgan & Co., its New York bankers. The gold is said to have been brought from England to Halifax by a vessel of the British Navy, and the transportation throughout from London to New York was carried out with the greatest possible secrecy. The train came via Bangor, Me., Boston, Mass., and Chatham, N. Y., and was preceded by a pilot engine. It is said that in the same cars, or one of them, were securities valued at \$35,000,000; securities owned in England to be deposited in New York as collateral for loans. This is believed to be the largest shipment of gold ever trusted to a single vessel. There was a little delay at Halifax, to make the necessary arrangements with the express company; and, counting interest on the gold at 5 per cent. per annum, the delay incurred a trifle of, say, \$2,500 additional expense.

Car Surpluses and Shortages

The committee on relations between railroads of the American Railway Association, in presenting statistical statement No. 7 giving a summary of freight car surpluses and shortages for August 1, 1915, says:

The total surplus on August 1, 1915, was 265,131 cars; on July 1, 1915, 276,421 cars, and on August 1, 1914, 198,998 cars.

The surplus for August 1, 1915, shown above, includes figures reported since the issue of statistical statement No. 6, reported in the *Railway Age Gazette* of July 16, page 136.

The decreases in surplus under July 1, 1915, are chiefly in Groups 2 and 4 (East) in coal and gondola cars. There are also decreases in the surplus of box cars in Group 5 (Southeast) and Group 8 (Central), which are offset by an increase in the surplus of box cars in Group 6 (Central North).

The total shortage on August 1, 1915, was 888 cars; on July 1, 1915, 785 cars, and on August 1, 1914, 2,333 cars.

The figures by classes of cars follow:

Classes	Surplus	Shortage
Box	132,342	352
Flat	12,666	99
Coal and Gondola	74,488	414
Other	45,635	23
	265,131	888

BRITISH LOCOMOTIVE EXPORTS.—The exports of locomotives from the United Kingdom are showing a sharp falling off, although when the comparison is extended to 1913 the outlook is less serious. The value of the engines exported in June was \$1,091,000, as compared with \$1,480,000 in June, 1914, and \$1,180,000 in June, 1913. In the six months ended June 30, 1915, locomotives were exported to the value of \$5,890,000, as compared with \$10,000,000 in the first half of 1914, and \$6,013,000 in the first half of 1913.—*Engineering*, London.

A NEW INDIAN RAILWAY.—The Teesta Valley Light Railway in Bengal is constructed, like the Darjeeling-Himalaya line, upon a 2-ft. gage, and the locomotives are of a special hill-climbing type. Although the new line is temporarily intended for goods traffic only, a journey from Siliquri to Teesta is so picturesque that there is little doubt that it will ultimately attract many tourists. At present the line stops short at Reang, but in a few months it will be carried another five miles to Teesta, thus bringing a traveler within easy reach of Kalimpong. The Teesta river forms the boundary between Sikkim state and the Darjeeling district. Near Sivok, the first station past Siliquri, the Teesta is 750 ft. wide, and at this point a suspension bridge is to be erected for the purpose of opening up Duars traffic. Several fine bridges occur upon the Teesta Valley line, notably at Sivok, Kaliore and Reang. Some of the spans on these bridges are 100 ft.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The South Bend, Ind., chamber of commerce has filed a complaint with the Interstate Commerce Commission against the withdrawal of proportional class rates applying to Northern Indiana cities to the Ohio river on traffic destined for the south-east.

The Southern Pacific Atlantic steamship lines have filed an application with the Interstate Commerce Commission for permission to quote low commodity rates from New York pier to California points without making corresponding reductions to intermediate points. A hearing before Examiner Thurtell has been set for September 1, in New York City.

Application Under the Panama Canal Act

In re Southern Pacific's ownership of stock in Sacramento Transportation Company. Opinion by Commissioner Clark:

The commission grants the application of the Southern Pacific and the Central Pacific to retain their control of the Sacramento Transportation Company, which owns and operates a line of steamboats on the Sacramento river and connecting waters. It is held that Southern Pacific competes for traffic with the transportation company, but that the operation of the boat line is in the interest of the public. (34 I. C. C., 648.)

Rates on Cottonseed Oil from Points in Oklahoma

Oklahoma Cottonseed Crushers Association v. Missouri, Kansas & Texas et al. Opinion by Commissioner Meyer:

The commission finds that the present grouping of points in Oklahoma, producing cottonseed oil, cake, meal and hulls, is unjust and unreasonable, and that the present blanket rates are unreasonable and prejudicial. The commission is unable to formulate conclusions regarding the details of a readjustment, but it is believed that the establishment of a distance tariff applicable from all points in the present blanket may be a solution of the difficulties. It therefore suggests a tentative schedule, worked out on the mileage basis. A further hearing in the case will be held at Kansas City, Mo., on October 11, 1915. (35 I. C. C., 94.)

Grain Milled in Transit at Lawrenceburg, Ind.

Opinion by Commissioner McChord:

The commission in this case rules against the reasonableness of a Baltimore & Ohio tariff, the effect of which would be to increase the rates from East St. Louis through Louisville or Cincinnati to points in Southeastern and Carolina territories on grain milled in transit at points on its line between East St. Louis and Cincinnati. It was found that the proposed tariff would effect an unjust discrimination against the protestant, a milling company of Lawrenceburg, Ind., in favor of competitors at St. Louis, Louisville, Cincinnati, and also at points south of the Kentucky-Tennessee State line on the lines of the Baltimore & Ohio's connections. (35 I. C. C., 27.)

The Ogden Gateway Case

Opinion by Commissioner Harlan:

The commission in this case finds that the Union Pacific has justified a proposed cancellation of the joint through passenger fares now in effect in connection with the Denver & Rio Grande between points in the territory of the Oregon Short Line and points east of and including Colorado common point territory. The purpose of that course is to give to the Union Pacific and the Oregon Short Line, two of the lines forming a part of the Union Pacific system, a longer haul than they now enjoy on passenger traffic to and from the local territory served by the Oregon Short Line. The commission makes certain suggestions, however, relative to the continuance of through accommodations for the benefit of travelers desiring to pass over the routes at the lawful fares available. (35 I. C. C., 131.)

Demurrage Charges

Picher Lead Company v. St. Louis & San Francisco. Opinion by Commissioner Clements:

Upon a complaint alleging that the accrual of 615 days' debits in excess of credits, under an average demurrage agreement, during a certain period resulted from defendant's failure to construct a 60-ft. extension to complainant's unloading track, the commission finds that the demurrage charges were properly assessed. It happened that the so-called contract for the track extension was of an informal character, and appears to have been only a promise to comply with complainant's request therefor. But even had it been a formal written contract, the question of alleged damages resulting from its non-fulfillment would be one for determination by the courts, and not by the commission. Complaint dismissed. (35 I. C. C., 45.)

The Checking of Baggage on Combination Tickets

Opinion by the Commission

The commission finds that the Pennsylvania and the Baltimore & Ohio have not justified proposed rules prohibiting the through checking of baggage and rate of through parlor and sleeping car tickets on combination tickets. For a number of years travelers from New York, Philadelphia, Baltimore and other trunk line territory points to points in the South and Southeast have been able to check their baggage through to destination and to secure through Pullman car accommodations on combinations of tickets good only to and from the gateways to Southern and Southeastern territory. The Pennsylvania and the Baltimore & Ohio have proposed to abolish the practice. The rules assailed apply to combinations of all forms of tickets issued by respondents and by their Southern connections to and from the gateways involved, but most of the testimony relates to combinations involving the use of Southern carriers' mileage books or southeastern passenger association interchangeable mileage exchange orders, which result in lower fares than the published joint through fares. The respondents state that the rules assailed were intended primarily to protect their joint fares and to conserve their revenues. The Pennsylvania issues 1,000-mile mileage books which it sells at a rate of 2¼ cents per mile. Southeastern passenger association interchangeable mileage exchange orders sell at a rate of 2 cents per mile. On this basis the combination fare from New York to Atlanta, for example, is \$13.88, or \$3.42 less than the joint through fare of \$17.30. From New York the joint through fares exceed the combination mileage fares by \$1.74 to Richmond, Va.; \$3.03 to Asheville, N. C.; \$4.30 to Savannah, Ga.; \$5.26 to Jacksonville, Fla.; \$6.06 to New Orleans, La. The protestants, on the other hand, emphasize the inconvenience that will result to travelers if they must detrain at Washington, for example, to recheck their baggage and to secure Pullman car accommodations for the portions of their journeys beyond Washington. Under the proposed rule, a traveler presenting two straight fare tickets for transportation from a point on respondent's line to a southern or southeastern destination on a connecting foreign line, for which he had paid a sum in excess of the joint through fare, would be denied through baggage checking and Pullman accommodations. Such a provision is obviously unjust and unreasonable. It operates to subject the holders of all such tickets to an annoying and often prohibitory inconvenience, and goes beyond the avowed purpose of respondents to protect the joint through fares in which they participate. No carrier receiving the equivalent of its full local fare to the junction may, in respect of combinations of tickets severally subject to the act, whatever the character of the transportation issued and accepted by the connecting line, lawfully withhold provision for incidental services so constantly and universally in demand as those at which the proposed rules are directed. (While Washington, as an important gateway, has been taken as illustrative of the situation involved, the local tariffs carrying rates to Washington and other junctions of the Pennsylvania Railroad with connecting lines from points on the Pennsylvania Railroad were not suspended, and the right of checking baggage and securing Pullman accommodations from points on that line through those gateways has therefore been withdrawn. In accordance, however, with the views above expressed, the arrangements should without delay be restored at all junctions with other lines. Upon all the facts disclosed we find that respondents have not justified the proposed rules, and an order requiring the cancellation of the suspended schedules

will be entered.) Commissioner Harlan dissents. (35 I. C. C., 157.)

STATE COMMISSIONS

The Nebraska State Railway Commission has received two conflicting opinions relative to the validity of the public warehouse law passed at the last session of the Legislature. The attorney-general has given an opinion that the act is invalid and cannot be enforced. The dean of the State University Law School says the law is valid. The commission is inclined to take the latter opinion. The commission had been advised by the attorney-general previously that it had no authority to take other legal advice than his own; but the Supreme Court of the state has held that in extraordinary cases a state officer is not required to accept the services of the state's attorney.

The New York State Public Service Commission, Second district, has taken the first steps toward the enforcement of the so-called jitney bus law passed at the last session of the Legislature by applying to the supreme court for a permanent injunction restraining James E. Adams in Corning, and Elmer G. Booth in Rochester, from operating "jitney" lines without the consent of the local authorities or a certificate of public convenience and necessity from the commission. This statute requires any vehicle operating in competition with a common carrier to procure the consent of the local authorities, and to obtain a certificate of public convenience and necessity from the Public Service Commission before operating in the streets of any of the cities of the state. The statute in specific terms makes all persons and corporations engaging in the jitney business, as defined, common carriers and subject to all provisions of law as such.

The New York State Public Service Commission, Second District, has issued an order forbidding the railroads to collect a charge for "spotting" cars, or placing them on and collecting them from industrial tracks and roads. This charge was proposed to be imposed on both interstate and intrastate traffic. The Public Service Commission suspended it in the case of intrastate traffic pending the decision of the Federal Commission. The Interstate Commerce Commission has issued its order deciding against the reasonableness of the charge in the large field, and the Public Service Commission follows this decision. The carriers—all of the roads of importance in the State—have now filed triffs discontinuing the proposed charge. The charge was to have been made at 5½ cents a ton, with a minimum of \$2 a car.

PERSONNEL OF COMMISSIONS

The railroad commissioners of South Dakota have appointed Joseph E. Love engineer for the commission. Mr. Love was formerly in the engineering department of the Chicago, Milwaukee & St. Paul.

COURT NEWS

The two-cent passenger fare case of the State of Oklahoma, which is being heard at Oklahoma City, has been continued by the Federal Court until September 6, because of the state being unable to take up its cross-examination at the present time.

The United States District Court at Detroit on August 5, denied the petition of the Pere Marquette to increase its passenger rates. The petition for an injunction to restrain the state authorities from enforcing the two-cent rate was filed by the holders of the consolidated mortgage bonds of the road. The circuit court of appeals at Grand Rapids had previously held that the showing made by the complainants did not justify an increase, but withheld final decision to permit the filing of a supplemental bill, which is now disposed of adversely to the railway company.

Injuries to Mail Clerk—Proximate Cause

A mail car was equipped, in accordance with the postal regulations, with an iron bar across each door, for the protection of the clerk. Before the car left the terminal, and while the clerk was working in it, a man came in to clean the car and told the clerk that he was going to take out the bar. The clerk acquiesced in this, but told the man to be sure to put it back.

The bar was not put back, and, in its absence, the clerk fell from the car and was injured. In an action against the railway company, the Virginia Supreme Court holds that the road was not liable, as its employee was not acting within the line of his duty in removing the bar, and he could not bind the company by his promise to restore it. If the clerk relied on this promise, he did so at his own peril. The fact that the car was insufficiently lighted was immaterial, for that was not the proximate cause of the accident.—*Washington & O. D. (Va.)* 85 S. E. 482.

Notice of Injuries to Live Stock—Amount of Claim

A shipper gave notice of injuries to live stock, but the claim filed with the notice was not so large as the amount afterwards sued for. The Texas Court of Civil Appeals held that this did not defeat recovery; but the amount of the claim was a proper matter for the jury to consider in estimating the damages sustained.—*Pecos & N. T. v. Holmes (Tex.)*, 177 S. W. 505.

Injuries to Live Stock—Notice

Construing the provision of the interstate commerce law requiring written notice of injuries to live stock, the Texas Court of Civil Appeals holds that the object of the provision is to afford an opportunity to the railroad to investigate the merits of the claim; and where it admits the justness of the shipper's claim his failure to give notice is not prejudicial to the carrier's rights, and notice becomes unnecessary.—*Hovey v. Tankersley (Tex.)*, 177 S. W. 153.

No Duty to Inspect Simple Appliances

In an action by a station agent for injuries caused by a fall, the result of a bolt which held the tongue of a four-wheel baggage truck in place, working loose, it appeared that the agent had 11 years' experience in the work of handling trucks, and knew of the dilapidated condition of that in question. The Virginia Supreme Court holds that such a truck is a simple appliance, the duty to inspect which rested on the agent rather than the railroad, which was not liable.—*Southern Ry. v. Snow (Va.)* 85 S. E. 488.

Boiler Explosion—Evidence of Cause

In an action by a locomotive engineer for injuries caused by the crown sheet "letting down," causing an explosion, it was alleged that the crown sheet and its fastenings were weak and insecure. The plaintiff's evidence tended to show that sufficient water was kept in the boiler to cover the crown sheet until at least a few minutes prior to the accident. The theory of the defense, with which this evidence was not inconsistent, was that in running down hill, after ascending an upgrade for about eight miles, the water ran forward in the boiler, and because of insufficient water therein the crown sheet was left uncovered, causing it to be burned out. Expert evidence was adduced to show that this was the cause of the explosion. The only evidence of defect in the crown sheet was that of one of the company's boiler makers, who testified that, on examining the engine the day before the accident, he found five broken stay bolts (of which there were more than 400 in the crown sheet) and about six bolts pulling through the sheet. The St. Louis Court of Appeals held that the evidence did not justify a finding that the crown sheet, as distinguished from the stay bolts, was defective. An employee, suing for a personal injury, has the burden of proving negligence of the employer, and a casual connection between the negligence and the injury; and where the injury might have resulted from one of two causes, for only one of which the employer was liable, the employee must show with reasonable certainty that the cause for which the employer was liable produced the injury. Under this rule the plaintiff could not recover.—*Sparkman v. Wabash (Mo.)*, 177 S. W. 703.

Discrimination in Diverting and Expediting Shipments

The interstate commerce commission has declared that the privilege of diverting cars is of value to the shipper, and in order to avoid discrimination it is necessary for the carrier granting this privilege to publish that fact in its tariff, together with the conditions on which it may be used. The Norfolk Southern adopted a tariff and conditions on which diversions would be made, which provided that parties making request for change of

destination must furnish satisfactory proof of ownership and acceptable form of bond. In an action by the shipper of a consignment which was delivered without change of cars to the consignee in Boston, Mass., the complaint was that while in transit the railroad agreed to divert the shipment to another consignee in New York and failed to do so. It appeared that this agreement to divert was made over the telephone. The Virginia Supreme Court holds that the regulations were not imposed solely for the benefit of the carrier, so as to be capable of being waived at its pleasure. They were intended to place all shippers upon the same plane and prevent unfair preferences among them, and the carrier could not waive them and allow diversion in an unauthorized manner. It followed the analogous case of *C. & O. v. Ruckman*, 115 Va. 493, 80 S. E. 496, where it was held that "a special contract with a particular shipper, whereby a carrier agrees for the published rate to expedite an interstate shipment of freight and deliver the same on a designated day, gives to the particular shipper an advantage over other shippers, and makes a discrimination in his favor which is prohibited by the interstate commerce act; hence such a contract is void."—*Norfolk Southern v. Whitehurst (Va.)* 85 S. E. 438.

Liability for Injury to Passenger on Steps of Vestibule Car

A passenger, while standing on the steps of a vestibule car in a moving train, to which position he had been invited by the action of a baggage man in opening the vestibule doors under instructions from the conductor to let the passenger off at the next station, was knocked from the steps by the swinging shut of the vestibule door, which the baggageman had negligently left unsecured. A rule of the company posted in the car prohibited passengers from going upon the platform when the car was moving, and a New Jersey statute exempted the company from liability for injury to a passenger "by reason of" such rule. In an action for his injuries, the Circuit Court of Appeals, Third Circuit, held that, while the passenger may have assumed the ordinary risk in violating the rule, he was not bound to anticipate the negligence of the baggageman, which was the proximate cause of his injury, and was not barred of the right to recover by contributory negligence.—*Central of New Jersey vs. Hirsch, C. C. A.*, 223 Fed. 44.

No Power to Construct Private Tramroad Over Right of Way

The predecessor of the Seaboard Air Line bought a tract of 40 acres from the state, built a railroad across it and then conveyed the 40 acres to third persons without reservation of any right of way. The owners of the land subsequently claimed that the railroad company was merely a tenant by sufferance, or, at least, that they could use the right of way for any purpose consistent with the railroad's use of it. They proposed to build a private tramroad to haul logs across the track, which the railroad sought to enjoin. The Florida Supreme Court holds that the railroad had no authority to sell its right of way; it must be held by implication to be excepted from the conveyance of the 40 acres.

The law recognizes the right of the public to have public roads cross railroad tracks, but makes no provision for a private tramroad. Common-carrier railroads as "public utilities . . . must be safeguarded for the safety of persons and property in transit." *Seaboard Air Line vs. McRaney (Fla.)* 68, S. E. 753.

Limitation of Powers of Railroad Companies

The Georgia Court of Appeals holds that it was beyond the powers of the president of a railroad incorporated under the general laws of Georgia as a common carrier, either with or without the consent of the board of directors, to give funds belonging to the corporation for the erection of a public school, or for the purpose of building up or promoting the town in which the school is situated, even though the school or town be located on the line of the company's road and its transportation business thereby be increased. A vote executed for such a purpose could not bind the corporation where the payee had full notice of the unauthorized purpose for which the vote was given. The court cited *Military Interstate Assoc. v. Savannah T. & I.* of 11, 105 Ga. 420, 31, S. E. 200, where the Supreme Court treated as ultra vires and void a subscription by a railroad to the capital stock of a corporation organized to furnish amusement to the public at a point on the line, and which therefore might inci-

dentally increase the road's transportation business.—Brimson, etc. (Ga.) 85 S. E. 634.

Validity of West Virginia Two-Cent Fare Law

The Public Service Commission of West Virginia sought by mandamus to compel the Baltimore & Ohio to obey its order requiring the railroad to conform to the provisions of Chapter 41, Acts of the Legislature of 1907, limiting railroads in their charges for the transportation of passengers and their baggage to two cents a mile. The railroad did not deny that the law was in force, and was not repealed by the public utilities act, but it claimed that it was confiscatory. It was held by the West Virginia Supreme Court that the act remained the paramount law on the subject, binding upon the railroad, until in the first instance, upon application by the railroad, or by some one injuriously affected by the act, or upon the initiative of the Public Service Commission, the rate had been investigated by the Commission and judicially determined to be unreasonable or confiscatory as to the Baltimore & Ohio, and therefore invalid. Until then or until the act had been otherwise amended or lawfully nullified, the Public Service Commission, as prescribed by the act creating it, had jurisdiction to compel observance of the act by the railroad. Until the Commission had investigated and determined that the rate complained of was unreasonable and invalid as to the Baltimore & Ohio, the courts could not interfere.—State vs. B. & O. (W. Va.) 85, S. E. 714.

Strict Construction of Air-Brake Law

The United States District Court for the Northern District of Ohio, Eastern Division, in the case of the United States vs. Pennsylvania Company, in a decision handed down July 2, penalizes the railroad on 34 counts for hauling 33 freight cars, all in bad order, without using air brakes. The decision by Judge Clarke, says:

"Where a carrier operates a train without the required percentage of air brakes being in use, due to the fact that the empty bad order and chained up cars composing such train are in condition such that the operation of the air brakes is not reasonably possible, and fails to establish that it was not reasonably possible to have placed these cars in such condition of repair, temporary or permanent, that the air brakes could have been connected up and used, such a movement is in violation of the air-brake provision of the safety appliance acts and does not come within the proviso to the act of April 14, 1910.

"The proviso exempts from the penalties of the acts only a movement of equipment which becomes defective when in use on a line of railway, and then only from the place where first discovered to be defective to the nearest available place where repairs can be made, and where such movement is necessary in order to make such repairs and they can not be made except at such repair point.

"The failure on the part of the carrier to have repair yards of adequate capacity or to provide a sufficient force of men to repair cars which may become defective in the vicinity of its established yards can not be permitted to create the necessity which the proviso declares shall relieve a railroad from liability for the movement of defective cars."

This is a civil action. The petition contains 34 counts. The first 25 counts are based upon the hauling of that number of empty bad order cars in a train from Mosier, Ohio, to Dock Junction at Erie, Pa., in July, 1913, when one or both ends of each of said cars (with the exception of the car mentioned in the 25th count, which was hauled by its own drawbars) were not equipped with automatic couplers as required by statute, but were fastened to adjoining cars by means of chains.

At Haselton, eight additional empty bad order cars were put into this train and hauled by means of chains instead of drawbars. The twenty-sixth count is based upon the operation of this train (33 cars), together with engine, tender and caboose, when less than 85 per cent. of the cars were controlled by air brakes, the air brakes being operated on engine and tender only.

The case was submitted to the court upon an agreed statement of facts, a jury being waived.

The cars, all empty, were thus moved because the repair facilities at Mosier and Haselton were congested, while those at Dock Junction were available. The air-brake hose was not coupled because of the liability of trouble from uncontrollable

slack and separation of hose couplings. The whole trip, about 97 miles, was made at about 10 miles an hour.

The court finds that the repairs could have been made at Haselton and Mosier but for the congestion; and virtually decides that repair facilities must, without exception, be adequate, everywhere.

"Such wise and humane legislation as the safety appliance acts" must not be weakened by allowing a railway to decide when its provisions may be suspended; must not be so construed as to put it in the power of carriers to largely suspend it "in a most important respect."

Reasonableness of Tender of Large Bill for Small Fare

In an action for wrongful ejectment for refusal to pay a fare of four cents a mile, the question involved was whether a \$100 bill was a reasonable tender at a union station ticket office at Gulfport, Miss., in payment of \$2.01. It appeared that the plaintiff boarded the train at Pascagoula, Miss., and went to Gulfport, where he proposed to take the regular fast train to New Orleans two hours later. At Gulfport he found he was without small change. The ticket agent only opened his window when the train was in sight. When the plaintiff tendered a \$100 bill he said he could not change it, and to pay his fare on the train. The plaintiff boarded the train, tendered the \$100 bill to the conductor, and said if he had no change they could wait and get the bill changed at the ticket window at New Orleans. The conductor said he did not know whether the plaintiff tried to buy a ticket or not, and demanded four cents a mile instead of the regular fare of three cents. This the plaintiff said he would not pay and was ejected. The trial court instructed the jury to find for the defendant, which it did.

On appeal, the Mississippi Supreme Court held that the trial court was in error in holding, as a matter of law, that the \$100 bill was an unreasonable sum to tender in a cosmopolitan city like Gulfport, especially in view of the fact that the agent was in a union depot handling funds of two large railroads. "The railroad companies," the court said, "are, of course, in the business of providing transportation for hire, and owe, we think, a duty to the traveling public to provide reasonable facilities for making change at an important station like the one here involved. They are servants and not masters. The lack of adjudicated cases on this point indicates, in the language of Patterson, J., in Barrett v. Market St. Ry. Co., 81 Cal. 296 (where it was said a distinction should be made between passengers on street railways and steam railroads), 'that a question like this will, as is usual, settle itself by a spirit of mutual accommodation between carrier and passenger.' * * * We do not undertake to lay down any rule defining what is and what is not reasonable tender in all cases. This is a mixed question of fact and law to be determined in each case, taking into account always the size of the city, town or village where the passage is demanded, the volume of business done, and the facilities for making change. We do say, however, that in this particular case the court could not, as a matter of law, declare the \$100 an unreasonable amount in a city like Gulfport. There is no question of the good faith of appellant, and surely we have fallen on uncertain times if a white gentleman with a pocket full of \$100 bills cannot buy first-class passage on a train operated by a common carrier doing both an interstate and intrastate business without paying a premium to do so, especially when he has transacted all business on hand and is destined for the attractive and cosmopolitan city of New Orleans. Such conduct on the part of the railway company comes near violating the constitutional guaranty accorded every citizen of the 'pursuit of happiness.' Reversed and remanded."

Mr. Chief Justice Smith dissented, saying, in part: "I think that it can be said, as a matter of law, that a \$100 bill does not reasonably approximate a fare of \$2.01. To require a railroad company to keep its ticket agent supplied with sufficient money to change all bills of this amount that may be tendered them in payment of small fares will not only seriously handicap it in its business by keeping an unnecessarily large amount of its money thus tied up, but will make its ticket offices the most attractive of places for burglars and robbers; and, moreover, its agents cannot transact their business with that expedition to which the traveling public is entitled, if all or a great part of the intending passengers put them to the trouble of changing bills for large amounts tendered in payment of small fares."—Jones v. L. & N. (Miss.), 68 So., 924.

Railway Officers

Executive, Financial, Legal and Accounting

Lee H. Landis, assistant to the president and traffic manager of the Tidewater Southern, has had his headquarters transferred from Stockton, Cal., to San Francisco.

Operating

C. J. Connett has been appointed assistant trainmaster of the Creston Division of the Chicago, Burlington & Quincy, with headquarters at Creston, Iowa.

James Harry Johnson, trainmaster of the Yellowstone division of the Northern Pacific at Dickinson, N. D., has been transferred to the Fargo division, with headquarters at Dilworth, Minn., succeeding J. M. Boyd, who has been transferred to the Yellowstone division, succeeding Mr. Johnson.

Louis Charlton Fritch, assistant to the president of the Canadian Northern at Toronto, Ont., has also been appointed general manager of the lines east of Port Arthur, with headquarters at Toronto. Mr.

Fritch was born in 1868, at Springfield, Ill., and took a course in civil engineering at the University of Cincinnati. Subsequently, he took a course in law and was admitted to the bar in Ohio. He began railway work in 1884, as supervisor's assistant on the Ohio & Mississippi. From January, 1886, to October, 1892, he was assistant engineer, and then to November, 1893, was engineer of maintenance of way of the same road, succeeding to the position formerly filled by the chief engineer and master maintenance of way. He was also chief engineer



L. C. Fritch

in charge of construction of the Cincinnati & Bedford. On November 1, 1893, he was appointed division engineer of the Baltimore & Ohio Southwestern, which absorbed the Ohio & Mississippi. From September 1, 1899, to November, 1902, he was superintendent of the Mississippi division of the same road. In February, 1904, he went to the Illinois Central at Chicago, and was engaged in special work until March 1, 1905, when he became assistant to the general manager of the same road. He was appointed assistant to the president in November, 1906, and from March 1 to November 15, 1909, was consulting engineer of the same road. He was later appointed chief engineer of the Chicago Great Western, and in March, 1914, was appointed assistant to the president of the Canadian Northern, which position he still holds.

Traffic

W. H. Mason has been appointed commercial freight agent of the Baltimore & Ohio, with headquarters at Uniontown, Pa., vice W. H. Eaton, promoted.

Edward J. Naylor, assistant freight and passenger agent of the Chicago & Alton at Peoria, Ill., has resigned to become general traffic manager of the Kansas City, Mexico & Orient of Texas, with headquarters at San Angelo, Tex.

J. D. Kenworthy, assistant general freight agent of the Denver & Rio Grande at Salt Lake City, Utah, has also been appointed assistant general passenger agent, succeeding I. A. Benton, resigned. His official title is assistant general freight and passenger agent.

F. S. McGinnis, district passenger agent of the Southern

Pacific at Los Angeles, Cal., has been appointed general passenger agent, with headquarters at Los Angeles, succeeding James Horsburgh, Jr., resigned. C. J. Balfour, commercial agent at Pasadena, Cal., succeeds Mr. McGinnis.

William T. LaMoure, whose appointment as general freight agent of the Boston & Maine, with headquarters at Boston, Mass., has already been announced in these columns, was born at Worcester, N. Y., and was



W. T. LaMoure

educated in the public school of his native town. He began railway work in 1882, as a telegraph operator on the Boston, Hoosac Tunnel & Western, now a part of the Boston & Maine. In 1885, he was appointed station agent at Petersburg Junction, N. Y. One year later he was transferred to Valley Falls, and then became agent at Johnsonville, when the Boston, Hoosac Tunnel & Western was consolidated with the Fitchburg Railroad. In 1892, he was appointed freight agent of the Fitchburg Railroad at Troy, N. Y.; three years later he was

transferred to Boston, as chief clerk of the local freight office, and two years later became local freight agent in charge of the Boston freight terminals of the Fitchburg Railroad, and continued in that position after the Fitchburg was leased to the Boston & Maine. In 1907, he was appointed foreign freight agent, and in January, 1914, was appointed assistant general freight agent of the Boston & Maine, which position he held at the time of his recent appointment as general freight agent of the same road above noted.

Engineering and Rolling Stock

A. M. Harvey has been appointed signal supervisor of the Canadian Government Railways, with headquarters at Moncton, N. B.

Charles Edelman has been appointed signal supervisor of the Missouri Pacific, at Osawatomie, Kans., succeeding A. Dewey, transferred.

C. C. Jones has been appointed supervisor of bridges and buildings of the Detroit division of the Grand Trunk, with headquarters at Detroit, Mich., succeeding H. G. Batten.

Harry C. Ruppel has been temporarily appointed roadmaster of the Northern Pacific, with headquarters at Pasco, Wash., succeeding Dan McLaughlin, granted leave of absence.

F. C. Carlson, assistant master mechanic of the Texas & Pacific, has resigned to become master mechanic of the International & Great Northern, with headquarters at San Antonio, Tex.

Purchasing

H. M. Powell, recently general storekeeper of the St. Louis & San Francisco, has been appointed to the newly created position of supervisor of material and supplies of the Texas & Pacific, with headquarters at Marshall, Tex.

OBITUARY

M. D. Monserrate, second vice-president of the San Antonio & Aransas Pass, with headquarters at San Antonio, Tex., died at San Diego, Cal., on July 30, at the age of 78 years.

M. J. Healy, until recently general manager of the Estacado, Gulf & Western at Midland, Tex., died on July 27, at Muscatine, Iowa. For the past 20 years Mr. Healy had been promoting railroads in Texas and other states, and at the time of his death was promoting the Chicago, Western Illinois & Iowa, from Arpee, Ill., to Chillicothe.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE FRENCH GOVERNMENT.—See item under Car Building.

THE PINE BELT LUMBER COMPANY, Fort Towson, Okla., has ordered one Mikado type locomotive from the Baldwin Locomotive Works.

THE UNITED STATES PORTLAND CEMENT COMPANY, Concrete, Colo., has ordered one 4-wheel switching locomotive from the Baldwin Locomotive Works.

THE PENNSYLVANIA has authorized its Altoona shops to proceed with the construction of 26 freight and 68 switching locomotives. This will complete the 1915 replacement program, which, as was noticed in the *Railway Age Gazette* of April 23, included a total of 194 locomotives for the Lines East and West of Pittsburgh.

CAR BUILDING

THE MAINE CENTRAL is in the market for 1,100 center constructions.

THE BANGOR & AROOSTOOK is in the market for 100 40-ton flat cars.

THE GUANTANAMO & WESTERN, with offices at 82 Beaver street, New York and Guantanamo, Cuba, has ordered 10 cars from the Magor Car Company.

THE HAVANA CENTRAL, which was reported in the *Railway Age Gazette* of July 9 as having ordered 660 freight cars from the Standard Steel Car Company, has now increased that order to 1,100 cars.

THE WHEELING & LAKE ERIE has filed an application in the Federal court at Cleveland, Ohio, to issue \$2,000,000 worth of receiver's certificates. Receiver Duncan wants to purchase 1,700 modern freight cars with the money.

THE BALTIMORE & OHIO has divided an order for 1,000 100,000-lb. capacity steel hopper car bodies among the Standard Steel Car Company, the Pressed Steel Car Company and the American Car & Foundry Company. These car bodies will be placed on trucks rebuilt in the company's shops.

THE FRENCH GOVERNMENT has ordered 1,000 gondola cars from the Eastern Car Company and has issued inquiries for 5,835 passenger and freight cars, 1,750 journal boxes, 744,421 kilograms of draw bars, 107 axle boxes, 600,000 kilograms of boiler tubes, 3 locomotive fire boxes and 101,147 kilograms of draft springs.

IRON AND STEEL

THE FLORIDA EAST COAST has ordered 2,200 tons of rails from the Pennsylvania Steel Company.

THE SOUTHERN RAILWAY has ordered 4,000 tons of rails from the Pennsylvania Steel Company.

THE PITTSBURGH & LAKE ERIE has ordered 7,500 tons of steel shapes from the Jones & Laughlin Company.

THE RUSSIAN GOVERNMENT is reported to have ordered 100,000 tons of rails from the Maryland Steel Company.

THE BALTIMORE & OHIO CHICAGO TERMINAL has ordered 149 tons of steel for various buildings at Chicago, from the American Bridge Company.

SIGNALING

THE WABASH has begun the installation of automatic signals between the following points: Danville, Ill., to Williamsport, Ind., and Attica, Ind., to LaFayette, a total of 7½ mi. of double-track and 34 mi. of single-track.

THE ST. LOUIS & SAN FRANCISCO has ordered two electro-mechanical interlocking plants from the Union Switch & Signal Company for installation at Southeastern Junction, Mo., and Nichols, Mo. The former plant will have 13 signals, 7 switches and 6 derails, and the latter will have 19 signals, 6 switches and 9 derails.

Supply Trade News

Samuel D. Fitton has been elected vice-president of the Niles Tool Works Company, Hamilton, Ohio, succeeding George T.

At a meeting of the board of directors of the American Locomotive Company held Wednesday, August 11, J. O. Hobby, Jr., was appointed treasurer.

Allan Strale, consulting engineer of the Inland Steel Company, died of heart disease at his home in Chicago on August 6, at the age of 58 years.

Owen W. Middleton, formerly editor of the *Railway Master Mechanic*, has been appointed publicity manager of the American Steel Foundries, with headquarters in the McCormick building, Chicago.

Simon S. Martin, formerly general superintendent of the Maryland Steel Company, Sparrows Point, Md., has been elected vice-president and a director of the Algoma Steel Corporation. Reiss, deceased.

The Pennsylvania Railroad Co. has asked bids on the construction of sixteen new vessels for use in New York Harbor. These will consist of one steam lighter, three derrick barges and twelve covered hatch barges.

Lewis Littlepage Holladay and Henry Negstad, consulting engineers, have formed a company under the corporate name of Holladay, Negstad & Co., and will specialize in the field of power plants, utilities and industries. They will be located at 109 North Dearborn street, Chicago.

M. A. Evans, western sales manager of the Railway Appliances Company, Chicago, at the time that company was bought by the Q. & C. Company, New York, and with the latter company temporarily during the reorganization period, has resigned. Mr. Evans will take a short vacation before returning to the railway supply business.

The Pratt & Whitney Company has opened an office and showroom at 16 Fremont street, San Francisco, in charge of S. G. Eastman, formerly manager of the Chicago office. A large stock of Pratt & Whitney machinery, small tools and gages will be carried for the convenience of customers, and the office has been appointed agent for the entire Niles-Bement-Pond line of machine tools, cranes, steam hammers, etc.

The Canadian Northern has given the Roberts & Schaefer Company, Chicago, an order to proceed with the building of three frame-constructed, 100-ton capacity, standard counterbalanced bucket coaling plants for installation at Rideau Junction, Ont., Capreol, Ont., and Fitzbach, Ont. This makes seven coaling plants this firm has constructed for the Canadian Northern within a year. The Roberts & Schaefer Company has also received a contract for the Temiskaming & Northern Ontario for a standard counterbalanced bucket locomotive coaling plant for installation at Porquis Junction, Ont.

Willy Lamot, a business man of Antwerp, but now with temporary address at "Shardhighs," Halstead (Essex), England, announces that he has established an organization for the purpose of introducing American products and manufactures into Belgium as soon as the war is over. The headquarters will be in Antwerp. It is Mr. Lamot's intention to engage as agents, representatives or dealers a number of Belgian manufacturers and business men who may have been partly ruined, but will still possess enough capital to be in a position to furnish proper guarantees. His organization will accept the agency for but one make of any one article, and contracts will be for at least two years. The various representatives will be established throughout Belgium, but will be under the supervision of the office at Antwerp.

TRADE PUBLICATIONS

BUILDING CONSTRUCTION.—The Stone & Webster Engineering Corporation, Boston, Mass., has published an attractive booklet showing photographs and essential data concerning projects recently completed by this company, including factory and office buildings, power plants, elevators, etc.

Railway Construction

CAROLINA, ATLANTIC & WESTERN.—See Seaboard Air Line.

CINCINNATI, BLUFFTON & CHICAGO.—Fred A. Dolph has issued a prospectus announcing a plan for the reorganization of this company under the name of the Huntington, Bluffton & Portland Short Line. Plans are being considered for the electrification of the line.

DALLAS & SOUTHWESTERN TRACTION.—J. O. Andrewartha, Dallas, Tex., consulting engineer of the Dallas & Southwestern Traction, is quoted as saying that the company will build from Dallas south to Austin, also that a system of interurban lines will be constructed in that part of Texas. The Dallas & Northwestern Traction, which is owned by the same interests, is planning to build an interurban line from Dallas northwest to Denton, to be operated by gasoline motor cars. E. P. Turner, president; J. T. Witt, chief engineer. (July 30, p. 219.)

DALLAS & NORTHWESTERN TRACTION.—See Dallas & Southwestern Traction.

EDDY LAKE & NORTHERN.—This company has filed an amendment to its charter, it is said, extending the time for ten years in which to complete the line. The proposed route is from Eddy Lake, S. C., north to either Marion or Mullins, about forty miles. G. Officer, secretary. W. M. Burgan, N. James, R. B. Scarborough, Conway, S. C., are interested.

FAIRMONT & HELEN'S RUN.—See Western Maryland.

FLORIDA ROADS (ELECTRIC).—Plans are being made, it is said, to build an electric railway in Clearwater, Fla., and vicinity. E. W. Parker, Tampa, and associates, are back of the project.

Work will soon be started, it is said, on the construction of an electric line from Brooksville, Fla., south to St. Petersburg. James Murphy, St. Petersburg, is interested.

FORT DODGE, DES MOINES & SOUTHERN.—This company will extend its line from Swanwood Junction, Iowa, its present junction with the Chicago, Rock Island & Pacific, to a connection with a leased track of the Des Moines Western. There is about 75,000 cu. yd. of grading, which has been awarded to the Conn Construction Company, Boone, Iowa. Track laying and bridge work will be done by company forces. R. L. Cooper, Boone, Iowa, is chief engineer.

GRAND TRUNK PACIFIC SASKATCHEWAN.—See Grand Trunk Pacific.

GRAND TRUNK PACIFIC.—The Saskatchewan legislature has passed an act extending the time to January, 1917, in which to build a number of branch lines, for which the province has guaranteed the bonds of the Grand Trunk Pacific and of the Grand Trunk Pacific Saskatchewan, and also extends the time within which these companies may build terminals at Regina, Saskatoon and Moose Jaw.

HUNTINGTON, BLUFFTON & PORTLAND SHORT LINE.—See Cincinnati, Bluffton & Chicago.

ILLINOIS CENTRAL.—This company has awarded a contract to the J. D. Lynch Construction Company, Vandalia, Ill., for 35,000 cubic yards of grading at Vandalia. This company has also awarded a contract to H. W. Nelson, Chicago, for 500,000 cubic yards of filling for bridges on the Indiana division.

JACKSON & EASTERN.—This company, it is said, has applied for a charter in Mississippi to build a line from Jackson to Houston, Miss., about 130 miles. The incorporators are S. A. Neville, R. W. Harris and C. J. Currie, of Meridian, Miss. Mr. Neville is vice-president of the Meridian & Memphis, now operating between Meridian, Miss., and Union, which is building an extension from Union to Sebastopol, about 13 miles. (January 29, p. 211.)

LAKE HURON & NORTHERN ONTARIO.—An officer writes denying the report that this company has given a contract to the

National Engineering Company, Cleveland, Ohio, to build the projected line from Sault Ste. Marie to a point on the Grand Trunk Pacific.

LA KEMP & NORTHWESTERN.—A charter has been granted the La Kemp & Northwestern Railway Company of Oklahoma for a line to be constructed from a point on the Atchison, Topeka & Santa Fe, in Ellis county, to a point on the Chicago, Rock Island & Pacific in Texas county, a distance of about 125 miles. The charter also provides for a 20-mile branch line from Ivanhoe to May, Okla. The company is capitalized at \$100,000, and the estimated cost of the proposed line is \$500,000. The incorporators are George C. Walick, I. N. Edwards, J. W. Bell, J. W. Lehman, E. W. Lehman, Theodore Doering and J. D. Key, all of La Kemp.

MERIDIAN & MEMPHIS.—See Jackson & Eastern.

MISSISSIPPI ROADS.—An officer of the Gilchrist-Fordney Lumber Company, Laurel, Miss., writes regarding the report that a logging line is being built from Montrose, Miss., eastward several miles, that the company is only putting in a logging spur. The grading work is finished and the company has already secured the rails and equipment.

MITCHELL STREET & INTERURBAN RAILWAY.—Incorporated in South Dakota with \$200,000 capital to build 30 miles of line at Mitchell, S. D., and near that place. O. E. Cassem, L. E. Cassem, D. N. Hill, A. N. Hill, F. E. Hill, all of Mitchell, are the incorporators.

MORRIS COUNTY TRACTION COMPANY.—This company, it is said, is interested in the organization of another company for the purpose of constructing an electric railway from Landing, N. J., to Lake Hopatcong, through Port Morris to Netcong.

OHIO VALLEY ELECTRIC.—This company has under consideration the question of building an extension, it is said, from Ashland, Ky., north to Russell.

OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY.—This company has awarded a contract to Twohy Bros., Portland, Ore., for the construction of its 30-mile extension from Riverside, Ore., to Crane Creek Gap. The estimated cost of the work is \$1,500,000. (July 16, p. 143.)

SCHUYLKILL ELECTRIC.—A contract is reported let to the Trexler Contracting Company, Reading, Pa., to build a section of this line over Broad mountain. The proposed line is to connect Pottsville, Pa., Frackville and Shenandoah.

SEABOARD AIR LINE.—The directors of the Seaboard Air Line have adopted a plan to take over the Carolina, Atlantic & Western, and have authorized the beginning of work on the extension of the C., A. & W. from Charleston, S. C., southwest to Savannah, Ga., 85 miles. See also Railway Financial News.

SOUTHERN RAILWAY.—Contracts have recently been let, it is said, for double-tracking 36 miles of the Southern Railway's main line in North Carolina and in South Carolina.

TOLEDO, ANN ARBOR & JACKSON.—See Toledo-Detroit.

TOLEDO-DETROIT.—This company, formerly the Toledo, Ann Arbor & Jackson, has been authorized by the Public Utilities Commission of Ohio to sell \$523,000 of bonds, to secure funds to complete the line from Toledo, Ohio, northwest to Dundee, Mich.

TUCSON, CORNELIA & GILA BEND.—A contract is reported let to James H. Maxey, Yuma, Ariz., to build from Gila Bend, Ariz., south to Ajo, 44 miles. John C. Greenway, general manager; R. H. Jones, chief engineer of construction, Gila Bend. (May 28, p. 1140.)

VIRGINIA-BLUE RIDGE.—This company, which is building a line from Tye River, Va., northwest via Lowesville to Massies Mill, 22 miles, has completed its line from Tye River as far as Lowesville, 13 miles. (January 29, p. 211.)

WESTERN MARYLAND.—This company has let to A. L. Anderson & Bros., of Altoona, Pa., the contract for the construction of the Fairmont & Helen's Run Railway, which is a company recently incorporated in West Virginia in interest of the Western Maryland. The new line will be about six miles long and will connect the Western Maryland with the Baltimore &

Ohio at a point near Chieftain, W. Va. It will give the Western Maryland a connection with the coal fields of the Consolidation Coal Company in West Virginia. Work is to be begun at once. (July 30, p. 219.)

RAILWAY STRUCTURES

BRATTLEBORO, Vt.—The Central Vermont has given a contract to H. Wales Lines Company, Meriden, Conn., for building a brick and stone station at Bridge street, in Brattleboro. The building is to be three stories high, 52 ft. 4 in. wide, by 183 ft. 6 in. long, and will cost \$70,000.

CHEEKTOWAGA, N. Y.—The Delaware, Lackawanna & Western is making plans to carry out grade crossing elimination work at Cheektowaga.

NEW YORK.—The joint order of the New York Public Service Commissions of the First and Second districts, which requires the elimination of grade crossings on the New York Central and the New York, New Haven & Hartford at Two Hundred and Forty-first street and Two Hundred and Forty-second street, in the borough of the Bronx, as was mentioned in these columns last week, also calls for the construction of a new station at Two Hundred and Forty-first street.

Bids were recently opened by the New York Public Service Commission, First district, for the construction of station finish on Section No. 2 of Routes Nos. 36 and 37, the Astoria line. The lowest bid was submitted by Charles Meads & Company, who offered to do the work for \$268,102.

QUEBEC, Canada.—The new stone and brick passenger station now under construction for the Canadian Pacific at Quebec will include a head house 65 ft. by 142 ft., a concourse 68 ft. by 142 ft., and an express and baggage building 44 ft. by 92 ft. Part of the building will be one story and part two stories. The improvements will cost \$300,000. W. S. Dowling Cook, Montreal, Que., has the contract for the work.

SMITHVILLE, TEX.—The Missouri, Kansas & Texas contemplates the rearrangement and replacement of certain portions of its roundhouse at this place.

SAN ANTONIO, TEX.—The San Antonio Belt Terminal Railway has accepted the franchise granted by the city commission of San Antonio, it is said, for the construction of a system of railway terminals, including new passenger and freight stations in San Antonio. The franchise is for a period of 25 years, and the proposed improvements will cost about \$1,200,000. It is understood that construction work on the terminals will be started within the next two or three months.

ITALIAN RAILWAYS AND THE WAR.—A recent issue of the *Journal des Transports* contains some interesting information relative to the role of the Italian Railways in time of war. During the mobilization the railway service is entirely subject to the military authorities, who regulate the conditions of operation, not only for military transport, but also for ordinary traffic. As soon as mobilization is decreed, a "Direction of Transport" is set up, and the Director of Transport is placed at the head of a special department attached to the general staff. The "Direction" is given an entirely free hand in arranging, modifying and suspending the train services. Operating details are actually entrusted to special military committees attached to the various lines, which exist in times of peace, and are more or less similar to the French *Commissions de reseau*. Among the duties of the "Direction of Transport" is that of repairing and rebuilding lines and bridges, etc., when necessary, for which purpose it has under its control a special military railway engineering organization. The system planned in times of peace has proved admirably efficient under war conditions. The whole of the mobilization was carried out without suspending the ordinary passenger and freight traffic, and the very few individual trains which were actually suspended were on unimportant sections of line, where a temporarily reduced service was decided on more for economic than for military reasons. The results were really remarkable, since on some sections of line, according to the *Corriere della Sera*, the traffic was increased a hundred-fold. In some instances this enormous increase was handled on lines whose facilities were considered inadequate even for normal traffic requirements. Yet there was not a breakdown, and the military trains arrived punctually.—*Railway Gazette*, London.

Railway Financial News

SEABOARD AIR LINE.—The directors at a meeting in Baltimore on August 9 adopted a comprehensive financial plan looking to a fuller development of this property. The statement given out by S. Davies Warfield says that the plan provides for the following:

"The Seaboard Air Line Railway will be consolidated with the Carolina Atlantic & Western Railway under the corporate name of the Seaboard Air Line Railway Company. The Carolina Atlantic & Western is a recent consolidation of the North & South Carolina, Charleston Northern and South Carolina Western Railroads—operating a total of 416 miles. The Carolina Atlantic & Western recently acquired the Georgetown & Western operating from Lanes to Georgetown, S. C., and from Andrews to the Pee Dee River, S. C., a distance of 70 miles. The Charlestown Northern is the line recently completed connecting the North & South Carolina with Charleston, giving the Seaboard Air Line entrance into Charleston and now becoming a part of the main line of the consolidated system. The new terminals at Charleston are admirable both as to location and facilities.

"The line will be extended from Charleston to Savannah by the immediate construction of 85 miles of railroad with maximum grade of only 3-10 of 1 per cent. This new line will also become part of the main line of the consolidated system.

"This will give the Seaboard Air Line Railway Company—the new company growing out of the consolidation of the above mentioned properties—a low grade line from Hamlet, N. C., to Savannah, Ga. By this new line the Seaboard will reach Georgetown, S. C., Charleston, S. C., and Savannah, Ga., will tap a rich and fertile territory, highly productive in cotton and tobacco, will admit of the Seaboard's running time to the South being shortened, will create a line with maximum grade of only ½ of 1 per cent as compared with 1½ per cent, the maximum grade of the present line to Savannah, and will permit the increase of the freight train load. In effect this will give the Seaboard, through South Carolina, from Hamlet, N. C., to Savannah, Ga., two lines, the other line running via Columbia, each one self-supporting in its own territory, and thus will be obviated the necessity of double-tracking the Hamlet-Columbia line, where traffic is becoming congested. The territory to be opened up between Charleston and Savannah is generally well adapted to the growing of vegetables, corn, rice and sea island cotton and will put the Seaboard immediately into Charleston's heaviest vegetable producing section.

"The Seaboard Air Line Railway Company, the new corporation, will have its first and consolidated mortgage securing an authorized issue of \$300,000,000 bonds of variable interest rates and maturities. This mortgage will be immediately a first lien on the 416 miles of main line track between Hamlet and Savannah, via Charleston, Lanes and Georgetown, S. C., and on the lines running from McBee, S. C., located on the Hamlet-Columbia line, to Florence, Poston, Sumter and Timmons ville, S. C. There will be pledged as collateral under the new mortgage a majority, \$22,361,000, of the outstanding refunding 4 per cent bonds of the Seaboard Air Line Railway.

"There will be presently issued under the new first and consolidated mortgage \$22,893,000 of 6 per cent thirty-year gold bonds; part are to be used in exchange for underlying bonds of constituent properties, the balance has been sold, proceeds to be used for the construction of the new line from Charleston to Savannah, for retirement of equipment trust obligations falling due during the year ending June 30, 1916, for the retirement of the \$6,000,000 three-year notes due March 1, 1916, for the acquisition of certain new property and for improvements and betterments.

"Subject to the carrying out of agreements for the exchange of bonds of the underlying railway properties to be consolidated with the Seaboard Air Line Railway, arrangements have been made for the sale of the bonds of this issue of Series 'A,' as above stated."

ANNUAL REPORT

SIXTY-FIRST ANNUAL REPORT OF THE LEHIGH VALLEY RAILROAD COMPANY

PHILADELPHIA, August 3, 1915.

To the Stockholders of the

LEHIGH VALLEY RAILROAD COMPANY.

The Board of Directors herewith submit the annual report of the business and condition of your Company for the fiscal year ended June 30, 1915.

MILEAGE.

The first track mileage owned or controlled and operated by the Lehigh Valley Railroad Company, the main line of which is double track, extending from Jersey City, N. J., to Buffalo and Suspension Bridge, N. Y., is as follows:

	MILES
Lehigh Valley Railroad Company.....	316.88
Controlled by ownership of entire capital stock.....	938.67
Controlled by ownership of majority of capital stock and lease....	115.37
Operated under lease	27.73
Total mileage operated (owned or controlled).....	1,398.65
Trackage rights over railroads owned by other companies.....	43.71
Total first track mileage.....	1,442.36

In addition to the above there are 594.86 miles, or 41.24 per cent. of second track, 99.51 miles of third track, 44.84 miles of fourth track, and 1,215.76 miles of yard tracks and sidings, a total of 3,397.33 miles of track in operation at the close of the year. A detailed statement of track mileage is shown below. The average number of miles of railway operated for the year was 1,443.52, upon which the mileage statistics in certain tables submitted in this report are based.

The total decrease of 1.38 track miles compared with the preceding year is due, in the main, to the deduction of 1.07 miles of trackage rights, the use of which was discontinued during the year.

OPERATING REVENUES AND EXPENSES.

The following statement sets forth the total revenues and expenses and net revenue from operation for the fiscal year, compared with similar figures for the fiscal year 1914. The complete income account appears on page 24.

The Interstate Commerce Commission having ordered certain further changes in the classification of operating revenues, expenses and income, effective July 1, 1914, it has been necessary, for the purpose of a proper comparison, to re-state the figures for the preceding fiscal year; hence those figures will in many cases be at variance with similar items published in last year's annual report. The principal change is the elimination of Outside Operations, which represent the operations of certain of our water lines, etc., the revenue from which is now included in Operating Revenues and the expenses in Operating Expenses. Similar explanation applies with respect to the classification of various items on the balance sheet which has been changed from the balance sheet published in previous years so as to conform with the accounting requirements of the Commission.

OPERATING REVENUES				
FROM	1915	1914	INCREASE	DECREASE
Coal freight	\$19,195,755.50	\$18,528,246.44	\$667,509.06	.....
Merchandise freight	16,005,501.45	15,541,885.90	463,615.55	.....
Passenger	4,043,799.00	4,795,147.44	.....	\$751,348.44
Mail	195,124.81	195,052.87	71.94	.....
Express	449,622.82	443,971.75	5,651.07	.....
Other transportation	2,022,230.85	2,063,650.04	.....	41,419.19
Incidental	613,927.59	602,692.34	11,235.25	.....
Total operating revenues	\$42,525,962.02	\$42,170,646.78	\$355,315.24	.....

OPERATING EXPENSES				
	1915	1914	INCREASE	DECREASE
Maintenance of way and structures..	\$4,483,924.72	\$4,674,725.37	.....	\$190,800.65
Maintenance of equipment ..	8,207,491.18	7,669,793.05	\$537,698.13	.....
Traffic expenses..	959,830.08	1,040,594.15	.....	80,764.07
Transportation expenses	15,382,186.83	15,804,058.77	.....	421,871.94
General expenses..	913,954.73	898,733.86	15,220.87	.....
Total operating expenses	\$29,947,387.54	\$30,087,905.20	.....	\$140,517.66
NET OPERATING REVENUE	\$12,578,574.48	\$12,082,741.58	\$495,832.90	.....
Ratio of operating expenses to operating revenues..	70.42%	71.35%	.....	.93%

OPERATING REVENUES.

COAL FREIGHT.

The revenue derived from the transportation of coal and coke amounted to \$19,195,755.50, an increase of \$667,509.06, or 3.60 per cent., as compared with the preceding twelve months.

The percentage of coal freight revenue to total operating revenues was 45.14 per cent., an increase of 1.20 per cent.

The coal and coke transported, excluding the Company's supply coal, was 16,894,930 tons, an increase of 429,982 tons, or 2.61 per cent.

This class of tonnage was 55.82 per cent. of the total tonnage hauled during the year, an increase of .52 per cent.

MERCHANDISE FREIGHT.

The transportation of merchandise freight produced a revenue of \$16,005,501.45, an increase of \$463,615.55, or 2.98 per cent., as compared with the preceding year.

The revenue derived from the transportation of merchandise freight was 37.64 per cent. of the total operating revenues, an increase of .79 per cent.

The tonnage moved, excluding Company's material, was 13,373,771 tons, an increase of .49 per cent.

GENERAL FREIGHT.

The total revenue derived from both coal and merchandise freight was \$35,201,256.95, an increase of \$1,131,124.61, or 3.32 per cent., as compared with the preceding twelve months.

The entire freight traffic amounted to 30,268,701 tons, an increase of 495,421 tons, or 1.66 per cent.

The number of tons carried one mile was 5,326,328.902, an increase of 140,128,336 ton miles, or 2.70 per cent.

The average haul was 175.97 miles, an increase of 1.78 miles, or 1.02 per cent.

The average revenue per ton was 116.30 cents, as compared with 114.43 cents last year, an increase of 1.87 cents, or 1.63 per cent.

Company's freight, not included in the above, amounted to 3,073,660 tons, a decrease of 62,095 tons, or 1.98 per cent.

The total freight train mileage was 8,580,867 miles, an increase of 244,295 miles, or 2.93 per cent.

The revenue received per freight train mile was \$4.10, an increase of \$0.01, or .24 per cent.

The average trainload of revenue freight was 620.72 tons, a decrease of 1.38 tons, or .22 per cent. Including Company's freight, the average trainload was 643.62 tons, a decrease of 1.57 tons, or .24 per cent.

PASSENGER.

The earnings received from passenger traffic amounted to \$4,043,799.00, a decrease of \$751,348.44, or 15.67 per cent., compared with the preceding year.

The total number of passengers carried was 5,206,972, a decrease of 522,070, or 9.11 per cent.

The number of passengers carried one mile decreased 49,671,062, or 18.72 per cent.

The average revenue per passenger was 77.66 cents, a decrease of 6.04 cents, or 7.22 per cent.

The average revenue per passenger per mile was 1.875 cents, an increase of .008 cent, or 3.76 per cent.

The average distance traveled by each passenger was 41.42 miles, a decrease of 4.89 miles, or 10.56 per cent.

Passenger train mileage was 4,170,202, a decrease of 225,157 miles, or 5.12 per cent., as compared with a decrease in this revenue of 15.67 per cent.

The average revenue from passengers per passenger train mile was 96.97 cents, a decrease of 12.13 cents, or 11.12 per cent.

MAIL.

The sum of \$195,124.81 was received from the Federal Government for the transportation of United States mail, an increase of \$71.94.

EXPRESS.

The revenue from this class of business amounted to \$449,622.82, an increase of \$5,651.07.

OTHER TRANSPORTATION.

The earnings derived from transportation other than shown under the preceding headings were \$2,022,230.85, a decrease of \$41,419.19.

INCIDENTAL.

Incidental revenue amounted to \$613,927.59, an increase of \$11,235.25.

OPERATING EXPENSES.

MAINTENANCE OF WAY AND STRUCTURES.

The sum of \$4,483,924.72 was expended for the maintenance of way and structures, a decrease of \$190,800.65, or 4.08 per cent., as compared with the preceding year.

A new four-track steel bridge was constructed during the year to replace a double-track steel bridge. Three overhead steel street bridges were raised, in connection with Buffalo Terminal improvements, and additional spans with solid floors were erected. One steel bridge was built in connection with new track construction. Sixteen steel bridges and eleven concrete-steel bridges were placed in the track, replacing light iron or wooden bridges. Three iron and eight wooden bridges were replaced by pipe culverts, and four iron and two wooden bridges were abandoned and the openings filled. One arch culvert was filled and abandoned and four wooden trusses were substantially shortened by filling.

5,535 tons of 110-pound rail, 30,549 tons of 100-pound rail and 45 tons of 90-pound rail, together with necessary frogs, switches, etc., were placed in the track.

1,118,810 tie plates and 193,934 anti-rail creepers were used. 1,001,577 cross ties, 2,842,100 feet B. M. switch ties, 637,471 feet B. M. bridge ties and lumber amounting to 3,511,267 feet B. M. were used.

647,981 of the cross ties, 2,495,412 feet B. M. of switch ties and 596,560 feet B. M. of bridge ties were treated with creosote.

65,612 cubic yards of crushed stone were used in ballasting track. 18,197 feet of drain tile were placed in the roadbed.

334.93 miles of copper and 54.50 miles of iron wire were used in extending and renewing the telephone, telegraph and signal wires on the system.

MAINTENANCE OF EQUIPMENT.

The expenditures for the maintenance of equipment amounted to \$8,207,491.18, an increase of \$537,698.13, or 7.01 per cent., as compared with the preceding twelve months. Included therein is a charge of \$1,426,831.06 for the depreciation of equipment, as required by the accounting rules of the Interstate Commerce Commission.

Ten worn-out locomotives, one passenger car, three express cars, two fruit cars, 572 freight equipment cars and thirteen road service cars were condemned and either sold or destroyed during the year, and their value written off the books by appropriate charges through operating expenses.

Four passenger cars, five express cars, four fruit cars and one combined baggage and mail car were converted into workmen's cars. Eighteen produce cars were converted into ice cars and fifty freight equipment cars were transferred to road service.

Twenty-eight locomotives have been equipped with additional air pumps

and one hundred and fifty-nine with bull's-eye lubricators, to meet the requirements of the Interstate Commerce Commission.

Fifty-six locomotives had new fire boxes applied, one hundred and fifteen were equipped with new cylinders and nine with new boilers.

275 passenger equipment cars were painted and varnished and thirteen equipped with electric lighting apparatus. Three dining cars and five milk cars were equipped with steel underframes.

Steel underframes were applied to 2,286 wooden freight and coal cars, making a total of 14,658 cars so equipped during the last seven years. Five eight-wheel cabooses were equipped with steel underframes. 12,855 freight equipment cars, one passenger equipment car and thirty-six road service cars were equipped with safety appliances to conform to the requirements of the Interstate Commerce Commission.

The total number of locomotives on hand at the close of the year was 945, with a tractive power of 30,234,824 pounds. The total number of freight equipment cars was 45,459, with a capacity of 1,693,578 tons.

TRAFFIC EXPENSES.

The expenditures under this heading amounted to \$959,830.08, a decrease of \$80,764.07, as compared with the preceding twelve months.

TRANSPORTATION EXPENSES.

The cost of conducting transportation was \$15,382,186.83, a decrease of \$421,871.94, or 2.67 per cent., as compared with the preceding year, notwithstanding an increase of .84 per cent. in the total operating revenues.

The ratio of transportation expenses to total operating revenues was 36.17 per cent., a decrease of 1.31 per cent. as compared with the preceding year.

GENERAL EXPENSES.

This class of expenses amounted to \$913,954.73, or 2.17 per cent. of the total operating revenues.

TAXES.

The taxes accrued on your property, capital and business, during the year amounted to \$1,797,379.16, an increase of \$36,967.58 over the preceding year.

ADDITIONS AND BETTERMENTS.

The sum of \$2,974,042.42 was expended during the year for the acquisition of new property and for the improvement and development of existing property, which amount has been charged to Additions and Betterments, as required by the Interstate Commerce Commission. A classified statement of these expenditures appears below. Specific mention is made of the more important expenditures, viz:

The new equipment purchased and added to the property during the year is as follows: Three passenger locomotives, five switching locomotives, two locomotive tenders, thirty steel passenger coaches, ten steel smoking cars, twenty-five steel baggage cars, two 150-ton steam derricks, two Russell snow plows, one caboose, one motor inspection car and one tank car. A portion of this equipment is covered by the Equipment Trust referred to in full under the heading "Financial."

In addition to the foregoing, orders have been placed for ten Pacific type passenger locomotives, five switching locomotives, three locomotive tenders and twenty steel underframe milk cars.

During the past fiscal year fifty-three heavy Consolidation type freight locomotives were rebuilt and equipped with superheaters, new cylinders and Walschaert valve gears. These changes have resulted in a reduced fuel consumption as well as increased efficiency of operation, due to the better sustained steaming qualities of the engines.

Work in connection with the new passenger and freight terminals at Buffalo is progressing favorably. The plans for the buildings were approved, contracts awarded and work commenced on April 14, 1915. It is expected that the freight terminal will be completed and ready for use by November next and the passenger terminal at a later date.

A new open pier 1,060 feet in length and 76 feet in width, equipped with modern ore handling machinery, together with necessary yard tracks, is being constructed at tidewater near Constable Hook, and, when completed, will accommodate steamships of 35-foot draft. The furnaces in the Lehigh Valley region will utilize these facilities for the handling of foreign ores. It is expected that this improvement will be completed early in the spring of 1916.

During the year considerable improvements and additions have been made to the pier stations in the City of New York. A long term lease was concluded with the city for the wharf property on the North River at the foot of Rector Street, and your Company is now constructing thereon a new pier 730 feet long and 75 feet wide, with suitable bulkheads on each side, which will be ready for operation about January 1, 1916. This will enable your Company to dispense with the station facilities at Pier 2, which are no longer adequate. The substructure of the new pier will be of concrete above the low-water line and the superstructure will be of steel, the pier section of which will be one-story and the bulkhead section two stories. Pier 44, East River, located between Gouverneur and Jackson Streets, has also been acquired under a long term lease from the city and will be equipped with a two-story steel shed, primarily intended for the handling of flour, the pier being advantageously located in the center of distribution of that commodity. At the 149th Street station there is now in course of erection a steel building, equipped with automatic sprinkler, for the storage of hay, a commodity which is extensively handled in that locality. At Pier 5, Wallabout, Brooklyn, where your Company previously leased only about one-fourth of the pier, it acquired the entire pier, enlarged the steel shed and installed an automatic sprinkler system. The acquisition of these additional pier facilities will permit your Company to render improved service to its patrons.

A modern steel and concrete ground-level plant for handling coal from cars to boats, with a capacity of 500 cars in ten hours, is being installed at Tift Farm, Buffalo, and will be ready for service early in August. It will be operated by electricity and will consist of two rocking cradles for unloading box cars and four fixed hoppers for unloading open cars. The coal will be conveyed by apron flights to a telescopic chute in the boat. This installation will reduce breakage of coal to a minimum, will eliminate all fire risk now incident to the high wooden trestle and also reduce the cost of maintenance.

66,422 feet, of 12.58 miles, of Company's sidings, and 15,787 feet, or 2.99 miles, of industrial sidings, were constructed during the year.

To avoid surface disturbances by reason of mine workings of one of the large anthracite mining companies, a change of line was completed between Espy Run and Newport, a distance of 1.2 miles. In making this change 82 degrees of curvature were eliminated, including a double reverse curve of 6 and 8 degrees respectively.

The car repair yard at Coxton is being relocated in order to provide additional room necessary for car repairs and at the same time to permit of the use of the old car repair tracks for the enlargement of the classification yard. About 8,000 feet of track have been constructed in this connection. The yards at South Plainfield, Perth Amboy and Oak Island were enlarged, resulting in increased capacities of 41, 174 and 32 cars respectively.

A new fifty-stall fireproof enginehouse, together with a 100-foot electrically operated turntable, is in course of construction at Sayre.

A concrete freight house was erected at Lehigh. Dwelling houses of hollow tile and stucco construction, for the accommodation of foremen and laborers, were constructed at Flemington Junction, Ashmore and Phelps. Extensive improvements were made to the Company dwelling houses at Delano and to the milk shipping stations at West Portal, Tioga Centre and Wysox. A frame shelter was erected at Weequeh Park, Newark, for the accommodation of incoming passengers waiting for trolley cars. In the waiting rooms of the Wilkes-Barre passenger station a new marbleoid floor was laid and new seating accommodations and electric light fixtures were installed.

A new 46-foot track scale was installed at South Plainfield.

Eleven gasoline motor cars were purchased for use of section, bridge, signal and telegraph gangs, making a total of 110 now in service.

The improvements in connection with the water supply at Lehigh and Packerton, comprising the construction of a reservoir of five million gallons capacity on Beaver Run and a dam across Mahoning Creek, together with electric pumping machinery and connecting pipe lines, which will afford an independent and ample supply of water for the locomotives and shops at those points, referred to in last year's report, are about one-half completed. A new water station with a 52,500-gallon steel standpipe supplied by gravity was established at Sheldrake Springs.

Automatic disc signals between Slatington and Penn Haven Junction, a distance of 21.3 miles, were replaced with three-position upper-quadrant signals, and the automatic disc signals between Laceyville and Wilkes-Barre, a distance of 49.1 miles, have been renewed with two-position lower-quadrant signals. Extensive improvements were made to the mechanical interlocking plant at Pine Junction.

Visible and audible crossing signals were installed at the following points: Morley's Crossing, east of Athens; Stanton; Clinton Avenue, South Plainfield; Colfax Avenue and Walnut Street, Roselle Park; Manville, and Lexington Avenue, Picton.

During the year thirty-five portable telephones were installed on freight and passenger trains, making a total of 720 in service, which completes the work of equipping trains. The purpose of these telephones is to enable train crews to communicate immediately with the proper officers in case of accident or unusual delay.

New telegraph and telephone pole lines were erected for a distance of 4.50 miles on the Mahanoy and Hazleton Division, .83 of a mile on the Seneca Division, and 2.50 miles on the Buffalo Division. Telegraph and telephone lines were rebuilt for a distance of 9.68 miles on the New Jersey and Lehigh Division, 2.10 miles on the Mahanoy and Hazleton Division, 23.85 miles on the Wyoming Division, and 21 miles on the Buffalo Division. Poles were set for a distance of 23.90 miles on the New Jersey and Lehigh Division, 19.70 miles on the Mahanoy and Hazleton Division, and 6.60 miles on the Wyoming Division.

FINANCIAL.

No capital obligations have been issued and sold by your Company during the fiscal year.

The following obligations matured and were retired during the year:

DESCRIPTION	INTEREST RATE	MATURITY	AMOUNT
Collateral Trust Bonds.....	4%	Feb. and Aug.	\$1,000,000
Equipment Trust, Series I, Certificates..	4%	September	400,000
Equipment Trust, Series J, Certificates..	4½%	Mar. and Sept.	500,000
Equipment Trust, Series K, Certificates.	4%	Mar. and Sept.	300,000
Equipment Trust, Series L, Certificates.	4½%	April and Oct.	400,000
Equipment Trust, Series M, Certificates.	4½%	March	200,000
Total.....			\$2,800,000

Thus far the improvements which have been made in connection with the new freight and passenger terminals at Buffalo, referred to elsewhere in the report, have been financed out of the current cash resources of the Company. It is proposed, however, at a later date to make a specific issue of bonds to cover the major portion of this expenditure. Accordingly a new company has been incorporated, known as the Lehigh-Buffalo Terminal Railway Corporation, which will take title to the real estate and make all the improvements incident to the construction of the terminals. Application is now pending before the Public Service Commission of New York State for authority to have the terminal corporation issue to the Lehigh Valley Railroad Company Fifty-Year Five Per Cent. Gold Debenture Bonds for such moneys as have been and will be advanced to it for this purpose. These bonds, when received, will be placed in the treasury of your Company. All of the real estate which was acquired by your Company and its subsidiaries is now being transferred to the new company.

The Equipment Trust, known as Series M, covering an issue of \$1,800,000 Four and One-Half Per Cent. Certificates, which was authorized last year, as mentioned in that annual report, has been completed and the certificates are now in the Company's treasury. The same mature in annual installments of \$200,000 on March 1st of each year, the last installment being due on March 1, 1923. The \$200,000 which matured March 1, 1915, were duly cancelled. This trust is a lien upon one thousand self-clearing double hopper steel coal cars of 100,000 pounds capacity each, sixty-five steel passenger coaches, twenty-five steel baggage and express and ten steel smoking cars.

The advances made by the Lehigh Valley Railroad Company to subsidiary companies, of which it owns the entire capital stock, were reimbursed by the issuance of Fifty-Year Five Per Cent. Gold Debenture Bonds as follows:

The Lehigh Valley Rail Way Company.....	\$380,000
Lehigh Valley Railroad Company of New Jersey.....	240,000
Pennsylvania and New York Canal and Railroad Company..	145,000
National Storage Company.....	80,000

These securities have been deposited with the Trustee of the General Consolidated Mortgage, as required by the terms of that mortgage.

To reimburse your Company for advances made to it for capital expenditures, the Wyoming Valley Water Supply Company has issued \$80,000 First Mortgage Five Per Cent. Bonds which have been received and placed in the treasury.

The book value of the capital stock of Cox Brothers & Company, Incorporated, has been reduced by the sum of \$1,000,000, and Profit and Loss charged with that amount, as has been the practice in preceding years.

There has been a reduction in the book value of the capital stock of the Temple Iron Company as a result of the liquidation of its anthracite business following the decree of the Supreme Court of the United States.

Material and Supplies on hand at the close of the year amounted to \$2,906,007.63, a decrease of \$467,253.15.

Current Assets are \$8,097,354.72 in excess of Current Liabilities.

Four quarterly dividends of two and one-half per cent. each on the preferred and common capital stocks of the Company were declared and paid during the year.

The cash and security balances of the Company for the year have been verified by certified public accountants and a copy of their certificate as to the correctness of the same is given on page 19.

GENERAL REMARKS.

Your Company has pursued a fairly aggressive policy in the matter of expenditures for the development and improvement of its property. The appropriations for the year were also very liberal for the maintenance of the permanent way and equipment. In fact, it will be observed by reference to the statement of operating expenses, that the total maintenance appropriations have been somewhat in excess of the preceding year, noticeably so in the case of equipment. Your Board of Directors believed it to be for the best interests of the stockholders to pursue this policy of liberal maintenance and conservative development for the future, notwithstanding the fact that the revenues were somewhat affected during part of the fiscal year as a result of the disturbed business and financial condition of the country resulting from the European situation.

The attention of the stockholders is again called to the tax accruals which are steadily increasing, and at a rate out of all proportion to the increase in revenues. The total taxes now amount to 4.23 per cent. of your Company's gross operating revenues. In the last ten years operating revenues have increased 29.69 per cent., while taxes have increased 154.21 per cent.

Five new covered barges were received during the year and added to the floating equipment of the Lehigh Valley Transportation Company, the entire capital stock of which is owned by your Company. One tug, fully covered by insurance, was lost at sea. One steam lighter, two cattle boats and six barges which, on account of age and capacity, became undesirable for further service, were condemned and sold.

The Interstate Commerce Commission rendered a decision in the month of May, 1915, under the so-called Panama Canal act, the effect of which, unless the decision can be modified, will be to compel the Lehigh Valley Railroad Company to cease the operation of six steamers owned by the Lehigh Valley Transportation Company and now operated upon the Great Lakes. These vessels have for years been operated in miscellaneous freight service and served as valuable feeders from western points to your Company's lines which end at Buffalo. The decision of the Commission does not require the discontinuance of these operations until December 1, 1915. The matter is one of grave concern to your Company and is now occupying the earnest attention of its officers.

Your Company has seventeen men engaged in the preparation of data and collection of records in connection with the valuation of the Company's property, for use by the Interstate Commerce Commission, as required by law, and this force will have to be increased as the work progresses.

The passenger stations at Waterloo and Seneca Falls and the passenger train service between Geneva and Seneca Falls were discontinued as of October 1, 1914. This discontinuance was consented to by the Public Service Commission of New York State upon proof being furnished to it that the service was being rendered at a loss to your Company and that the communities interested were being well served otherwise.

Upon petition of the Board of Trade of Irvington the Board of Public Utility Commissioners of New Jersey ordered your Company, effective January 29, 1915, to operate three passenger trains on the Irvington Branch in connection with three main line trains to and from Jersey City. The receipts from this service were so hopelessly inadequate in meeting the expense of operation that the Board of Public Utility Commissioners consented to the withdrawal of the service as of June 22, 1915.

The operation of the Lehigh and New York Railroad for the year under review resulted in a loss of \$225,826.13. The property of that Company is leased and operated by your Company under an agreement made in 1895.

Sixty new industries were located on the system during the year, of which fifty have direct track connections with your Company's lines.

Total payments direct to labor for the year amounted to \$16,834,699.53, or 56.21 per cent. of the total operating expenses, the same having been distributed among an average of 20,173 employees.

The contribution made by your Company to its Employees' Relief Fund amounted to \$59,989.38.

The officers and employees are thanked for their loyal and faithful services rendered during the year.

E. B. THOMAS, President.

COMPARATIVE INCOME ACCOUNT FOR THE YEARS ENDED JUNE 30, 1915 AND 1914

OPERATING REVENUES:—		1915	1914	INCREASE OR DECREASE
Coal freight revenue....	\$19,195,755.50	\$18,528,246.44		\$667,509.06
Merchandise freight revenue	16,005,501.45	15,541,885.90		463,615.55
Passenger revenue	4,043,799.00	4,795,147.44		—\$751,348.44
Mail revenue	195,124.81	195,052.87		71.94
Express revenue	449,622.82	443,971.75		5,651.07
Other transportation revenue	2,022,230.85	2,063,650.04		—41,419.19
Incidental revenue	613,927.59	602,692.34		11,235.25
Total operating revenues.....	\$42,525,962.02	\$42,170,646.78		\$355,315.24
OPERATING EXPENSES:—				
Maintenance of way and structures	\$4,483,924.72	\$4,674,725.37		—\$190,800.65
Maintenance of equipment	8,207,491.18	7,669,793.05		\$537,698.13
Traffic expenses	959,830.08	1,040,594.15		—80,764.07
Transportation expenses..	15,382,186.83	15,804,058.77		—421,871.94
General expenses	913,954.73	898,733.86		15,220.87
Total operating expenses.....	\$29,947,387.54	\$30,087,905.20		—\$140,517.66
Ratio of operating expenses to operating revenues..	70.42%	71.35%		.93%
Net operating revenue.....	\$12,578,574.48	\$12,082,741.58		\$495,832.90
RAILWAY TAX ACCRUALS....	\$1,689,109.33	\$1,659,280.99		\$29,828.34
UNCOLLECTIBLE RAILWAY REVENUES	14,781.88	.....		14,781.88
Total tax accruals, etc.,	\$1,703,891.21	\$1,659,280.99		\$44,610.22
OPERATING INCOME	\$10,874,683.27	\$10,423,460.59		\$451,222.68
OTHER INCOME:—				
Hire of equipment—Credit balance	\$68,807.74	\$325,440.01		—\$394,247.75
Joint facility rent income.	325,579.07	402,957.70		—77,378.63
Dividend income	712,998.77	*1,241,034.58		528,035.81
Income from funded securities	428,027.08	423,060.00		\$4,967.08
Miscellaneous income....	544,414.27	624,197.19		—79,782.92
Total other income....	\$1,942,211.45	\$3,016,689.48		—\$1,074,478.03
TOTAL INCOME	\$12,816,894.72	\$13,440,150.07		\$623,255.35

†Debit balance.

*Includes dividend of \$685,080.00 on capital stock of Temple Iron Co.

GENERAL BALANCE SHEET, JUNE 30, 1915.

ASSETS.		LIABILITIES.	
Dr.			Cr.
INVESTMENT IN ROAD AND EQUIPMENT:—		CAPITAL STOCK:—	
Investment in road.....	\$24,064,145.93	1,210,034 shares common stock, par \$50	\$60,501,700.00
Investment in equipment.....	55,699,182.97	2,126 shares preferred stock, par \$50	106,300.00
	\$79,763,328.90		\$60,608,000.00
Less reserve for accrued depreciation..	8,371,409.12		
	\$71,391,919.78	FUNDED DEBT:—	
INVESTMENT IN MISCELLANEOUS PHYSICAL PROPERTY		Mortgage bonds.....	\$77,639,000.00
	4,770,573.52	Collateral trust bonds.....	11,000,000.00
INVESTMENTS IN AFFILIATED COMPANIES:—		Equipment trust obligations.....	6,200,000.00
Stocks	\$46,988,785.27	Mortgage on real estate.....	1,669.18
Bonds	26,815,926.00		\$94,840,669.18
Notes	353,750.00	Less securities held in treasury of the Company	19,073,000.00
Advances	229,510.12		75,767,669.18
	\$74,387,971.39	CURRENT LIABILITIES:—	
OTHER INVESTMENTS:—		Traffic and car-service balances payable..	\$89,829.37
Stocks	\$252,860.00	Audited accounts and wages payable....	3,218,038.42
Bonds	34,000	Miscellaneous accounts payable.....	202,047.56
Miscellaneous	306,839.00	Interest matured unpaid.....	403,980.75
	\$593,699.00	Dividends matured unpaid.....	4,197.25
CURRENT ASSETS:—		Unmatured dividends declared.....	1,515,200.00
Cash	\$9,177,789.11	Unmatured interest accrued.....	558,568.47
Traffic and car-service balances receivable	133,082.01	Unmatured rents accrued.....	355,980.77
Net balance receivable from agents and conductors	984,744.39	Other current liabilities.....	476,185.13
Miscellaneous accounts receivable.....	1,315,537.70		6,824,033.73
Material and supplies.....	2,906,007.63		1,366,223.89
Interest and dividends receivable.....	199,397.85	UNADJUSTED CREDITS:—	
Other current assets.....	204,829.76	Tax liability	\$450,787.01
	\$14,921,388.45	Other unadjusted credits.....	496,468.13
DEFERRED ASSETS	1,321,493.28		947,255.14
UNADJUSTED DEBITS:—		PROFIT AND LOSS	
Rents and insurance premiums paid in advance	\$140,396.49		23,692,716.88
Other unadjusted debits.....	1,678,456.91		
	\$1,818,853.40	TOTAL LIABILITIES	
TOTAL ASSETS.....	\$169,205,898.82		\$169,205,898.82

NOTE: The Interstate Commerce Commission issued an order, effective July 1, 1914, requiring the reclassification of balance sheet accounts and, accordingly, the balance sheet has been rearranged to conform thereto.

DEDUCTIONS FROM INCOME:—

Interest on funded debt.....	\$3,459,738.48	\$3,308,428.49	\$151,309.99
Rent for leased roads.....	2,131,795.00	2,212,420.00	—\$80,625.00
Joint facility rents.....	208,613.37	210,322.40	1,709.03
Miscellaneous rents.....	526,985.22	514,084.51	12,900.71
Miscellaneous tax accruals.....	108,269.83	101,130.59	7,139.24
Miscellaneous deductions.....	59,047.86	37,104.39	21,943.47
Total deductions from income.....	\$6,494,449.76	\$6,383,490.38	\$110,959.38
NET INCOME.....	\$6,322,444.96	\$7,056,659.69	—\$734,214.73

PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED
JUNE 30, 1915.

	Dr.	Cr.
Balance, July 1, 1914.....		\$23,898,683.75
Net income for year ended June 30, 1915..		6,322,444.96
Adjustments account distribution of cost of sundry real estate purchased in prior years.....		574,236.34
Miscellaneous adjustments.....		7,402.13
Reduction of book value of capital stock of Coxo Brothers & Co., Inc.....	\$1,000,000.00	
Property abandoned.....	49,250.30	

THE LEHIGH VALLEY COAL COMPANY

REPORT OF OPERATIONS.

PHILADELPHIA, August 2, 1915.

The annual report of the operations conducted by The Lehigh Valley Coal Company for the fiscal year ended June 30, 1915, and statements indicating its financial condition at the close of the year, are herewith submitted.

The conditions in the anthracite trade have not been very satisfactory because of the mild weather which has prevailed during the past several winters. While the tonnage mined shows a slight increase over the preceding year, all of the increase was made in the first six months. The second half of the year shows a decrease as compared with the same period a year ago.

The total net income of the Company from all sources, after deducting charges for royalties, sinking funds, depreciation of the property and interest on the funded debt, amounted to \$1,022,814.91, an increase of \$457,955.47 as compared with the preceding year.

The production of anthracite coal from the lands owned and leased by The Lehigh Valley Coal Company, including that mined by tenants, was 8,088,901 gross tons, an increase of 211,511 tons.

The percentage of sizes above pea produced by the mining operations of the Company was 65.41 per cent., a decrease of 1.05 per cent.

The number of breaker hours worked was 42,085, an increase of 867 hours.

The bituminous coal mined from the Snow Shoe lands, located in Centre County, Pennsylvania, amounted to 258,205 gross tons, an increase of 5,474 tons.

The property of the Company was fully maintained during the year and \$517,542 was expended for additions and betterments.

The steel fireproof breaker at Packer No. 5 colliery, referred to in the last annual report, was completed and is now in successful operation. Other improvements at this colliery, including a substantial addition to the boiler plant and a new steel headframe over the shaft, have been completed, and a new steel fireproof ventilating fan is now in course of construction. At Packer No. 4 colliery the alterations to the breaker and the concentration of the underground pumping are well under way and will be completed during the coming year.

An addition to the boiler plant at Dorrance colliery has been made to provide the increased amount of steam required because of the extension of underground operations.

Prospecting on the Broadwell lands in Lackawanna County is now under way with a view to commencing mining operations thereon and taking the coal to Heidelberg colliery for preparation.

To reduce still further the risk of destruction by fire, a complete spray system was introduced at each of the frame breakers and, as a result of tests made under the observation of representatives of the insurance companies, a substantial reduction was made in the premiums paid for fire insurance.

DIVIDENDS:—

Two and one-half per cent. on preferred stock, paid Oct. 10, 1914.....	\$2,657.50	
Two and one-half per cent. on common stock, paid Oct. 10, 1914.....	1,512,542.50	
Two and one-half per cent. on preferred stock, paid Jan. 9, 1915.....	2,657.50	
Two and one-half per cent. on common stock, paid Jan. 9, 1915.....	1,512,542.50	
Two and one-half per cent. on preferred stock, paid April 10, 1915.....	2,657.50	
Two and one-half per cent. on common stock, paid April 10, 1915.....	1,512,542.50	
Two and one-half per cent. on preferred stock, due July 10, 1915.....	2,657.50	
Two and one-half per cent. on common stock, due July 30, 1915.....	1,512,542.50	
		6,060,800.00
Balance, June 30, 1915.....	23,692,716.88	
		\$30,802,767.18
Balance brought forward, July 1, 1915.....		\$23,692,716.88

The operations on the bituminous coal lands at Snow Shoe are being steadily developed to permit of greater efficiency. As soon as the power line, now under construction, is completed, electric haulage will be substituted for mules and electric coal cutting machinery will be introduced in place of pick mining.

The properties at West Harrison Street, Chicago, and Fillmore Avenue, Buffalo, which were no longer required in the conduct of the Company's business, were sold during the year.

Included in the cash on hand is the sum of \$678,085 representing an amount set aside on account of the special tax levied by the State of Pennsylvania of two and one-half per cent. of the value of the coal mined. The constitutionality of this law has not as yet been decided by the courts.

No new capital obligations have been issued during the year.

By action of the Sinking Fund \$404,000 Delano Land Company First Mortgage Five Per Cent. Bonds were purchased and canceled during the year. The retirement of these bonds will result in a reduction of \$20,200 per annum in the fixed charges of the Company.

The obligations appearing on the balance sheet as "Deferred Real Estate Payments," representing short term notes given for the purchase of property in prior years, have been reduced by the sum of \$100,000.

Payments amounting to \$112,804 were made to the sinking funds of the various mortgages on the Company's property.

Current Assets are \$3,521,901 in excess of Current Liabilities.

The books and accounts of the Company have been verified by certified public accountants and a copy of their certificate as to the correctness thereof appears on page 9.

By order of the Board of Directors.

F. M. CHASE,
Vice-President and General Manager.PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED
JUNE 30, 1915.

	Dr.	Cr.
Credit balance, July 1, 1914.....		\$4,225,685.28
Net income for year ended June 30, 1915.....		1,022,814.91
Adjustment of Pennsylvania State Taxes.....	\$67,126.51	
Miscellaneous adjustments.....	73,359.12	
Balance, June 30, 1915.....	5,108,014.56	
	\$5,248,500.19	\$5,248,500.19
Credit balance brought forward, July 1, 1915.....		\$5,108,014.56

GENERAL BALANCE SHEET, JUNE 30, 1915.

ASSETS.		LIABILITIES.	
PROPERTY AND PLANT.....	\$24,969,596.83	CAPITAL STOCK.....	\$1,965,000.00
SECURITIES OWNED.....	200,000.00	FUNDED DEBT.....	19,892,000.00
ADVANCES FOR COAL MINING RIGHTS.....	4,465,730.06	CURRENT LIABILITIES:—	
SINKING FUNDS IN HANDS OF TRUSTEES.....	2,570,393.71	Audited vouchers.....	\$570,862.06
INSURANCE FUND.....	133,465.59	Wages due and unpaid.....	517,704.62
CURRENT ASSETS:—		Due to individuals and companies.....	45,855.55
Cash on deposit.....	\$4,178,948.66	Royalties on coal mined, due lessors.....	40,602.31
Materials and supplies.....	321,829.72	Interest on funded debt, due July 1, 1915..	303,800.00
Notes receivable.....	4,000.00	Interest on funded debt, accrued, not due..	100,000.00
Due from individuals and companies.....	1,700,743.66	Interest due on funded debt, unclaimed....	5,000.00
	6,205,522.04	Taxes due and accrued.....	1,099,796.35
DEFERRED AND SUSPENDED ASSETS.....	238,175.13		2,683,620.89
		DEFERRED AND SUSPENDED LIABILITIES:	
		Deferred real estate payments.....	\$600,000.00
		Miscellaneous.....	149,717.42
			749,717.42
		RESERVE ACCOUNTS:—	
		Depreciation and other reserves.....	8,384,530.49
		PROFIT AND LOSS.....	5,108,014.56
TOTAL ASSETS.....	\$38,782,883.36	TOTAL LIABILITIES.....	\$38,782,883.36

Railway Age Gazette

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L. B. SHERMAN, Vice-President. HENRY LEE, Sec'y & Treas.
The address of the company is the address of the officers.

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WE GUARANTEE, that of this issue (the monthly Engineering and Maintenance Edition) 10,850 copies were printed; that of these 10,850 copies 7,370 were mailed to regular paid subscribers to the weekly edition, 1,861 to subscribers who get the Engineering and Maintenance Edition only, 172 were provided for counter and news companies' sales, 976 were mailed to advertisers, exchanges and correspondents, and 471 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 314,500, an average of 9,250 copies a week.

The RAILWAY AGE GAZETTE and all other Simmons-Boardman publications are members of the Audit Bureau of Circulations.

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*Illustrated.

The experiments on lateral thrusts on rails on curves, described by George L. Fowler on another page, are interesting and to a certain extent instructive; but as stated by Mr. Fowler, it is impossible to draw accurate conclusions from them. In the first place, the curves on which the tests were made were too short—215 ft.

Lateral Stresses in Rails on Curves

in one case, and 237 ft. in the other. The test instruments were so placed on the curves that they were only about 125 ft. from the ends. Under these conditions, there is a question as to whether the wheels or trucks were exerting a normal amount of pressure on the rail at the time they passed over the recording instrument. In the next place in plotting the curves showing the average thrust for different speeds, the median lines were roughly drawn, and while they would appear to approximate parabolic curves, no pretense was made at determining their exact shape with mathematical accuracy; in fact, an insufficient number of experiments were made in each case to warrant so doing. In studying the results of the tests, it should be remembered therefore, that "the records cannot be taken as comprehensive enough to base a final conclusion on, but their general trend is sufficiently consistent to indicate a probability.

Elsewhere in this issue there is an article by Walter S. Hiatt, Special Correspondent for the *Railway Age Gazette* in France, describing handling of the wounded from the front to the permanent hospitals of the country. The magnitude of the business of transporting wounded soldiers is fearfully impressive when one thinks of

Hospital Cars in France

600 carloads of wounded men sent back each day. It brings quite vividly to mind one phase of the horror of the European war. In sending the article printed elsewhere, Mr. Hiatt suggests that some of the railroad men of America might like to contribute toward the rebuilding of one or more of the freight cars into hospital cars. Commandant E. Loiseleur, who is in charge of the rebuilding of these cars, will see that if money for a car or cars is contributed by American railroad men, a plate will be placed on the car stating from whom the money came. The suggestion is worth considering. One or more of these cars in service would form a fitting tribute of American railroad men to the resourcefulness and good work of the French railroads in this war. Such tribute would be in the nature of contribution to Red Cross work and not an act of partisanship. As Mr. Hiatt points out, the cars cost less than \$250 to rebuild. Money should be sent to Commandant E. Loiseleur, Fourth Bureau, Fourth Division, Ministère de la Guerre, Boulevard St. Germain, Paris, France.

The voluntary reorganization of the finances of the Missouri-Pacific has proved impracticable and on August 17 the company

The Missouri Pacific Receivership

was put into the hands of the receiver R. F. Bush, president, was appointed sole receiver by the court. A plan of readjustment which called for an assessment of \$50 per \$100 share on the stock and the exchange of various issues of bonds for preferred stock and bonds was announced by Kuhn, Loeb & Company and associates on July 1, and deposits of security were asked under this plan. August 17 was the last day for deposits, but presumably if there had been any at all satisfactory response from security holders previous to August 17 the date for deposits would have been extended. The board of directors, however, in announcing the receivership, say that "the deposits of securities are wholly insufficient." Kuhn, Loeb & Company and various protective committees representing different issues of securities announce that a reorganization will take place along the same lines as had been proposed for the voluntary reorganization. An attempt to get the co-operation and consent of so many conflicting interests and to secure sacrifices so drastic (at least

on paper) had never been made before in the history of American railroad companies. Although there were very numerous individual complaints against numerous provisions of the plan of reorganization, the failure of a sufficient number of security holders to make the required deposits does not necessarily cast any reflection on the merits of the reorganization plan. It may and probably does simply reflect the extreme difficulties of the case, and the quite natural attitude of each class of security holders to put up the strongest possible fight for their own individual interests and to distrust the co-operation and sacrifices made by other classes of security holders.

If any reader should complain of the levity of our court news column now and then, we should hardly be ready to disprove the charge, especially if he should cite a decision like that reported from Mississippi last week (page 298). Courts are always dignified, but of the exceedingly frivolous matters which they are often obliged to listen to, the railroad law column seems always to have its full share. In this Mississippi case the judge seems to have thought himself that his decision would probably reach the reader in the summer, when light reading is in order, and his reference to "white gentlemen with pockets full of hundred dollar bills," shows a delicate appreciation of all sides of the question at issue. The only legitimate criticism that the editor can admit is that he failed to put the article in the humorous column. In speaking of the frivolousness of damage suits we refer, of course, to the impression on the readers. Every law suit is intensely serious to somebody. In this case the serious side, to the railroad man, is entirely ignored in the decision, as reported. The serious side is that the ticket agent, who could not change the hundred-dollar bill, in all probability would have averted the law suit if he had opened his office ten or fifteen minutes earlier, as he ought to have done; and the conductor, who ejected the passenger, would also have averted it if he had taken the passenger's word that he had tried to buy a ticket. It would not be fair to condemn the conductor at this distance, and it is true that the question when to stretch the regulations is a delicate one, very difficult to provide for in advance. Nevertheless, discreet employees who do go outside of their instructions now and then, often thereby smooth the relations between their employer and the public in a way to deserve praise. At all events, we have here the lesson that a very small irregularity can make troublesome and often costly litigation.

The railroad policeman is, probably, very much like the average policeman in other service, in that he is subject to the insidious weakness which in ordinary concerns, where there is little excitement and apparently no great matter at stake, causes him to follow the line of least resistance. The Court News column this week contains an illustration, from Massachusetts, of how a conductor and a brakeman failed in their duty, compelling their employer to pay damages to a passenger who was assaulted by another passenger. The conductor and the brakeman were police officers, but failed to realize their responsibilities as such. Passenger trainmen must be affable to pleasant passengers and severe with those who deserve restraint, rebuke or punishment. This is a difficult dual role, and it is not to be wondered at that many trainmen fail to measure up to its requirements. It sometimes looks as though it would be a good idea to have the rough, energetic and ugly conductor give courses of instruction to those who are lazy or too mild. Drill and discussion are the only means by which conductors generally can be educated in this matter, for actual practice is too intermittent and irregular to be depended on. It is very desirable for the trainman to cultivate an aggressive habit of mind without reference to his duties in connection with law breakers. Most of the time, it is true, he must be cultivating gentility; but that does

not mean that this suggestion is out of place. Indeed, the efficient passenger trainman must exercise these opposite qualities every day. On many trains there are enough thoughtless passengers who occupy two seats while women with children walk through three cars to find one seat, to occupy profitably the attention of several brakemen at every large station. It may be questionable whether a railway can afford thus to educate boorish passengers, for the task is a big one; but there is no question that the brakeman, well trained in all his duties, who voluntarily cultivates the iron hand for law-breakers—even petty law-breakers—is a valuable member of society.

WESTERN FREIGHT RATE DECISION

THE decision of the majority of the Interstate Commerce Commission in the western freight rate advance case is disappointing to the carriers and surprising to most people who followed the hearings closely. It is disappointing to the carriers because the advances granted are only a minor part of those asked for and so small that they will do practically no good. Some newspapers, desirous of stimulating prosperity by artificial respiration, have estimated the advances at \$4,000,000 a year. "The aggregate increase of revenue permitted under the majority report," says Commissioner Daniels, who heard the case, "will hardly exceed \$1,600,000, or about one-fourth of 1 per cent of the total freight revenue of these carriers for 1914." This is the estimate made independently by representatives of the railways and is undoubtedly correct.

The decision caused so much surprise because most people who followed the hearings thought the roads made out their case. Repeated careful readings of the majority opinion itself tends to confirm this view. The facts accepted and presented sustain almost every contention made by the representatives of the railways. It is significant that Commissioner Daniels, who knows the record better than any one else, attacks the decision of the majority as unsupported by facts, logic or justice. It is almost unprecedented for the commission to make a decision so exactly opposite to that favored by one of its own members who heard the case.

The western railways based their claims mainly on the grounds that they needed larger earnings and that the specific proposed advanced rates were reasonable. Upon the first point they introduced evidence showing that their operating expenses had been rapidly increasing, both absolutely and relatively, to their total earnings and that in consequence their net operating income and the return on their capitalization and property investment had been declining. Those who opposed the advances sought to show that the increasing ratio of operating expenses to earnings was more nominal than real, being due to changes in accounting methods required by the commission in 1907. The majority of the commission definitely rules that the increases in the operating ratio have been due to actual increases in operating expenses. Those who opposed the advances also claimed that the increases in expenses of some of the roads were due largely to financial mismanagement. The majority explicitly finds that there is no apparent connection between the increases in the operating ratio and the financial mismanagement of certain roads. It finds also that there has been a large increase in the ratio of the bonds to stocks outstanding, and that this is due to an increasing reluctance on the part of the public to risk investment in railway stocks.

But while it makes these and other similar findings, the majority refrains for some reason from making any finding as to whether the net returns of the roads are inadequate. As Commissioner Daniels points out, the eastern lines made no clearer demonstration in the five per cent. case of the inadequacy of their revenues, and yet in that case the commission specifically held that they were insufficient from the standpoint of the public welfare.

There are several roads in western territory which recently have been under attack for financial mismanagement. But the commission explicitly recognizes the fact that all the roads in a

group should not be judged either by the strongest or the weakest, the best managed or the worst managed, but that it should consider the situation as a whole. Nevertheless, in view of the hiatus between the facts which it presents and the decision it reaches, there seems ground for the suspicion that it was unduly influenced by the disclosures which have been made in some other proceedings.

When Commisisoner Daniels says that such cases as this should be "neither prejudiced nor complicated by considerations of individual instances of corporate mismanagement," he is plainly implying that this is just what the majority has done. The blame for the outcome, so far as it is due to this cause, cannot all be put on the commission. A large part of it should be placed on the management of the roads that have brought railways in general into bad odor. But two wrongs do not make a right. The commission has no moral or legal authority to base its decisions in rate cases on prejudiced or punitive considerations. It has no right to punish all roads for the shortcomings of a part.

The second important point involved was the reasonableness of the proposed advanced rates. In its opinion in the five per cent case the commission intimated that it did not look with favor on general advances. The tariffs, it indicated, were full of inconsistencies and discriminations, and the carriers should first secure increases in revenues by advancing the rates which were relatively low. The western lines sought to do this. The four principal commodities on which advances were proposed were grain and grain products, live stock, packing house products and coal. The majority of the commission refused the advances on all these but coal.

It refused the increase on live stock on the ground that above half of the traffic now moves on state rates and that many state rates are lower than the present and proposed interstate rates. Commissioner Daniels shows it is not a fact that so large a part of the traffic moves on the state rates. He also contends that the commission should not have refused advance in interstate rates because there were lower state rates. The attitude adopted by the majority is illogical and disappointing. The Federal authority over commerce is paramount. It would seem, therefore, that the reasonable and proper thing for the commission to do, where it finds state rates are lower than interstate rates, is to determine which are reasonable and then bring them into harmony. For it to refuse reasonable advances in interstate rates because there are lower state rates, is to let state regulation control interstate regulation. If the Federal commission is to begin to refuse advances in interstate rates because of low state rates, and the state commissions are to refuse advances in state rates because of interstate rates that do not suit them, the situation of the railways is indeed an unhappy one. The attitude assumed by the majority of the commission is lacking in fairness and courage and contrasts strongly with its opinion in the Shreveport case. As to the rates on packing house products, these have been notoriously low in proportion to the value and cost of the service rendered for years. The decision of the commission against advances in them is almost inexplicable. However, certain of the railways have themselves afforded some ground for refusing advances by keeping in effect between Kansas City and Chicago certain packing house products rates that are unremunerative and discriminatory.

The worst feature about the decision is its negative character. Nothing has so blighting an effect on the management of a business concern as to have at its head a man who has no constructive program or policies of his own and who vetoes most of those suggested by his subordinates. This is very much the situation in which the railways find themselves. The Interstate Commerce Commission is in an important sense at their head. When their eastern lines asked for a horizontal increase in freight rates it conceded they needed larger revenues. In its first decision in the five per cent case, however, it gave them only a small part of the advances they asked and told them to get the rest of the needed revenues by imposing special charges

for special service at terminals, advancing low rates on specific commodities and raising passenger rates. The railways, east and west, filed tariffs fixing special rates for special services. The commission promptly suspended and soon annulled them. They advanced their passenger rates. The commission let the advances go into effect in the east, but suspended them in the west. The western lines proposed advances in the low rates on certain specific commodities. The commission suspended them and now has annulled most of them. By permitting some freight rate advances to be made and by its discussion of the financial condition of the western lines, the commission seems to admit that the western lines need larger revenues. But it does not explicitly concede this, and nowhere does it give the roads any hint as to how they should proceed to get additional revenues.

The decision, as Commissioner Daniels says in his dissenting opinion, "only beclouds the principles upon which the commission may be expected to act in future and leaves nothing certain but uncertainty." As he adds, a point has been reached where "one of two courses ought deliberately to be chosen and clearly announced. If, despite increased costs not offset by increased revenue, increases in rates are to be denied, except where in individual instances gross injustice would be occasioned by their denial, the carriers ought to be apprised of this policy, so that they may set their house in order, if they can, against such a situation. If, on the other hand, we are to acknowledge in general, what we are perforce compelled to admit in detail, just and reasonable increased rates should be permitted not grudgingly but with such fair measure of allowance as will indicate that the transportation industry is entitled in the interest of the public to earnings sufficient to provide a service commensurate with public needs." The course the commission has thus far followed regarding advances in rates has been illogical, inconsistent and vacillating.

"D—d IF THEY DO AND D—d IF THEY DON'T"

WHAT everybody expected would happen is happening—in Texas. It is a mild statement that a Dallas paper makes in saying that the railroads "occupy rather an awkward position." The environments of the position are the Interstate Commerce Commission, the Louisiana Railroad Commission and the Texas Railroad Commission. The bone of contention is the advantage claimed to have been given to Shreveport, La., over inland Texas jobbing points by a supplemental order of the Interstate Commerce Commission, which defines East Texas. The western limits have been set at a line drawn through Gainesville, Fort Worth, Waco and down the Brazos river to the gulf. Within that territory the railroads are ordered to put in rates from Texas points toward Shreveport that shall be uniform with rates from Shreveport for like distances. The railroads are expected to comply with this order by September 15.

Now come in the devil and the deep sea. Rates between Texas points are fixed by the Texas commission. The rates required by the Interstate Commerce Commission are under an order authorized by the Supreme Court of the United States. The first proceeding by which the situation was brought about was instituted by the Louisiana commission. The railroads are the goat. They have been brought into a controversy in which they have little interest except to know whether it will be better to obey the law of the state or of the United States. It has been suggested that Congress might take some action that would settle controversies between the commissions of two states or between a state commission and the Interstate Commerce Commission, and not allow all the punishment to fall upon the innocent bystander who is being robbed at the same time, but Congress has not done so.

It has been intimated by one of the Texas commissioners that he will ask the attorney-general of the state to bring an injunction suit against the carriers if they attempt to apply the rates required by the order of the federal commission. The railroads are left in a position where they have to guess which one of

the commissions will triumph and risk a penalty for guessing whether the guess is right or wrong. The Dallas News hits the mark in saying: "The mistake of the state railroad commission was in standing back on its dignity and muttering the litany of state's rights when it ought to have been engaged in showing that the discrimination complained of by Shreveport was one more of appearance than reality." In a way the railways should welcome the struggle between the state and federal commissions, for it is another step toward a final settlement of the question as to what authority is finally to be their master.

BUFFALO, ROCHESTER & PITTSBURGH

At one time almost exclusively a coal road, the Buffalo, Rochester & Pittsburgh, under its present management, has been developed into an all-around profitable railroad, doing a large passenger business and general freight business, as well as being a carrier of coal and coke. Being an independent north and south road, serving Pittsburgh and the territory north to Lake Ontario, it has been necessary to maintain earning power through the development of economies and the utilization of modern methods of railroading, freight rates per ton per mile having shown a steady decline, and passenger service a steady increase in cost, due to more exacting demands of the public.

Since a considerable part of the coal traffic moves from the neighborhood of Vintondale and nearby branches over almost the entire length of the road north to Buffalo or Rochester, it was obvious that one of the surest methods of effecting economies in operation would be the development of a south-bound traffic which could be carried in coal cars, and it was through the efforts of the present management that a company was induced to locate an iron furnace on the southern part of the road. The development of an iron ore traffic south at once greatly improved the average train load of revenue freight.

A railroad doing a competitive passenger business, the train mileage of which amounted in 1915 to 1,343,611 miles, as compared with the revenue freight train mileage of 2,344,000 miles and with an average ton mile rate of only 0.477 cents, must of necessity operate economically to show a profit, and especially is this true with a road having as heavy and numerous grades as has the Buffalo, Rochester & Pittsburgh.

The year ended June 30, 1915, was in a way a test applied to the work of development, which has been carried on by the management. Military strategists say that a retreat is a far more severe criterion of generalship than a victorious advance. This is in some measure equally true of the operation of a railroad in a time of business depression and falling off of traffic. What makes the Buffalo, Rochester & Pittsburgh's 1915 year peculiarly interesting is that the falling off of ore traffic was in much greater proportion than the falling off in bituminous coal traffic. The total tonnage of freight carried in 1915 was 10,928,000; in 1914, 12,295,000. The bituminous coal tonnage in 1915 was 7,108,000, or 1,069,000 less than in 1914, and the tonnage of iron ore was 417,000 in 1915, or 283,000 tons less than in 1914.

In 1914 and the first part of 1915, very considerable additions had been made to the engines in the service, and the new engines put into freight service were mostly Mallets, Mikados having previously been the heaviest locomotives used.

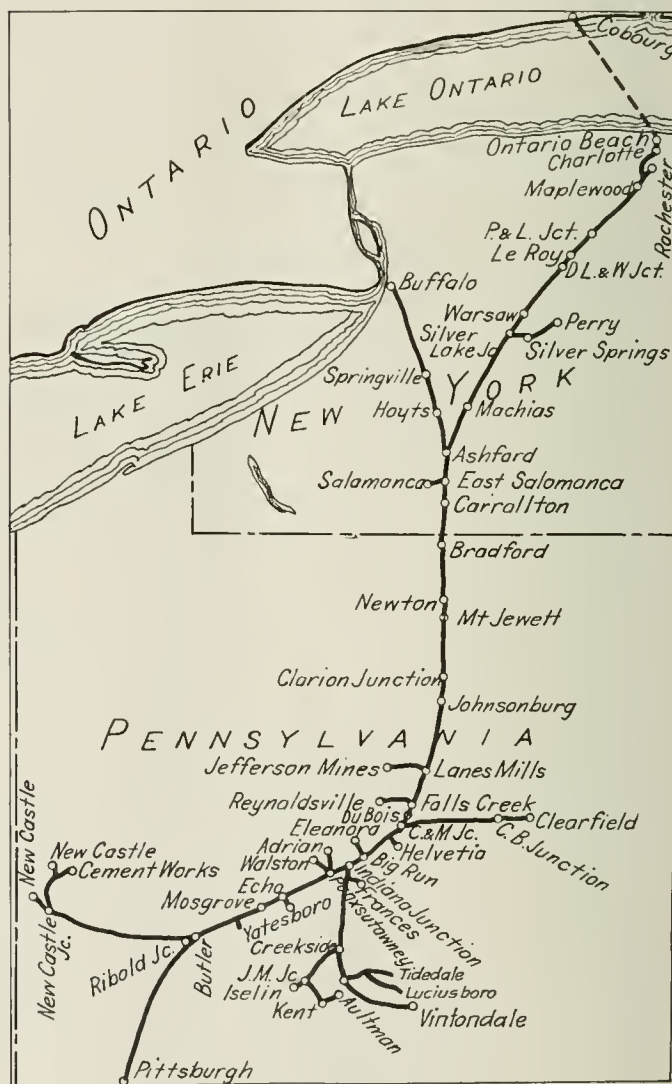
It is only necessary to reflect that if two train loads of coal of 50 cars each are sent north 100 miles, and the 100 cars have to be sent south empty, even if combined into one train, the average train load is about 1,700 tons, whereas if 50 of the coal cars can be loaded south-bound, even if the empties and loads are sent south in two trains, the average train load is about 1,900 tons, to see what the Buffalo, Rochester & Pittsburgh was brought up against with the falling off of 40 per cent. in ore tonnage as compared with 10 per cent. in coal tonnage. The purchase of heavier locomotives, however, had apparently come in the very nick of time. The average revenue freight train load in 1915 was 707 tons, as against 694 tons in 1914, and the average load of revenue freight per engine mile was 477 tons, the highest in the history of the road, comparing with 454 tons in 1914 and 463

tons in 1913, the best previous record. Transportation expenses in 1915 amounted to \$3,145,000, as compared with \$3,880,000 in the previous year, a decrease of 18.96 per cent. A striking and significant saving was made in the cost of fuel for train locomotives. This was \$473,000 in 1915, as against \$773,000 in 1914, a decrease of 39 per cent., as against a decrease of 14 per cent. in total train mileage. The total operating expenses amounted to \$6,935,000 in 1915, as compared with \$7,965,000 in 1914, a decrease of 12.93 per cent.

The following table shows the ratio of each class of expenses to total operating revenues in 1915 and 1914:

	1915.	1914.
Maintenance of way.....	13.37	13.49
Maintenance of equipment.....	22.53	20.65
Traffic	1.50	1.40
Transportation	33.17	36.15
Miscellaneous	0.15	0.25
General	2.44	2.26

In commenting on the annual report of the Buffalo, Rochester & Pittsburgh for 1914, it was pointed out that the adoption of



The Buffalo, Rochester & Pittsburgh

very heavy power was made only after the completion of a far-sighted and scientific strengthening of the entire permanent property and especially of those parts of the road on which the heavy locomotives were to be placed. The opinion was expressed that the result of such a scientific development would be clearly reflected in materially greater effectiveness of the plan. The showing made in 1915 confirms this opinion fully as conclusively as would a great gain made in net profits in a year of increased traffic and large ore shipments.

In 1915 the total operating revenues amounted to \$9,480,000. This was a decline as compared with 1914 of \$1,255,000, the de-

crease in expenses previously mentioned amounting to \$1,030,000, leaving a net revenue in 1915 of \$2,545,000, which was less than the 1914 net by \$225,000. There was a decrease also in non-operating income, due principally to the fact that the credit balance for hire of freight cars was less by \$115,000 than in the previous year, so that the net income available for dividends amounted to \$913,000, as against \$1,355,000 in the previous year. From this was appropriated in 1915 \$22,000 for pension and fire insurance, and \$111,000 principally for the payment of equipment trust and \$780,000 for dividends, being 6 per cent. on the \$6,000,000 preferred stock, and 4 per cent. on the \$10,500,000 common stock. In 1914 6 per cent. was paid on both the common and the preferred, calling for \$990,000, and a larger appropriation, \$348,000, was made for payment of equipment trust, etc.

The total current assets at the end of 1915 amounted to \$3,547,000, of which \$1,409,000 was cash and demand loans and deposits. The current liabilities amounted to \$1,245,000, with only a nominal amount of loans and bills payable, \$9,600.

Apparently a return to normal business conditions with a resumption of iron ore shipments would, barring some unforeseeable great increase in operating expenses, not only restore the earning power of 1913, when a substantial margin was earned over 6 per cent. dividends on the common, but give the company an even greater margin of safety. This fact, it might incidentally be mentioned, is wholly due to the foresight and good judgment of the management of the property, since the Interstate Commerce Commission 5 per cent. rate advance affected the Buffalo, Rochester & Pittsburgh to only a very small extent, the increase not applying on coal, coke or iron ore. President Noonan in his report says that "A careful estimate indicates that such increases (those granted by the Interstate Commerce Commission) added about \$41,000 to our revenues this year."

The following table shows the principal figures for operation in 1915, as compared with 1914:

	1915.	1914.
Average mileage operated.....	586	586
Coal freight revenue.....	\$5,040,101	\$5,904,106
Coke freight revenue.....	318,638	338,339
Merchandise freight revenue.....	2,663,951	2,911,497
Passenger revenue.....	1,101,981	1,184,417
Total operating revenues.....	9,479,936	10,734,691
Maintenance of way and structures...	1,267,253	1,447,954
Maintenance of equipment.....	2,135,354	2,216,194
Traffic.....	141,767	150,553
Transportation.....	3,144,598	3,880,160
Miscellaneous operations.....	14,658	27,054
General expenses.....	231,621	243,202
Total operating expenses.....	6,935,252	7,965,117
Taxes.....	230,000	234,000
Uncollectible revenues.....	596	.....
Operating income.....	2,314,087	2,535,574
Gross income.....	3,032,733	3,355,798
Net income.....	912,720	1,354,784
Appropriations.....	132,720	364,784
Dividends.....	780,000	999,000

NEW BOOKS

Oxy-Acetylene Welding and Cutting. By Calvin F. Swingle, M.E. 190 pages, 4½ in. by 6½ in. Illustrated. Bound in leather or cloth. Published by Frederick J. Drake & Co., Chicago. Price, \$1.50 in leather; \$1.00 in cloth.

This book is intended as a practical treatise on the subject of welding and cutting with the oxy-acetylene flame, and only so much of the theory pertaining to the subject has been included as will enable the practical man to acquire a thorough working understanding of the subject. After an introductory chapter dealing briefly with the adaptability of various methods of welding, several chapters are devoted to welding flames and the properties and methods of handling the gases most commonly used. This portion of the book is confined largely to the oxy-acetylene flame, which has the widest practical application, and touches only briefly on other gases which have been used with oxygen to a less extent in welding and cutting operations. The equipment used in welding and cutting is next discussed, after which the operation of the plant and the practices followed in welding and cutting are taken up. A final brief chapter is devoted to the subject of carbon removal with the oxygen torch. The book contains a large number of illustrations and a number of tables.

Letters to the Editor

DEPRECIATION AND CONFISCATION

NEW YORK, N. Y.

To the Editor of the Railway Age Gazette:

Permit me to comment on the article in your issue of June 4—A Billion Dollar Confiscation—by Morrell Walker Gaines, and your editorial in the same issue, and the letter of Lawrence K. Frank, in your issue of July 9.

The subject of depreciation, *so-called*, is of vital importance to-day to the railroads and other public utilities of the country and, therefore, to the people as a whole.

Mr. Gaines' first paragraph in which he condemns the present tendency towards over-regulation of railroads by "powerful Federal and State commissions," in which "counsels of perfection" are substituted for "experience, rough grown from the soil of struggle," is fully justified by the conditions which have developed, especially during the last few years, in answer to public clamor and the activities of honest but incompetent reformers and self-seeking politicians. As has been well said, regulation has degenerated into strangulation.

Mr. Gaines' objections to the present unwieldy, inefficient, costly and unfair scheme for valuing the railroad properties as a basis for rate-making are also fully justified. An additional argument might be advanced against this scheme, which is now costing millions of dollars a year and will in the end, I feel sure, cost more than the \$50,000,000 mentioned by Mr. Gaines. The appraisals will be obsolete by the time they are completed.

One radical fault in this system is in deducting for depreciation, *so-called*; not alone for the actual depreciation, but for the proportion of cost indicated by the age of the several parts as compared with the *assumed* expectation of life. That is, the ratio of the present age to the expected life.

This aging of plant calls for a charge for renewals and replacements, but does not call for, nor does it in any way justify a writing down of the fixed capital account.

The income must, if possible, be made to pay for the maintenance of plant, and this renewal or replacement is part of the maintenance. If all parts of the plant were to last only one year and then to be renewed or replaced by an equivalent, the total cost of renewals would fall automatically on each year and be paid for from the year's income. In this case the confounding of cost of renewals with "depreciation" would never have taken root with commissions, courts and others.

Particularly in the case of a new or single unit plant, the accruing liability for the renewal or replacement of its several parts must be carried into the accounts each year, for otherwise the profits will be overstated. This is the justification for an annual charge as an item of expense for deferred, future, or periodic renewals, wrongly styled "depreciation."

It may happen, and does not infrequently happen, in the case of composite properties built up of units of different ages, that the total cost of maintenance, including accruing liability for renewals, is fully met by current expenditures.

This charge to operating expense for future renewals should be credited to reserve, and this reserve should be kept as an open account to be charged for items of renewal and replacement and credited with the annual apportionment, plus the interest on the balance if kept on the sinking fund principle.

It is to be borne in mind constantly that an expectation of life table made up from averages (or said to be) must not be relied upon for individual application. In the case of plant of the same class, even if of standard design and construction, the life of such parts will vary widely according to the character of maintenance and of operation in general. An estimate of accruing liability for renewals and replacements should be held subject to constant amendment and correction as experience indicates in each separate case.

The later rulings of the Interstate Commerce Commission indicate that they are beginning to appreciate some of the practical features of this complicated question.

But we find in the commission's "Classification of Investment in Road and Equipment"—Issue of 1914—effective July 1, 1914, page 32, under the head of, 11. Equipment, the following:

"The ledger value of each unit of equipment shall be credited to the appropriate equipment account when it is retired from service. The amount of this credit shall be concurrently charged as follows:

"The amount of the balance in the balance sheet accrued depreciation account with respect to the equipment thus retired shall be charged to that account; the salvage recovered shall be charged to the materials and supplies account or elsewhere, according to the purpose for which used; the amount of depreciation prior to July 1, 1907, not previously written off or provided for, shall be charged to Profit and Loss, and the remainder shall be charged to the appropriate operating expense account for equipment retired."

That is, so much of the "ledger value" as cannot be located in the "accrued depreciation account" (renewal reserve) and recovered in the parts saved for future sale or service must be charged against income, either past or current.

The question as to the entire cost of renewals being a charge against income depends upon whether, in the early years of the property's life, the income was sufficient to pay all expenses, including cost of maintenance and a fair return on the investment.

A fair study of all the elements involved should be convincing that no such rule should be made retroactive and applied indiscriminately. Here is where, by way of example, the "counsels of perfection" should be tempered by the saving grace of common sense.

Mr. Frank is right so far as he argues for spreading the accruing liability for future renewals over the years of effective service; but he is far from the vital facts of this important question when he speaks of the setting up of a "depreciation reserve" as "a book transaction." The transaction involves fundamental principles; the book-entry is the record only of the transaction. A record may be an entirely accurate statement of an improper transaction. May it not be suggested that a fault to be guarded against on the part of accountants as well as bookkeepers is the placing of the book record above the transaction recorded.

Mr. Frank, in the statement just referred to, says that plant retired should be credited to fixed capital. If it is intended here to refer to such parts only as are permanently retired and not to the parts renewed or replaced by substitutes, then there may be a sufficient reason for the practice proposed. But even in the case of parts thus permanently retired which, for instance, were required to bring into effective action some necessary continuing structure or equipment, the writing off or crediting to fixed capital by no means necessarily is good practice.

To put this in another way—in making a schedule for a valuation, there should be included more than the parts which meet the eye; there should be included and valued the parts which were necessary to bring the plant as a whole into position and condition for effective service.

This brings me to the point which I wish particularly to make in regard to "depreciation" charges as intended to cover only renewals and replacements of active plant.

Because a plant or any of its parts has spent part of its anticipated life, this presents no reason for deducting from plant valuation. The owners are liable for the renewals as they fall due. So long as the renewals are made as required for adequate efficiency of operation, and the renewals are charged against income instead of being capitalized, every legitimate requirement has been met.

Suppose, for instance, that in the case of a composite plant, on the basis of expected life and age the property as a whole has settled down to an 80 per cent. age, and it is assumed that nothing better than this can be maintained, then it is argued that 20 per cent. should be deducted from the valuation on account of "depreciation." If this procedure is enforced by the commission, then they should allow a 20 per cent. item to be included in the

estimate of original cost to cover under this ruling a *necessary* item of cost of construction. Otherwise, the investors have to face at the outset a confiscation of 20 per cent. of the necessary original investment.

In this connection it is to be noted that Mr. Frank, while supporting the Interstate Commerce Commission against Mr. Gaines' criticisms, indorses the investment of "depreciation" reserves in plant and then states that these investments "are unalienable." If the plant paid for from reserves represents an unalienable investment, certainly the original investment should be at least equally secure from confiscation.

In your editorial you say:

"The commission's theories about depreciation and charges for retirement are in general sound. Any number of individual instances may be cited where the facts would fail entirely to conform to the theory; but this does not vitiate the general soundness of the rules for charging depreciation. . . . Co-operation between individual railroad companies and the Interstate Commerce Commission should, if the commission takes a broad point of view and the railroad managements a helpful attitude, minimize the hardship that will be worked on present security holders."

There is some evidence that the Interstate Commerce Commission is now more inclined than formerly to take a broad view of its grave responsibility; there is also some evidence to the contrary. Let us hope for the best. One instance of greater breadth of view on their part is found in the public statement made by Judge Prouty and Commissioner Daniels that engineers should be included in the personnel of our commission boards instead of being employed only as members of the staff. This is a decided, though tardy, concession. In this connection I am reminded of an opinion expressed by a man eminent in the engineering profession, H. L. Gantt, in his paper—The Relation Between Production and Cost—presented at this year's spring meeting of the American Society of Mechanical Engineers:

"The cost accountant of the future must himself be an engineer."

Here we may well bear in mind that a man may be competent as a keeper of books, and yet not be qualified in the principles of accountancy and the fundamentals of the business under consideration.

If each of our commissions had as a full member as least one competent engineer, trained in theory and practice, a man of character and judicial temperament, and qualified as an administrator by extended practical experience, there would be more hope for definite improvement in the line of justice and common sense in regulation by commissions.

I speak from my own experience when I say that the executives of railroads and other public utilities are far more likely to do their full part in the line of co-operation advised in your editorial than are the members of our commissions.

The tremendous authority placed in the hands of our commissions, including the three functions of government which, according to our traditions, should be kept separate and apart, is a fundamental fault and puts before the commissions a temptation too strong for the average man to resist.

In conclusion I must dissent positively from your statement:

"The commission's theories about depreciation and charges for retirements are in general sound."

So long as the commission confounds actual depreciation with the accruing liability for renewals and replacements and in any degree deducts from plant valuation on account of this liability, so long will their theories be unsound.

ALEX. C. HUMPHREYS,
President Stevens Institute of Technology.

ITALIAN RAILWAY EMPLOYEES REFUSE BONUS.—Press despatches report that the employees of the Italian State Railways at Milan, recently refused to accept 3,000,000 lire (\$600,000) offered them by the government for extra work done by them in connection with the mobilization of the army. The railway men at Rome have followed their example and have issued a statement saying, "We would feel ourselves humiliated if we were not willing to give our toil while others give their lives to their country."

Reductions Ordered in Rates on Anthracite Coal

Revenues of Carriers May Be Decreased \$8,000,000
by Lower Rates Ordered to Tidewater and Eastern Points

The Interstate Commerce Commission in a decision given out Friday, August 13, finds unreasonable the rates on anthracite coal in carloads, from the Wyoming, Lehigh and Schuylkill regions of Pennsylvania to tidewater and certain interior eastern points. The commission also condemns certain of the practices of the anthracite carriers, with reference to their subsidiary coal companies. The opinion was written by Commissioner McChord. The case bears the name: "In the matter of rates, practices, rules and regulations governing the transportation of anthracite coal," and is to be found in 35 I. C. C. 220. The decision covers 90 pages and connected with it there is an appendix of 154 pages. An abstract follows, the language of the commission being preserved insofar as possible.

Pursuant to an order of June 10, 1912, a general investigation was made of the rates, and practices governing the transportation of anthracite coal from the Wyoming, Lehigh and Schuylkill regions of Pennsylvania to tidewater and interior points on the lines of the initial anthracite carriers. The order named all the carriers in official classification territory, but it was found impracticable to extend the inquiry beyond the affairs of the 11 initial carriers, as follows: Central of New Jersey; Philadelphia & Reading; Delaware, Lackawanna & Western; Lehigh Valley; Erie; Wilkes-Barre & Eastern; New York, Susquehanna & Western; New York, Ontario & Western; Pennsylvania; Northern Central, and Delaware & Hudson.

Freight rates on many commodities are but an infinitesimal part of the price which the consumer pays for such commodities. On coal the freight rate is a more important factor. Anthracite coal is very largely a fuel for domestic use, and it is a necessity. That reasonable freight rates should be charged for the distribution of the great fuel tonnage herein involved is of vital importance to the producers and of equal concern to the consumers.

Anthracite coal is mined in three regions in Pennsylvania—the Wyoming, the Lehigh and the Schuylkill. Practically the entire source of supply is confined to an area of 496 square miles, having an extreme distance from northeast to southwest of about 100 miles. The tonnage (in tons of 2,240 lb.) of anthracite coal shipped from the three regions was 3,358,899 in the year 1850, 16,182,191 in 1870, 36,615,459 in 1890, 45,107,484 in 1900, and 71,295,716 tons in 1913. The tonnage shipped has practically doubled since the year 1890. This large tonnage is produced from approximately 302 operations, collieries and washeries.

Anthracite coal is sold in the market in eight sizes. The sizes smaller than pea are a by-product in the preparation of domestic sizes. The sizes larger than pea are designated "prepared sizes" in the carriers' freight tariffs.

The stove and chestnut sizes are in the greatest demand and constitute 40 per cent of the total shipments. The sizes larger than pea size constitute approximately 61 per cent of the total tonnage shipped. Anthracite coal is principally a domestic fuel. Its selling price at tidewater (the wholesale price obtained by the operators) shows a very definite upward trend during recent years, 34 to 49 per cent during the past 13 years.

These carriers are to a large extent interested in the mining and sale of anthracite coal through their affiliations with or their control of separately incorporated coal companies. Two of the carriers, the Delaware, Lackawanna & Western and the Delaware & Hudson, own coal lands and conduct mining operations.

THE LARGE COAL COMPANIES

The Lehigh Coal & Navigation Co. owns a large portion of the railway lines operated by the Central of New Jersey. Under leases entered into from 1871 to 1883 for 900 years, the

Central of New Jersey operates the railroads, and the navigation company is obligated to ship 75 per cent of its output over the leased railway lines. The navigation company is not controlled by the Central of New Jersey.

The Delaware, Lackawanna & Western Coal Co. was organized in 1909. It ships and markets all of the coal mined by the Delaware, Lackawanna & Western. At the time the coal company was organized the Lackawanna Railroad paid an extra dividend of \$13,000,000 to its stockholders, and the latter were allowed to purchase the \$6,500,000 stock of the coal company. Most of them availed themselves of that privilege.

The Lehigh Valley Coal Sales Company was organized in 1912. It ships and markets all of the coal mined and purchased by the Lehigh Valley Coal Company. The coal sales company issued \$6,060,800 in stock, giving the shareholders of the Lehigh Valley the privilege of purchasing the stock. At the same time the Lehigh Valley paid an extra dividend of \$6,060,800 to its shareholders to provide them with the funds to purchase the stock of the coal sales company.

The Reading Company, a holding company, owns the entire capital stock of the Philadelphia & Reading Railway Company and the Philadelphia & Reading Coal & Iron Co.

With these exceptions the stocks of the coal companies that ship the largest portion of the total tonnage of anthracite coal shipped over the railway lines of the several initial carriers are owned by the carriers.

The tonnage shipped by the coal companies amounts to a very large proportion of the total tonnage shipped by all shippers over each particular railway system.

RATES ON ANTHRACITE COAL

Generally speaking, all the collieries on the lines of any one of the initial carriers in each region are, under the schedules of rates established by the carriers, covered by blanket rates to a particular destination; that is, the several collieries in each region are placed in one group taking the same rate, although the distance between the collieries in the group may be 50 miles more or less. To many important groups of destinations also the rates via any given line are frequently the same; that is, they are blanketed from all the regions reached by that line. Exceptions to this rule apply principally to local short-haul rates.

Rates to Tidewater. For many years a large number of the independent operators sold their coal at the mines to the carriers, or to their allied coal companies, in accordance with the terms of "percentage contracts." Instead of a fixed money price per ton, the independent operator received a certain per cent of the average price at which that grade of coal was sold in New York harbor.

The percentage of the tidewater selling price paid to the operators on prepared sizes of coal was, in the early years, about 40 per cent. It gradually increased, reaching 50 and 55 per cent in the eighties, 60 per cent in 1892, and 65 per cent on November 1, 1900. The remaining portion of the selling price of the coal, 40 or 35 per cent in the more recent years, was the freight rate which the carriers charged the individual operators who elected to ship their own coal production to tidewater. The percentage freight rate was also applied on anthracite coal shipped to Buffalo in the early days. In 1882 the Reading rate on anthracite coal to Buffalo was 57 per cent of the selling price at Buffalo.

In July, 1901, several of the carriers took action to establish fixed or flat rates to tidewater. Six of them, the Reading, Lehigh Valley, Jersey Central, Lackawanna, Erie and Susquehanna & Western were represented on the board of directors of the Temple Iron Company, which was merely a holding company

for the several carriers. Through this medium rates were established for outside shippers as follows: Prepared sizes, \$1.60; pea, \$1.45, etc.

The rates to the lower ports, such as Perth Amboy, are 5 cents per ton less than those to the upper ports because of the higher cost of lighterage from the lower ports. Thus the rates to New York City are equalized.

The rates actually charged by the Lehigh Valley on anthracite coal from the mines to tidewater, for November in the years named, were:

Year.	Prepared sizes.	Pea.	Buckwheat.
1898	\$1.3930	\$1.1225	\$1.1312
1899	1.4965	1.1887	1.1695
1900	1.55	1.3204	1.2290
1901-1910, inclusive	1.55	1.40	\$1.25-1.20

The prevailing percentage rates at the time the flat basis of rates was adopted became the tariff rates to tidewater. The definite upward trend of the rates based on a percentage of the selling price is clearly set forth in the Lehigh Valley figures. Rates based on a percentage of the selling price of a commodity whose selling price increased from year to year would naturally climb to an excessive basis.

The Percentage Contracts Established Excessive Rates. It appears that the 35 per cent division of the selling price of the coal constituted an excessive freight rate, and it was fixed at a high basis in order to make it more advantageous to the individual operator to sell his output to the railroad interests at the mines than to ship it to market.

UNNECESSARY RAILWAY CONSTRUCTION AND PROJECTED RAILWAY LINES

The history of the development of anthracite mining presents a series of persistent but apparently unsuccessful struggles by the individual operators against the conditions imposed by the carriers. The independent shippers did all in their power to promote the construction of additional railway lines. Some of such efforts were unsuccessful, but at the present time eight railway lines extend into the Wyoming region. It is apparent that the Wyoming region was already adequately served by railway lines before the extension of the last two lines, the Ontario & Western and the Susquehanna & Western, into that region subsequent to 1890. Under normal conditions, wherein the interests of the carriers and the shippers were not antagonistic, with the construction of additional tracks when needed the region would have been amply served by the six railway lines which were constructed into that region prior to 1890. Under existing conditions the anthracite tonnage is charged with the burden of earning an income on the investments in a large portion of two railway lines which were not required and which surely would not have been constructed had proper conditions existed in the marketing of the commodity.

The resistance of the individual operators to the rates and selling conditions imposed by the carriers is well illustrated by the efforts of the individual operators to cause the construction of additional lines of railway into the Wyoming region. The construction of two of these projected lines, the New York, Wyoming & Western and the Delaware Valley & Kingston, was prevented by the action taken by several of the respondent carriers.

CONDUCT OF THE CARRIERS AND THEIR ALLIED COAL COMPANIES

The act to regulate commerce imposes on these carriers the obligation to establish and maintain just and reasonable rates, and it prohibits the granting of rebates or concessions from or offsets against the established rates whereby interstate shipments shall by any device be transported at less than the lawfully established rates, or whereby any advantage is given or discrimination is practiced amongst shippers. Although published rates may be collected on the shipments transported, concessions and offsets may be extended by the carriers or the interests who control the carriers to favored shippers. These concessions and offsets are as pernicious as direct rebates, and it matters little whether they are in the form of cash payments, interest charges,

royalty earnings, the use of valuable property at inadequate rent, the free use of the carriers' funds or credit or other insidious means, if they confer concessions and advantages which place certain shippers in a position of preference and advantage over competitors who are also customers of these carriers. Some of the advantages granted to the coal companies that are allied with the carriers are disclosed by the following facts established in this case:

Reading Companies. The evidence shows that prior to the reorganization of the Reading companies in November, 1896, the Philadelphia & Reading Railroad had advanced to the Philadelphia & Reading Coal & Iron Co. \$76,154,000. In December, 1896, the Reading Company, the present holding company, became the owner of this debt and the creditor of the coal and iron company. From December, 1896, to October, 1913, the holding company extended to the coal and iron company financial assistance, which increased the indebtedness so that in October, 1913, it was \$82,980,000. The coal and iron company has paid no dividends to the holding company on its stock, and it has paid very low rates of interest on the indebtedness. The payments of interest actually made by the coal and iron company to the holding company were \$34,000,000 less than the amount of such interest, computed at 4 per cent, from December 1, 1896, to June 30, 1913.

On the date the holding company acquired this indebtedness, December 1, 1896, it immediately entered the \$76,154,000 in its accounts as an asset and issued its own obligations to the amount of every dollar of assets it possessed, including the said \$76,154,000. The income of this holding company during recent years has been from \$14,000,000 to \$15,900,000 per annum, and with the exception of the inadequate payments of interest made by the coal and iron company and from \$200,000 to \$300,000 per annum derived from outside sources, this entire income of the holding company has arisen from dividends, interest and rental payments made to it by the Reading Railway lines, and such payments have been at very high rates per annum. This clearly shows the remarkably remunerative character of the rates assessed by the carriers.

The situation here presented is that this shipper, the coal and iron company, ships approximately 10,000,000 tons of anthracite coal annually over the Reading railway lines. Presumably it pays the tariff rates on this product. The carrier and the coal company are but the subsidiary corporate hands of the holding company, inasmuch as the same interests direct and administer the affairs of the three corporations. By the aid of the railway earnings that are paid into its treasury, the holding company furnishes the coal and iron company with its working capital. The holding company also assumes the burden of the interest charges on the capital invested in the properties of the coal and iron company, and the railway earnings enable it to do so. These facts constitute an unlawful discrimination against other shippers who are competitors of the Coal & Iron Company.

Published tariff rates are of no significance to this shipper, the Philadelphia & Reading Coal & Iron Company, under these circumstances. The same executive officials control and administer the affairs of the railway company, the coal and iron company, and the holding company; therefore the coal and iron company receives offsets, against such published rates, in the form of interest charges which are waived by the same parties who are charged with the duty of collecting and retaining the full published tariff rates on all shipments. These facts have been referred to the department of justice.

Central of New Jersey. Similarly reference is made to the dealings of the Central of New Jersey with the Lehigh Coal & Navigation Company. The coal company leases to the railway lines of railroad for which the New Jersey Central has paid compensation of upward of 10 per cent. yearly. At the same time the carrier has transported coal for the coal company at reductions of from 11 to 23 cents a ton below the tariff rates. These reductions are known as lateral allowances and result from the tenth covenant of the lease in which it is provided that

on coal delivered by the Navigation Company on sidings at the northern end of the Nesquehoning tunnel for transportation by the carrier, the rates should not exceed the rates from Penn Haven. Although the carrier for many years has transported the shipments the Navigation Company at the Penn Haven basis of rates, it has published in tariff form a higher basis and then at the close of each month's business paid back to the shipper a portion of these established tariff rates.

Reference is also made to the dealings of this carrier with Burns Brothers, who lease from the railroad docks and trestles in New York harbor, and to the dealings of the other carriers with their related coal companies.

THE COMMODITIES CLAUSE.

The mining, transportation, and to a considerable extent the selling operations necessary to market this commodity, though in a sense being each conducted under the name of separate corporate entities, are united under one management and control. The relations of the controlling carriers and the coal companies have not undergone any substantial changes since the effective date of the commodities clause in the Hepburn Act, May 1, 1908, with the exception that the shipping and marketing of the coal production of the Lackawanna, the Delaware & Hudson, and the Lehigh Valley Coal Company are now performed by the Delaware, Lackawanna & Western Coal Company, the Hudson Coal Company, and the Lehigh Valley Coal Sales Company, respectively. These three coal companies assumed their present functions after the decision of the Supreme Court in March, 1909, in the Commodities cases (213 U. S., 366), and the decision of the Supreme Court in the Lehigh Valley case, decided April 3, 1911 (220 U. S., 257). The evidence shows that the three coal companies were organized and financed without the interposition of outside interests or capital.

Delaware, Lackawanna & Western. This carrier owns coal lands and conducts mining operations. Prior to August 1, 1909, it sold its own coal in the markets. To rearrange its affairs in conformance with the decision of the United States Supreme Court (213 U. S., 366), the carrier caused to be organized the Delaware, Lackawanna & Western Coal Company. It paid to its stockholders an extra dividend of 50 per cent—that is, \$13,000,000—on its stock, in cash, and its stockholders were given the option to use part of the dividend so paid to purchase the capital stock, \$6,500,000, of the coal company. Most of them availed themselves of this privilege. Under two contracts entered into between the coal company and the carrier under date of August 2, 1909, the coal company assumed the selling operations theretofore conducted by the carrier.

The carrier conveyed to the coal company its established trade, its stock of coal, its selling facilities, and the good will of its established business at much less than their true and actual value. The use of the properties leased, approximately 170 trestles, at the inadequate rental reserved in the lease has each year constituted a substantial concession to the coal company, a discrimination against competing shippers, and an offset against the freight rates paid to the carrier by the coal company.

Under the contracts between the carrier and the coal company the coal company is obligated to purchase from the carrier all of the anthracite coal which it sells and to purchase no coal from other sources without the written consent of the carrier, and to conduct the business of selling the coal in such manner as best conserves the interest of and preserves the good will and markets of the coal mined by the carrier. The only property owned by the coal company, excepting current assets, is property and fixtures valued at \$169,070, and its annual sales of coal amount to approximately \$35,000,000. On six months' notice the carrier can discontinue its contractual relations with the coal company and take over the stocks of coal the coal company has on hand. Under such conditions the coal company is merely a dependency of the carrier, and the conduct of its business is subject to the arbitrary will of the carrier.

Ownership by Carriers of Capital Stock of Shipping Corporations. The amendment to the act to regulate commerce com-

monly known as the commodities clause, has not resulted in a bona fide separation of the affairs of these carriers from the mining and selling of anthracite coal. The dual and inconsistent position of public carrier and private shipper that would exist where the carrier was miner, transporter and seller of this commodity now exists, and is effectuated by the relations of the carriers respondent in this case and the several coal companies allied with and controlled by the carriers. Corporate charters and contracts, as used by these carriers, are merely devices whereby the business of mining, transporting and selling the anthracite coal production of each carrier and its allied coal company are united under one management and directed and controlled by one paramount power.

PRESENT EFFECTIVE RATES ON ANTHRACITE COAL.

The average revenue per ton (2,000 pounds) per mile for all anthracite coal transported by the initial anthracite carriers during the year ended June 30, 1913, is as follows: Jersey Central, 8.37 mills; Reading, 8.82; Lackawanna, 7.40; Delaware & Hudson, 7.54; Lehigh Valley, 7.11; Pennsylvania, 5.99; Northern Central, 6.02; Erie, 5.96, and Ontario & Western, 6.47.

Anthracite coal is hauled in trains that transport the maximum train tonnage. The large tonnage hauled in the trains produces high earnings per train-mile. At the present effective rates the revenue per train-mile on anthracite coal transported to tidewater is, for the Jersey Central, \$19.30; for the Lehigh Valley, \$16.14, and for the Lackawanna, \$16.43. These revenues are substantially higher than average train-mile revenue, the average for the United States in 1912 being but \$3.02284; for the eastern district, \$3.12891; for the southern district, \$2.48888, and for the western district, \$3.17357.

Anthracite coal is a low-grade commodity which is transported in vast quantities in trains of maximum tonnage. The car load is much greater than is attained in the loading of most other classes of traffic excepting bituminous coal and ore. Most of the anthracite tonnage is produced from collieries whose daily production, measured in carloads, is very large. These conditions tend toward lower operating costs in transporting this commodity than result from the transportation of most other commodities.

COST OF TRANSPORTING ANTHRACITE COAL.

The commission's examiners computed the cost of service for anthracite coal, including only such costs as are represented in operating expenses. Complete results were reached as to the tidewater movement of anthracite over the Central of New Jersey. The traffic hauled in November, 1912, was the basis of the computations. Part of the operating costs resulting from the transportation of anthracite coal to tidewater on the Lackawanna and terminal costs on the Reading were also compiled.

The conduct of the anthracite traffic involves the collection of the loaded cars from the breakers and washeries into assembling yards, the necessary switching into trains, the road haul to destination, terminal services, and the return of the empty cars. The computations are set forth in detail in the appendix to this opinion, and they indicate how the various services were accounted for in the computations made by the commission's examiners.

Briefly stated, the examiners found that the operating cost of transporting anthracite coal to tidewater by the Central of New Jersey was 59.26 cents per long ton from the Wyoming region (average haul, 160 miles), 44.35 cents per long ton from the Lehigh region (average haul, 120 miles), and 49.04 cents per long ton from the Upper Lehigh region (average haul, 140 miles), making a weighted average of 3.3 mills per short ton-mile to the three tidewater termini of this carrier. The Central of New Jersey costs were computed for a railway line whose average distance to tidewater is shorter than the average haul of the other carriers. We have frequently held that cost of service per ton-mile properly decreases as the length of the haul increases. In the short haul of the Central of New Jersey there are included the assembling costs and the terminal costs which necessarily result in causing a higher cost per ton-mile than would result

under similar operating conditions for the longer haul to tide-water of the other carriers.

The margin of profit on tidewater anthracite is indicated by a comparison of the cost of transportation, 3.3 mills per ton (2,000 pounds) per mile, with the average revenue here shown:

Carrier.	Average haul.	Average revenue per ton.		Average revenue per ton-mile.	
		2,240 pounds.	2,000 pounds.	2,240 pounds.	2,000 pounds.
	Miles			Mills	Mills
C. R. R. Co. of N. J.	140.58	\$1.489	\$1.329	10.59	9.45
L. V. R. R. Co.	157	1.484	1.325	9.45	8.44
N. Y., O. & W. Ry. Co.	209	1.447	1.292	6.92	6.18
Erie R. R. Co. (including N. Y., S. & W. R. R. Co. and W.-B. & E. R. R. Co.)	169.90	1.407	1.256	8.28	7.39
P. & R. Ry. Co.	185.70	1.338	1.195	7.21	6.44
D., L. & W. R. R. Co.	147	1.300	1.161	8.84	7.90
P. R. R. Co. (including N. C. Ry. Co.)	221.43	1.347	1.203	6.08	5.43

CARRIERS' INVESTMENT AND INCOME AS DEDUCED FROM THEIR BOOKS.

The carriers submitted statements concerning their investment in road and equipment and in working capital, their net operating income, and the ratios of net operating income to investment for a number of years.

The investment, total property devoted to public use, as thus presented by the carriers, and the per cent. of return on the investment produced by the net operating income as adjusted are here shown:

Carrier Year ended June 30, 1913.	Book value of property devoted to public use.	Net operating income.	Rate of income on investment.	Amount of income.	
				In excess of 6 per cent. per annum.	Less than 6 per cent. per annum.
			Per Ct.		
D., L. & W. R. R.	\$187,102,870	\$14,450,741	7.73	\$3,234,569	
Reading	238,325,264	21,836,887	9.16	7,537,371	
D. & H. Co.	107,906,939	8,990,587	8.33	2,516,171	
C. R. R. of N. J.	94,827,868	8,269,160	8.72	2,579,488	
N. Y., O. & W. Ry.	56,694,648	2,471,471	4.36		\$930,208
L. V. R. R.	196,753,503	12,985,175	6.60	1,179,965	
Pennsylvania and Nor.					
Central	753,420,790	42,431,006	5.63		2,774,241
Erie	386,648,946	16,246,206	4.20		6,952,731
N. Y., S. & W. R. R.	44,155,784	1,010,923	2.29		1,638,424

The combined investment of the several carriers, including working capital, was shown to be \$2,131,046,429 on June 30, 1914. By merging the book entries of property costs of their various railway lines the carriers have proceeded to the conclusion that 6 per cent. per annum is the lowest possible suggestion as to what would constitute a fair return on the investment, and that "a legislative command to accept anything less than 6 per cent. would be adjudged to be confiscation."

In considering this question we do not suggest that 6 per cent. per annum income is too high a rate of return on railroad investments or too low a return. The stockholders of several railways operated by the initial anthracite carriers have leased their properties to anthracite carriers for a return of 4 per cent. per annum on their investment; some properties are leased at 7 per cent. per annum, and some at 10 per cent. per annum under long term leases.

The trouble is that the investment shown in the carriers' statements does not represent cost of property nor an approximate figure of cost.

The evidence shows that the road account, now designated "cost of road," was used prior to 1907 as a general clearing account into which were charged valueless and uncollectible items and liabilities which could not conveniently be absorbed into other accounts. This was not considered wrongful or bad book-keeping in those days, and we do not desire to criticise these carriers now for such past practices.

Property costs deduced from the old books of these carriers are not reliable. The fault is back of the books. This is well illustrated by the cost of construction of the Port Reading Railroad, which the carriers' expert has ascertained from its books to have been \$3,025,000. This railroad is of recent construction, being completed in 1894. The commission's examiners found, by their review of the construction contracts and records, that the actual cost of constructing this railroad was \$1,525,000, and that the book cost includes \$1,500,000 representing a bonus payment

in securities to the construction company. Such practices were so prevalent in railroad construction in former years that we must regard property costs deduced from the old books as very unreliable.

The property costs per mile of line shown for the Erie are \$199,832, and for the New York, Susquehanna & Western, \$200,213, while for the Reading they are \$157,732, and for the Pennsylvania, \$180,543. Such property costs for the New York, Susquehanna & Western, whose terminal properties are very limited in comparison with the other lines mentioned, clearly indicate the unreliability of book costs as representative of actual cost of property.

The carriers have used the term "total property devoted to public use" as representative of the investment in their railway properties devoted to public use. They have included in their investment the cost of properties rented to tenants and used for private purposes, and they justify this by the assertion that it was acquired for railroad purposes and may in the future be used for railroad purposes.

Unproductive Betterments. The Pennsylvania has expended on its new passenger terminal properties in New York City approximately \$114,000,000. These properties are operated by the Pennsylvania Tunnel & Terminal Railroad Company, and the operations result in deficits each year. The deficit in the year ended June 30, 1913, was \$2,087,000. The record shows that the terminal was constructed for the benefit of the Pennsylvania lines west of Pittsburgh as well as the lines east of Pittsburgh, but no part of its cost is, by the carrier, assigned to the income of the lines west of Pittsburgh. In the statements of investment and income the deficit is charged to the income of the Pennsylvania Railroad (the lines east of Pittsburgh), and the per cent. of net operating income on the investment for the Pennsylvania Railroad is substantially reduced because of these deficits and the large investment in this terminal property. The record shows that when the New York Connecting, now under construction, is completed the terminal properties will some time in the future be used for passenger traffic between the Pennsylvania lines and the New Haven. Thus the question is presented: Must the present effective freight rates of the Pennsylvania earn an annual return of 6 per cent. on the investment in these passenger terminal properties? The record shows that \$47,000,000 of the expenditures in this property has been charged to profit and loss and to income of the Pennsylvania; that is, its past surplus income has already contributed \$47,000,000 to the cost of this property.

The commission notes at this point that the total property investment given above includes the cost of lines which, as noted previously, would not have been built had proper treatment been given the independents.

INCOME OF THE INITIAL ANTHRACITE CARRIERS.

For the year ended June 30, 1913, the total operating revenues of these carriers were \$448,711,496, their total freight revenues were \$342,499,310, and the revenue they derived from transporting anthracite coal was \$96,516,183. The ratio of their anthracite coal revenues to their total freight revenue ranged from 6 per cent. to 86 per cent.

The operating revenues earned by these carriers have increased greatly during the past 10 years, as shown by the averages per mile of line following:

	1904	1913
C. R. R. of N. J.	\$29,769	\$42,016
P. & R. Ry. Co.	33,795	49,553
D., L. & W. R. R. Co.	35,222	42,275
L. V. R. R. Co.	21,456	29,665
D. & H. Co.	17,682	28,115
P. R. R. Co.	30,097	45,101
N. C. Ry. Co.	21,962	27,147
Erie R. R. Co.	21,926	27,147
N. Y., S. & W. R. R. Co.	13,655	18,954
W.-B. & E. R. R. Co.	6,751	7,180
N. Y., O. & W. Ry. Co.	12,165	16,715

Of all the railways in the United States with annual operating revenues of \$1,000,000 or more, only three besides those above indicated had revenues in 1913 and in 1914 averaging \$40,000 per mile of line or more. The three exceptions are the Pittsburgh & Lake Erie, the Bessemer & Lake Erie, and the Bingham & Gar-

field. The very unusual traffic conditions enjoyed by the first two roads are well known, while the third is a heavy carrier of ore, so that the four initial anthracite carriers showing such unusual earning capacity hold a position unquestionably unique among the steam transportation systems of the country having diversified traffic.

The exceptional earning capacity of the principal anthracite carriers is well illustrated when comparison is made with the average operating revenue per mile of line of the following representative carriers for 1913:

New York Central & Hudson River, \$30,776; Baltimore & Ohio, \$22,789; Buffalo, Rochester & Pittsburgh, \$19,113; Michigan Central, \$19,448; Pittsburgh, Cincinnati, Chicago & St. Louis, \$30,236; Hocking Valley, \$22,241; Illinois Central, \$13,497; Louisville & Nashville, \$12,338; Atlantic Coast Line, \$7,833; Virginian, \$11,896; Chesapeake & Ohio, \$15,129, and Norfolk & Western, \$21,623.

The net corporate income of these carriers has enabled them not only to pay the very substantial dividends shown by these figures, but also to set aside large amounts for the purchase of additional property and still have considerable amounts remaining to add to their surplus. In addition to providing for necessary expenses and charges and for generous dividends, the Central of New Jersey, the Reading, and the Lackawanna have set aside from income \$74,607,157 for additions and betterments to their properties. During this period the capital obligations of these carriers have actually decreased, indicating that their net income has not only provided for the necessary maintenance of their properties and for substantial dividends, but has also provided the improvements to the properties necessary to handle the large increase in traffic. The Lackawanna recently has issued capital stock to its shareholders at par to provide funds for large improvements to its property, but the improvements were not available for use during the 10-year period.

The Less Prosperous Roads. For the reasons underlying the Erie's failure to earn satisfactory net income it is necessary to look further than the net operating results. One reason is found in its high capitalization. The Erie's operating revenue per mile of road is considerably lower than that of the principal anthracite carriers.

To its over-capitalization and the resulting burden as well as traffic conditions can be ascribed the failure of the New York, Susquehanna & Western to earn satisfactory net income.

The small volume of its local traffic and the limitations as to the tonnage of the anthracite coal traffic which the New York, Ontario & Western can command preclude the possibility of its income ever mounting to the high standard of earnings which result to its more fortunately situated competitors that reach New York harbor.

POSITION OF THE CARRIERS.

Counsel for the carriers has frankly admitted that the cost of transporting anthracite coal is so low that the revenues resulting from the anthracite coal rates are sufficient not only to pay the costs chargeable to the anthracite traffic, but to take care of the general costs, which other traffic cannot take care of because of lower rates assessed for the transportation of other traffic; but counsel stated that the actual cost of transporting anthracite, when it could be ascertained, would be higher than the cost computed by the commission's examiners.

The carriers have stated upon their briefs that "in the end this study of cost accounting reaches the inevitable condition of the railroad business of the United States, that railroad rates must be made with regard to what the traffic can afford to bear."

The experience of shippers and carriers in the past resulted in the enactment of the act to regulate commerce, and the law limits such principles of rate making; at least to the extent that the rates on the low-grade commodities must be just and reasonable to all shippers and not discriminatory. The transportation of this low-grade commodity, anthracite coal, has been termed by these carriers "their backbone traffic." They are engaged in producing and selling, as well as transporting it. We cannot over-

look the fact that some force has brought the production and sale of most of the tonnage of this commodity under their control. If they established excessive rates on anthracite they became the beneficiaries of conditions which were prejudicial to the business of the individual operator or shipper. The power to fix freight rates on this commodity was the opportunity to confiscate property if the carrier so willed.

Our railroad properties should be kept in a high state of efficiency, and freight rates should be sufficiently remunerative to permit it. Necessary improvements should be made to the properties. The carriers respondents in this case command a traffic of exceptional volume and density, and all these results can be accomplished by them without imposing excessive and unreasonable rates. The more important reductions ordered by the commission are as follows:

Delaware, Lackawanna & Western to Hoboken, Paterson, Newark, Boonton and Washington, N. J., prepared sizes, from \$1.60 per ton to \$1.45, \$1.35, \$1.40, \$1.20 and 95 cents to those points, respectively; other sizes from \$1.45 to \$1.35, \$1.22, \$1.30, \$1.09 and 86 cents. To Binghamton, Waverly and Elmira, N. Y., prepared, cut \$1.50 to 90 cents, \$1.15 and \$1.25; other sizes, from \$1.50 to 82 cents, \$1.05 and \$1.14, respectively. To Corning and Syracuse, N. Y., prepared, from \$1.90 to \$1.35 and \$1.40; smaller sizes, cut from \$1.65 to \$1.17 and \$1.22. East Lancaster and Utica, prepared, \$2 to \$1.90 and \$1.50; other sizes, \$1.75 to \$1.66 and \$1.31.

Lehigh Valley to Jersey City and Newark, prepared, from \$1.60 to \$1.45 A. D., \$1.40; smaller sizes, \$1.45 and \$1.40 to \$1.35 A. D., \$1.30. To Ithaca, prepared, \$1.65 to \$1.45; smaller, \$1.50 to \$1.32. To Phillipsburg, N. J., from Wyoming region, prepared, from \$1.45 to 95 cents. From Lehigh and Schuylkill regions, prepared, from \$1.30 to 85 cents, prepared, from \$1.30 to 85 cents; smaller sizes, Wyoming, prepared, from \$1.15 to 75 cents; Lehigh and Schuylkill, prepared, from \$1 to 68 cents. To Rochester, N. Y., prepared, \$1.90 to \$1.85; smaller, \$1.05 to \$1.61.

Erie to Jersey City, Paterson, Newark, N. J., Middletown and Port Jervis, N. Y., prepared, from \$1.50 to \$1.45, \$1.35, \$1.40, \$1.05 and 90 cents, smaller sizes from \$1.45 to \$1.35, \$1.22, \$1.30, and 95 and 82 cents. To Binghamton, N. Y., prepared, from \$1.65 to 90 cents; smaller, \$1.50 to 82 cents. To Elmira, prepared, \$1.65 to \$1.25; smaller, \$1.50 to \$1.14. To Rochester, prepared, from \$2 to \$1.85; smaller, \$1.75 to \$1.51.

Central of New Jersey to Jersey City and Newark, prepared, \$1.60 to \$1.45 and \$1.40; smaller, from \$1.45 to \$1.40 to \$1.35 and \$1.30. To Elizabeth and Somerville, N. J., prepared, \$1.55 each to \$1.40 and \$1.20; smaller, from \$1.40 to \$1.30 and \$1.09. Phillipsburg from Wyoming region, prepared, from \$1.45 to 95 cents; from Lehigh region, prepared, from \$1.30 to 85 cents; smaller, from \$1.15 and \$1.00, respectively, to 75 and 68 cents.

Delaware & Hudson to Windsor, N. Y., prepared, \$1.65 to 85 cents; smaller, \$1.40 to 72 cents. To Albany, Troy and Mechanicsville, N. Y., prepared, from \$1.93 to \$1.60; smaller, from \$1.60 to \$1.31.

From the Central of New Jersey producing points to the Elizabethport and Port Johnston, N. J., piers, from \$1.55 a ton on prepared coal to \$1.40, and from \$1.40 to \$1.30 on pea and smaller sizes. To Communipaw pier and Port Liberty, N. J., prepared, from \$1.60 to \$1.45, and on smaller sizes by 10 cents a ton. Similar reductions ordered on the various lines to Weehawken, Perth Amboy, Undercliff and South Amboy, N. J.

Several of the respondents have granted the exclusive use of some of their piers, docks, storage plants, retail delivery trestles, and other properties to their allied coal companies at inadequate rental charges and under conditions which constitute substantial discrimination in favor of such coal shippers. The exclusive right to operate certain of the carriers' public docks and piers has also been granted to such coal companies, who in operating such properties gain information as to the shipments of their competitors, handled over the docks and piers, which section 15 of the Act to regulate commerce prohibits common carriers from giving to shippers and prohibits shippers from receiving from common carriers. We assume the carriers will at once adjust these practices to remove the discrimination and conform with the requirements of the law.

The evidence shows that several of these carriers have in the past declined to establish joint rates for all shippers, while the coal production of their allied coal companies has been accorded an interline movement by means of trackage arrangements and the free transportation to junction points of the coal production exchanged by the coal companies controlled by the carriers. Such a practice is unlawful and is discriminatory in its worst sense, since the discrimination results to the benefit of the carriers. The carriers will be required to establish through routes and to publish joint rates, of which other shippers may avail, such as will neutralize any such undue benefit heretofore enjoyed by the coal operations of railroad ownership.

Commissioner Harlan, Dissenting. In my judgment the record before us here justifies a modification of many of the present

rates, but for the future a rate structure on anthracite coal based upon the general standard of the Meeker case, surcharged, so far as that would result in a reasonable rate schedule, with the 5 per cent. increase that has been imposed in The Five Per Cent. case upon substantially all other traffic in official classification territory, would seem to be a more consistent disposition of the case.

THE TRAIN DESPATCHER

BY ONE OF THEM

In many respects the despatcher is like a ship without a rudder on a tempestuous sea. He must fight his way through the multitude of obstacles that obstruct the way, all by himself; even though he use his best judgment at the time, his anticipations may not materialize for the best and then he is open to criticism by everybody from the call boy to the general manager's office. Many times the criticisms are unjust, no thorough investigation being made of the surrounding conditions at the particular time.

The feeling seems often to prevail among his superiors that if a bad move is made he is "laying down on the job." It has always been a profound mystery to the writer, why these critics do not see that the despatcher is just as much interested in good service, just as anxious to make good meeting points, to avoid delays to trains, to reduce overtime and to rightly handle any irregularity that comes up as any one in the employ of the company. He worries over bad moves a great deal more than do his superiors. How often do you see him in his chair after his hours are up and the relief man standing by ready to take the transfer. He has in hand some complicated condition that he is anxious to straighten out; not because he can do it better than his relief, but because he has the outline in his mind and possibly can do it in less time than he could explain it; and also because of the natural satisfaction in finishing a job that has been begun. How many times have you seen him come back to the office after going home to see how some complicated affair worked out, or to see that the other man completely understands some proposition to be handled.

He has certain rules laid down to work by, but it is a foregone conclusion that some of these rules at times will have to be violated in order to make some emergency move which is for the interest of the company. As an example, the management says. "Passenger trains must run on time; freight trains must be kept out of their way; despatchers must keep freights off the time of passenger trains twenty minutes; certain red ball trains must have the same treatment as is accorded passenger trains so far as the despatchers are concerned; certain forms of orders must be used in all cases, and some forms he is ordered not to use at all. The despatcher finds a train close to the sixteen-hour limit, or on overtime, which, if allowed five or ten minutes on a passenger or fast freight, can be got in, thereby saving overtime and avoiding tying up the engine on the road. The passenger or fast freight undoubtedly will recover the time used to advance the belated train. If the despatcher adheres strictly to his instructions he may be censured for not taking a chance; if he takes a chance and everything goes all right, there may be nothing said (in this particular case); but if a drawbar is pulled out or something happens to make a bad job of it, then the old instructions are flashed in his face, and he is called a poor despatcher. Many things just like this confront the despatcher every day.

I have in mind a case where an important stock train crept up on the sixteen-hour limit; ten minutes on a fast passenger train would move the freight to the terminal; the despatcher took the change, and he was discharged for disobeying his instructions. But did he not save the company money by this move? A like infringement of the rules by some trainman or engineman, and with such sentence imposed, would have been followed quickly by a visit from the committee and the offender, after a few days, would be reinstated, and maybe with full pay for the time out of service.

Many times prejudice arises against a certain despatcher in the office, and some local officer goes back and checks him on every

little move that he has made, and then makes a show to the superior officer that the despatcher is not doing his work satisfactorily. But no investigations were made to bring out the existing conditions at the time the so-called bad work was performed, and now it is taken for granted that the despatcher was at fault.

What does it cost to make a despatcher? What does it cost to break in a despatcher, even though he be what they call an experienced man, from another line? What does it cost to break in one that has had no experience at all? It is estimated that it costs a railroad company \$5,000 to make an engineer. If that much for an engineer who handles one train, what would be a fair estimate for a despatcher who handles all of them on from one to three divisions?

The despatcher is the commander-in-chief of the division in the absence of the superintendent, trainmasters and chief despatcher, and he must be qualified to act in their stead judiciously, expeditiously and economically. In the face of this, how about his surroundings in the office? Has he a quiet office where he can figure and study out these questions? Generally the latch string is on the outside of the door and nearly every one that desires comes in; they think nothing of asking the despatcher about this, that and the other thing, even without taking time to see if he is busy; they poke their heads in at the door and shout at him. Frequently there is a telephone or two in the office connecting to the yard, roundhouse, ticket office, freight house, car office, water service shanty, etc., and there is a continual ringing of bells. This interrupts him even though some one else is doing the calling and talking. If he is located near the yards where switch engines are working the whistling and other noises will disturb him in his work.

If the telephone despatching circuit is used for other purposes conversations thereon distract his attention from his work. No man can sit with a telephone on his head—and the despatcher is required to keep it there all the time—and be forced to hear miscellaneous conversations, and still be able to concentrate his mind on the trains.

Telephone lines have brought in some new annoyances. Batteries at outlying stations are sometimes allowed to run down, so that you cannot hear the operators plainly. Where does "safety first" come in when the despatcher makes out reports, traces cars, and has to do other jobs just because he seems to have an idle moment now and then? His hands may be idle but, no doubt, his brain is working.

Is it reasonable to suppose that a man can give the necessary attention to the handling of trains while he is forced to have his train sheets covered with reports, with some one running over to his desk every now and then to pull at his sheets and maybe take them off the desk entirely for a while?

The despatchers of to-day have more to do than they did twenty years ago, for the reason they have the sixteen-hour lay, the live stock confinement law, and other laws to contend with. The telephone has given the despatchers of to-day about double the territory they used to have. It may be said that with the telephone the work can be done easier and quicker. Granted, but the load on the mind has not decreased one bit.

THE SOUTHERN SHAN STATES RAILWAY OF INDIA.—The Shan States are on the inland side of Upper Burma. The southern Shan States touch Chinese territory, Tonking and Siam and the Southern Shan States Railway runs mainly in an east and west direction, branching off from the Burma Railway's main line from Rangoon to Mandalay, at Thazi, 306 miles from Rangoon. It is a metre-gage road and as planned is to be 103 miles in length. At present it has been completed and put in operation as far as Aungban, at mile 72, and the continuation to Heho is being undertaken, but further work beyond that point will have to be postponed for the present. The cost of the present line differed but 2.8 per cent from the estimate. The line has been constructed at the cost of the government by the Burma Railways Company and will be operated by the latter.

Lateral Stresses on Rails in Curved Tracks

Experiments with Ten-Wheel, Pacific, Consolidation
and Mikado Locomotives: Also Tenders and Cars

By GEORGE L. FOWLER,
Consulting Mechanical Engineer.

Supplementing the investigations of the lateral stresses on rails in a straight track, which were described in the *Railway Age Gazette*, June 11, 1915, page 1231, an investigation was entered upon to make a similar determination on sharp curves, with this difference, however, that whereas the thrust on the rail in the straight track was taken as that of the heaviest of the engine as a whole, the apparatus used on curves measured the thrust on the outer rail of each individual wheel as it passed. This apparatus



Track and Recording Apparatus for Measuring Lateral Thrust of Wheels on Rail

is the same as that originally designed to measure the outward thrust of car wheels on the outer rails of curves, as described in the *Railroad Gazette*, November 15, 1907, and furnishes a graphical record of the thrust of each individual wheel.

The apparatus was first installed in the outside rail of a 6 deg. 12 min. curve which had a total length of 215 ft.; the apparatus was placed 130 ft. from the east end. The outer rail was elevated 5 in., the gage was widened $\frac{1}{4}$ in., and the location was on a 1.31 per cent. grade, dropping to the west. A curve of 6 deg. 12 min. has a radius of 462 ft., and the elevation of 5 in. compensates for a speed of 24.4 miles an hour.

The second location was in the outer rail of an 8 deg. 7 min. curve. The radius of this is 353 ft. The 5 in. elevation of the



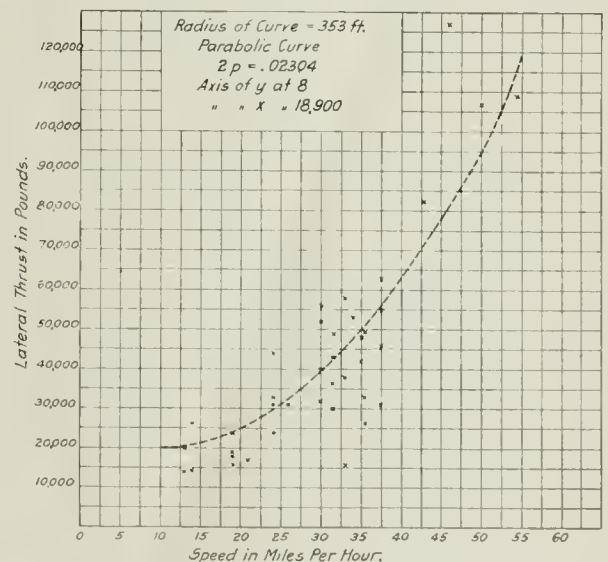
outer rail compensated for a speed of 21.3 miles an hour. The gage was widened $\frac{3}{8}$ in. The total length of this curve was 237 ft., and the apparatus was located 122 ft. from the east end. The grade was .8 per cent., dropping to the west.

The apparatus was put in service at about 8 o'clock in the morning and records were taken of all locomotives passing until

above 5 in the evening. During the night the movable rail was bolted rigidly in place so that it had no effect on the recording apparatus.

The speed of passing trains was obtained by setting a twig, carrying a piece of paper, in the center of the track, 176 ft. from the apparatus, and another at the apparatus itself. An assistant started a stop watch when the pilot of the locomotive struck the first twig and stopped it when it struck the second. As 176 ft. is the distance traversed in two seconds by a locomotive traveling 60 miles an hour, it was simply necessary to divide 120 by the number of seconds occupied in passing from one twig to another to obtain the speed of the train in miles per hour.

The apparatus was in the 6 deg. 12 min. curve 11 days and in the 8 deg. 7 min. curve 10 days. In these periods records were obtained of 40 different locomotives in the first and 16 in the second curve, running at speeds of from 6.1 to 54.5 miles an hour, the great majority, however, falling between 25 and 40 miles an hour. In all there were 45 different locomotives, of which 4 were



Lateral Thrust on Rails for Consolidation Locomotive Running at Different Speeds Over an 8 deg. 7 min. Curve Elevated for a Speed of 21.3 Miles Per Hour

of the Ten-Wheel type; 6 Pacific; 25 Consolidation, and 10 Mikado.

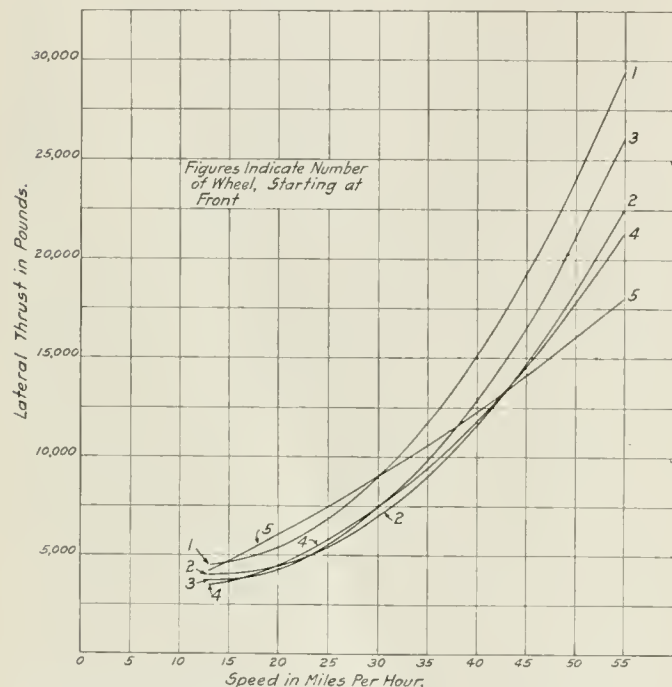
As in the case of the experiments on a tangent track, a complete survey of the lateral play in the axle boxes of each of the locomotives was made. The records have been grouped in a series of tables with each type of locomotive by itself. Of all types tested the largest number of records were obtained with the Consolidation—40 on the 6 deg. 12 min. curve and 41 on the 8 deg. 7 min. curve. They therefore present the best opportunity for drawing conclusions, and will be considered first.

No final conclusions can be drawn as to the effect of the lateral play of the axles in their boxes on the lateral thrust of the wheel on the rail. The records are, seemingly, contradictory and confusing, but a careful examination seems to indicate that an excess of lateral play tends to increase the lateral thrust. Whether this would hold in the case of an engine on which the lateral play was entirely eliminated there is nothing to show.

The stresses with the wedge trucks seem to run higher than with the swing trucks. This does not always appear in the truck,

but may appear in the total thrust of the engine. In the case of the Consolidation locomotives on the 8 deg. 7 min. curve, the total thrust of those having the wedge trucks was almost invariably higher than with those having the swing trucks. The same thing appears in a general way, though to not quite so pronounced an extent, in the thrusts on the 6 deg. 12 min. curve. On the 8 deg. 7 min. curve this holds for the leading truck wheel; but for the 6 deg. 12 min. curve the excess so far as the front truck is concerned largely disappears, though, in the majority of cases, the thrust of the wedge truck is more than that of the swing.

In making comparisons of the lateral thrust exerted by any



Comparison of Individual Wheel Thrusts for a Consolidation Locomotive at Different Speeds on an 8 deg. 7 min. Curve Elevated for a Speed of 21.3 Miles Per Hour

type of engine, it was found necessary to take the sum of the thrusts of the individual wheels in order to gain an idea as to what the engine was doing, because of the slight actual difference of pressure exerted by any one wheel at different speeds. This I have used as a basis. As for the different wheels it will be found that there is a certain sequence of relative pressure that is peculiar to each type, but when the work is considered with reference to the speed it is necessary to take the total thrust of all of the wheels in order to get the range needed to draw conclusions.

After plotting the individual runs the usual median line was drawn to indicate the averages for the different speeds and then, when this had been done with no regard to mathematical accuracy, an equation was developed for the several lines so drawn, and they were found to be parabolic. This statement is made as to the method employed for the location of the lines in order to impress the fact that there was no preconceived idea as to their form. From this it appears that the records indicate that the total average increase of pressure on curves of all of the engines tested increases in the ratio of the equation of the parabola

$$y^2 = 2 p x.$$

in which

y = the speed in miles per hour.

x = the lateral thrust in pounds.

$2 p$ = a constant which varies with the locomotive and the curve.

This holds for each of the engines. The rate of increase of pressure with the increase of speed also varies inversely with the value of $2p$. The value of $2p$ was determined for the curves given in the manner indicated, and for the Consolidation and

Pacific types was found to vary nearly as the squares of the radii of the curves.

$2p = .03652$ for the Consolidation on the 6 deg. 12 min. curve.
 $2p = .02304$ for the Consolidation on the 8 deg. 7 min. curve.
 $2p = .09375$ for the Pacifics on the 6 deg. 12 min. curve.
 $2p = .056$ for the Pacifics on the 8 deg. 7 min. curve.

These curves could not be plotted for the Mikados and Ten-wheelers on the 8 deg. 7 min. curve because of insufficiency of records, but inasmuch as the median lines for the 6 deg. 12 min. curve are parabolic* there is no reason why those for the 8 deg.

7 min. curve should not be of the same character. If the conclusions drawn from those of the Consolidations and Pacifics are accepted the curves for the Mikados and Ten-wheelers for the 8 deg. 7 min. curve can be readily calculated.

The value of the constant $2p$ varies with each type of engine, and the less this value the more rapid is the rise of lateral thrust with the speed. For example, the thrust on the Consolidations with a value of $2p$ of .02304 rises much more rapidly than it does on the Pacifics where the corresponding value is .056.

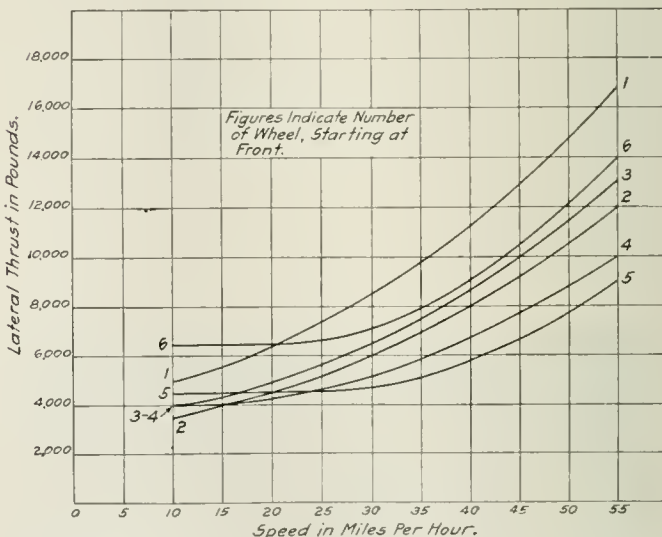
This then serves to gage the relative intensity of the lateral thrust imposed by the several types of locomotives tested. According to it they stand in the following order, taken from the data obtained on the 6 deg. 12 min. curve:

Consolidation.....	$2p = .03652$
Ten Wheel.....	$2p = .06562$
Pacific.....	$2p = .09375$
Mikado.....	$2p = .10866$

There is not sufficient data to warrant a similar arrangement on the 8 deg. 7 min. curve.

The actual location of the curves on the diagrams are, however, modified by the locations of the directrix, which varies from 11,800 for the Ten-wheelers to 17,750 for the Mikados. This does not essentially change the relationship of the curves as given above.

If the total lateral thrusts of the several locomotives rise on a



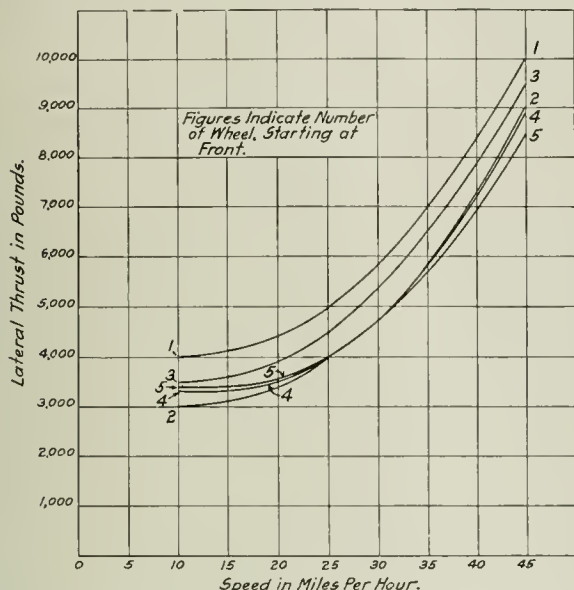
Comparison of Individual Wheel Thrusts for a Pacific Locomotive at Different Speeds on an 8 deg. 7 min. Curve Elevated for a Speed of 21.3 Miles Per Hour

parabolic curve it is fair to presume that the same is true of the lateral thrusts of the individual wheels. In order to ascertain how this would work out the individual wheel thrusts of the Consolidation and Pacific locomotives have been plotted for both the 6 deg. 12 min. and 8 deg. 7 min. curves, and approximately median lines have been drawn through these in the form of parabolas, which are substantially accurate. In each case the sums of the ordinates of these curves are equal to the corresponding ordinates of the curve for the total thrusts. This was not done for the Mikados and Ten-wheelers, because of the small number of records obtained. These individual wheel record curves have also

* As roughly determined in the manner described above.

been brought together for each curve and locomotive, from which a comparison of the relative average intensity of the thrusts of the individual wheels can be made.

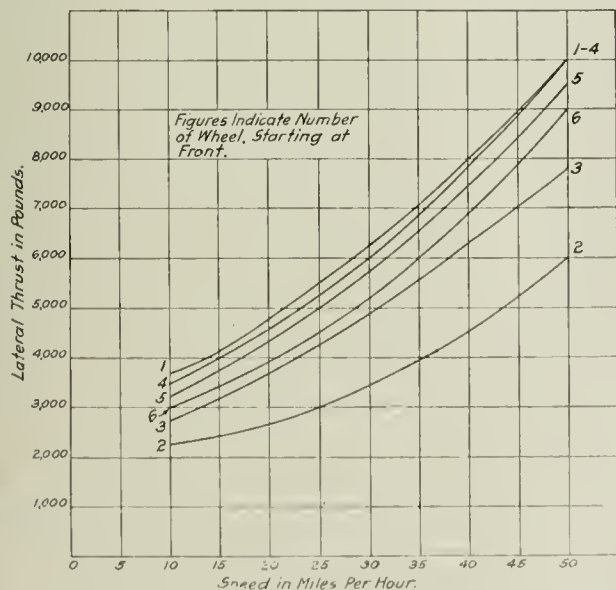
In the case of the Consolidation locomotives on the 6 deg. 12 min. curve the front truck wheel stands clearly out as exerting the maximum thrust on the rail, followed by the third wheel which



Comparison of Individual Wheel Thrusts for a Consolidation Locomotive at Different Speeds in a 6 deg. 12 min. Curve Elevated for a Speed of 24.4 Miles Per Hour

is the second driver. This is in exact accord with the results obtained on the Pennsylvania a number of years ago. The other three wheels reverse their relative positions in rising from slow to high speed and it is interesting that they come together at a speed which is approximately that for which the track is elevated.

On the 8 deg. 7 min. curve the same general order prevails, except that it is complicated by an evident binding of the rear



Comparison of Individual Wheel Thrusts for a Pacific Locomotive at Different Speeds on a 6 deg. 12 min. Curve Elevated for a Speed of 24.4 Miles Per Hour

driver. In this, too, it will be seen that the thrusts of the second and fourth drivers are about the same at a speed approximating that for which the outer rail was elevated (21.3 miles an hour).

In the case of the Pacific locomotives on the 6 deg. 12 min. curve, the average maximum thrust was exerted by the leading truck with the second truck wheel the lowest of the six. The

order of average maximum thrust, taken in the wheels counting from the front, is 1, 4, 5, 6, 3, 2, and this order is preserved throughout the whole range of speeds.

On the 8 deg. 7 min. curve the order of wheel thrusts is 1, 6, 3, 2, 4, 5. The reason for this change may have been due to a binding of the wheelbase, due to the sharpness of the curve, or the low center of gravity of that portion of the engine over the trailing truck. I am inclined to attribute it to the latter cause. Throughout the whole of the tests on this curve the excessive thrust put on the rail by the trailing truck wheel was very apparent, when compared with the rear driver. It was the rule, to which there are a few exceptions, that the trailing truck wheel put a thrust on the rail in excess of that imposed by the rear driver.

LATERAL THRUST OF WHEELS ON RAILS, TENDERS AND CARS On 6 Deg. 12 Min. Curve Elevated for 24.4 Miles Per Hour

Direction	Speed in Miles per Hour	Train Engine No.	Car or Tender	Individual Wheel Thrust in Lbs.
E	11.5	5013	Freight	3,600 to 4,400
W	25.0	5018	Tender	4,750
"	30.0	3836	Freight	6,000
"	30.0	3809	Freight	5,375
"	33.3	3886	Sleeping	9,250
"	37.5	2510	Sleeping	7,125
"	37.5	1206	Sleeping	10,375
"	38 est.	3836	Sleeping	12,250
"	40.0	3809	Tender	15,300; 26,435; 27,150; 25,470
"	41.4	3807	Tender	17,125; 27,750; 27,250; 26,000
"	42.8	2508	Tender	6,000
"	42.8	2510	Sleeping	8,000
"	42.8	2508	Sleeping	9,250
"	42.8	1206	Sleeping	9,875
"	42.9	3837	Sleeping	5,375
"	42.9	3837	Tender	4,125
"	44.4	2508	Tender	7,750 to 7,125
"	44.4	2508	Sleeping	10,375
"	46.1	2508	Sleeping	10,100
"	46.1	2509	Tender	4,700
"	46.2	2508	Sleeping	11,000
"	50.0	724	Sleeping	9,875
"	50.0	2793	Sleeping	11,000

E = East. W = West.

LATERAL THRUST OF WHEELS ON RAILS, TENDERS AND CARS On 8 Deg. 7 Min. Curve Elevated for 21.3 Miles Per Hour

Direction	Speed in Miles per Hour	Train Engine No.	Car or Tender	Individual Wheel Thrust in Lbs.
W	22.2	5018	Freight	7,125
"	24.0	3917	Freight	9,250
"	24.0	3889	Freight	4,750
"	24.0	3809	Tender	13,250
"	24.2	3470	Freight	7,750
"	25.0	5015	Freight	12,000
"	26.1	3899	Freight	9,250
E	26.1	2510	Sleeping	9,875
W	27.3	724	Tender	8,750
"	27.3	724	Freight	8,750
"	30.0	5017	Freight	13,000
"	30.0	3889	Freight	10,375
"	35.3	3809	Freight	18,200
"	35.3	1018	Tender	10,750
"	35.3	3889	Tender	4,750
"	37.5	3894	Tender	11,000
"	37.5	3950	Tender	13,375
"	37.5	5015	Tender	19,250
"	37.5	3887	Freight	21,450
"	37.5	5015	Freight	26,750
"	37.5	3950	Sleeping	13,750
"	40.0	2510	Sleeping	22,500
"	40.0	2510	Sleeping	11,000
"	42.8	2510	Sleeping	21,425
"	42.8	1206	Sleeping	14,625
"	42.8	2508	Tender	12,500; 26,500; 26,000; 23,000
"	42.8	2508	Baggage	16,000; 24,750; 23,000
"	46.1	3894	Tender	22,500
"	46.2	2510	Sleeping	15,525
"	50.0	1226	Sleeping	32,125
"	50.0	2508	Sleeping	19,275 to 24,625
"	50.0	1206	Sleeping	29,400
"	50.0	2510	Sleeping	36,400
"	50.0	2508	Tender	6,750
"	50.0	1226	Tender	12,500
"	50.0	2508	Sleeping	19,300
"	54.4	2508	Sleeping	17,150 to 29,450
"	54.4	5017	Freight	33,200
"	54.5	2508	Tender	9,250
"	54.5	2508	Sleeping	21,400 to 33,200

E = East. W = West.

In addition to the locomotive records a number of records were taken of tenders, freight cars and sleeping cars. These must, however, be considered as indicating possibilities rather than average results. From the thrusts on the 6 deg. 12 min. curve it will be seen that the three classes of vehicles are grouped very closely together without much difference between them; but, on the 8 deg. 7 min. curve, the sleeping cars exerted the heaviest thrust, followed by the freight cars and tenders in the order named. I think the position of the tenders in this regard is due

to the fact that the work was done only 13 miles from the division terminal, that the run was mostly down grade, requiring the consumption of very little water and fuel, and that, as a result, the center of gravity was high when the records were obtained.

As for the sleeping cars, the thrusts, which are for individual wheels, were invariably higher than those imposed by the locomotive at the head of the train—a comparison will show that they are from two to three times as much. This cannot be attributed to low center of gravity because, if that of the one car measured is taken as an average height of the other cars, it will be seen to be considerably higher than that of any of the locomotives. The fact, however, remains that the lateral thrust put on the rails by sleeping cars is considerably in excess of that imposed by the locomotives.

In addition to the above a few records were obtained from Consolidation locomotives running backwards, and of switching engines. These records emphasized very distinctly the excessive lateral thrust imposed when there is no guiding truck. For example, at 18.8 miles an hour we have a maximum of 10,375 lbs. for a Consolidation locomotive running backwards, as against 7,125 running forwards. At 19.4 miles an hour we have 13,000 lbs. and 6,000 lbs., and at between 28 and 29, and at 31.6 miles an hour we have 12,000 and 13,000 lbs. as against from 7,000 to 9,000 lbs. Thus a Consolidation locomotive running backwards puts a maximum lateral thrust on the rails about 50 per cent. in excess of that imposed by the same locomotive running forwards.

These records cannot, of course, be taken as comprehensive enough to base a final conclusion on, but their general trend is sufficiently consistent to indicate a probability. They do show, however, that no predication can yet be made of the performance of any individual locomotive on a curve. The total thrust of the locomotive, as well as the individual wheel thrusts, is evidently dependent to a great extent on the way in which the locomotive enters and passes the curve, though of this we have no information. Apparently the amount of lateral play in the axle boxes has an influence tending to increase the thrust, but the information is too meagre to warrant the statement as a fact. There are indications also that the lateral thrust is greater when the engine is using steam than when it is not, but the data on this point is still too meagre to serve as a basis for a final conclusion. As for the effect of the height of the center of gravity, that of all of the engines tested was too nearly alike to warrant any inferences regarding it. I can only say that when these results are compared with others obtained elsewhere, they show that the lateral thrust is increased as the center of gravity is lowered. Finally the ratio of average increase of thrust along the lines of a parabolic curve, cannot be regarded as having been proven, but the method by which the curves were drawn indicates that pressures do not tend to increase directly as the square of the speed, but by that square as modified by a constant which is itself a function of the radius of curvature.

In developing the equation for the parabolic curves indicative of the wheel thrust it was found that the directrix did not lie at the base or zero of pressure, but at a considerable distance above it, nor was the axis on the zero line of the speed, but at one side, usually to the right. Hence in order to determine the locus of any particular point of the parabola a constant must be added that varies with the type of engine and the radius of curvature. It follows, therefore, that, accepting the equation as correct, the value given for the lateral thrust for low speeds will be higher than that usually obtained by the use of the centrifugal formula. If, however, the centrifugal formula

$$F = \frac{Wv^2}{gR}$$

in which

F = Centrifugal force.
W = Weight in lbs.
v = Linear velocity in feet per second.
R = Radius of curvature.

be used for the calculation of the stresses imposed and the effect of the elevation of the outer rail be disregarded, it will be found that this will give results below the experimental parabola for low

speeds, and above it for high speeds, and that the two lines will cross at a point near, but somewhat above, the speed for which the track is elevated.

In other words the resultant thrust of the locomotive on the outer rail does not follow the formula for centrifugal action, because it is not a freely rotating body, but has its action modified by the binding of the wheels and flanges on the rails, the height of its center of gravity and other details as to the precise influence of which we have no knowledge.

A TRAIN DESPATCHER AS A REVENUE SOLICITOR

By J. L. Coss.

There is a large field in which the train despatcher, in an indirect way, can materially aid in the solicitation of business. At stations where only one man is employed, he performing the duties both of agent and operator, there are times when, if he could be excused from the office a while he would be able to secure some business, but he is in duty bound to remain at the office to take train orders. The despatcher by a little advance figuring could arrange his work to accommodate these agents in this direction and give them a chance to see shippers and prospective passengers. A little trip into the country in the afternoon or early evening might secure some emigrant outfit or a number of passengers for a long haul. The agent having made his request for this opportunity the despatcher, very likely, by arranging to use some other office, perhaps by holding a man on duty a few minutes extra, can arrange it all around.

Suppose an agent calls up the despatcher and says that some influential citizen of his town has just been called away on some important matter, or by sickness, and wishes to take the fast train, which does not stop at that particular place. Stopping the train will keep him from driving to a station on some other line. If no one higher in authority is within call, don't wait two or three hours to find out if it will be all right; take a chance; stop the train. Have the agent and the passenger understand that this is not establishing a precedent. Then make an explanatory note to the chief despatcher and he can lay it on the superintendent's desk. You may have secured a nice little bit of revenue for the road at some future time. In case of emergency give a man a permit to ride on a freight train; he will appreciate it and no doubt repay you many times in the way of shipments.

Despatchers who have families will frequently hear of prospective travelers or movers. When this comes to your ear get the word to the agent or traffic representative. In the course of social correspondence we often hear of people who are contemplating a trip. Suppose it be in St. Louis; why can't we drop our representative in that city a postal card? When your wife or daughter comes home from the club ask who is going away or who is going to have visitors.

When traveling and coming in contact with other people on the train bring up the subject of travel and learn what business your fellow passenger is in; he may be a big shipper. After you get the desired information explain to him the advantages of your road.

In conversation with any one don't unravel to them any trouble the road has experienced; always tell them of the good engines, fine cars, excellent dining service, fast freight and passenger trains, good road bed, rarity of accidents and loyalty of employees. This will be a good advertisement for the road and, no doubt, some one will get the idea that he ought to give it a trial, even if it be a few miles out of his way.

In the elections, vote for the man who will favor the railroads regardless of your politics. If the little town elects a town marshal who will see that the children are not allowed to play around the station and hop trains, keep trespassers off the right of way and promote law and order generally, he is the man to vote for.

The despatcher's work is confining and the majority of us are satisfied to plod along and not reach out very far; but why not take another view of the situation and lend a hand?

The Interstate Commerce Commission's Report on Rock Island

Commission Reviews History of the Rock Island; Condemns Severely the Policy of Controlling Syndicate

The Interstate Commerce Commission on the afternoon of August 17, gave out its report which is signed "By the Commission," "In re financial transactions, history and operations of the Chicago, Rock Island & Pacific Railway Co." The report, a very full abstract of which is printed below, is the result of hearings on various dates from April 24, 1914, to June 5, 1915. In the abstract the exact language of the commission has been preserved with a few slight exceptions.

In 1902 the main line of the Chicago, Rock Island & Pacific Railway Company extended from Chicago to Denver, with branch lines to St. Paul, Minneapolis and Kansas City. The territory served is one of the richest and most prosperous in the country and the system's ramification of branch lines insures to it a large volume of tonnage. It was then thriving and its prospects were promising, its stock selling in the markets of the world at more than \$200 a share. In 1914 the shares had fallen to \$20 and the road is now in receivers' hands. The evidence shows that the earnings of the railway company have steadily increased, and that in 1914 they were the largest in its history.

The results of the management, which is the subject of this investigation, may be seen from the statement above made as to the market value of the stock, and from the table below, showing the capitalization, indebtedness and operating accounts for the years 1901 and 1914:

	1901	1914
Capital stock	\$49,921,400.00	\$74,995,122.50
Funded debt	63,538,000.00	235,246,000.00
Loans payable	None.	3,500,000.00
Operating revenue	26,075,574.00	65,848,258.00
Operating expenses	17,096,066.00	49,517,948.00
Interest on funded debt.....	2,931,980.00	9,934,169.00
Rentals	473,962.00	1,881,651.00
Net income	5,306,519.00	395,915.00
Surplus	10,263,184.55	6,264,208.84
Mileage owned	3,128	5,367
Mileage operated	3,772	7,729

SYNDICATE CONTROL.

In 1901 Daniel G. Reid, W. H. Moore, J. H. Moore and W. B. Leeds purchased about \$20,000,000 of stock of the company, and by the use of proxies they soon became members of the board of directors, W. B. Leeds being made president and D. G. Reid chairman of the executive committee. This syndicate procured the selection of other members of the board of directors, notably F. L. Hine, George McMurtry, and George T. Boggs, each of whom appears to have acted and voted in accordance with the wishes of the members of the syndicate. One other director stated that he knew but little of what was being transacted in the affairs of the railway company, and that he was a member of so many other boards of directors that he had no opportunity to examine into things for himself, but had to take the word of those in authority. Thus the syndicate controlled the board through the directorships held by themselves and by those subject to their wishes.

At a stockholders' meeting held June 5, 1901, at which an increase of the capitalization of from about \$50,000,000 to approximately \$60,000,000 was authorized, W. H. Moore was elected a director of the company, and at a directors' meeting held on the same date Daniel G. Reid was also elected a director. At the former meeting a 10 per cent. stock dividend was declared. On July 31 W. B. Leeds was elected by the board a director to succeed W. A. Nash, resigned.

On October 24 the articles of incorporation of the railway company were amended to provide for an executive committee to consist of the president and six directors, to be designated by the board, and to be invested with all of the powers of the board when it was not in session. W. H. Moore and W. B. Leeds were appointed on this committee on the day it was

created, and on December 12 following W. B. Leeds succeeded W. G. Purdy as president of the railway company. Then D. G. Reid became a member of the executive committee and J. H. Moore a member of the board. On January 30, 1902, J. H. Moore was elected by the board to the executive committee in place of H. R. Bishop, resigned. The other members of the executive committee at this time were R. R. Cable, Marshall Field and A. R. Flower.

On June 4, 1902, the capital stock of the railway company was increased to \$75,000,000 and the board authorized President Leeds to sell to certain individuals portions of this increased stock at par, although at the time the stock was quoted on the market above 175.

In July, 1902, the syndicate organized two holding companies, the Chicago, Rock Island & Pacific Railroad Company of Iowa, and the Rock Island Company of New Jersey. The railway or operating company will be referred to hereinafter as the railway company, and the holding companies as the Iowa company and the New Jersey company, respectively. The St. Louis & San Francisco Railroad Company will be referred to as the Frisco.

The authorized capitalization of the Iowa company was \$125,000,000 in stock and \$75,000,000 in 4 per cent. collateral bonds. That of the New Jersey company was \$150,000,000 in stock, of which \$54,000,000 was preferred and \$96,000,000 common. In the latter company the preferred stock only had voting power to elect directors of the first class, which directors under the by-laws constituted a majority of the board. The directors of these two corporations first elected were merely figureheads, but later members of the syndicate became directors of both companies and controlled them. The New Jersey company and the Iowa company each issued their stock as fully paid, whereas no payment was made on either. Then upon motion of D. G. Reid, the Central Trust Company, of New York, of which J. N. Wallace was and is president, was selected as trustee, and an arrangement was made with that company whereby the entire bond issue of the Iowa company and stock issue of the New Jersey company were placed with it under an agreement that they were to be exchanged for stock of the railway company in the proportion of \$100 in Iowa company bonds and \$70 in preferred and \$100 in common stock of the New Jersey company for each \$100 in stock of the railway company, or \$270 face value of the holding company securities for each \$100 par value of the railway company stock. Under this agreement the members of the syndicate deposited railway stock as follows:

D. G. Reid	\$5,915,437.50
W. H. Moore	6,118,975.00
J. H. Moore	3,059,262.50
W. B. Leeds	5,597,100.00

making a total of \$20,690,775, for which they received \$20,690,775 in the Iowa company's bonds and the same amount in the common and \$14,483,542 in the preferred stock of the New Jersey company, at total of \$55,865,092.

The 10 per cent. stock dividend declared by the railway company on June 5, 1901, had the apparently intended effect of creating a demand for the stock of the holding companies, the only revenue of which was from dividends on the stock of the railway company and practically all of the stockholders of the railway company exchanged their stock, the total amount deposited being approximately \$71,000,000, or all but about \$4,000,000 of the total railway stock. The par value of the holding companies' securities issued in exchange amounted to about \$191,000,000.

Under the terms of the trust agreement the railway stock deposited was to be held by the trust company as collateral

to secure the Iowa company's bonds, and the trust company was authorized to sell the railway stock upon default of payment of interest on any of the bonds.

Thus by the organization of the two holding companies the syndicate, the members of which held but little more than one-fourth of the railway stock, secured control of and dominated the affairs of this transportation system.

A significant transaction at this time is that growing out of the action of C. H. Venner, a stockholder of the railway company. He made demands upon the officers of the railway company in December, 1902, and in January, 1903, for a list of its shareholders. Being ignored, he instituted on January 31, 1903, a proceeding in a state court of Illinois to enjoin the organization of the holding companies and the exchange of railway company stock for their securities. In February and March, 1904, the railway company paid Venner \$291,000, ostensibly in consideration of his delivery to it of securities of the New Jersey company and of the railway company valued at \$91,000 and stock of the Nebraska Central Railway and of the Nebraska Construction Company of a nominal value of \$200,000. Thereupon the suit to restrain the holding companies' plan was dismissed. Neither the Nebraska Central Railway Company nor the Nebraska Construction Company had any road or other tangible assets, and their stock is therefore considered to be without value. The conclusion is obvious that the payments to Venner were in consideration of his refraining from further prosecuting in the courts his opposition to the syndicate plans. The railway company incurred in this litigation expenses amounting to about \$17,000.

The expense of incorporating the holding companies, \$218,000 for the Iowa company and \$120,000 for the New Jersey company, was paid by the railway company, but these amounts were returned to it three years later without interest, the necessary funds having been secured by the holding companies from dividends on the stock of the railway company.

Practically the entire expense of renting, fitting up and furnishing the quarters occupied by the holding companies for the first four years of their existence was sustained by the railway company. During the next four years, or until 1910, the proportion of this expense borne by the holding companies was slightly increased, the balance being distributed between the railway company, the Frisco, the Chicago & Eastern Illinois, the Evansville & Terre Haute Railroad, and the Chicago & Alton. From 1910 to 1914 the expenses of the offices were prorated on the basis of 50 per cent. to the railway company, 37½ per cent. to the New Jersey company, and 12½ per cent. to the Iowa company. On the basis of apportionment adopted in 1910, the overcharge paid by the railway company prior to that year would amount to approximately \$290,000. That amount was improperly diverted from the treasury of the railway company.

SALARIES OF AND CONTRIBUTIONS TO OFFICERS AND DIRECTORS

The salaries paid to some of the principal officers at various periods were as follows:

	Per annum.
H. U. Mudge, president.....	\$60,000
L. F. Loree, chairman executive committee (one-half to be paid by the Frisco).....	75,000
R. A. Jackson, vice president and general solicitor....	50,000
R. R. Cable, member of board of directors.....	32,000
W. B. Leeds, president.....	32,000
B. L. Winchell, president.....	40,000
B. F. Yoakum, chairman executive committee.....	30,000
Daniel G. Reid, chairman board of directors.....	32,000
C. H. Warren, first vice president.....	35,000

W. G. Purdy, upon his retirement from the presidency, was given two years' salary at \$22,500 per annum.

Mr. Mudge, president of the railway company and now one of the receivers, asserted that the troubles of the railway were in a measure due to increase of wages and governmental regulations. When asked what wages he referred to as being increased he pointed out the wages of clerks, telegraph operators, conductors and brakemen. While he regarded the wages of these minor employees as having partially sapped the financial strength of the railway, he declared that the salaries paid to the higher officers of the company had no appreciable effect on its expenses.

It appeared to be the idea of those in control of the railway that it was no concern of the public what became of the corporate funds so long as rates were reasonable. Those stating this opinion apparently did not take into consideration the fact that if the funds derived from transportation services are expended wastefully or corruptly the inevitable result must be either increased charges in order to enable the railway company to obtain money to pay operating expenses, or bankruptcy.

The contributions to officials of the railway company in excess of their salaries aggregated about a million dollars.

THE ST. LOUIS & SAN FRANCISCO

On May 6, 1903, an agreement was executed between the Iowa company, the New Jersey company, and J. P. Morgan & Company, wherein it was agreed that the common stock of the Frisco would be exchanged for securities of the Iowa and New Jersey companies.

The terms of the agreement provided that for each share of the common stock of the Frisco there would be exchanged \$60 par value in 5 per cent. bonds of the Iowa company and \$60 par value of the common stock of the New Jersey company. Pursuant to this agreement Frisco common stock in par value of \$28,940,300 was exchanged for securities of the Iowa and New Jersey companies in par value of \$34,728,360, equally divided between stocks and bonds.

The Frisco stock thus exchanged was deposited as collateral for the bonds of the Iowa company, and in December, 1909, was resold to B. F. Yoakum for \$37.50 a share, or \$10,852,000. This amount was insufficient to redeem the Iowa company bonds, which was necessary in order to make delivery of the Frisco stock, and the Iowa company, having no resources, issued to the railway company its bonds, which now appear to be worthless, to an amount in par value of \$7,500,000 and received therefor \$7,300,000 in cash, the net proceeds from a loan of \$7,500,000 made to the railway company by the First National Bank of New York. Of these bonds \$1,388,000 were subsequently retired, leaving in the possession of the railway company \$6,112,000, which the Iowa company has no assets to retire. The latter amount was thus taken from the treasury of the railway company to meet an obligation of the Iowa company for which the railway company was in no way responsible and from which it derived no apparent benefit.

The final result of this transaction is that the railway company has sustained a loss estimated to be about \$6,500,000.

CHICAGO & ALTON.

In November, 1903, an account styled "B. F. Yoakum advances" was opened on the general ledger of the railway company to cover amounts advanced by it for the purchase of stock of the Chicago & Alton, hereinafter referred to as the Alton company.

As a result of transactions in the Alton stock the railway company acquired 48,800 shares of preferred and 144,200 shares of common at a total cost of \$9,709,876.49. These shares were bought principally in 1903, but sundry purchases were made after that time until June 30, 1907, when the above total amount had been accumulated.

In October, 1907, the railway company delivered to the Toledo, St. Louis & Western 41,100 shares of the preferred and 144,200 shares of the common stock of the Alton company, receiving in exchange for the former 4,110 series "A" \$1,000 bonds and for the latter 5,047 series "B" \$1,000 bonds of the Toledo, St. Louis & Western.

On November 28, 1908, the executive committee of the railway company authorized the sale of the remaining shares of the preferred stock of the Alton company held by the railway company, together with sundry bonds, series "A" of the Toledo, St. Louis & Western Railroad Company. Pursuant thereto, 3,220 shares of the Alton preferred were sold at a loss of \$45,527.69, and the sale of 3,710 of the series "A" bonds of the Toledo, St. Louis & Western resulted in a loss of \$393,572.44.

On June 30, 1914, the railway company owned 400 series "A" and 5,047 series "B" bonds of the Toledo, St. Louis & Western,

and 4,500 shares of Alton preferred, which in the aggregate had cost it \$6,193,240.36, whereas on the date named their market value was \$1,582,400, a difference of \$4,610,840.36. In addition, the money with which the Alton stock was originally purchased was secured from the sale of bonds, the interest on which to June 30, 1914, less dividends on the stock and interest on the bonds secured, amounted to \$1,320,644.76.

From the foregoing it will be noted that the total loss sustained by the railway company as a result of the disastrous Alton deal was approximately \$6,370,000.

TRINITY & BRAZOS VALLEY.

A contract was entered into under date of March 31, 1906, between the railway company, the New Jersey company, the Colorado & Southern, and the Frisco. The last-named carrier's participation was only to the extent of through traffic arrangements. The cost of construction of the Brazos line, which is practically the entire line of the Trinity & Brazos Valley Railway, was borne by the Colorado & Southern, and under the terms of the contract the latter company and the railway company were to share equally the profits or losses of the Trinity & Brazos Valley, and on May 1, 1935, the railway company was to pay to the Colorado & Southern one-half of the entire cost of the Brazos line, receiving in return one-half of the bonds of the Trinity & Brazos Valley and one-half of other evidence of debt included in the total cost of the Brazos line. The contract further provided for the delivery to the New Jersey company of one-half of the stock of the Trinity & Brazos Valley, the former to make payment only of such amounts as are defaulted by the railway company.

A supplemental contract was entered into on June 1, 1914, wherein the railway company and the Colorado & Southern release each other from the obligation to make any further payments to or for account of the Trinity & Brazos Valley, and the railway company agrees to pay to the Colorado & Southern one-half of the interest at the rate of $4\frac{1}{2}$ per cent. per annum on the total cost of the Brazos line to May 1, 1935. The total cost of the Brazos line approximated on June 30, 1914, \$11,000,000.

In accordance with these agreements the railway company advanced to June 30, 1914, to and for the account of the Brazos line, \$3,729,863.87. For all but \$35,000 of this the railway company holds certificates of indebtedness of the Trinity & Brazos Valley, on which there has accrued unpaid interest charges of \$774,918.20. The total investment of the railway company, therefore, is \$4,504,782.07, and in view of the fact that the Trinity & Brazos Valley is now in the hands of a receiver and the operation of its property has for some time resulted in a deficit, it appears that this investment is of very doubtful value.

OTHER LOSSES

As a result of coal deals the company had a total loss of more than \$1,300,000. If the advances to the coal companies can not be collected, it will result in an additional loss of nearly \$2,500,000.

On April 11, 1902, the executive committee of the railway company authorized the president and secretary of that company to engage with Speyer & Company, New York bankers, to assume a contract previously entered into between that firm and the Choctaw, Oklahoma & Gulf covering the purchase of the stock of the latter company.

Whether or not a loss has been sustained by the railway company as a result of this transaction is not demonstrable for the reason that the accounts of the carrier are not kept in such a manner as to permit the segregation of items by corporate lines. There is abundant reason to believe, however, that the disbursements made by the railway company in acquiring the Oklahoma company are far in excess of the actual value of the property and disproportionate to the returns accruing from the investment therein.

The Rock Island Improvement Company, incorporated under the laws of the state of New Jersey, is primarily a creature of the holding companies, designed to acquire on behalf of the

railway company transportation equipment and other facilities.

As an incident to these transactions, the railway company in one instance at least sold bonds of the improvement company at less than par and six months later bought them back at more than par, notwithstanding the general tendency of bonds to approximate par as they approach maturity. The only justification offered by its sponsors for the existence of the improvement company is that by means of its operations the equipment of the railway company is exempted from the lien of a bond issue of 1898 covering all property then held by the railway company or subsequently acquired by it or its successors.

In the absence of specific figures it is impossible to determine the difference between the ultimate cost of equipment furnished the railway by the improvement company and what such cost would have been had such equipment been purchased directly by the railway company, but it is plain that the procedure entailed an added cost, and that to that extent the railway company sustained a loss by reason of its affiliation with the improvement company.

AGGREGATE OF LOSSES

The aggregate losses sustained by the railway company in connection with the foregoing transactions may be summarized as follows:

Expenses of maintaining and housing holding companies, more than	\$290,000.00
Frisco deal, approximately	6,500,000.00
Alton deal, approximately	6,370,000.00
Trinity & Brazos Valley Railway deal, more than	4,500,000.00
Consolidated Indiana and Bering coal companies, at least	1,300,000.00
Contributions or gratuities to officers and directors, about	1,000,000.00
Venner transaction	217,000.00
Miscellaneous and unexplained expenditures	72,523.45

These items show an aggregate loss to the railway company of more than \$20,000,000. In addition thereto it is to be noted that prior to June 30, 1914, the railway company paid to financial institutions, in connection with the issuance of bonds, commissions aggregating more than \$1,600,000, and suffered discounts of more than \$17,700,000.

INDIVIDUAL PROFITS

The amount of gains accruing to W. B. Leeds, D. G. Reid, W. H. Moore, and J. H. Moore through their control and manipulation of the railway company are probably not ascertainable. Reid, when interrogated with a view to ascertaining his profits from the various transactions, explained that he always burned his books at the end of each month.

The quotations placed in the record from the stock market of the New Jersey company stock and the railway company stock showed wide fluctuations. Whatever have been the gains realized by these persons, it is certain that the present holders of the stocks and bonds of the holding companies have that which is of little or no value.

REPORTS TO STOCKHOLDERS

Misrepresentation of assets in reports to stockholders appears to have been a practice of the directors of the railway company. On June 30, 1904, a book surplus was claimed for the railway company of \$22,343,955.26. By June 30, 1914, the company conceded a reduction of this surplus to \$6,199,841.08, and even this amount was fictitious.

Thus the railway company included among its assets certificates of indebtedness of the Trinity & Brazos Valley carried at a book value of \$3,694,863.87. The Trinity & Brazos Valley was then in the hands of a receiver and was already facing a deficit of \$8,000,000, with a practical certainty that this amount would increase from year to year. It is apparent, therefore, that this item of more than \$3,500,000 was based upon securities which were known to be practically worthless.

In view of the fact that the reported value of the "securities" listed for the year 1914 was nearly \$18,000,000 in excess of their actual value, instead of a surplus of more than \$6,000,000 claimed by the railway company, there should have been shown a deficit of over \$11,600,000.

Another misleading and objectionable practice of the railway

company officials was the failure to state on the pay roll the true amounts paid to its officers.

The publication of misleading reports to stockholders can not be too severely condemned, and the individuals guilty of such acts should be subject to adequate penalties.

PRESENT STATUS OF THE RAILWAY

The original articles of consolidation provided that the maximum of indebtedness to which the company might subject itself should not exceed two-thirds of its outstanding capital stock. This maximum has been increased from time to time until the funded debt of the railway on June 30, 1914, was \$238,746,000, an increase of nearly \$175,208,000 over the amount outstanding on June 30, 1901. On June 30, 1914, the total capitalization of the railway company was \$313,741,000. Of this amount only \$75,000,000, or 28.73 per cent, was capital stock on which dividends might or might not be paid, according as the net earnings of the company might or might not warrant. The remaining 71.27 per cent of the total capitalization consisted of interest-bearing debt, including \$3,500,000 of short-term loans, on which interest was required to be paid regardless of earnings.

The Iowa company being wholly dependent for earnings upon the dividends paid by the railway company, the passing of the railway company dividends in May, 1914, resulted in a default of interest on the bonds of the Iowa company. Pursuant to foreclosure proceedings instituted on behalf of the bondholders, the United States district court for the southern district of New York ordered the sale in one block of \$71,353,500 par value of the railway company stock deposited with the Central Trust Company of New York as collateral for the bonds of the Iowa company.

Some time previous thereto J. N. Wallace, president of the Central Trust Company of New York, which, it will be remembered, was trustee by virtue of the agreement between the holding companies and the railway company, having been selected upon the suggestion of Daniel G. Reid, a member of the syndicate, organized a self-appointed bondholders' protective committee, the members consisting of himself and five other men of his selection. This committee advertised extensively for Iowa company bonds to be deposited in trust with it for the benefit of the bondholders, but after five months succeeded in getting only about \$23,000,000 out of \$75,000,000. Under the terms of the order of the district court the purchaser of the railway stock at foreclosure was to deposit \$1,000,000 in cash or \$10,000,000 in Iowa company bonds. In November, 1914, the circuit court of appeals permitted N. L. Amster, of Boston, a minority stockholder in the railway company, to intervene in the foreclosure proceedings, thereby postponing the sale as scheduled. Following the decision of the circuit court of appeals an adjustment was reached with the Wallace committee in the interest of all undeposited bonds, and an order was entered by the court on December 31, 1914, pursuant to which the stock was sold to Mr. Wallace, who was the only bidder, for \$7,135,350.

The syndicate decided to put the railway into a receivership. The general counsel of the railway company at the suggestion of W. H. Moore, a member of the syndicate, drew the bill asking for a receivership and engaged an attorney ostensibly to represent the other side. The bill was placed in the hands of this attorney with the name of the complainant omitted and he was instructed by the general counsel to locate some creditor of the railway company willing to act as complainant. There was an agreement between the general counsel and this attorney as to the parties the latter would recommend to the court as receivers, the general counsel agreeing to instruct the attorney appearing for the railway company to acquiesce in the recommendations so made.

The board of directors of the railway company was not informed of the intention to file a bill for receivership and at no meeting of the board was any authority ever given for such action. Members of the board of directors not in the confidence of the syndicate were kept in ignorance of the fact that such a

bill had been prepared. The stockholders had no information of the purpose to put the railway company into a receivership, although a stockholders' meeting was held after the date upon which the receivership bill was completed by the general counsel, and this general counsel attended the meeting. According to the testimony, the bill was completed by the general counsel March 29, 1915, and the fact that it was to be filed whenever desired by those in authority was known only to certain insiders. The testimony clearly establishes the fact that the railway company could easily have paid the debt of \$16,000 upon which the receivership application was based, and that arrangements probably could have been made to meet all pressing obligations of the railway company.

The creditor at whose instance the receivership application was filed appeared as complainant by request. R. P. Lamont, the president of the American Steel Foundries, the complainant, testified that he would not have thought of bringing such a proceeding against the railway company unless he had understood that it would be regarded as not unfriendly but as a friendly act to oblige the railway company. He only consented that his company should appear as complainant when he was assured that this course was in accordance with the wishes of the railway company and that his company was not to have any care or expense in the preparation of papers or payment of counsel fees. The suit was not a bona fide proceeding to collect a debt, but was instituted to carry out the purposes and schemes of the syndicate controlling the railway.

N. L. Amster, who was elected to the board of directors of the railway company by the minority stockholders at the stockholders' meeting held in Chicago, April 12, 1915, believing, according to his testimony, that no sincere effort was being made by other members of the board to finance the obligations of the railway, undertook to assist in raising about \$6,000,000 needed by the railway to meet obligations soon thereafter to mature. On April 16, 1915, he met and conferred with Messrs. James, McLean and Schumacher, all directors of the railway and members of the executive committee, and discussed the company's finances. These three expressed approval of his purpose to negotiate for the money. Amster testified that he had secured assurances for the furnishing of the money from responsible Boston bankers on securities which the railway company had. When he arrived in New York on the morning of April 20 to report this fact he went to the office of the railway company, and, quoting his testimony, "could not find anybody there that would say anything, except a lot of people moving back and forth. I left the office and found on the ticker that the Rock Island had been put in the hands of a receiver." This, Amster testified, was the first information he had of the receivership or that such a step was in preparation, yet he was a director of the road and after the stockholders' meeting in Chicago, April 12, traveled from Chicago to New York with Roberts Walker, the general counsel of the railway company.

It will be remembered that the bill was completed by the general counsel on March 29, this fact being known only to a special few. The bill was filed April 20. The records of the New York stock market reveal that the railway stock was inactive until the day this bill was completed, March 29. Then the stock began to be largely dealt in, and the price increased from \$20 to \$39 a share. When the bill was filed and receivers were appointed the stock dropped from \$39 to \$20 a share.

It is a forceful commentary on the methods by which a great railway may be manipulated into a receivership when it is noted that the general counsel, after drawing the bill for a receivership, sold his stock, and the local counsel, who represented the railway company in the receivership proceedings, owned no stock in the railway company, and that none of those directly participating in the receivership proceedings had any financial interest in the railway company. The real owners of the railway, the stockholders, the security holders, and the directors, except those composing the syndicate and in its confidence, were in ignorance of the receivership application. Mr. Mudge, former

president of the railway company, is now one of the receivers.

The general counsel for the railway company, who planned the receivership in obedience to the will of the syndicate, is now counsel for the receivers.

The property of the railway company will be called upon for many years to make up the drain upon its resources resulting from transactions outside the proper sphere in which stockholders had a right to suppose their moneys were invested. This record emphasizes the need of railway directors who actually direct. There are too many passive directors who acquiesce in what is being done without knowledge and without investigation. A director of a railroad is a quasi public official who occupies a position of trust. A director who submits blindly to the exploitation of his company is a party to its undoing and he should be held responsible to the same extent as if he had been a principal instead of an accessory before the fact. The greater his prominence the greater his responsibility and the greater his dereliction. Obviously a man of large affairs could not attend to all the details in intricate transactions, but it is inconceivable that a director of ordinary business prudence and sagacity would sanction large expenditures without an inquiry as to the purposes of such disbursements. So long as this situation exists, however, it suggests the need of a law to charge such directors with individual responsibility for the dissipation of corporate funds.

The Clayton anti-trust act, which becomes effective October 15, 1916, will make it unlawful for any person at the same time to be a director in two or more competing corporations, any one of which has a capital, surplus or undivided profits aggregating more than \$1,000,000, but common carriers are expressly exempted from its application. It should be just as grave an offense for an official of a railway to be faithless to his trust for financial gain as it is for an elected official of the government to betray his trust for money reward.

By this case the need of some limitations on the issuance of stocks and bonds by common carriers, whether directly or through holding company devices or otherwise, is again demonstrated.

REPORT ON THURMONT COLLISION

The Interstate Commerce Commission has issued a report, signed by H. W. Belnap, chief of the division of safety, dated July 30, explaining the cause of the butting collision of passenger trains on the Western Maryland, near Thurmont, Md., June 24th, when two passengers and four employees were killed and twenty-three passengers, employees and other persons were injured. This spectacular wreck, caused by the trains meeting on a high bridge, both running at fifteen or twenty miles an hour, was reported in the *Railway Age Gazette* monthly record in the issue for August 6, page 229. An abstract of the commission's report follows:

The collision occurred in broad daylight but the line approaches the bridge from both directions on sharp curves, so that neither engineman had more than a few seconds' view of the opposing train. The cause of the collision was a mistake of the train despatcher, a man of experience, with good record, in assuming that a train order, after having been superseded, could be restored by annulling the superseding order.

The despatcher first issued order No. 71, requiring the westbound train (No. 11) and the eastbound train (No. 10) to meet at Flint. Finding, afterwards, that one of the trains would be delayed, he sent order No. 74, making the meeting point Sixty instead of Flint. This advanced the eastbound train about two miles, against the westbound. Again, the eastbound train was delayed and the despatcher sent order No. 75 annulling order No. 74. This order cancelled all of the train-order meeting points between No. 10 and No. 11 and left No. 10 superior, according to the time table, to No. 11.

The westbound train received order No. 71, giving it the absolute right of road to Flint; but order No. 74, which was sent (for this train) to Thurmont, was annulled before train

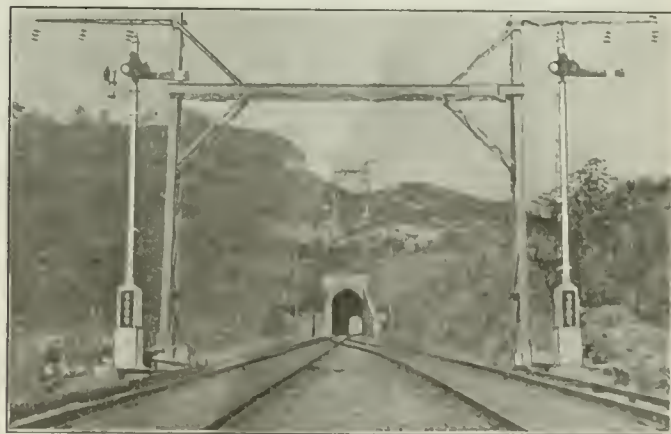
No. 11 reached that station, the annulling order, No. 75, being addressed to the operator at Thurmont. According to the order No. 75, he filed away both No. 74 and No. 75, neither being of any further effect; and so No. 11 proceeded toward Flint on the authority of order No. 71.

The despatcher said to the inspector that at the time he issued order No. 75 he was momentarily under the impression that in annulling order No. 74 he restored order No. 71 (to train No. 10); and as No. 11 had not received order No. 74, it would be unnecessary for that train to have a copy of No. 75. He was very busy with train orders and messages and did not discover his mistake until he heard of the collision. From the time he came on duty, four o'clock, until the time of the collision, 5.47 p. m., he had issued eleven train orders and had recorded sixteen acceptances of these orders. The despatcher said that he had more work than one man could properly look after, two divisions of the road having been consolidated about a year ago. Officers of the road testified that the consolidation of divisions had been justified by a simplification of the work of the despatchers. Engine failures and delays to trains had been very greatly reduced. At the time of the collision, the daily average number of train movements over the section of road where the collision occurred was twenty-two.

The report calls attention to the fact that there were three butting collisions on this road during the last three months of 1912, and that at that time the government inspector recommended the introduction of the block system. The company has installed automatic block signals on 57 miles of its line during the past year, but Mr. Belnap says that at the present rate it will be twelve years before the whole of the road will be thus protected; and, "in view of the volume of traffic, the installation of an adequate block system is urgently required."

AUTOMATIC BLOCK SIGNALS FOR GAUNTLET IN MIRAFLORES TUNNEL

During the period of construction of the Panama Canal, the trains hauling excavated material from the canal prism, and all of the regular trains of the Panama railroad, were moved through the single-track tunnel at Miraflores, under the protection of an absolute train staff system and an interlocking plant at each



Signals at Miraflores Tunnel, Panama Railroad

end. As the traffic changed toward the end of the construction period, it was possible to eliminate the interlocking at the ends and to install a gauntlet through the tunnel. It was then decided that it would be economical to replace the staff machines by automatic block signals. The tunnel is about 1,500 ft. long.

An incline had been built to a point over the tunnel for taking material up to construct a new filtration plant for the water system, and there was a material yard near the south portal of the tunnel, so that it was often advantageous to make certain movements against the current of traffic, with light engines. In addition to this, it was anticipated that it might be necessary

at some time to operate one main as a single-track. Considering these conditions, it was decided to place two automatic signals at each end of the tunnel so as to signal trains in both directions on either track. The original installation included four Union Switch & Signal Company's style B signals, operating from 0 to 90 deg. in the upper right-hand quadrant. The reverse movement signals were located to the left of the track governed (looking in the direction of the reverse movement). The circuits were arranged on the "normal danger" basis, with an approach signal located at the entrance of the clearing section, 1,500 ft. in the rear of the tunnel signals. These approach signals operated in two positions only, from 0 to 45 deg. The clearing sections for the reverse movement signals were only 150 ft. long, allowing a train traveling with the current of traffic to pass over the section in such a short time after the rear end had passed out of the gauntlet track circuit that the signal arm would not be raised from its horizontal position, even though the relay might be momentarily energized and the armature make a few revolutions.

The crossovers and switches were equipped with indicators and switch boxes, though some of the switch boxes actuate line circuits only. A crossing gong, actuated by trains running with the current of traffic, was located at the north end of the tunnel to serve as a warning to speeders and hand cars.

When automatic signals were installed through this territory recently this scheme was tied on, and all signals except the two reverse signals and the two approach signals, were made to operate in three positions.

Under the present arrangement the signals clear for trains on the "first come, first served," basis, regardless of right, class, or direction. If, for example, a second section of a train going with the current of traffic is held at one of the signals because the first section is not out of the block in advance, a train in the opposite direction will receive a proceed indication if it is standing on or has entered its clearing section prior to the time the aforementioned section enters its clearing section. This gives an even chance to trains moving in both directions, and tends to prevent congestion on either track. It also allows an engine to return for the rear end of its train after switching, and safely expedites a number of other train movements that are specially necessary in this territory. The maximum speed here is about 30 miles an hour.

This special tunnel protection was worked out and installed under the direction of W. H. Fenley, formerly superintendent of signals and telegraph.

TRAIN ACCIDENTS IN JULY¹

The following is a list of the most notable train accidents that occurred on railways of the United States in the month of July, 1915:

DERAILMENTS

Date	Road	Place	Cause of Der'lmt	Kind of train	Kil'd	Inj'd
† 3.	Chc., M. & St. P.	Rainer, Wash.	Acc. Obst.	P.	3	15
7.	Pennsylvania	Ter. Park, O.	Wind.	P.	3	15
7.	Wabash	Gilmore, Mo.	Wind.	P.	0	10
9.	Atlantic Coast Line	Newark, Ga.	Malice.	P.	1	6
14.	Boston & Albany	Claverack, N.Y.	Neg.	F.	1	2
20.	El Paso & S. W.	Indiole, N. M.	Flood.	F.	5	0
28.	A., T. & S. F.	Navajo, Ariz.	F.	F.	1	0
29.	C., C. & St. L.	Grafton, O.	h. truck	F.	4	0
30.	M., K. & T.	Lockhart, Mo.	F.	F.	2	0
31.	Raritan River	Parlin, N. J.	Malice.	P.	0	1

The train derailed on the Chicago, Milwaukee & St. Paul, near Rainier, Wash., on the third, was a southbound passenger, and the engine and two cars fell through a trestle bridge. These two cars lodged on a freight train of the Northern Pacific, which was passing beneath the trestle at the time. One passenger, the engineman and the fireman were killed and 15 passengers were

injured. The cause of the derailment was the weakening of the bridge (which did not alter the appearance of the track) by a derrick in the freight train, which had become loose and swung around.

The train derailed near Terrace Park, Ohio, on the 7th, was northbound passenger train No. 8, consisting of four express cars loaded with race horses, together with a postal car, passenger coaches and sleepers. It ran into a very severe rain and wind storm near Terrace Park, north of Cincinnati, and while on a high bank ran through the path of extremely high wind, which blew the first car of the train (an express car) over the bank; and the three following cars were derailed. Three attendants with the horses were killed and fifteen injured, those killed being in the car which was blown from the track. An officer of the road writes that very careful investigation showed that the accident occurred directly in the path of the severest portion of the wind storm. The train at the time was running at about 40 miles an hour, and he has no doubt that the car was blown from the track.

The train derailed near Gilmore, Mo., on the 7th, was westbound passenger No. 9, and the cause was a tornado. The four cars of the train next the engine were blown off the track and overturned. The injuries to the passengers, numbering 10, were all comparatively slight. The train was running at about 20 miles an hour. The four cars were all blown clear of the track, and the engine and five remaining cars proceeded, after a delay of only an hour.

The train derailed at Newark, Ga., on the 9th was eastbound passenger No. 58, and the engine and one car were overturned. The engineman was killed and the fireman and five passengers were slightly injured. The derailment occurred about 2 a. m., and was caused by the malicious misplacement of a switch.

The train derailed at Claverack, N. Y., on the 14th was a westbound switching engine without cars. The engine was partly turned over and one trainman was killed and two others injured. The cause of the derailment was excessive speed over soft track, and the absence of the engineman, who was at the tender of the engine getting a drink of water and was not in a position to shut the throttle and apply the brake.

The train derailed at Indiole, N. M., on the 20th was freight No. 71, and the cause was the failure of a bridge, due to washing out of foundation by a cloud burst. The engine and ten cars fell to the gulch below, and five persons were killed, the engineman, fireman, one brakeman and two tramps.

The train derailed at Navajo, Ariz., on the 28th was an eastbound freight, and the locomotive was overturned and the engineman killed. The derailment was due to insecure track caused by abnormal rains.

The train derailed at Grafton, Ohio, on the 29th, was a northbound freight and 18 cars were badly damaged. Ten of them took fire and were burned up. Four tramps are said to have been riding on an oil tank car, the car which was the first to jump the track, and they were killed in the fire, though the body of only one person was discovered. The cause of the derailment is believed to have been a broken truck.

The train derailed near Lockhart, Tex., on the 30th, was an eastbound local freight, and the engine was overturned. Eight cars were wrecked, and the fireman and one brakeman were killed. The derailment occurred about 8 p. m., at a highway crossing, and may have been due to sand or other obstruction on the track.

The train derailed on the Raritan River Railroad, near Parlin, N. J., on the 31st of July, was express train No. 10, and the engine and one car were ditched. The engineman was slightly injured. The derailment is believed to have been caused by spikes maliciously placed on the rails.

Electric Car Accidents.—Four serious accidents to electric cars were reported in the newspapers as having occurred in the United States in the month of July, but no fatal results were expected from any one of them. At Queenston, Ontario, on the 7th, a trolley car, heavily loaded, ran away on a steep grade and eleven passengers were killed.

¹Abbreviations and marks used in Accident List:
 re, Rear collision—lc, Butting collision—xc, Other collisions—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, Unexplained—derail, Open derailing switch—ms, Misplaced switch—acc obst., Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of locomotive on road—fire, Cars burned while running—P or Pass., Passenger train—F, or Ft., Freight train (including empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

TURNING FRENCH FREIGHT CARS INTO HOSPITALS

By WALTER S. HIATT.*

On that French front of 500 odd miles, an average of 5,000 Frenchmen are killed or wounded during each 24 terrible hours of battle.

How shall the wounded be cared for? As a matter of cold-blooded calculation, sympathy aside, if this war is to go on these wounded must be saved and nursed back to health, so that they may return to the defense of their homes and their nation, and so that France, after the war, may not be a manless country. In the heat of the fighting, during the defense of a trench or in the attempt to take a trench from the enemy, a man falls, pricked by a bullet or stung in a dozen places by fragments of shell. When there is time, particularly at night, when the enemy cannot see to fire upon the life-savers, men of the hospital corps, or comrades of the fallen, crawl out beyond the trenches into the

every kindness of old men, of women, of children even, is at work in this stern business of caring for the wounded that these trains deliver.

There have been many problems for the railroads to solve in caring for these wounded. This hospital work has assumed colossal proportions and out of it has grown not only a perfection of the old means of caring for wounded on the field of battle, and in the hospital, but also in their transportation. It cannot be too frequently stated that railroad men and railroads have rendered services in this war the scope and real usefulness of which are hardly yet understood; which are taken too much for granted. A soldier wounded on the Yser, in the north, may be delivered at Paris within 30 hours of the time he was wounded, if he is in condition to be moved at all.

One phase of this service has been the evolution of a life-saving hospital car out of a rude, cheap box car. In the beginning of the war, when the railroads had rendered their first great service of launching the soldiers towards the frontiers, the prob-



A French Freight Car Transformed into a Hospital Car

open space of No Man's Land, locate the wounded man and, still crawling, drag him back to the safety of the trenches.

Then, by slow degrees, the wounded man is carried to the rear, always under cover of the deep ditches (*boyaux*) that connect with the front trenches, until a temporary hospital is found, often a mile or two from the trenches. There the man is given temporary treatment, after a time placed in a hospital wagon, and, if not so cut up that he cannot stand being moved, huddled off to the trains that are always waiting to whirl the wounded back to life, back into the heart of France, to Paris, Orleans, Bordeaux, Lyons, or to the seacoast at Toulon in the distant south, to Tours, or to St. Nazaire at the mouth of the Loire.

These trains of mercy have been running by thousands since the first month of the war, until now they have carried nearly a million men into the hospital country, and by the hospital country is meant the whole of France. Every palace, every chateau, every comfortable home, every comfortable public building, whether in the city or in the country, has been turned inside out, and made into a hospital. Every resource of the human heart,

lem of caring for the wounded was in a state of infancy. A great deal of ink has been wasted about the value of field hospitals. The only hospital in which a seriously wounded man can be treated effectively is one in a building away from the heat, the noise and the hurry-scurry of the camps. The only way to get the soldiers to those hospitals, when there are so many thousand to handle, is by train. Before the war there was scarcely any provision for the sanitary train. So the soldiers of Charleroi and other places lucky enough to reach a railroad station were piled into box cars, cattle cars, passenger cars or upon flat cars, helter-skelter, dead and dying together, and the trains moved as best they could towards Rheims, Châlons and other points. Sometimes it took them days where it should have taken them hours to reach a hospital, because of the congested condition of the line. Consequently it was not unusual for the soldiers to reach their hospitals dead, or so badly done-up by the time lost and the rough ride, that they died soon after they had left the train.

Gradually this condition was improved by the railroads. Sanitary first-aid stations were arranged in the depots so that the wounded could be cared for while waiting for the trains. The

* Our special European correspondent.

next step was to secure more rapid movement, and then to increase the number of trains, which by October last totaled 600 on all the roads.

The final step, which began by the swinging of hammocks, one above the other, in the cars, so the wounded could be comfortable without taking up too much of the precious space in the cars, was the so-called sanitary train. The sanitary train implies above all that it carries with it the means of saving human life while the train is moving on its way to the permanent hospital.

At first the sleeping and dining cars of the Pullman type used by the Paris Lyons & Mediterranean and other railroads were used as temporary moving hospitals for the treatment of men who would surely have died if the surgeon had had to wait until he was in a real hospital to treat them. One of these hospital cars was put on each train and those needing treatment were carried into it as it was on its way. The trouble with the Pullman cars was their weight. They rendered excellent service, but a car weighing 37 tons used too much of the tractive effort of an engine. The more cars a train for the wounded can carry just now means that more lives will be saved. Hence there was evolved the idea of converting the homely, often-despised, ill-treated box car into a little hospital. One of these cars and two other light cars could be hauled in place of one 37-ton car. Wherever the idea originated, credit must be given to Commandant E. Loiseleur, in charge of the fourth bureau of the war department, a bureau devoted to railway service, for actively carrying out the plan.

At present these light, clean, little hospitals are rolling from the front to every hospital district in France, to the number of 600; that is one to each train. War time is the hardest time of all for the advancement of an idea, no matter how good, and it was only after the greatest effort that Commandant Loiseleur was able to persuade anybody to begin re-building these cars. Among the first built was one made over with the money given by an American, Mrs. Washington Lopp. She gave the required \$220, and now her car is saving lives every day.

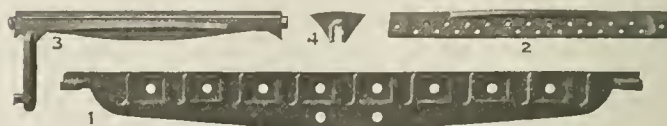
This 30-ft. car when rebuilt—the rebuilding consists of painting it, boarding its inside, and installing certain small-priced articles—is divided into three parts. First, there is the operating room proper, furnished with a canvas-topped table and various instruments and utensils needed in operations; second, there is a middle closet for the storing of medicines; and lastly, there is a kitchen for the boiling of water, for the making of broth, and the burning of the cloths and cottons used in treating the wounded. The entire interior of the car is painted with white enamel, the floor is covered with linoleum, and every measure is taken to preserve its aspect and usefulness as a hospital.

Recently Commandant Loiseleur showed me some reports he had received from different trains provided with these little hospitals, and to read a report was to be convinced of their usefulness. One report showed that of 350 men taken at one time to Brest, a long, slow ride from the front all the way across Brittany, there were no deaths. At different points along the route, no less than 33 men had been received into the hospital and injected with anti-tetanic serum, while 4 others had had fractured limbs set. Another report showed that of 418 wounded taken to Ronen, all badly wounded, 200 had been treated, and but one death was registered. Still another report showed that in a train with 611 wounded, the lives of 5 had been positively saved by operations, and 55 others had had their wounds dressed. There was a report from another part of the front, where the fighting was as bad as any yet seen, and of 163 men in a train, 22 underwent immediate surgical operations, had bits of shell taken from their bodies, and were otherwise cared for. So the reports ran on, some of them dealing with deliveries of wounded to the American hospital at Neuilly, a suburb of Paris.

SOUTH AFRICAN RAILWAY MEN WITH THE COLORS.—The "white," i.e., not colored, staff of the Union of South Africa Railways number 31,000, and of these 3,922, or 12½ per cent. are serving with the colors.—*The Engineer, London.*

LOCOMOTIVE GRATE WITH LARGE AIR OPENINGS

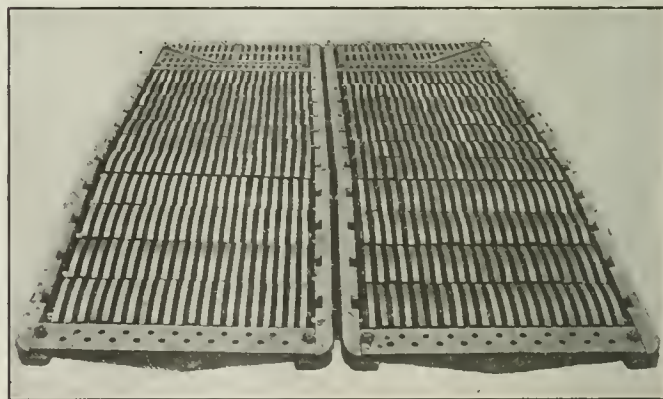
At the recent convention of the International Railway Fuel Association it was stated that from a canvass of 21 roads, it was found that the percentage of the area of the air openings in the grate to the total grate area varied from a minimum of 28.5 per cent. to a maximum of 49.6 per cent., and that the average was 37.2 per cent., with 1 in. openings between the fingers, for bituminous coal burning engines. It was also stated that the Seaboard



Parts of the Hulson Grate

Air Line strongly favored the table grate on account of its large air opening. The advantage of a large total air opening in the grates without an excessive width of opening between the fingers is generally acknowledged.

The illustrations show a grate for locomotives which provides an air opening area of 55 per cent. of the total grate area, with 5/8 in. openings between the fingers, and with possibilities of a larger percentage of air space where the conditions permit. This grate is made by the Hulson Grate Company, Keokuk, Iowa. It has been installed in a large number of stationary plants and has been made standard on the locomotives of one railway. The experiences of those who have it in service indicate that with the large amount of air opening in the grate it has been possible to more thoroughly consume the coal, thus producing less smoke and keeping cleaner fires. Many cases have also been found where a



The Hulson Locomotive Grate for a Firebox 108 in. by 66 in.

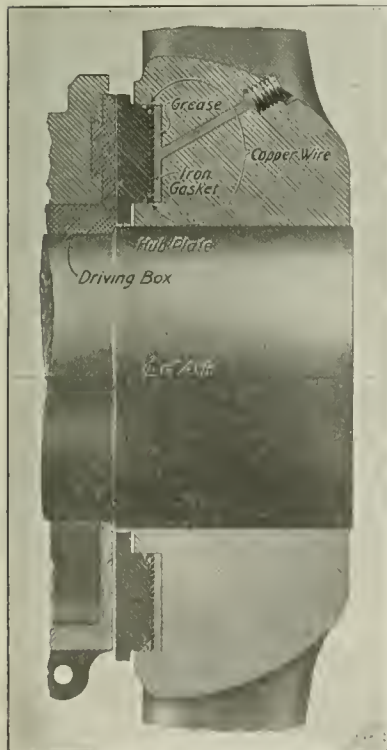
cheaper grade of fuel can be used with this grate. Because of the better consumption of the fuel several of the users report considerable savings in coal consumption.

Aside from the large amount of air space provided by this grate the mechanical features are of considerable interest, the purpose of the manufacturers being to provide a grate of as simple construction as possible, with a minimum amount of trouble to repair. The details of the grate are shown in one of the illustrations. No. 1 is the side bar; No. 2 the tie bar; No. 3 the finger bar, and No. 4 the finger. The fingers are all loose on the finger bar, which permits expansion or contraction without affecting the finger bar. The fingers slide on to the finger bar from the end, being held by means of a key cast into the bar and fitting into a keyway in the fingers. This construction has been adopted to make possible the renewing the fingers, should they become broken, at a very small cost, the finger bar simply being lifted from the side bar and the broken finger replaced. It will also be noted that the tops of the fingers are curved so that when the grate is rocked slightly, a rubbing action will be produced on

the fuel bed, which dislodges the fine ash without disturbing the fire or allowing the unburned fuel to drop into the ashpan. By shaking the grate for the full stroke, however, it is possible to dump the fire. The construction of these fingers also tends to raise the bed of the fire sufficiently high from the mechanism of the grate to keep it from being subjected to the severe heat. It is also claimed that the large percentage of air space in the grate permits the use of a larger exhaust nozzle, since as much draft will not be required to pull the air through the grate bars. With the $\frac{5}{8}$ in. openings there will be a more even distribution of the air through the fuel bed, which permits of a lighter fire being carried.

ADJUSTABLE HUB PLATE

The Smith adjustable hub plate is maintained at the proper distance from the hub by means of compressed grease, the adjustment being made by screwing in the grease plug shown on the outside of the wheel hub. The adjustable plate is forced into a recess in the hub, which is 1 in. deep and varies from 2 in. to $3\frac{1}{4}$ in. in width, according to the size of the wheel. It may be applied either by hammering or under a press, about 20 tons being required to press the plate into place. Patents have recently been granted on an improvement in this device designed to increase its effectiveness. The new feature is the method of preventing the grease from leaking past the plate and relieving the pressure, which would affect the adjustment. The plate is beveled to receive a No. 9 gage copper wire, which is placed around the outer and inner edges of the plate, as indicated in the illustration. This wire is soldered so as to be continuous. A



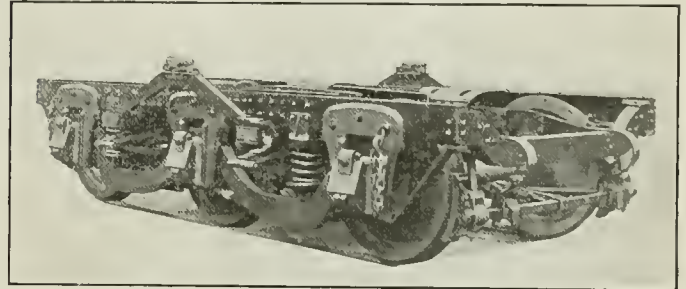
Smith Adjustable Hub Plate

No. 24 gage iron liner holds the copper wire in place as the hub plate is forced outward by the grease pressure. As the hub plate is forced into a bearing in the hub the copper wire assumes a rectangular section, thereby making a more perfect seal. The plate is kept from rotating by six $\frac{3}{4}$ -in. dowel pins screwed into the plate and fitting into the holes in the wheel hub. By the use of this device the lateral may be maintained constant and it may be taken up with comparatively little labor, it being possible to adjust all the wheels in from one to three hours. This eliminates the necessity of dropping the wheels and relining the face of the driving boxes when the lateral becomes too great. By the use of this hub plate much less lining material is required on the face of the driving box, inasmuch as the hub plate is $\frac{1}{2}$ in. thick on its outer flange. Excessive wear on the driving box liner is also eliminated as the lateral may be properly maintained and thus prevent pounding, due to the excessive lateral, which many times breaks away the driving box liner. It has also been found unnecessary to reline the boxes between shoppings. The plate can be applied to old as well as new locomotives. The right for its use is sold by the Smith Locomotive Adjustable Hub Plate Company, Pittsburgh, Kan.

ROLLED STEEL TRUCK FRAMES

In designs of four-wheel and six-wheel passenger trucks developed by the American Car & Foundry Co., New York, the frames have been made up almost entirely of standard rolled sections. The idea in designing these trucks was to reduce both first cost and maintenance troubles. Repairs to the frames can be made at almost any shop and experience has shown that under ordinary service conditions, heavy repairs requiring special work and tools are unnecessary.

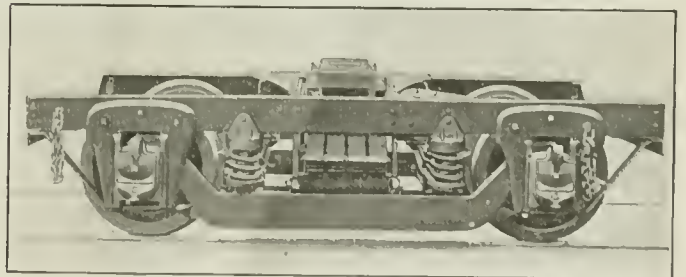
In both designs the attempt was made to secure maximum strength and service ability with a minimum weight. The frame for the four-wheel truck weighs approximately the same as the old wooden frame having iron flitch plates, while there is a marked advantage as regards strength and rigidity. All rivet holes are reamed to size and the more important rivets are ma-



Six-Wheel Truck with Rolled Steel Frame

chine driven. Large gusset plates are used to connect the cross members to the truck sides and the friction plates for the bolsters are located on the bolster hanger brackets, thus removing the lateral strain from the cross members. The brake hanger bracket is secured to a pressed arm, which is supported by the truck side and the cross member gussets. The bolster hanger is extra long and the pins are of large diameter in order to reduce wear. Either the usual design of inside hung brakes or the American Brake Company's design of clasp brakes may be used with this truck.

The six-wheel truck has been found to meet all the requirements of high-speed passenger service, trucks of this design having been used for some time under heavy passenger equipment cars, including dining cars. It is claimed that frames for the six-wheel truck are approximately 3,000 lb. lighter per car



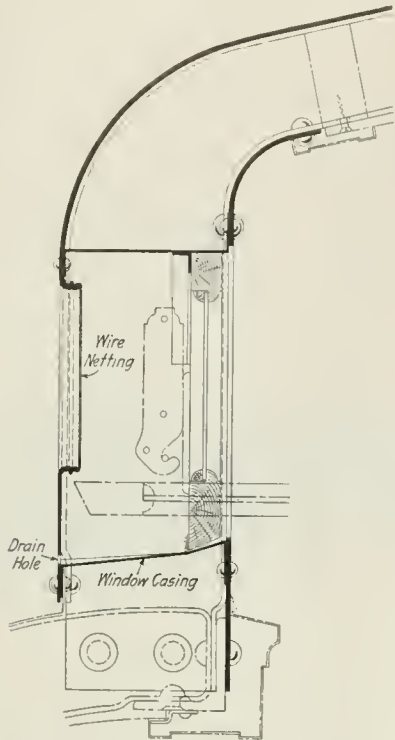
Rolled Steel Frame Four-Wheel Truck

than the usual design of cast steel frame, this advantage being obtained because in the rolled steel design the metal can be placed to better advantage at the points of greatest stress. The American Brake Company's clasp brake arrangement can be used with this truck, as well as with the four-wheel design.

THE CENTRAL RAILWAY STATION AT LEIPSI, GERMANY.—The building of the new central station in Leipsic, which, when completed, will be the largest in Europe, is being steadily proceeded with in spite of the war. The second half, intended for the traffic of the State Railway lines of Saxony which touch the city, will, in accordance with the original plan, be finished during the present year.

PASSENGER CAR ROOF CONSTRUCTION

There has always been more or less difficulty in securing a satisfactory upper deck construction in passenger cars of the



Detail of the Deck Sash Casing

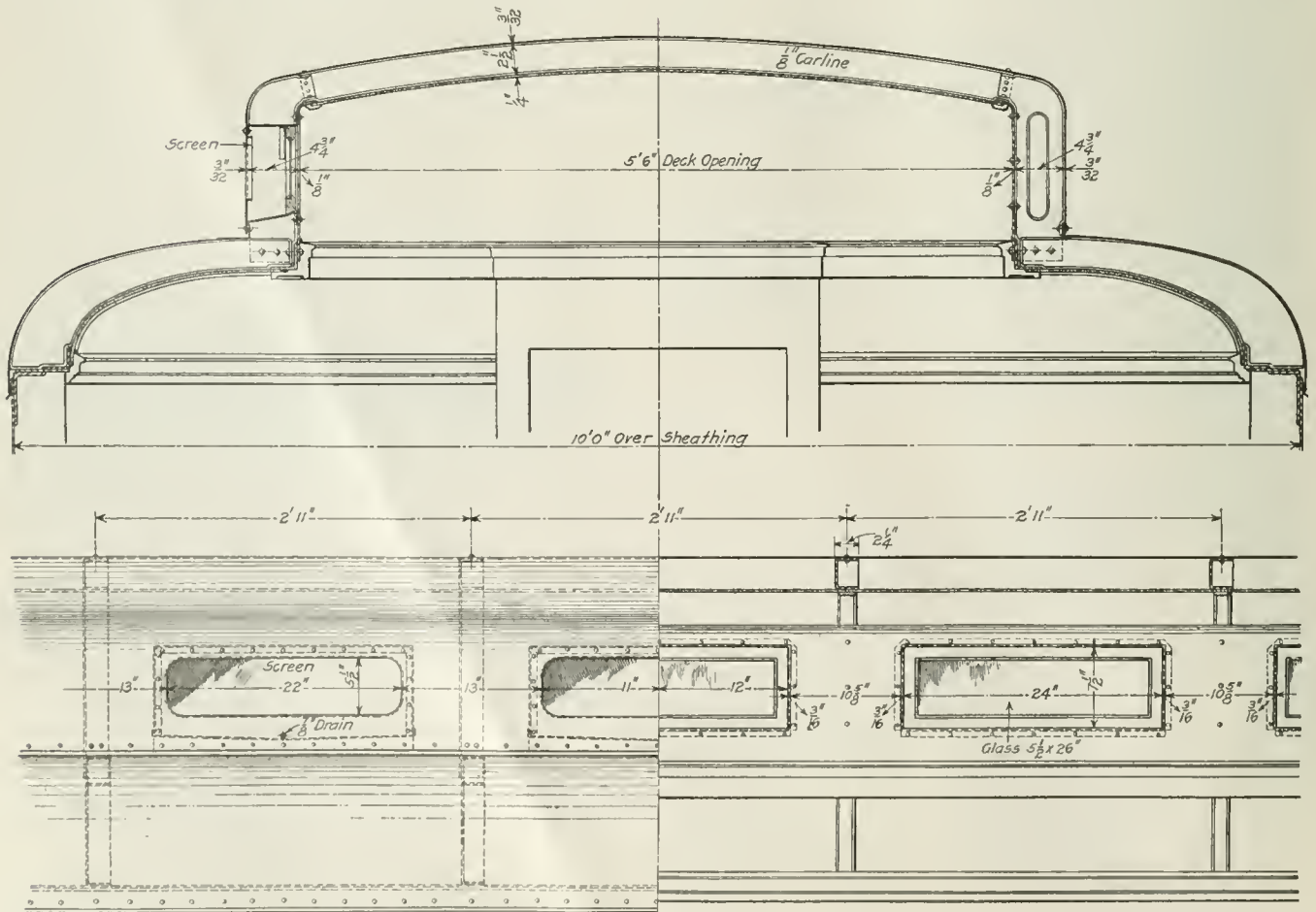
clere-story type. The difficulty has been to secure a deck which could be cheaply built and in which a satisfactory casing could

be provided around the deck sash and screens. The accompanying drawings show a type of construction recently patented by Otto B. Johnson, New Glasgow, Nova Scotia, which is designed to overcome these difficulties and to simplify the securing of weather-proof connections between the lower roof and the deck of the car.

In this construction the roof frame consists of special pressed steel channel sections, forming the carlines and upper deck posts, to the outside of which the fastened the roof sheets and to the inside of which the interior finish is applied. The sides and roof of the upper deck are covered with continuous sheets formed to the contour of the roof. Flanged openings are provided in these sheets for the ventilator screens which are secured against the edge of the flange by means of a wire clamp. The deck posts are secured at the bottom to the upper ends of the lower carlines and to the deck sill angle, the three pieces being securely riveted together. The upper ends are bent to form a connection with the upper carline, with this construction the soldering of flashing around the posts is avoided, which is unsatisfactory and expensive, and continuous roof sheets from lower deck to lower deck may be used. The lower roof sheets may be formed with vertical flanges at the sides of the deck and directly riveted to the upper roof sheets.

Instead of having a continuous flashing and sash frame throughout the length of the deck a combined flashing and frame is provided for each opening which completely encloses the space between the screen and the sash. The remainder of the space between the sheathing and the interior finish of the car is thus enclosed from communication with the outside air and serves as insulation. The bottom of the window casing slopes outward and toward the middle and drains through a small hole in the outside sheet.

This construction is claimed to make possible a considerable saving in weight as compared with the usual type of clere-story roof.



Simple Weather Proof Passenger Car Roof Construction

Maintenance of Way Section

In spite of the reduced amount of work under way the labor situation has become quite acute on some roads during the last three or four weeks. Late last year considerable numbers of Austrians returned to their country. With the entrance of Italy into the European war, many members of this nationality, including large numbers of track laborers, have been called home and are leaving this country. The placing of large orders for ammunition and other supplies for the belligerent countries in the United States has also required the employment of additional labor in these factories, drawing still more men from the track forces of the railroads in the vicinity of these industrial centers. While this condition has not seriously affected the maintenance of way forces of the country at large, the forces of several eastern roads have been reduced considerably below the authorized quota.

The War and Track Labor

The magnitude of routine railway construction activities is frequently overlooked by railway men themselves and is seldom realized by the general public. Several months ago we called attention to the fact that the Chicago, Milwaukee & St. Paul moved over 48,300,000 yd. of earth in 1912 and 1913, or an average of over 66,000 yd. per day for the entire period. During the same interval this road placed over 563,800 cu. yd. of concrete, building 741 structures. Another railroad of less than 1,000 miles has placed over 1,521,000 cu. yd. of concrete during the 10 years from 1905 to 1914, inclusive. This is at the rate of 12,680 cu. yd. per month, or 490 cu. yd. per working day for the entire 10-year period. The minimum amount of concrete placed by this road in any single year during this period was 91,700 cu. yd., while the maximum was 236,125 cu. yd. Operations such as these are equalled in other fields only on special projects such as the construction of the Panama Canal and are one measure of the importance of our railway activities.

Every-Day Railroad Construction

It seems to be a general rule that railroad bridges in large cities are poorly maintained. This applies particularly to structural steel viaducts in densely populated or commercial districts. Excluding the special case of deterioration due to corrosive gases, the principal source of trouble with the city bridge is the accumulation of dirt,

Maintaining Bridges in Cities

which seems to be present everywhere in the portions of large cities commonly occupied by railroads. This material is deposited on all horizontal surfaces of bridges below the floor level, on the bottom flanges of stringers and floor beams and around the bearings, frequently piling high on the bridge seats. The filthy character of the deposit makes the inspection, cleaning or repairing an exceedingly distasteful job, and probably accounts for procrastination with respect to this work. The use of modern tight pavements, with adequate drainage systems and efficient street cleaning, has had a tendency to improve conditions, but proper attention to this phase of the subject in the design and detailing of the bridges will still further relieve the maintenance forces. Dust guards completely covering the bearings and rollers should be provided and the arrangement of bridge seats and bearings should be such that all parts are readily accessible to inspection and cleaning. The bottom of the vertical web members of trusses should be filled with concrete to eliminate

pockets for the accumulation of dirt deposits. The maintenance department, by giving proper attention to the new bridge will avoid much work at a later date. The small details should receive special consideration. Drain pipes must be kept open, cracks or slots through which dirt and dust may be sifted should be closed, and any other preventive measures which have been overlooked by the construction department should be taken immediately. The conditions surrounding the railroad bridge in the city are such that the maintenance expense is bound to be higher than that of the bridge in rural districts, and if the city bridge does not receive attention in the proportion established by these conditions, its life will surely be shortened.

An interesting feature of this year's rail orders is the tendency to buy longer rails. At least two or three roads have ordered

The Tendency Toward Longer Rails

considerable quantities of 39 ft. rails, while one road has ordered 40 ft. rails. Other roads are seriously considering this question, and one line at least was prevented from ordering 39 ft. rails only by the fact that it did not have sufficient equipment of the proper kind long enough to carry them. A number of years ago several roads laid considerable quantities of rails up to 60 ft. in length. In some instances these proved satisfactory, but with the poor roadbed conditions and lighter ballast of that time the 60 ft. rails were difficult to maintain, and most of them have since been sawed into shorter lengths. With the improved roadbed conditions and the more liberal use of ballast in recent years, some engineers feel that the roads are now warranted in laying longer rails. In this connection it is interesting to note the conditions on foreign railways. In England the standard length is now 45 ft. One or two railways use rails 48 ft. long, while the London & Northwestern uses 60 ft. rails. French and Egyptian railways lay rails 39 ft. 4 in. long, while 59 ft. rails are coming into common use. The Northern Railway of France is now laying rails 78 ft. 9 in. long. In India and Australia, 36 ft. and 40 ft. rails are being laid in considerable quantities. Thus we have numerous precedents for adopting longer rails in this country.

The economy of starting maintenance of way work early in the season has been emphasized repeatedly in these columns. Since the main reason for delaying the inauguration of active work until the middle of the summer is to hold down expenses during the latter part of the fiscal year, it is somewhat surprising at first thought

Starting Maintenance Work Early

to observe the increasing extent to which work was inaugurated early in the spring this year in view of the declining railway revenues. However, this is a most encouraging feature of railway operation, indicating a realization on the part of executives of the economy of this practice and a willingness to forego temporarily a "paper showing" to secure real economies. It requires courage to do as did one road, now in financial difficulties and threatened with a receivership, in starting its track work early this spring after having delayed such work until after July 1 last year. The expenditures for maintenance of way for the fiscal year just closed will, therefore, be unusually high, the savings being reflected in the reports of the following year. If a road in this condition can adopt these measures there would seem to be little reason for the stronger lines hesitating. The greatest economy in maintenance

of way will only be secured when the work of this department is conducted without reference to the fiscal year and each problem is handled at the most favorable season.

Complete co-operation between the manufacturer and the user of any material is necessary to its highest development. Few

Co-operation in Equipment Development

devices are perfect the first time they appear; practically all have to pass through a period of initial experiment and development. The railroads of this country

have aided greatly in the development of the materials and equipment used by them by offering their facilities, by encouraging tests to be made under actual service conditions and by giving the manufacturers the benefit of their observations of such tests as a means to overcoming weaknesses. By combining the practical experience of the railway man as a user with the ability of the manufacturer to concentrate on production, the latter has been enabled to produce a practicable commercial article. Although working for his own individual gain, a maker of railway supplies is able to succeed only as he makes a product which the railways can use with economy to themselves. Because of this mutual co-operation the railways of this country lead those of the world in much of their equipment and construction.

One of the relatively recent developments in construction has been the use of manganese for frogs, crossings, switch points and other parts of track which are subject to unusually severe wear. The importance of this form of construction is indicated by the statement in the article by V. Angerer, in another column, that

The Development of Manganese Track Construction

21,300 such units were manufactured in 1913. Within the past two years the manufacturers of manganese track work have determined among themselves on certain minimum standards of construction below which they will not go, and they have submitted these standards to the American Railway Engineering Association for approval. This action has been taken because of conditions which have arisen in this field jeopardizing the future of the manganese industry, as outlined in the article referred to. The special problems of manufacture, particularly with materials such as manganese which require unusual and careful treatment, are essentially those for the manufacturers to solve. The ability of such construction to stand up under the heavy pounding of traffic on busy lines is of direct interest to the maintenance of way engineer. Properly made and placed manganese track construction has demonstrated its economy, and co-operation in establishing standards which will insure an improved product, will result to the benefit of the railways and the manufacturers.

TOOLS FOR MAINTENANCE OF WAY EMPLOYEES

ON another page of this issue is an interesting discussion of the subject of tools for maintenance of way forces which includes a number of suggested lists of tools for gangs engaged in the various classes of maintenance work. Of particular interest is the agreement of the several writers concerning certain phases of the subject which indicates a similarity of experience. Each one emphasizes the importance of a sufficient supply of high grade tools, their proper maintenance by a skilled tool man, and the influence of the character of the tools on the efficiency of the men. Attention is also called to the benefit to be derived from the acquisition of the latest developments in tool manufacture.

It is well to consider the magnitude of the investment represented by tools for maintenance of way work. A decision to add one tool to the complement of each track gang on a road of any size may cause an expenditure of several hundred dollars. The Nebraska State Railway Commission, in making a valuation of the roads of that state in 1912, put the allowance for tools for a section gang at \$120, and for each extra

gang and bridge gang at \$600. Without question the money value of some of the lists of tools referred to above would far exceed the above estimate.

Of no less importance is the maintenance of tools, a phase of the subject influenced very largely by the quality of the tools acquired and the measures taken for their proper care in use. The purchase of tools at the lowest price to the subordination of quality is sure to result in larger repair bills, shorter life, and an increase in the number of accidents due to defective tools. On the other hand, having provided good tools, their proper maintenance is paramount and a definite plan for repairs, sharpening and inspection is necessary if the advantages of the higher grade equipment are to be realized.

Having determined the number and quality of the tools to be supplied to a given force, it is necessary to select the particular type of tools most suitable for the class of work, local conditions, etc. The difference of opinion as to the proper tamping tools to be used for the same class of ballast, as expressed in the discussion, indicates one of the difficulties to be met. The serious consideration of the many new devices which are introduced from time to time is also important.

THE USE OF LIQUOR IN MAINTENANCE CAMPS

RULE G of the Standard Code of the American Railway Association, which prohibits the use of intoxicants by employees while on duty and makes their use or the frequenting of places where they are sold, a sufficient cause for dismissal, is very generally incorporated in the standard books of rules of the operating departments of the different roads. The application of similar rules to the maintenance of way department is far less general, largely because of the different conditions governing the work, the varying degree of responsibility and the different classes of labor employed.

Few roads will permit open drinking among their track foremen. Beyond this, little attempt is usually made to curb the use of intoxicants. On some roads no liquor is sold in the camp commissaries, nor is it allowed to be brought into the camps. In others the commissaries are not permitted to sell it, but the men bring it in from the outside if they desire, while on other roads the commissaries sell it openly to the men. One road on which the latter plan was in force a recent investigation led to the conclusion that a large per cent of the drinking was the result of the men being exploited by the commissaries. Practically all of the men employed in the camps on this road are foreign, approximately 60 per cent of them being Italians and the remainder Austrians and Montenegrins. Starting six months ago, this road forbade the sale of intoxicants through the commissaries and also prohibited the bringing of liquor into its camps. While some is undoubtedly still brought in secretly, the open sale of it has entirely disappeared. When this rule was put into effect it was feared that considerable numbers of men would leave for adjoining roads where such regulations were not enforced. But only a few left, and there was no organized complaint.

The results of this campaign have been shown in the increased efficiency of the men, in the reduction in the amount of sickness and particularly in the greatly lessened amount of laying off. While there has been no opportunity to test the effects of this action in the ability to secure and hold men in times of labor shortage, the officers feel well pleased with the results secured thus far.

NEW BOOKS

Manual del Ingeniero por John C. Trautwine, Traducido de la 19th Edición por A. Smith. Published by Casa Editorial Gardner Hermanos, Paris, France. Price \$5. On sale in America at Van Nostrand & Co., New York, and Brentano & Co., New York.

This is a translation of the 1913 edition of Trautwine into Spanish. The chief interest to American and English railroad men in the fact that this translation has been made is that the translation is a literal one. It therefore affords an opportunity for the

American engineer who is desirous of learning Spanish technical engineering terms of using this Spanish translation in connection with the English edition of Trautwine. In South America English speaking and Spanish engineers are working side by side and a Spanish translation of the American standard engineering manual is an event of importance to both the American engineer in South America and the Spanish engineer who may be working with him. The very fact that Trautwine covers such a broad field in such great detail makes the Spanish translation of particular value to the engineer who wishes to learn the Spanish language.

Manual of Surveying for Field and Office. By Raymond E. Davis. Size 4 in. by 7 in.; 395 pages. Bound in flexible leather. Published by The McGraw-Hill Book Company, 239 West Thirty-ninth street, New York. Price, \$2.50.

The author states in his preface that the book is designed for the use of civil engineering students in their preparation for field and office exercises. To the man engaged in actual railroad surveying its value would be as a supplement to the usual railroad manual, particularly as a reference to triangulation and precise measurements and for astronomical observations. There are eight chapters, arranged in the order of progress of the surveying student. The first chapter deals with field notes, note-books, accuracy and other matters of general information to the novice.

The remarks on accuracy and the method of keeping notes are well worth the reading. However, the failure to mention the loose-leaf note-book is surprising. The pages on the care and adjustment of instruments are, of course, absolutely essential to the novice, but even the experienced engineer will find them useful at times. The later chapters consist principally of typical exercises in the use of the various instruments. There are 123 pages of tables. Of these 19 cover logarithms and trigonometric functions and 19 are for use in astronomical observations.

Practical Track Work. By Kenneth L. Van Auken. Size 5½ in. by 8 in., 216 pages, 48 illustrations. Bound in cloth. Published by the Railway Educational Press, Chicago. Price \$1.50.

As its name indicates, this book is intended for the practical track man. The author made no attempt to prepare a complete treatise on maintenance of way work or to discuss features of engineering design, but has covered only the problems that are of direct interest to the track supervisor and foreman. He has taken their viewpoint throughout in his discussions, and while higher officers will not agree with him on all points, he reflects the attitude of the track men gained by extended experience as a laborer and a foreman.

The contents of the book are best indicated by noting the chapter headings. (1) Labor and Organization; (2) Track Materials and Tools; (3) Spiking, Bolting, Cutting and Curving Rails, etc.; (4) Constructing Track on a New Line; (5) Double Tracking; (6) Relaying Track; (7) Construction of Turnouts, Ladder Tracks and Crossovers; (8) Slip Switches; (9) Surfacing New Track; (10) Laying Out a Curve with a Tape Line.

Considerable space has been devoted by the author to the proper care of the laborers, especially those who are in floating gangs, and to the organization of forces for various kinds of work. The methods of putting in switches and taking care of other complicated track work are described in some detail, with sketches and organization charts.

While not covering all problems with which a track man is confronted, this book contains much information which will be of value to the average track foreman and is well worth reading by higher officers having to do with track work. It forms an important addition to the limited literature on this subject. An interesting feature is a glossary of 500 track terms in common use. The book also contains 20 tables giving practical data of use to the foreman.

Letters to the Editor

CLASSIFYING SCRAP RAIL

SAVANNAH, Ga.

To the Editor of the Railway Age Gazette:

I have read with much interest the article by L. C. Fontaine in the *Railway Age Gazette* of July 16, in regard to the classifying of scrap rail. The amounts in dollars and cents transferred in accounting for rail by reason of adjustments, as has been stated, is quite large and is entirely due to differences in opinion in classifying. To take care of rail classifications properly and to avoid these adjustments, a written classification should govern the differentiation between relay and scrap rails as removed from tracks. In addition the classification should be indicated on the rail ends with paint, different colors being used for each class. The classification should be made only by roadmasters, supervisors or others thoroughly familiar with such work, because it has been found that classifications made by the average section foreman have a tendency to vary in a great many cases from those which should properly have been assigned, by reason of the condition of the rail. By use of the paint method rail may be transferred from one division to another, without fear of the classification being changed. If originally made in accordance with specifications the expense of painting will be a small factor because of the benefits derived from an accounting standpoint.

H. E. DUGGER.

Chief Clerk to General Storekeeper Central of Georgia.

THE INCLINATION OF THE RAIL IN ECONOMIC RAILROAD PRACTICE

NEW YORK, N. Y.

To the Editor of the Railway Age Gazette:

The main object of wheel coning is the elimination, as far as possible, of the rubbing of wheel flanges against the rail as when a wheel-flange approaches the rail, the tread of this wheel is running on a greater diameter than that of the opposite wheel on the same axle. Thus the wheel-flange swerves away from the rail until the corresponding action takes place on the opposite wheel. The action of a pair of wheels passing around a curve is not referred to here. The standard coning or taper on the tread of railroad wheels throughout Europe as determined by long experience is 1 in 20, with the exception of Italy, where the Government Railways have adopted a coning on the wheels of 1 in 10. The only recognized standard for the contour of wheels in the United States is that of the Master Car Builders Association, which is 1 in 20.

The running of coned wheels on upright rails is not justified from any standpoint. A standard wheel coning having been generally adopted, the only scientific thing to do is to incline the rail normal to this coning. This practice is standard throughout Europe, with the result that rail wear there is considered generally satisfactory. Rail wear in the United States is considered as being generally very unsatisfactory; one reason for this being the general use of the upright instead of the inclined rail. Only the inertia of bad habit can be urged for the continuance of the unscientific practice of using an upright rail.

The inclination of the rail presents the following advantages: From the standpoint of the equipment it keeps the tread wear away from the flange, thereby obviously reducing flange wear; it reduces the bending stresses in car axles, so helping to eliminate hot journal box trouble, and it prolongs the life of wheels. From the standpoint of the rail it effects a reduction of the flange rubbing; it produces rail wear, under normal conditions, in the center of the head of the rail instead of on its edge. In the latter position of the load, not only is rail wear excessive, but stresses are induced calculated to accentuate the danger of broken rail from the formation of transverse fissures. It places the load on the rail in the position where the rail can exercise its function as a beam

with minimum fibre stresses. It equalizes the pressure on the base of the rail, through the base being normal to the resultant force from weight and the wedging thrust due to the coning of the wheels.

It eliminates the tendency of the rail to overturn (in railroad parlance, *to roll out*) from the wedging action of the coning. And it prolongs the life of the rail.

The subject of rail wear is increasingly occupying the attention of engineering societies and technical papers, because of the expense of rail renewal standing out so prominently in railroad operating reports. Strangely enough, although uniformly standardized in Europe, the simple expedient of inclining the rail normal to the wheel coning has not received the attention it deserves in the United States. It might as well be frankly admitted that the lack of consideration of rail inclination is due, first, to the inertia of habit; second, to timidity in putting in practice one's scientific deductions on a subject until the idea involved in that subject becomes more or less general; third, and perhaps most insidious of all, to the idea that the section of rail is responsible for much trouble, which could have been avoided by inclining the rail instead of placing it upright.

Among the fallacious suggestions made on behalf of saving the rail may be mentioned the following:

1. Reduction of the existing standard coning. This suggestion, if carried out, would be productive of dangerous side thrashing of equipment and could not be considered as a move in the direction of safety. When wheels have been worn to an average taper of 1 to 40 they are ready for attention at the shops. Reducing the coning would be an attempt to save the rail in an unscientific way at the expense of the wheels. The suggestion has been answered by the wheel committee of the M. C. B. Association at its meeting in June, 1915, as follows:

"A communication has been received from one of the roads, a member of this Association, criticising the present standard taper of tread of 1 in 20, and recommending that a change be made to 1 in 38, the claim being made that the present standard taper is responsible for increased rail renewal, and is also more severe on the wheel itself. It is the opinion of your committee as a whole that any reduction in the taper of the tread will be detrimental to the wheel, but that if it can be shown that such change would be of sufficient benefit to the rail as to more than offset any bad effect on the wheel, they would be willing to consider such change."

2. Compromising on a rail inclination of half the requisite amount, viz., 1 in 38 or 40. There is no scientific argument in favor of such a compromise. The inclination of 1 in 20 on rail would tend to return to standard the profile of old rail, and would tend to return to standard the profile of wheels worn on upright rail. All that could be said for giving rail an inclination of 1 in 40 is that it would tend to keep wheels, worn to an average taper of 1 in 40 (and thus unquestionably ready for sending to the shops), from becoming still flatter. With standard wheels running on rails inclined only to 1 in 40, there would still be a wedging thrust of one-fortieth, or 50 lb. per ton, of the wheel load, tending to overturn the rail.

The apparent abnormal effect of an inclination of 1 in 20 on old rail or on worn wheels would really be advantageous to such rail and equipment. The rail would receive the wheel load outside of the center of the head, but not more so than the load rests inside of the center with the average conditions of operation on an upright rail. This position of rail wear would gradually approach the center of the head. On old rail under such conditions the wear would be in the most economic position, in that the rail would be worn where it had not been worn before. Another point of advantage in inclining old rail and having the position of rail-wear outside the center of the head, is that during the process of the wearing position approaching the center of the head, the bending stresses in car axles would be reduced below normal for the reason that the lever arm between the center of the journal bearing and the point of bearing of the load on the wheel would be reduced considerably.

JOHN LUNDIE.
Consulting Engineer.

SPECIAL TRACK CONSTRUCTION AT WATER CRANES

PROWERS, Colo.

To the Editor of the Railway Age Gazette:

One is frequently asked for a means of preventing the burning out of ties at water cranes, and I have seen a special form of track construction used very successfully to overcome this trouble and believe that the following description will therefore be of interest.

The ground was excavated under the tracks to a depth of 32 in. below the base of rail. Forms were then built for a continuous concrete wall under each rail, 18 in. wide at the bottom and battered to 8 in. at the time. A fastening for the track rail was secured by imbedding an old rail in the wall, head down. Holes were drilled in this inverted rail every 21 in. on both sides of the base. Bolts were inserted with the heads on the under side so that when the concrete was placed the threaded ends of these bolts projected above the top of the walls. The track rails were then drilled to correspond and were bolted securely in place.

This form of construction was used for 75 ft. each way from the crane. For the safety of the employees the space between the walls was filled with earth to the level of the base of rail. The track has been kept in perfect line, surface and gage.

RALPH E. PITTS,

Section Foreman Atchison, Topeka & Santa Fe.

[The form of track construction described above undoubtedly is successful at points where all trains are operated at relatively slow speed. There would be considerable question, however, as to its durability and safety for heavy, fast traffic. It is also desirable to call attention to the fact that the method of building as described is practicable only where the tracks can be put out of service a sufficient time to permit the concrete of the walls to set properly, the trains being detoured, presumably, over adjacent passing or side tracks.—EDITOR.]

THE DISTRIBUTION OF LABOR ACCOUNTS

HAILEYVILLE, Okla.

To the Editor of the Railway Age Gazette:

As the maintenance of way department is the subject of much discussion so far as operating expenses are concerned, and since when a reduction of expenses is to be made, this department is the first to be attacked, the accurate distribution of the labor accounts to show the proper charges for all work performed is essential. There is an important factor that is sometimes not considered when arriving at a decision concerning the reduction of forces. It is simply this, the section foreman in many cases is not a good bookkeeper and in making his monthly distribution for labor he is liable to charge it all to track work when, as a matter of fact, a considerable percentage may have been spent in assisting car men repairing cars, transferring freight and many other jobs of like nature. The aggregate of such work by the section forces on a hundred-mile division during a year amounts to no little amount, and were it carefully separated from the regular maintenance of track work it would show up to an extent which would, no doubt, cause the superintendent to give the subject due credit. It is so easy to call on the section men to assist at some job around the station, at the roundhouse, car shops, etc., that it is almost second nature to put out the call.

There is a wide field for the roadmasters to impress upon their foremen the importance of charging up every nickel to the account to which it justly belongs, and by so doing they will materially decrease the maintenance of track per mile each month of the year. There is no doubt that the section foreman is imposed on many times by having to do odd jobs outside of his regular and assigned work, and many times he suffers for it by reason of his not having had the time away from these hurry up calls to attend to his track work. A good way to make a check of the foreman's distribution is to require any office to send the instructions to the roadmaster's office every time a foreman is instructed to do any work outside of his regular duties. Then when the foreman's distribution sheets come in the roadmaster or his clerk can check these instructions with the distribution, and if such labor does not appear the foreman's attention can be called to it for a correction.

J. L. COSS,
Dispatcher C. R. I. & P.

The Tool Equipment for Maintenance of Way Forces

Suggested Lists of Tools for Section and Floating Track Gangs, and for Bridge and Water Service Gangs

One of the most important essentials to the economical performance of work is the supplying of sufficient tools adapted for the work in hand. The following articles discuss tools for the different classes of maintenance of way work, giving suggested lists of equipment for gangs of varying sizes for the different classes of work.

TOOLS FOR TRACK GANGS

BY "SUPERVISOR"

In no part of railroad enterprise has there been so little progress in the last few decades as in the development of tools for track work. Our men today use the same devices, slightly modified perhaps, that were in use in the seventies. The gasoline motor car has apparently come to stay, and the writer has heard favorable comment on the use of compressed air tools for some forms of track work, but the latter are still distinctly in the experimental stage. Otherwise there is little change. In the main, the tool problem is still that of the proper use and distribution of the same old articles rather than the substitution of more modern and efficient devices.

The equipment of a given roadway force with sufficient tools for the quickest and most economical performance of its duties is very largely to be governed by local working conditions and the density of traffic. Certain general requirements are common to maintenance work the country over, and in addition each locality has its own requirements for which special equipment is essential.

The gravest mistake that can be made in this matter is to under-supply the men with tools. The money saved in tool bills can be lost so quickly in labor charges that great care must be exercised to see that effort is not wasted for want of equipment. The over-supply of tools is an error which must also be watched, in order that there may be no undue expense under this heading. In the following lists the writer has endeavored to give a fair equipment for section and general purpose gangs under ordinary conditions.

As absolute requirements may be classed tools for the maintenance of line and surface, for the renewal of worn switches, frogs and rail, for the replacement of ties and switch timbers, and for the proper protection of traffic while such work is being done. The size of the section gangs and the amount of work performed by floating or extra gangs on the various sections will have great bearing upon the number and kind of tools to be furnished, but for gangs of 4 to 15 men the following should embrace all the tools necessary to keep the track in condition:

adzes	1	per 4 men
axe, chopping	1	
bars, claw	1	per 3 men
bars, lining	1	per man
brooms, corn	1	
brooms, rattan	1	per man where there is snowfall
bags, tool	1	for each track walker
barrows	1	per 4 men
bits, ratchet	2	of each diameter in use
cans, hand	1	or more as required except in dense traffic yds.
cans, push	1	or more as required
chisels, rail	6	
cans, engineers' oil	1	
cans, oil	2	for each lampman
cans, water	1	
cups, water	2	(individual sanitary cups to be preferred)
frames, ratchet	1	
flags, red	6	(Painted iron portable signals are to be preferred to flags stuck in the ground on sections where the force is light)
flags, green	6	
flags, white	2	
forks, ballast	1	per man (where stone or slag ballast is used)
gages, track	1	
hammers, spiking	2	for 3 men, 1 extra
hammers, sledge	1	
hammers, hand	1	
handles, adze	1	extra
handles, axe	1	extra
handles, jack	1	extra
handles, pick	1	extra for each 6 picks
handles, spike hammer	1	extra for each 4 hammers
jacks, track	2	(If density of traffic requires raising bars, 1 jack may be dispensed with and 1 raising bar supplied for each 2 men)

levels, track	1	
lines, ditching	1	
lines, tape	1	
lanterns, red	6	
lanterns, green	6	
lanterns, white	4	
picks, clay	2	
picks, tamping	1	per man
ratchets	1	
spike pullers	1	
squirt cans	1	
saws, hand	1	
saws, crosscut	1	
shovels, track	1	per man and 10 per cent over
shovels, scoop	1	per man in ash ballast
torches	1	per man
rail tongs	1	per 2 men
tongs, tie	1	per 3 men
wrenches, monkey	2	
wrenches, track	1	per man

In addition, where the right of way is mowed by the section men, the following mowing tools should be provided.

grindstones	1	
scythes, hrush	1	
scythes, grass	1	per man
scythe snaths	1	per man
scythe stones	1	per 2 men

In automatic signal territory, there should be provided a bonding machine, drills, punches, pins and bondwires. Other local conditions will make it necessary to have pike poles for ice and debris in freshets, devices for using combustible compounds at interlockers, fence repair tools, telegraph wire, wire cutters and climbers, and other articles too numerous to mention. Every section should also be provided with a first-aid kit, and the foreman should have at least a superficial knowledge of its use.

For the general purpose floating gang enough tools should be provided to permit it to handle any class of work coming up on the territory. For a gang of 26 men, exclusive of the foremen, the following should prove an ample supply for general conditions:

adzes	6	
axes, chopping	2	
bars, claw	12	
bars, lining	26	
brooms, rattan	26	
barrows	6	
chisels, rail	24	
chisels, cold	4	
cans, water	2	
cups, water	4	(individual sanitary cups to be preferred)
flags, red	4	
flags, green	4	
flags, white	2	
forks, ballast	26	
gages	2	
hammers, hand	2	
hammers, sledge	2	
hammers, spiking	16	
handles, axe	1	extra
handles, adze	2	extra
handles, pick	6	extra
handles, hammer	12	extra
handles, jack	1	extra
hatchets	2	
jacks, track	4	
levels, track	1	
lines, tape	1	
lines, ditching	1	
lanterns, red	4	
lanterns, green	4	
lanterns, white	2	
machines, bonding	4	
picks, clay	25	
picks, tamping	25	
pails, spike	4	
punches	4	
rail benders	1	
rail dogs	2	
saws, hand	1	
saws, crosscut	1	
shovels, track	25	
shovels, scoop	25	
shovels, long handle	12	
torches	25	
tongs, rail	8	
tongs, tie	10	
wrenches, monkey	2	
wrenches, track	25	

At the sub-division headquarters should be kept a supply of tools for which there is occasional use at various points on the territory but which it would be unwise to supply for the individual sections. These can be shipped out when needed and one tool will thus supply the needs of a large area. Among

the articles of this character may be mentioned rail benders, rail saws, high candle-power flares, portable electric lights for wrecking in the vicinity of explosives or inflammables, boring drills, stone drills and hammers, electric exploders, concrete mixers, pumps, ladders, ropes for rock cuts, rail unloaders, crabs, clam-shell buckets and whatever other tools of this nature the work at hand may need. A toolman should be employed to keep this material in working order, to issue new tools and to take care of the repairs of old ones, and to keep separate the old tools sent in by each foreman until the supervisor or other officer can inspect them personally. This will prevent foremen from discarding tools before they are worn out, or from abusing tools as is so often done.

The lists given above will probably be criticised severely by maintenance men both for errors of omission and commission. Some tools which are in general use have been omitted, such as sight board and raising blocks. These are, however, but poor substitutes for grade stakes set at sufficiently close intervals, and it is the experience of the writer that a regular grade will soon be badly broken if track raising is done at haphazard, relying on the foreman's eye rather than on the wye-level. The same objection holds against the string lining of curves. Tamping bars are omitted because the writer has been able to get better and more uniform results from the tamping pick and the shovel in ash, slag and stone ballasts.

It will also be claimed that certain items are overstocked. Two jacks are supplied for sections and but four for large gangs. The second jack on the section is of great use when patching, working through turnouts and crossovers, and insures better work on curves. With a gang of 26 men, under a good foreman, every man can be kept hard at work tamping up, although but two jacks per rail are doing the raising. More and better work will have been accomplished at the day's end with four jacks and grade stakes than by using more jacks and trusting to the eye of the foreman to hit the grade.

The allowance of wrenches, spiking hammers and shovels is kept high on account of winter, emergency, and rush work. It is true that often there will be idle tools, but occasions will arise when every tool will be employed most profitably. Another item which must be considered is that proper tools and enough of them are the strongest safeguards against personal injury to the men. Handling rail, ties or switch material without proper tools is bound to result in nervousness, demoralization and accident. In providing and in using tools, as in every other phase of work on the railroads, the keynote of true success is "Safety First."

TOOLS FOR SECTION AND EXTRA TRACK GANGS

By P. J. McANDREWS

Roadmaster, Chicago & North Western; Belle Plaine, Ia.

To secure full efficiency from expenditures for track labor, good tools of proper type must be used. The first cost of supplying such tools is not so important a consideration as the items of adaptability and length of service to be obtained. Unfortunately, first cost has too often been considered to the detriment of the service and at an actual net loss to the railway. Good tools being furnished, the next important step is to care for them properly, having repairs made at the right time and in a workmanlike manner.

For sections outside of terminals, where the length averages from 3 to 6 miles, a gasoline motor car is a necessity. Such a car should have a carrying capacity for the maximum number of men employed in ordinary maintenance, in addition to all the tools required for the work. The car should be simple in construction, with sufficient power to carry the gang at a speed not in excess of 15 to 18 miles per hour. A light but strong push car should be furnished each section so that the handling of ties and other heavy material need never be done on the gasoline car, nor on an ordinary hand car where gasoline cars are not provided.

For a section crew of about 10 men, the following tools are recommended:

One dozen shovels (short handled) with square points where gravel, cinder or earth ballast is used and with round points where stone ballast is used.

Four track wrenches, with an additional number where more than one size of nuts is in use on track bolts.

One track gage.

One track level.

Two track jacks, double acting, with a lifting capacity of 10 to 12 tons.

Two claw bars, weighing about 30 lb.

Six spike mauls, weighing 9 lb.

One spike puller (2 or 3 knob, depending on the height of the rail).

Seven diamond-pointed lining bars, weighing about 25 lb.

One pinch bar, weighing about 2 lb., suitable for nipping rails and may be used for a lining bar also.

Four tie tongs.

One dozen T tamping picks for stone ballast sections, weighing 7½ to 8 lb.

Eight clay picks for light ballasted sections.

One dozen tamping bars, weighing about 13 lb., for gravel or cinder ballast.

Two adzes, clay pick eye, square or round pole, end 6 in. bit.

One double-face striking sledge, weighing 12 lb.

Four rail tongs weighing 16 lb.

Six track chisels.

One geared rail drill and 6 bits of suitable sizes. (Where two sections have headquarters at the same station, only one drill should be supplied for both.)

One broad hand axe, with a 4-in. bit.

One hand saw.

One chopping axe.

One claw hammer.

One measuring tape.

Four eight-tine stone forks.

For terminal gangs add to the above:

One light rail hender or "jim crow."

One portable rail saw.

Two rail dollies.

All sections should be furnished water pails, kegs, etc., as local conditions make necessary. They should also be furnished with a portable tool grinder.

Ballasting gangs should be furnished with two 15- and two 10-ton jacks, of the double-acting type, with an 18-in. lifting bar on the 15-ton jack and a 12-in. bar on the 10-ton jack. A complement of tools, sufficient for the number of men employed, must be at hand and should include spike mauls, claw bars, lining bars, wrenches, shovels, picks, tie tongs, tamping bars, gages, levels and a spot board.

For rebalasting with gravel or cinders, the use of square pointed shovels, and the ordinary tamping bars with solid handles is thought to be most efficient, while in the application of stone or slag ballast (crushed) round-pointed shovels have advantages over the square-pointed ones, while the diamond stone tamping bars with spear ends and solid handles and weighing about 16 to 18 lb. are believed to be superior to tamping picks or the common square-faced tamping bars. Spades are used to good advantage in applying stone ballast, but the round-pointed shovels are of equal value in placing ballast under the track and also have a desirable shape for handling the ballast at all times.

For rail-laying gangs, the number of tools furnished will depend on the number of men employed, the class of tools which we would suggest as necessary being as follows:

Track laying machine, which in relaying rails can be handled with a comparatively small number of men, making a considerable saving as against the use of tong gangs.

Adzes: the use of adzes with clay pick eye and square pole end suitable for driving spike stubs, and with a 6-in. bit is considered good practice on account of the importance of adzing ties so that new rails will set to proper bearing.

Claw bars: good claw bars, *always kept in good condition*, are essential to good work in relaying rail.

Wrenches: ratchet wrenches have not come into general use, but they would be advantageous for rapid bolting of track, the tightening to be done more carefully by the use of ordinary track wrenches.

Track chisels: the frequent necessity for track chisels by a rail laying gang makes essential the supplying of first-class heat-treated tools.

The proper repairing of track tools such as chisels, claw bars, spike mauls, etc., which must go through a tempering process is a most important matter, and should be entrusted only to first-class workmen. On important divisions it has been found economical to employ a special tool man at the supervisor's headquarters to do the blacksmithing on these tools. Such a man making a specialty of track tool repairing, taking suggestions from the men who use the tools, and going carefully into details of any failures, can do much toward getting the full life from each article. It is believed that the repairing of track tools under the direction of track supervisors or roadmasters will be found a better plan than having it done at the general shop under the direction of men who are not familiar with their use.

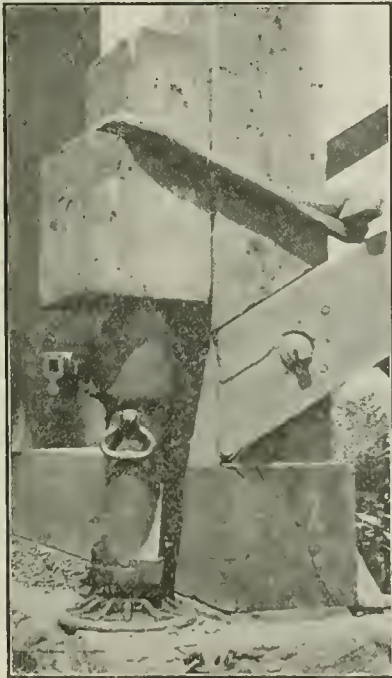
THE SELECTION AND USE OF BRIDGE AND BUILDING TOOLS

By S. C. TANNER

Master Carpenter, Baltimore & Ohio, Baltimore, Md.

The subject of tools for use by the bridge and building forces in the maintenance of way department is of much importance and is unfortunately too often neglected. To derive the greatest degree of efficiency from the labor, only the best tools should be employed and in sufficient quantities to insure uninterrupted performance of the men employed and the quick and free movement of traffic. Due to the diversified character of the work to be done by the bridge and building forces, the number of tools required is correspondingly large and while many of them can be used universally for various kinds of work, it is better economy to provide special tools for special work, as such work can then be performed more quickly, cheaply and safely.

A bridge and building gang on maintenance work usually consists of a foreman and from 10 to 14 men, who are assigned to sections with headquarters located preferably at termi-



Post Clamp in Position for Jacking

nals and junction points if not too far from the bulk of their work. The duties of the gang should include the repair and renewal of all bridges and buildings in the section and with a proper organization they should be able to do all classes of the work. It is necessary, however, to provide them with the proper tools, including the necessary construction cars, and in most cases this should include the equipment shown in the list given below. New tools should be provided from time to time as improvements are made, when it is found that they are of such a character as to make labor lighter and cheaper, bearing in mind at all times that all tools should be of such a design that their use does not involve any danger to the men or to the structures.

As the work of the section bridge gangs and the extra bridge gangs is practically the same in maintenance, the tools and equipment should be the same, except where special work requires the use of hoisting engines and derricks. These should be classed as system equipment, to be available for transfer from one gang or division to another. System equipment should consist of pile drivers, hoisting engines, derricks, concrete mixers and such tools as may be required to handle heavy work. They should be of the highest class and the latest design to be had on the market, especially where the work is to be done under traffic.

In all well organized bridge gangs there ought to be at least one man who is a good blacksmith or who is good at nearly all trades. He could be known as the tool man and should look after the tools and see that they are in a fit condition for use at all times and in safe working order. By so doing he can repair the tools when needed and avoid sending them to the shops or ordering new tools to replace them. Thus he will insure greater life of the tools and increased safety in their use.

The foreman should see that all tools are properly marked and accounted for each night. They should either be locked up in the tool boxes on the work or placed in the racks provided for them in the tool cars. The foreman should also observe personally the use of the tools to be sure that they are not overstrained or overworked and should instruct his men relative to the proper use and the safe loads which they will carry. Many bridge men will frequently overload jacks. Where one man cannot work the lever, two or three will sometimes help him, with the result that the jacks are frequently injured beyond repair. It is safer and more economical to use more jacks or other tools to lift the load than to overstrain them. This same feature should be guarded very closely when using tackle blocks and rope. This equipment is of great importance to bridge gangs and as few bridge men are familiar with them, special instructions are of material assistance. In accordance with this idea, the Baltimore & Ohio issues drawings to its bridge foremen showing the proper methods of tying knots and slings and the allowable load on blocks, ropes, etc.

EQUIPMENT FOR A MAINTENANCE BRIDGE GANG.

- One sleeping coach equipped for 15 men.
- One dining and cook car equipped for 15 men.
- One tool car.
- One material car.
- One portable tool box, 2 ft. 6 in. by 2 ft. 6 in. by 6 ft. for rough tools.
- One portable tool box, 18 in. by 2 ft. by 6 ft. for sharp edged tools.
- One gasoline motor car.
- One heavy truck car.
- One heavy truck car with mounted hoisting crab and boom as illustrated in the *Railway Age Gazette* of Aug. 16, 1912.
- Two one- or two-wheeled timber trucks or dandy cars to run on rail for handling heavy timber or other material.
- Six timber dollies.
- Five timber carrying hooks.
- Eight timber cant hooks.
- Two 50-ton ball bearing screw jacks.
- Two 30-ton ball bearing screw jacks.
- Two 20-ton ball bearing screw jacks.
- Four double screw 14-in. telescopic jacks.
- Four large pulling jacks.
- Four 10-ton double action ladder jacks.
- Four track jacks.
- Eight 10-in. track shovels.
- Five clay picks.
- Two 6-ft. clay chisel spudding bars.
- Five 5-ft. cross cut saws.
- Six chopping axes.
- Two 1-in. double crank ship augers.
- Six 13/16-in. double crank ship augers.
- Six 11/16-in. double crank ship augers.
- Two 9/16-in. double crank ship augers.
- Four track claw bars.
- Two bridge shackle bars for pulling drift bolts.
- One bridge shackle jack for pulling drift bolts.
- Six track lining bars.
- Six 1 in. by 4 1/2 ft. octagonal steel bars with one chisel point and one diamond point.
- Four 1 1/2 in. by 4 1/2 ft. octagonal steel bars with one chisel point and one diamond point.
- Two hammer bars to be used as rams for driving drift bolts in places that men cannot get to with handle hammers, made by upsetting each end of a track lining bar, making a 2 1/2-in. hammer face on one end and a 1-in. hammer face on the other.
- One double-faced, 16-lb. hammer.
- Two double-faced, 10-lb. hammers.
- Four double-faced, 8-lb. hammers.
- Four double-faced, 6-lb. hammers.
- Four track spiking hammers.
- Four 3-lb. pin hammers.
- Six rail cutting chisels with handles.
- Five 1 1/4 in. by 2 ft. octagon chisel bars.
- Two 1 1/4 in. by 4 ft. octagon chisel bars.
- One track level.
- One tripod telescope with targets for establishing line, grade and surface on bridges, as illustrated in the *Railway Age Gazette* of Dec. 20, 1912.
- One track gage.
- Six 1/2 in. by 9 ft. chains with a ring at one end and a grab hook at other end.
- Four post clamps for jack supports, as shown in the accompanying photograph.
- Two 3-sheave 12-in. tackle blocks for 1 1/4-in. manila rope.
- Two 2-sheave 12-in. tackle blocks for 1 1/2-in. manila rope.
- Two 3-sheave 10-in. tackle blocks for 1 1/2-in. manila rope.
- Two 2-sheave 10-in. tackle blocks for 1 in. manila rope.
- Two 3-sheave 8-in. tackle blocks for 3/4 in. manila rope.
- Two 2-sheave 8-in. tackle blocks for 3/4 in. manila rope.
- Two 10-in. hinge snatch blocks for 1 1/4-in. manila rope.
- Two 8-in. hinge snatch blocks for 1-in. manila rope.

Equipment for a Maintenance Bridge Gang (Continued.)

Two 6-in. hinge snatch blocks for $\frac{3}{4}$ -in. manila rope.
 600 ft. of $1\frac{1}{4}$ -in. manila rope for tackle blocks.
 600 ft. of 1-in. manila rope for tackle blocks.
 600 ft. of $\frac{3}{4}$ -in. manila rope for tackle blocks.
 Two $1\frac{1}{2}$ in. by 200 ft. manila rope for hand lines.
 Two $1\frac{1}{4}$ in. by 200 ft. manila rope for hand lines.
 Four 1 in. by 200 ft. manila rope for hand lines.
 Four $\frac{3}{4}$ in. by 200 ft. manila rope for hand lines.
 Six $1\frac{1}{4}$ in. by 6 ft. manila rope for slings.
 Four 1 in. by 6 ft. manila rope for slings.
 One portable blacksmith's forge.
 Two sets of blacksmith's tongs.
 One blacksmith's anvil.
 One combination bench and blacksmith's vise.
 One set of machine bolt stocks and dies from $\frac{1}{2}$ in. to 1 in.
 One ratchet drill and bits from $\frac{1}{2}$ in. to 1 in.
 One press drill for tool car with a set of bits from $\frac{1}{4}$ in. to 1 in.
 Six 24-in. S wrenches for $\frac{5}{8}$ -in and $\frac{3}{4}$ -in. bolts.
 Four 16-in. monkey wrenches.
 Two 12-in. monkey wrenches.
 One large grindstone.
 One tool grinding machine.
 One oxy-acetylene torch for cutting iron.

The adze and small tools should be furnished by the men and maintained as their personal tools. The list each good bridge man should have is as follows:

One adze with $4\frac{1}{2}$ -in. bit.
 One hand ax.
 One hand hatchet.
 One claw hammer.
 One 2-ft. steel square.
 One 10-in. try square.
 One 10-in. T bevel square.
 One ratchet brace with bits.
 One set of framing chisels.
 One jack plane.
 One fore plane.
 One smooth plane.
 One block plane.
 One $4\frac{1}{2}$ -point rip saw.
 One 7-point cut-off saw.
 One 12-point cut-off saw.

TOOLS FOR THE WATER SERVICE AND BRIDGE AND BUILDING DEPARTMENTS

By E. M. GRIME

Supervisor of Bridges and Buildings, Northern Pacific; Dilworth, Minn.

On most railways the bridge and building department is responsible for the care and frequently for the construction of practically everything pertaining to the physical property of the railway except the roadway, track and signals. It is therefore always necessary to have available an organization capable of handling a large variety of work comprising many different trades. In order to handle this work economically it is usually found advisable to divide the organization into crews, each of which makes a specialty of certain lines, and the first essential for effective work is to provide each crew with sufficient tools of the kind and character best suited to the work.

A good arrangement of crews and the tools required by each may be stated as follows:

A water service crew, consisting of a foreman, assistant foreman and two helpers, augmented by additional laborers when needed for heavy work, will handle everything pertaining to water stations, the plumbing and heating of buildings, fire lines, hydrants, sewers, steam lines and air lines, as well as the maintenance of coal dock machinery. In addition to the kit of personal tools carried by the men, a gang should be provided with:

Taps and dies for all sizes of pipe from $\frac{1}{4}$ in. to 8 in.
 Bolt taps and dies $\frac{3}{8}$ in. to 1 in.
 Pipe cutters for various sizes of cast pipe up to and including 14 in.
 One pressure tapping machine for corporation cocks up to 1 in. size.
 One No. 3 Edson diaphragm pump with two extra diaphragms.
 One No. 2 Myers force pump with 100 ft. of rubber hose.
 Two 5-ft. chain pipe tongs.
 Two 24-in. Stilson wrenches.
 Two 36-in. Stilson wrenches.
 Two sets of calking irons.
 One 12-in. lead melting pot.
 One 8-in. lead pouring ladle.
 One small blacksmith forge.
 One anvil.
 One each of 3-lb., 4-lb. and 5-lb. blacksmith hammers.
 One 8-lb. sledge hammer.
 One differential chain hoist of two tons capacity.
 An 8-in. bench vise.
 Ten clay picks with six extra handles.
 Ten No. 2 shovels.
 Ten long-handled, round-pointed shovels.
 Five pairs of leather-soled hip rubber boots.
 One boiler test pump.
 Two 8-in. ratchet jacks.
 One 5-ft. V-tooth cross cut saw.
 Five steel tray wheelbarrows.
 Two hack saws with 24 extra blades.
 Two sets of $\frac{3}{4}$ -in. wood tackle blocks.
 300 ft. of $\frac{3}{4}$ -in. four-strand manila rope.
 One push car.
 One 4-hp. gasoline motor car.

Concrete crews, consisting of a foreman, four carpenters and 15 to 20 laborers, handling all kinds of concrete work and particularly bridge abutments, concrete arch and box culverts, concrete trestle bridges, etc., should be provided with:

$\frac{1}{2}$ or $\frac{3}{4}$ yd. concrete mixer, direct connected to a steam or gasoline engine.
 One No. 3 Edson diaphragm pump with four extra diaphragms.
 One No. 2 Myers force pump.
 Twelve pairs of leather-soled hip rubber boots.
 Twelve steel tray concrete wheelbarrows.
 Two sand screens.
 100 ft. of $\frac{3}{4}$ -in. garden hose.
 Three 8-lb. mauls.
 Two 8-in. ratchet jacks.
 Three 5-ft. V-tooth cross cut saws and 12 10-in. saw files.
 Four spading shovels.
 Two sets of $\frac{3}{4}$ -in. wood tackle blocks.
 500 ft. of 4-strand manila rope.
 Six lantern frames—four each of yellow, red and white globes.
 Four red and four yellow flags.
 24 torpedoes.
 Four 24-in. steel claw bars for nails.
 One grindstone.
 One push car.
 Two hand cars.
 One gasoline motor car.

Carpenter crews, consisting of a foreman and 6 to 10 house carpenters and helpers, to handle repairs or construction of second class stations, freight depots, section houses, stockyards, grain and station platforms and all light carpenter work should be provided with:

Three 5-ft. V-tooth cross cut saws and twelve 10-in saw files.
 Twelve 16-in. common screw jacks.
 Two track jacks.
 One small wrench.
 Two sets of $\frac{3}{4}$ -in. wood tackle blocks.
 One set of 1-in. wood tackle blocks.
 Two $\frac{3}{4}$ -in. snatch blocks.
 300 ft. of $\frac{3}{4}$ -in. 4-strand manila rope.
 300 ft. of 1-in. 4-strand manila rope.
 Four 5 ft. 4 in. by $1\frac{1}{2}$ in. octagonal steel pinch bars.
 Five peavies with two extra handles.
 Five carrying hooks, one extra handle.
 Two pairs leather-soled hip rubber boots.
 Ten No. 2 shovels.
 Six clay picks.
 One grindstone.
 Ten long-handled, round-pointed shovels.
 Two 24 in. by $\frac{3}{4}$ in. steel claw bars for nails.
 Two post hole diggers.
 One No. 3 Edson diaphragm pump with one extra diaphragm.
 Two 8-ft. chains of $\frac{3}{8}$ -in. iron with ring and book.
 Six lantern frames with four each of white, red and yellow globes.
 Four red and four yellow flags.
 24 torpedoes.
 Two 8-lb. mauls.
 Two 12-lb. mauls.
 One No. 3 Merrill's saw set for single tooth cross cut saws.
 One push car.
 One 4-hp. gasoline motor car.

A painting crew, consisting of a foreman and six to eight painters, to handle all painting, except high steel trestles, should have constantly on hand:

Twelve $4\frac{1}{2}$ -in. round paint brushes.
 Twelve $4\frac{1}{2}$ -in. flat paint brushes.
 Twelve stencil brushes.
 Twelve lettering pencils.
 Twelve scraping knives.
 Six steel wire brushes.
 One belows for sanding.
 Four kalsomine brushes.
 Two 16-ft. extension ladders.
 Four 5-ft. staging books.
 Four sets of $\frac{1}{2}$ -in. tackle blocks, single and double sheave.
 500 ft. of $\frac{1}{2}$ -in. manila rope.
 Two sets of $\frac{3}{4}$ -in. tackle blocks.
 300 ft. of $\frac{3}{4}$ -in. four-strand manila rope.

A bridge crew, consisting of a foreman, pile driver, engineer and seven bridge carpenters and helpers, is required to handle repairs or the rebuilding of timber pile and trestle bridges, wooden water tanks and coaling stations, the placing of steel girder bridges, moving buildings, repairing washouts and sometimes clearing wrecks. This is the most important crew, as it is depended upon for practically all heavy work. To it is assigned a pile driver, and frequently a wrecking crane. The tools required by this crew are as follows:

Four 10-ton ratchet jacks.
 Four 15-ton ratchet jacks.
 Eight 8-in. ratchet jacks.
 Twelve 16-in. common screw jacks.
 Two track jacks (Barrett No. 1).
 Two ratchet pulling jacks.
 Eighteen 6-in. maple rollers.
 Two sets of 1-in. tackle blocks, single and double.
 One set of $\frac{3}{4}$ -in. tackle blocks, single and double.
 400 ft. of 1-in. four-strand manila rope.
 200 ft. of $\frac{3}{4}$ -in. four-strand manila rope.
 200 ft. bell cord.
 Two 1-in. snatch blocks (steel).
 One $\frac{3}{4}$ -in. snatch block (steel).
 Six octagonal steel pinch bars $1\frac{1}{2}$ in. by 5 ft. 4 in.
 Two claw bars for track bolts.
 Two 24 in. by $\frac{3}{4}$ in. steel claw bars for nails.
 Two shackle bars for $\frac{7}{8}$ -in. drift bolts.

Ten peavies, 12 extra handles.
 Six carrying hooks, 2 extra handles.
 Two hand axes.
 Six chopping axes.
 Two adzes.
 Four spike mauls.
 Twelve No. 2 shovels.
 Twelve long-handled, round-pointed shovels.
 Twelve clay picks, 4 extra handles.
 Two post hole diggers.
 One No. 3 Edson diaphragm pump.
 One No. 2 Myers force pump with 100 ft. water hose.
 Three 5-ft. V-tooth crosscut saws.
 Three 6-ft. V-tooth crosscut saws.
 Twelve 10-in. saw files.
 One No. 3 Merrill's saw set for crosscut saws.
 Four 8-ft. chains of $\frac{3}{8}$ -in. iron with ring and hook.
 Two 8-lb. mauls.
 Two 12-lb. mauls.
 Two 16-lb. mauls.
 Six extra maul handles.
 Six lantern frames with four each red, white and yellow globes.
 Four lanterns with reflectors.
 Four red and four yellow flags.
 24 torpedoes.
 Two chisel bars, $3\frac{1}{2}$ in. by 1 in., 6 ft. long.
 Two 16-in. monkey wrenches.
 Two track wrenches.
 Two 24-in. Stilson wrenches.
 Four S wrenches to fit bolts in general use on bridges.
 Six 13/16-in. bridge augers.
 Three $\frac{5}{8}$ -in. bridge augers.
 Three $\frac{1}{2}$ -in. bridge augers.
 Two $\frac{5}{8}$ -in. steel drifts, 24 in. long.
 Four 5-ft. staging hooks.
 Grindstone.
 One set of bolt taps and dies, $\frac{1}{2}$ in. to 1 in.
 One track level.
 One track gage.
 Four timber dollies.
 One track dolly.
 Six pairs of leather-soled hip rubber boots.
 Four track chisels.
 Small blacksmith forge.
 Anvil.
 Bench vise.
 Four 2-gal. oil cans.
 One 1-qt. oiler.
 One Buckeye light of 1,000 c.p.
 Four straight edges of clear white pine, $1\frac{1}{4}$ in. by 10 in. by 16 ft.
 One push car.
 One 4-hp. gasoline motor car.

The work of sharpening or repairing tools in all crews should be reserved for stormy days, when little can be accomplished in the field. The foreman should be required to turn in such tools as cannot be readily repaired and they should be promptly replaced from the storekeeper's stock or by order on the purchasing agent. To avoid personal injuries a defective tool should never be allowed to remain in use and the men should be encouraged to report any defects. Successful contractors provide their men with plenty of first class tools and equipment and experience has shown that the best results are obtained in the bridge and building department by following the same practice.

DESIGNING MANGANESE STEEL TRACK WORK

By V. ANGERER

Vice-President, William Wharton, Jr., & Company, Inc.,
 Philadelphia, Pa.

When manganese steel was introduced into special track work such as frogs and crossings on steam railroads 15 years ago, it necessarily took a long time before its economic value was generally appreciated. It was a new proposition for a railroad to install a manganese steel track structure costing $2\frac{1}{2}$ or even 4 times as much as the material it had been using theretofore, and to expect economical results. Each railroad that ventured a trial on the representation of the manufacturer, or on what it had heard concerning the results obtained elsewhere, wanted a demonstration under its own observation. This consumed time. Within the last 8 years, however, the important economies that can be effected by the use of manganese steel frogs, crossings and switches in maintenance have been more fully recognized and the demand for them has greatly increased. It has been estimated that in 1913 approximately 18,000 manganese steel frogs, 1,300 manganese steel crossings and 2,000 manganese steel pointed switches were bought by the steam railroads of this country, and while in 1914 these figures have fallen off, owing to the general condition of business and the retrenchment of the railroads in particular, there is

no doubt but that they will be exceeded in the next few years.

Unfortunately, when the demand grew, and numerous track work builders took up the manufacture of manganese steel track structures, the tendency was displayed to try to cheapen the work at the expense of the product. The hesitation of the railroads to make so much larger first investment in track structures over what they were accustomed to pay in ordinary work, made it appear desirable to reduce the ratio of difference to promote the use of manganese steel work. It was a mistake, probably due to the inexperience of some manufacturers, but into which even some of the older track work manufacturers fell, in their endeavor to meet competition. The result was almost the opposite to that intended.

Also in some cases the railroads who had found manganese steel work entirely satisfactory induced the track work manufacturer to undertake to make more difficult pieces than they had ever made before, for the elimination of joints and other anticipated maintenance advantages. Under the pressure from both sides, the manganese steel founders allowed themselves to attempt the making of castings of proportions which were not productive of the best results. The consequences were some failures and cases where manganese steel did not prove a success. Every such case apparently stood out prominently against the use of manganese steel work, notwithstanding the hundreds of other cases where it had given perfect satisfaction and effected great economy, paying for itself several times over in comparison with ordinary work.

The critical stage which was brought about by these causes has now been passed. The manganese steel founders and track work manufacturers have gotten together and secured the interest and co-operation of the railroads, through the track committee of the American Railway Engineering Association. This has resulted in certain minimums being established in the proportions of the manganese steel castings for the various track structures below which satisfactory results can hardly be expected. The founders of manganese steel have also profited by experience and improved their methods toward making the castings suitable for the hard service for which they are intended. Patterns and designs are scrutinized more closely now as to whether they suit foundry practice, and whether a casting of proper quality in manganese steel can be produced from it.

The main mistake frequently made in designing manganese steel track work was that they were based on theoretical calculations as to the necessary strength and an endeavor to provide for a large amount of wear without due regard to the foundry problem. The shrinkage of manganese steel from the fluid to the solid cold state is considerably more than that of other metals, such as iron and ordinary steel. Roughly speaking, it is 5/16 in. to the foot. This means that a casting of 10 ft. in length is over 3 in. longer when poured in the mold than after it has cooled. Thick portions take longer to cool than thin portions and therefore do not contract as quickly. This presents a problem that must be taken care of, not only by the foundry practice, but by the design, otherwise uneven shrinkage, shrinkage cracks, and resulting segregation and unsoundness of metal or internal strains are unavoidable, and an improper design may defeat all the ingenuities of the foundryman. These dangers are aggravated by the fact that manganese steel is what might be called red short, i. e., in the red hot state it is extremely brittle and weak and subject to cracking. This requires special treatment of the castings in the molds, only gained by experience, and being quite different from the treatment of ordinary steel castings.

When the castings undergo the subsequent heat treatment, further problems are met. Thin castings are affected differently from thick castings when both are subjected to exactly the same heat treatment. Consequently thin portions of a casting may be differently affected than the thick portions of the same casting, if the variation in thickness is considerable. It is for this reason that the practice to cast coupons on the castings for

the determination of physical properties, which is the usual practice with ordinary steel castings, is not followed in manganese steel castings, as the difference in heat treatment required by the thin coupon, when attached to a casting of greater thickness, would result in different properties being developed in the test coupon from those of the main casting. Thus, the treatment given a casting must be gaged by experience, according to the nature of each individual casting, or group of castings, particularly in reference to the thickness of metal.

The castings come out of a heat treatment usually very much distorted and bent, and have to undergo a straightening process, under powerful presses, to put them back into shape. The degree of this distortion often depends largely upon the design, and in long, complex and spider-like track castings, is often quite aggravated, so that the straightening process becomes very difficult and hazardous. Internal strains and, in fact, internal fracture, with no outside indication thereof, may be the consequence, destroying all theories as to the strength of the piece. All such difficulties and dangers should be given due consideration in the design. By special precautions the foundry can overcome the detrimental effect which may be due to some feature of the design, but may not be able to avoid it altogether.

Heavy or thick portions in some parts of a casting may be just as objectionable as too thin portions. Ribs intended to strengthen portions of a casting may have the opposite effect, producing incipient cracks. No actual fixed rules can be laid down for designing manganese steel track castings, except a few cardinal principles which might be summed up as follows:

Make the sections of a casting and the thickness of metal in the section as uniform as possible.

Make changes from one section to another and from one thickness of metal to another gradual. Avoid abrupt changes and all sharp corners.

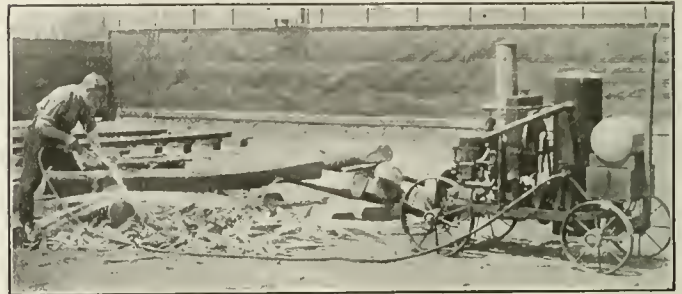
Avoid all possible projections, brackets or cross members which may form a serious impediment to the free contraction of the casting in cooling in the mold. Before deciding upon an unusual design, consult the foundryman.

After a piece has been cast successfully, the wearing qualities so essential to track work have to be imparted to it through the heat treatment. Manganese steel derives its remarkable wearing qualities through a combination of hardness and ductility. It may be of interest to the designer and maker, as well as to the user of manganese steel track work, to have pointed out a few peculiarities of this remarkable metal. The hardest castings may not always be the best wearing ones. The particular value is in its great resistance to abrasion. In its toughest and most ductile state, manganese steel has somewhat of a tendency to flow under cold rolling or pounding. In track work this sometimes causes the appearance of initial wear, due to this action of the skin, which usually is slightly tougher than the rest of the castings. Such initial wear is no criterion of the subsequent wearing qualities of the piece. Blow holes are a rare occurrence in manganese steel castings, as, owing to the chemical composition of manganese steel, it is quite free from gases in the molten state. While never desirable, small cracks need not cause any such apprehension as in an ordinary carbon steel casting. It is a very well known fact, and pointed out by eminent authorities as Dr. H. M. Howe, that owing to the toughness of manganese steel, cracks do not readily propagate. A sudden parting of a manganese steel casting, properly heat-treated and toughened, need never be apprehended under almost any strain to which the pieces are subjected in the track. Even if physical tests for ultimate tensile strength or elastic limit could be made readily, in view of the difficulty of machining test pieces to proper sizes, they would form no criterion for the strength of the pieces. The necessary strength and solidity of a manganese steel track casting depends mostly upon the design and its wearing qualities upon the proper heat-treatment given to it by the metallurgist.

A PNEUMATIC TIE PEELER

In the past the removal of bark from railroad ties has always been a costly and laborious hand operation. From information gathered from contractors it has been found that when working on fresh timber the most expert tie peeler is capable of peeling by hand an average of but 100 ties per day of 10 hours, for which production he receives comparatively high wages. The output of the average tie peeler is from 40 to 60 ties per day, and he also receives a wage considerably in excess of that demanded by the ordinary laborer. The generally prevailing price paid is 5 cents per tie.

The search for means to reduce this cost led to the develop-



Portable Plant for Peeling Ties

ment by the Ingersoll-Rand Company, New York, of the "Imperial" tie peeling tool, used in conjunction with an "Imperial" pneumatic hammer. Experiments have shown that with this tool an ordinary laborer had no difficulty in thoroughly peeling from 150 to 200 ties per day, and at a wage rate far below that received by the expert hand peeler. Inexperienced men who had never used an air hammer nor seen a tie peeled were used in the tests. They were able to peel a standard seasoned tie with this tool in an average time of less than three minutes.

A complete installation for pneumatic tie peeling comprises the two tools already mentioned and a small "Imperial" vertical sin-



Pneumatic Tie Peeler in Use

gle-acting air compressor, with 6 in. diameter by 6 in. stroke, a small air receiver, suitable valves, piping, hose, etc. It costs approximately \$300. The compressor has sufficient capacity to operate the two tools simultaneously if necessary. An accompanying photograph shows the pneumatic tie peeler at work. The compressor may be installed in some convenient place and is driven by a belt from the line shaft. The extra load imposed upon the power plant is scarcely perceptible. Another illustration shows a portable plant.

By the insertion of other tools the hammer also has other useful applications, such as the chipping and calking of metals, while by the addition of other pneumatic tools the air compressor can be used for such work as portable drilling and boring and general repair work.

The Chattanooga Creek Bridge of the N. C. & St. L.

Interesting Substructure Work on a 15-track Structure Involving the Use of a Drag Line for Excavation

By C. H. JOHNSON

Engineer of Construction, Nashville, Chattanooga & St. Louis, Nashville, Tenn.

The Nashville, Chattanooga & St. Louis has recently completed high masonry abutments for a 15-track deck girder bridge across Chattanooga creek at the point where it flows into the Tennessee river, which involved interesting construction methods. Only four of the girder spans have been placed at present, two of which replace a three-track pile trestle, one replaces a main line truss bridge, while one is for new second track.

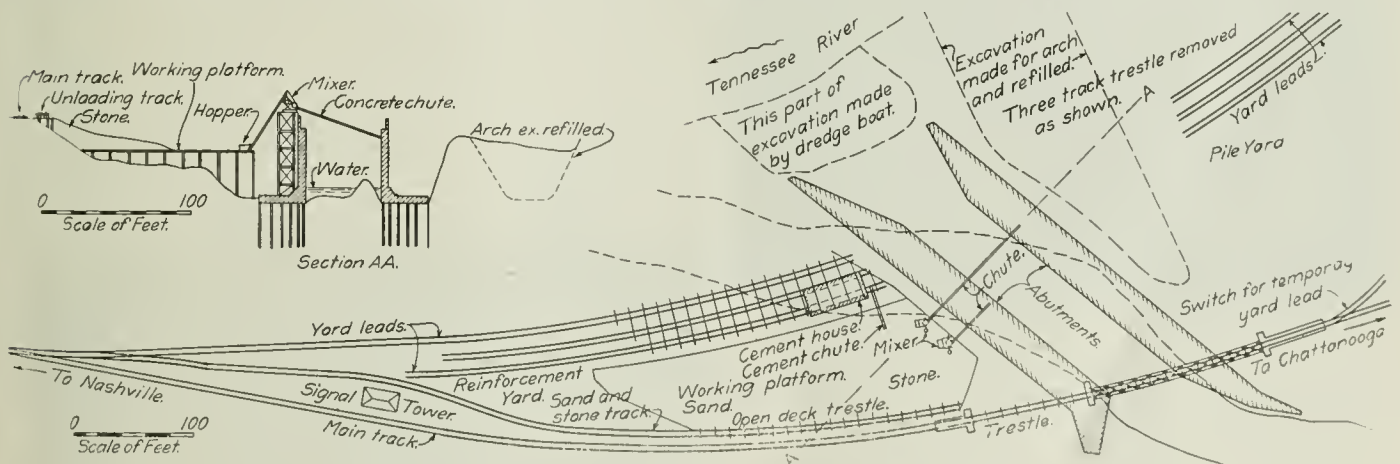
The creek originally flowed under the tracks at a very acute angle, and the first plan adopted for the new structure provided for changing the channel to permit the use of two 25-ft. arches at right angles to the main track. After considerable excavation had been made to carry out this plan, objections were raised by certain citizens of Chattanooga on the ground that the proposed structure would interfere with the navigation of the stream. The matter was taken up with the War department, the objections of the citizens were sustained, and a change in plan was ordered. This resulted in the adoption of plans providing for deck girders resting on concrete abutments. The abutments are of the cantilever type. The base is 5 ft. thick by 31 ft. wide, and the vertical wall 5 ft. thick by 56 ft. high, while 5-ft. fillet connects the vertical wall and the base. Reinforcement consists entirely of second-hand 56-lb. rail spaced 9 in. center to center in both the base and vertical walls. The

the south side of the creek. The excavation had to be taken out to about 5 ft. below the water surface and the maximum depth of cutting was 42 ft. A Bucyrus drag line with a working radius of 70 ft. horizontally and 50 ft. vertically was rented from a contractor, who also furnished the men to operate it. The excavation made for the two arches as originally planned was refilled by this machine, a half-inch stream of water being thrown on the material as it was dumped from the bucket. As the material was already wet, part of it coming from below the water surface, this stream proved sufficient to make it flow so as to fill the entire excavation. The expense of operating the machine was as follows:

Rent of machine.....	Per day, \$25.00
Foreman	4.00
Engineer	6.00
Fireman	3.60
Six laborers	10.50
Pumper	2.00
Watchman	3.00
Machinist	4.00
Coal, repairs, oil, etc.....	5.90

Total..... \$64.00

The total cost of excavating 40,000 cu. yd. was \$9,739.87 or 24.4 cents a yd. However, about half the material had to be handled twice on account of the difficult location of the work, and allowing for this the cost was 16.2 cents per yd. of material



Plant Layout at the Chattanooga Creek Crossing of the Nashville, Chattanooga & St. Louis

fillet is reinforced with short pieces of rail placed 18 in. center to center on a batter of 1 to 1. No reinforcement was used in the walls above the tops of the 30-ft. rails, which were carried to the bottom of the foundation slab, the tension in the wall above this point being taken care of by the concrete.

The girders are placed parallel to the tracks which they support, and, as there is a difference in the angles which the various tracks make with the walls, these girders vary in length. They are floored with creosoted timber and the regular track construction on rock ballast is used across them.

One of the piers of the old truss bridge was directly in the line of the north wall, which necessitated a special design at this point as it was impossible to place the horizontal reinforcement for a footing. Consequently a gravity section was used to a height of 30 ft. and the old pier was incorporated in the new wall.

EXCAVATION

The plans as finally adopted called for the excavation of 40,000 cu. yd. of material, about two-thirds of which was on

handled. This rather high price for drag line work was due to the fact that it was necessary to pull the old piles with the machine and also because of the many boulders which were encountered.

PILE DRIVING

No suitable natural foundation could be secured, the creek bed being made up of boulders from the mountain side for a great depth, so it was necessary to use piles. The specifications for the piles provide for any kind of timber 8 in. tops and 12 in. butts. The cut off of the piles is at the old low water line so that they will be submerged at all times. The piles were driven with a 4-ton steam hammer handled by a 20-ton locomotive crane, operating on a short section of trestle work built on foundation piles sufficiently high to keep the track above any expected stage of water. An attempt was made to use a floating driver, but as the only barge available proved too small, and the men demonstrated their inexperience in handling boats, the attempt was abandoned, after 24 hours' trial. The failure of this plan occurred at a critical time. The excavation

for the new wall having been completed behind the old pier and under the main line approach trestle, the mountain side above began to slide and endanger the main track. It was necessary to build a short section of the wall promptly in order to stop the slide, and before this could be done the foundation piles had to be driven. As an emergency measure, the drag line was moved into position, the bucket was taken off and the machine used as a crane to handle the 4-ton hammer. This was a heavier load than the machine was designed to handle, but it did the work very well. Piles were driven day and night and the short section of wall was completed in time to prevent serious results from the slide. In the meantime the locomotive crane was provided to finish the driving.

The pile driving gang consisted of 14 men and a foreman, and 2,700 piles were driven, the penetration varying from 5 ft. to 30 ft. sometimes in adjacent piles. This great variation made the driving slow, as it was necessary to use piles long enough for the greatest depth, and they had to be cut off if they failed to penetrate the full distance before the adjacent pile could be driven. The pile driver expense was about \$50 a day, and with an average of 35 piles driven a day the cost of driving per pile was \$1.40. On account of the great variation in pene-

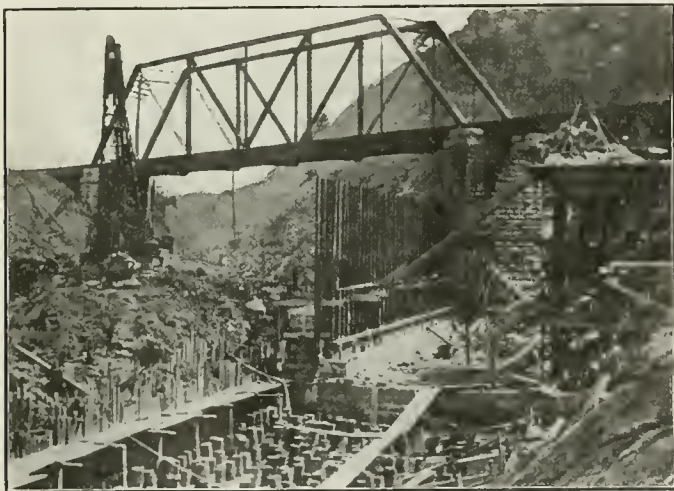
drop-bottom cars of about one cu. yd. capacity each, one car being used for each mixer. A small receiving hopper holding about $\frac{3}{4}$ cu. yd. was built at the mouth of each mixer so that no delay occurred while the car was making the trip. Two men were required with each car to push it to place, dump it and return to the mixer. Before resorting to the use of cars the mixers were raised to the height of the bridge seat, without interfering with the material bins and wheeling platforms.



The Concreting Plant

This was accomplished by extending the guides for the charging hoppers enough to reach the new position of the mixers and using a larger cable for hoisting.

Old car sills 30 ft. long were used for posts and braces for the lower part of the wall, to which the casing, consisting of 2 in. dressed lumber for the face and 2 in. rough lumber for the back of the wall were nailed. Above a height of 30 ft. the casing was nailed to studding 5 ft. long and was bolted into place by rods running through the wall. After the concrete



General View Showing Construction Progress

tration no accurate estimate can be given of the cost per foot, but assuming an average penetration of 15 ft. the cost would be 9.3 cents a driven foot. The above prices include the cost of temporary trestle work, the cost of installing the machine and the cost of unloading the piles, framing them in the yard and transporting from the yard to the machine.

CONCRETE WORK

All concrete work was of 1-3-5 mixture, the aggregate being crushed limestone. Sand and stone were delivered on the work in drop-bottom cars, which were dumped from a trestle built over the material bin. Soaked cement was unloaded by hand into a cement house built on the three-track trestle referred to above. Two No. 6 Chicago Cube mixers equipped with charging hoppers were placed on a wheeling platform which was formed by extending the floor of the sand and stone bins, and which was about 20 ft. below the bridge seat. Sand and stone were placed in the hoppers from measured wheel-barrows and the proper amount of cement added. For a large part of the work the mixers dumped directly into chutes, consisting of wooden troughs lined with sheet iron. It was found by experiment that the best inclination for chutes of this kind was 4 in. vertical to 12 in. horizontal, any steeper slope than this had a tendency to separate the mixture, while a lighter slope was not sufficient to make the concrete flow readily. A tram track was built just outside of each wall, and when the wall became too high for the chutes the concrete was delivered in



The Drag Line Excavator at Work

had set the casing was taken off in sections and used again, while the rods were simply cut off at the face of the concrete, no provision having been made for removing them. The 5-ft. wall required considerable yardage per square foot of form surface, and it was possible to keep ahead of the concrete work with a small force of form men. This term is used for the reason that there was no carpenter on the job, the form gang consisting of an experienced concrete man assisted by 4 or 5 common laborers. The mixing gang was composed of 21 men for the two mixers working as follows: 8 hauling stone, 4 haul-

ing sand, 2 on the charging hoppers, 2 dumping mixers, 1 hauling cement and 4 hauling concrete. From 2 to 6 men, depending on speed of mixing, were used for placing concrete and spading it away from the forms.

A large part of the concrete was placed with the temperature about 20 deg. F., necessitating the heating of the sand and stone to prevent freezing. This was done by building a grid-iron consisting of 1½ in. pipe laid about 30 in. center to center on the full length of the bin floor and passing steam through it. Steam was supplied from a small vertical boiler belonging to a hoisting engine.

The abutments contain 8,071 cu. yd. of concrete, and cost \$5.03 a cu. yd., exclusive of excavation and pile foundation, this figure being made up as follows:

Labor mixing and placing concrete	\$1.22
Concrete material, including unloading, etc.....	3.12
Labor building forms .....	.33
Material for forms .....	.33

\$5.03

The cost of placing about 30,000 lin. ft. of 56-lb. rail and 5,550 lb. of rods is included in the above figure. The pile foundation cost \$1.10 a cu. yd. of concrete.

PORTABLE GRAVEL SCREENING AND WASHING PLANT

BY MAC RAE D. CAMPBELL.

Although nature has been very lavish in distributing materials suitable for use as aggregate in concrete construction, nevertheless most, if not all, bank-run material should be screened so that fine and coarse volumes may be properly reportioned before using in concrete mixtures to secure dense, hence water tight concrete. Likewise, many bank deposits contain foreign matter such as clay or loam, rendering the material unfit for use unless washed. Sand and gravel may be found near the site of the contemplated work, but if facilities for washing dirty material are not available haul of varying length is involved to bring suitable materials to the site of the work.

Engineers now realize the important part that aggregates play in concrete construction. Economies resulting from applying any simple and practical method to make otherwise unsuitable material available for concrete work will soon represent a sum that would absorb the cost of a portable gravel screening and washing plant such as shown in the accompanying plan. The plant shown in the accompanying drawing is estimated to cost about \$2,000 for a capacity of screens of 350 cu. yd. per day.

Timber used in this construction should be selected stock that will permit the repeated setting up and dismantling of the plant with the least injury to the units of which it is composed. Working out the details of the design carefully for the cutting and boring of timbers will insure that most, if not all, of the units can be assembled by bolts, dowels and lag screws. Materials forming bin bottoms and sides or ends can be assembled so as to make units of these portions of the construction that in turn can be erected quickly, and dismantled with equal ease. The size of bins will be regulated by the necessity for storing any considerable quantity of material, also by the capacity of the plant. An additional amount of bracing beyond that shown in the drawing will take up any lost motion that might result from poor fit of the parts, although proper detailing at the time of laying out the work will prevent the necessity for this.

A suitable area should be cleared off at the pit or site of the deposit where such a plant is to be erected and bridge timbers or cribbing used for a foundation. It will be well to mark every piece of timber or unit of the plant, either at the time of erection or just before dismantling the plant for the first time, to designate its proper place in the construction and thus insure economy of time when necessary to re-erect the structure. Portability and convenience are prime requisites if the design is to serve its intended purpose. Many short cuts will, no doubt, suggest themselves while detailing the construction preparatory to cutting timber and erecting.

The method of charging the elevator will depend upon the conditions and upon the amount of money that it is desired to invest in loading equipment, or on the kind of loading equipment that may already be available. The drawing shows team runways leading to the hopper, but the hopper can also be loaded by means of a derrick, and a clam-shell or orange-peel bucket, a locomotive crane, a small steam traction shovel or industrial cars. The last would hardly be employed unless it was intended to use the plant at one locality for a considerable length of time. Screens, shafts, sprockets, pulleys, etc., can be obtained in the open market, yet most of such equipment could be turned out in the railroad shop. Sprockets, spur gears and pinion gears can, in nearly every case, be obtained of suitable size from a manufacturers' standard stock.

The general operation of preparing sand and gravel for use as concrete aggregate consists first of excavating the material from the bank deposit or elevating it from the beds of streams, transporting it to the washing plant, where it is elevated to a hopper located directly above suitable screens, dumping it into these screens, and playing upon the material water under pressure, which, in connection with the agitation of screens, causes rolling and tumbling of material and accomplishes its cleansing. From screens the material may be passed into bins unless used as coming from the hoppers.

Screening, washing, and, where necessary, crushing, are accomplished by using any one of several types of screens and a type of crusher that seems most desirable for the material to be handled. Screens can be grouped under the head of gravity, reciprocating, and rotary. Gravity screens are so named because the material rolls down their face by weight alone, the screens being fixed. Experience has generally proved that gravity screening plants are not as satisfactory in all cases as other types in securing a product possessing all desirable qualities. This is due largely to the great variety of material found in different pits and even in different parts of the same pit.

Reciprocating screens are a marked improvement over gravity screens, especially as regards subsequent sizing of the materials. They have long been used successfully in coal and ore mining plants. The application of reciprocating screens to gravel and sand sizing and washing has, however, been limited. Such screens are at times arranged so that the operating angle may be changed to meet different requirements arising through variations in the composition of material. In using reciprocating or vibrating screens the material to be handled must be distributed evenly across the face of the screens and be fed upon it at a uniform rate; also, the oscillating or vibrating motion must be greater at the feed than at the discharge end because of the greater quantity handled. When properly designed and erected, such screens will produce satisfactory separation of fine and coarse materials.

Rotary screens are of four general kinds: Straight-cylindrical, conical (used in an inclined as well as in a horizontal position), the combined cylindrical and conical, so-called because incorporating both forms, and the multiple conical. Cylindrical screens are made by attaching perforated sheet metal or wire cloth to circular metal frames, the size of the perforations being governed by the grading of the output desired.

To obtain material properly sized for construction which requires coarse aggregate from ¼ to 1½ in. and washed sand from ¼-in. to that which will be retained on a No. 100 mesh screen, perforations are, in the majority of cases, 1½-in. round holes in the first conical screen, the same size in the inner skirt, or screen, and ¾-in. diameter in the next screen. Material from this last screen should then be discharged into a settling tank.

Wherever a grading of material is required which lies between ¼ and ½ in. or ¼ and 1 in., the material must pass through a screen with 1-in. or ½-in. perforations, and be retained on a screen having 5/16-in. perforations. It must be remembered, however, that unless a very large percentage of the material lies between ¼ and ½ in. or ¼ and 1 in., as it comes from the pit, this grading cannot be secured in the same operation that pro-

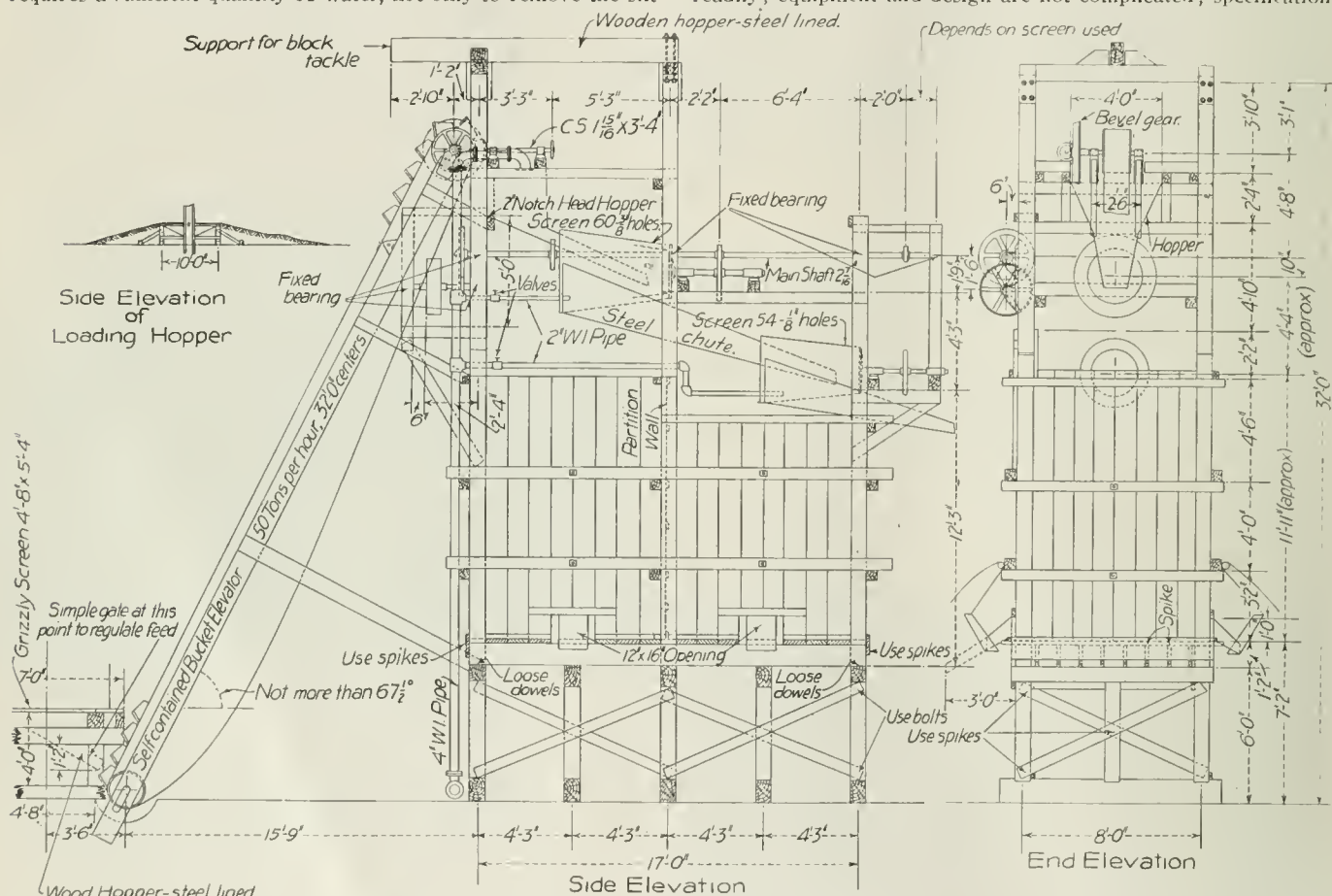
duces the coarse aggregate ranging from $\frac{1}{4}$ to $1\frac{1}{2}$ in. When specifications refer to material retained on a $\frac{1}{4}$ -in. screen, the screen meant is a testing screen, which is simply $\frac{1}{4}$ -in. wire mesh stretched over a circular frame of small diameter. Testing screens of this type are held in a horizontal position when the material is screened through them, the screens being shaken by hand sufficiently to force all material under $\frac{1}{4}$ in. through the openings. Hence, the perforations or openings in screens used in washing or screening plants must be of such diameter as experience and experiment have proved will produce materials conforming to the hand-screen test. It will readily be appreciated that sand and fine aggregate can be made to pass over instead of through a $\frac{1}{2}$ -in. mesh screen if the angle at which it is set and the speed of travel are made great enough.

The successful operation of a sand and gravel washing plant requires a sufficient quantity of water, not only to remove the silt

If materials are not used as coming from the washing plant, then storage facilities must be provided. Bins can be made of timber, steel or concrete, but if they are to be portable or semi-portable they should be constructed of timber or steel, preferably timber, as such bins can be moved around readily on trucks. Stationary bins are usually constructed only for permanent plants having large capacity.

The horse power required to operate this plant will vary considerably, depending upon modifications of design and capacity. Gasoline motive power is very convenient, economical and adaptable.

The particular advantages of the plant shown in this design are that preparation of sand and gravel for use in concrete, or by slight modifications, the preparation of ballast that in its natural state is unsuited for use, may be accomplished very readily; equipment and design are not complicated; specifications



Semi-Portable Gravel Screening and Washing Plant

from the material, but also to assist in sizing it. Every screen should be supplied with a separate water-supply spray, which also serves to rinse the material as it leaves the screen. The quantity of water required to thoroughly wash and size sand and gravel varies from $\frac{1}{2}$ gal. to 1 gal. per minute, per cubic yard of material prepared per day. That is, if the capacity of the plant is 500 yd. of prepared material per day, from 250 to 500 gal. of water per minute will be necessary at the pump. This apparent wide range in figures is due to variations in the sand and gravel that will have to be handled. In determining pump capacity it is necessary to know, of course, the quantity of water required, length of pipe between the pump and the point of discharge, size of pipe, total distance from the surface of the water at the suction end to the point where water is discharged, and the pressure of water desired at the point of discharge. In many gravel pits, large stones or boulders are found that cannot be used in concrete without crushing. Material which is over size and rejected by the first screen should be passed to a spout which will convey the large size stones to a crusher.

covering coarse and fine aggregate, as regards sizing and cleanliness, are easily met; such a plant can readily be made to produce coarse aggregate grading from $\frac{1}{4}$ to $1\frac{1}{2}$ in. that will contain not to exceed 5 per cent of material passing through a $\frac{1}{4}$ -in. hand-testing sieve, nor containing more than 3 per cent of silt; aggregate graded from $\frac{1}{4}$ to $\frac{1}{2}$ in. can be produced so that not more than 10 per cent will pass through a $\frac{1}{4}$ -in. hand-testing sieve.

RAILWAY CONSTRUCTION IN JAPAN.—A recent consular report says that the Japanese Government has laid down a general policy for railway construction. If the plan be adopted, the country's railway webs will be completed within ten years, with the addition of 1,219 miles to the mileage already operated. During the present fiscal year new lines of 79 miles will be completed and opened to traffic. Within the succeeding six years 238 miles will be completed, while the remainder is not yet assigned for the lack of capital. All the light railway lines, with a total length of 331 miles, are postponed until the year 1916-17, or later.

Practical Bridge Erection and Maintenance Methods

Second Series of Contest Papers Describing Solutions of Various Common and Special Problems by Bridge Men

The two prize winning papers and five other contributions received in the contest on Bridge Construction Methods, which closed March 10, were published in the *Railway Age Gazette* of May 21. The following contributions received at the same time cover other phases of interest to railway men engaged in building, maintaining and renewing bridges. Five additional articles for which space is not available in this issue will appear in an early maintenance section.

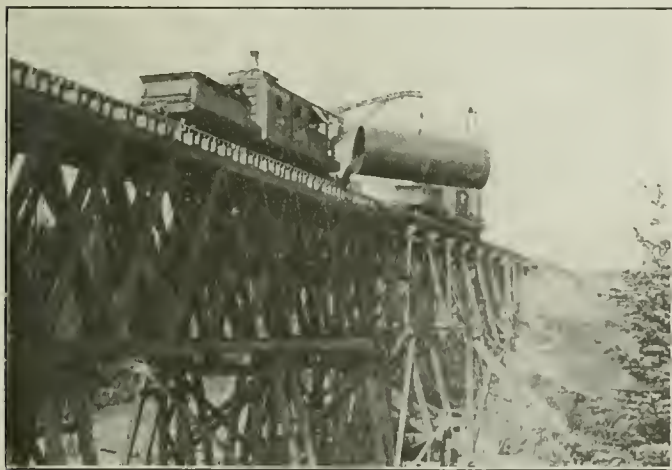
RECENT CYLINDER PIER CONSTRUCTION

By J. E. BEBB

Office Engineer, Duluth, South Shore & Atlantic, Duluth, Minn.

Metal cylinders, either of steel, wrought, or cast iron, have been used extensively by European engineers for piers and abutments of bridges, particularly by the British throughout the colonies of India, South Africa and Australia. American engineers, however, have been rather backward in adopting steel cylinders for this purpose, and until comparatively recent years they were used only under highway bridges or railroad structures of the lightest type. The following description covers two recent examples of cylinder pier construction on the Duluth, South Shore & Atlantic.

Bridge D-94, $9\frac{1}{2}$ miles south of Houghton, Mich., on the Houghton Division, which was originally a pony Howe truss span 107 ft. long with a 50-ft. timber trestle approach at each end, was replaced by one 100-ft. through plate girder span and



Derrick Car Lowering 8-ft. Steel Cylinder for D. S. S. & A. Bridge over the Waiska River

two 50-ft. through plate girder spans, one at each end of the long span. The stream spanned is known as the Sturgeon river, which drains a large territory lying to the west and south of the right-of-way. The stream is approximately 130 ft. wide at this point and 17 ft. deep, and is subject to annual floods. Soundings showed that the bed of the stream consisted of 5 to 6 ft. of sand and silt overlying red clay. Embedded in the silt were found logs and driftwood in large quantities. This fact made it seem probable that the driving of sheet pile cofferdams would be attended by considerable difficulty, so that the construction of piers by this method was abandoned as uneconomical. It was finally decided to use two $5\frac{1}{2}$ -ft. steel cylinders 26 ft. long filled with concrete, for each pier with a supporting cluster of 7 piles driven inside each cylinder. The cylinders were made of $\frac{3}{8}$ -in. steel plates, with lap joints and rivets spaced 4 in. vertically and horizontally. Each pair of cylinders was joined at the top by 8-ft. girder diaphragms.

The bottom of the stream at each pier location was thoroughly dragged to remove all logs and driftwood. Excavation was begun with a $1\frac{1}{4}$ -yd. orange peel bucket operated from a boom derrick on the shore before the cylinder was placed in position. About one-half of the total depth was excavated in this manner. The tube was then lifted by the derrick and placed in position, the remainder of the excavation being handled by means of a $\frac{1}{2}$ -yd. orange peel bucket operating inside the tube. All of the cylinders settled quite uniformly under their own weight or by blocking between the cylinders and the stringers of the old bridge, after the latter had been raised by jacks, and then allowing the weight of a locomotive to force the tubes downward. Slight inequality in settling was corrected by swinging a stick of timber in the falls of the derrick and using this timber as a ram or hammer along the edge of the tube. No obstacle in the form of logs or boulders was encountered during the placing of the first three cylinders. When the fourth cylinder was within 2 ft. of grade, a large log was struck lying diagonally across the cylinder's location 13 ft. below water level. Attempts to remove the log by grappling hooks and dynamite proved of no avail. A large chisel was then made by forging and sharpening the end of an 80-lb. rail. This rail was suspended between the leads of a track pile driver and a section cut from the log by striking the rail with the hammer.

When all the tubes were down to grade and thoroughly cleaned out, seven 40-ft. piles were driven in each one and cut off just above the water line. The water was then pumped from the tubes and the interior filled with concrete. In only one instance was it necessary to deposit a seal of concrete in the bottom of the cylinder before pumping out. The concrete filling was carried to within 14 in. of the top of the tubes and levelled. Four bolts, $1\frac{1}{4}$ in. in diameter and 15 in. long, were set in the concrete, 6 in. of the bolt protruding above the surface of the concrete. The upper ends of these bolts had been threaded and provided with nuts. Circular concrete cap slabs had been cast with an I-beam grillage in each slab for the girder bearings, before the work on the bridge began. These caps were placed in position on the four bolts by the derrick. The exact elevation of each cap slab was obtained by adjusting the nuts on the four bolts that supported each slab. Two pieces of 3-in. iron pipe had been cast into each slab extending from top to bottom, and through these two openings cement mortar was forced, after the slab had been set to line and grade. This mortar filled the 6-in. space between the concrete deposited in the cylinder and the under side of the slab, also the small annular space between the sides of the cylinder and the slab.

The usual concrete abutments were then built at the ends of the bridge, the girders placed in position and the bridge completed. The bridge was built in mid-winter, concrete being placed when the temperature was as low as 10 deg. below zero. The water and concrete aggregates were heated and the interior of the cylinders kept warm by steam coils.

Bridge No. 6, 12 miles west of Sault Ste. Marie, Mich., on the main line to Marquette, was originally a timber frame trestle, with a deck Howe truss 129 ft. long on pile piers spanning the stream. The total length of the bridge was 452 ft., and the height above normal water 49 ft. This bridge was replaced by a steel trestle 436 ft. long, with a 104 ft. 6 in. girder over the stream. The tower spans are 31 ft. long. The two towers on each side of the stream rest on concrete filled steel cylinder piers. The remaining towers rest on concrete piers of the usual type. The stream is known as the Waiska river, and is 155 ft. wide and 17 ft. deep at the crossing.

Soundings showed that the bed of the stream was composed of

stiff red clay to a great depth. Large quantities of logs and drift-wood were found on the bottom. The cylinders were made 8 ft. in diameter, and were built of $\frac{3}{8}$ -in. steel plates. This enabled a $1\frac{1}{4}$ -yd. orange peel bucket to work inside the cylinder, which hastened the sinking. The toughness of the clay rendered the excavation more difficult than in the case of the Sturgeon river bridge. Also the friction along the sides of the cylinders was great enough to prevent their sinking, as the interior was excavated. A frame of heavy maple timber was made and placed on top of the cylinder. An old pile driver hammer was fastened to the falls of a small boom derrick and used to drive the cylinders by striking the timber frame. A hand line fastened to the hammer made it possible to place the blows on various parts of the frame, which kept the cylinder plumb and the settlement uniform.

Seven piles were driven in each cylinder, which was then pumped out without sealing the bottom with concrete. Leveling bolts with sleeve nuts were set in the top of the concrete. An I-beam grillage was used on each cylinder instead of the concrete cap. This grillage was brought to proper level by the leveling bolts and to proper line by shifting the grillage on the bolts. The grillage was then concreted in to form a cap for the pier.

The cylinders were handled and placed by a steam derrick working on the deck of the old bridge. This derrick also handled the concrete mixer. When each cylinder was ready for concrete, the mixer was placed by the derrick upon a staging directly over the cylinder and the concrete discharged into the interior without handling. The same method was used in placing the concrete in the piers under the towers on the shore. The boom derrick and hoisting engine which operated the orange peel bucket were handled by the derrick and moved from place to place as necessary.

This steam derrick was built from an old steam shovel which had been badly damaged by rolling down a steep embankment and was not considered worth repairing for shovel work. The work of remodeling was done by the motive power department. Its present lifting capacity is 20 tons. It is self propelling and is used on bridge work in place of a work train.

To utilize the second class timber released from bridges recently rebuilt, a small portable saw-mill has been purchased and set up at Marquette in the building which houses the rail saw. During the winter months when the rail saw is not much used, the electric power is utilized to saw this timber into smaller sizes for building purposes. Practically all of the rough building lumber used for the past two years in building construction has been resawed from used bridge timber.

RENEWING TRESTLE STRINGERS WITHOUT DELAY TO TRAFFIC

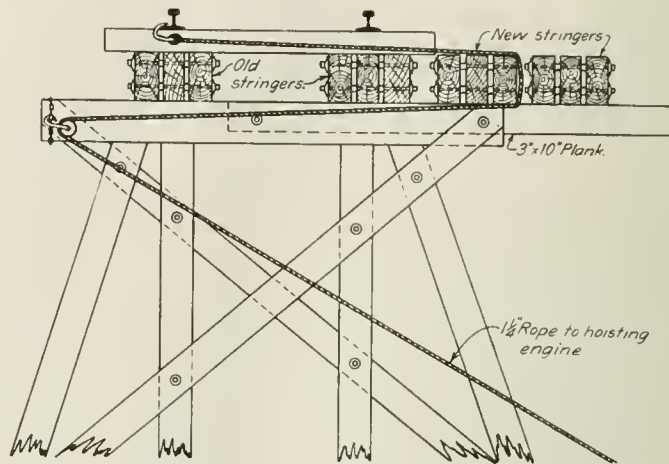
By S. C. TANNER

Master Carpenter, Baltimore & Ohio, Baltimore, Md.

In renewing the stringers in the trestle approach to the Baltimore & Ohio coal pier at Curtis Bay, Md., it was essential that the work be handled without delay to the trains of coal which pass over this trestle to the pier every 10 or 15 min., day and night. Any interference to these trains would have meant considerable delay in the yard operation and to the traffic on the road, as well as inconvenience in the loading of ocean liners.

A scaffold was built along one side of the trestle by bolting 3-in. by 10-in. planks to the caps and the new stringers were hoisted to this scaffold by the derrick shown in the accompanying illustration. The ties were then turned with the framed side up in order to make a smooth surface over the tops of the stringers, after which the track was spiked to the ties and the ties spiked to the stringers on the side opposite the scaffold. By jacking up the track on the side adjacent to the scaffold the new stringers on the scaffold were pulled under the ties between trains. A $1\frac{1}{4}$ -in. rope run from a hoisting engine on the ground

through a snatch block at the opposite end of the cap, around the new stringers and back to the opposite rail, was used for pulling in the stringers, the old ones being pushed ahead until they touched the stringers on the opposite side. The second new set was then pulled under in the same way until they touched the first set, making a solid tier of timbers under the ties. After removing the spikes from the old stringers on the opposite side and jacking up the track on that side, the first set of old stringers was pulled out to the ends of the caps and the other set of old stringers and the first set of new ones pulled over to replace them. This allowed the second set of new ones to be pulled into the permanent location. The bolts were then removed from



Sketch Showing Method of Pulling in New Trestle Stringers Without Weakening the Structure

the first line of old stringers and the timbers dropped to the ground, after which the second set of old stringers was pulled out to the end of the cap and the first set of new stringers pulled into its permanent location. Any parts of the old stringers that were worth saving were snubbed down to the ground with a rope to prevent their being damaged.

This method insured safety, as the new stringers took some of



Hoisting New Stringers to Scaffold Alongside Trestle

the load from the old ones and had a tendency to make the structure stronger rather than weaker during the renewal. The ties were turned back with the framed side down, and the work completed without the necessity for even reducing the speed of any train. A stretch of 580 ft. was renewed in this way at a cost less than would have been possible by any method I know of.

PLACING THROUGH GIRDER SPANS BY LATERAL MOVEMENT

By E. W. FAIR

Supervisor Bridges and Buildings, Buffalo, Rochester & Pittsburgh.
Du Bois, Pa.

The Buffalo, Rochester & Pittsburgh has replaced a number of steel bridges in the past three or four years by assembling the new structure on falsework alongside the old and pulling it laterally into place, using heavy bridge dollies bolted to the ends of the girders in place of the bridge shoes. This method of supporting the new spans is objectionable, however, on account of the delay involved in jacking up the bridge and removing the dollies after the new structure has been put in place before traffic can be carried over it. For this reason a method has been developed by which the span is moved on rollers between two sets of rails. In this case it is only necessary to block the rollers to allow traffic to pass over the new structure, the permanent shoes being placed later.

In the case of bridge No. 202.01, the old structure was a double-track through plate girder span 62 ft. 6 in. long, with a middle girder between tracks and a spacing of 31 ft. 2 in. center to center between outside girders. This bridge was replaced by a through girder span of the same length without a middle girder, carrying a solid concrete floor. On account of the dense traffic the new span was assembled and riveted up on falsework west of the old track, the concrete floor, ballast and ties being put in place on the new bridge. As it was necessary to cut down the masonry abutments and place new concrete bridge seats, pile bents were driven to support the old span and these were capped at an elevation low enough to allow jacks to be placed on them after the new span had been rolled into place to remove the rails and place the shoes.

Three 100-lb. rails were placed on the falsework under the new span at each end close together with the ball of the rail up, and extending over the new bridge seats. The new span was assembled on two 100-lb. rails with the ball of the rail down, these rails being fastened together with bolts extending through joint holes with wooden filler blocks to keep them from turning. Steel rollers 2 in. in diameter were laid between the two sets of rails at 18-in. intervals and were also placed in position on the lower rails ahead of the new structure ready to receive it in rolling into place. The end floor beams were in line with the sole plates, providing a support for the two rails carrying the new span. The center rails on the bridge seat were extended out over falsework on the east side erected to receive the old span when moved out to make room for the new.

Two wrecking cranes were used to make the movement, the cars being placed as close as possible to the ends of the bridge. The old span was raised and girder dollies placed under each corner, after which it was pulled out on the falsework at the east side and the new span pulled in from the west. This change was made between 6:10 a. m. and 7:25 a. m., the actual time of pulling the new structure into line being only 8 min. The steel in this bridge weighed 315,220 lb., and the concrete deck 180,000 lb. In addition to this the span carried the limestone ballast and ties. A similar bridge 76 ft. 6 in. long in which the steel weighed 452,778 lb., and the concrete deck 225,000 lb. in addition to ballast and ties, was rolled into place on old 5-in. bridge pins, the track being out of service only 1 hour and 45 minutes.

No trouble was experienced in rolling these bridges into place and a probable saving in time of at least one or two hours was effected in addition to the greater convenience and security of this method. The difficulty experienced with the dollies was that they had a tendency to skew and bind on the flanges of the dollies, causing one or more of them to slide, which gave considerable trouble in moving heavy spans. With the free movement of the load on rollers it was found that by hitching the pulling lines near the center of the span the bridge could be moved evenly at both ends, although there might be a stronger pull on one line than on the other. The ease with which the heaviest of these two spans could be moved was

demonstrated by placing a No. 6 Barrett track jack at each end and moving the span without difficulty with six men.

REPLACING HOWE TRUSS SPANS WITHOUT FALSEWORK

By J. B. SHELDON

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When it became necessary to renew the New York, New Haven & Hartford double-track bridge over the Blackstone river in Woonsocket, R. I., the two Howe truss spans of 146 ft. and 91 ft., respectively, were replaced by three deck plate girder spans, one of 91 ft. and two of 73 ft. The intermediate bearing for the girder spans replacing the long trusses was provided by a steel tower supported on a concrete pier built up a few feet above the water level.

The base of rail was about 47 ft. above the river and the water was about 11 ft. deep. In order to reduce the cost of falsework to the minimum consistent with safe operation of the bridge during construction, a number of changes were made in the old Howe trusses. The old trusses, which had been built in 1876, had been strengthened in 1890 by placing pile bents at each end under the second panel to reduce the chord strain. In order to permit raising the bridge seats at the ends of this span to receive the new girders the main braces at the ends of the old trusses were changed to incline away from the bridge seats and the bottom chord was cut in front of the bridge seats, making cantilever spans at the ends of the old trusses, the temporary pile supports serving as



Renewing a Howe Truss with Two Girder Spans. The New Span on the Right Is in Place, the Other Is Supported from Overhead Bents During the Removal of the Old Floor System

abutments. Also to permit the erection of the tower on the new center pier to support the new girder span the bottom chords of the trusses had to be cut and to carry the load mud sills were placed on each side of the new pier foundation and frame bents erected, after which the counter braces for two panels at each side of the center of the trusses were reinforced to act as the main braces of the two spans which were formed by the cutting of the bottom chord. The top chords of the old trusses were not cut until after the girders had been placed and the old trusses removed.

The new girder spans were riveted up on a nearby siding and taken to the bridge on flat cars. When spotted above their permanent location they were raised from the cars by manila rope lines and tackle blocks hung from overhead timber bents, supported from the piers below. The lead lines to these hoisting blocks were handled by a locomotive at each end of the structure, the lines being long enough to allow the flat cars to be pulled out one at each end, and to stand on the structure between the girders and the locomotive. With the new span held by the locomotives the floor system of the old bridge was dropped into the river and the girder spans were then lowered into position between the outside and the middle trusses of the old bridge. These girders were placed on three successive Sundays when traffic over the line was the lightest. About 20 trains were operated over a single track during the 10 hours that the one track was blocked, while removing the floor of the old bridge and placing the new girder span. The cost of temporary falsework for carrying traffic was thus avoided. The cost of all work in connection with installing the new steel, riveting the girders, towers, etc., was \$7.20 a ton. The work was handled by the company's maintenance forces under the direction of the writer.

RENEWING A BUSY MAIN LINE BRIDGE ON THE SANTA FE

By L. C. LAWTON

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During the latter part of 1914 the three-span deck girder bridge carrying a double track over the Cottonwood river at Florence, Kan., was replaced by a four-track through girder structure of the same span length in order to provide additional waterway without a raise in grade, and additional tracks to carry a heavy main line traffic and numerous yard movements. This bridge is located between the east and west yards of an important freight junction, the new tracks forming a part of a new yard plan which will be the beginning of a four-track system. This is a coal and water station for all freight trains and the new arrangement will permit two or three trains to come into the yards from either direction and take coal and water without blocking the main line. These tracks will also serve as switching leads to both yards.

As in most trunk line work, it was necessary that traffic should not be interfered with, and to prevent it, falsework for one track on the north side was driven. This was located so as to carry one of the new tracks and crossovers were so arranged that any two of the three tracks could be used as part of the double-track main line. All falsework was built to carry any train under ordinary control in yard limits.

The old masonry was of local limestone in large blocks, well cut and pointed, and with the exception of the west abutment and several pedestal blocks was in very good shape. The east abutment, however, had been built on the fill, and had to be taken out and a concrete gravity abutment placed on solid rock 37 ft. below the base of rail. To carry the ends of the girders while this was being done, a double bent was driven to clear the toe of the new abutment, and to carry the track over the excavation falsework was driven back of the abutment and was connected to the girders by boxing in a frame bent between the ends of the girders to carry the stringers from the last bent. The same method was used on the west abutment, as the entire top had to be removed.

On account of the change in depth of girders, the old masonry had to be raised several feet. This, together with the fact that the old piers were much thinner than the present standard requires, made necessary the adding of a jacket of concrete 2 ft. thick on each side of the piers. Holes 36 in. apart in horizontal rows, 18 in. apart vertically and 12 in. deep, were drilled in both sides of the old piers and hooks made of reinforcing bars were placed in these holes, wedged with track spikes, and later grouted. To these hooks were fastened a network of 58-in. bars spaced 36 in. horizontally

and 18 in. vertically at a distance of 4 in. from the forms. This frame work was so well set that it was used as a ladder by the carpenters in completing the forms. These bars were carried around the ends of the old masonry into concrete extensions and above it, where the pedestal blocks and coping had been removed, into a solid cap 5 ft. thick. The concrete under the girder shoes was reinforced in the usual way.

On the south side a temporary material track was built up to the west end of the bridge, with its end elevated on frame bent so that rock and sand for concrete could be unloaded from dump cars. A cement shed was also built adjacent to it, of old roundhouse doors framed so as to be easily put up, taken down and transported. A light roof of tar paper on sheeting went with it. A floor of old boiler plate was placed for stone under the end of the material track, which made the shoveling much easier and quicker. A cantilever runway was built along this side of the bridge for handling all material on barrows from this end to the mixer set up over the forms on bents. Both piers and the abutment were built up for the full length as high as concrete could be run under the girders from this side.

While this was being done, material for the falsework first mentioned was received and placed, after which the north



Placing 70-ft. Through Girder with Wrecking Crane and Derrick Car

ends of the piers and abutments were completed by using this for a runway. It was not practical to spout or wheel concrete across the tracks, nor could material be unloaded except at one end of the bridge. This made a long barrow haul for part of the material, but the relatively small amount of the work, 3,300 cu. yd., did not justify a more expensive outfit. The labor cost of unloading, mixing, and placing concrete was \$1.08 per yard. This included the piping of water and steam, building of runways and scaffolds, moving mixer and unloading all material, but not the building of forms or placing reinforcement, other than that laid during pouring of concrete. The labor on forms was \$0.52 per yard of concrete, which was rather high on account of their enclosing much old masonry.

There are three new girders in each span. To make room for the center one, the south track had to be thrown 22 in. This was done by moving the deck girders onto new frame pedestals by lifting and pushing with heavy jacks and by lining the falsework and track with them. This allowed the bridge seat in the center to be completed, its top being nearly 2 ft. above the bottom of the old girders. The remainder of the top course of the piers and abutments was not finished until the old girders had been taken out.

On account of the narrow space in which to work, only one mixer could be used. The work was laid out so as to keep this working as much as possible, by keeping the excavating out of the way of the forms, and the latter well ahead of the concrete. It was necessary to move the mixer oftener in this way, so as to allow time for building forms after the foundation had been poured, as it was found that by getting the forms nearly completed and well braced from top to bottom before pouring, a big saving in form work could be effected.

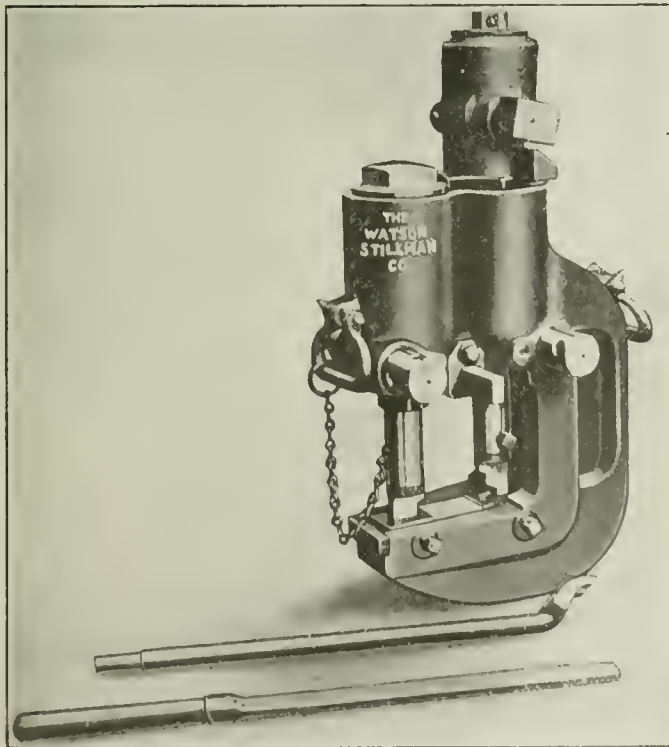
All concreting was completed well before freezing weather except that part placed under the center girder after the old

bridge was shifted. As this had to hold up the major portion of the bridge, it was especially important that it should not be frozen and that it should be well cured. This work was done during a very cold spell in December, as it could not be held up, on account of the schedule of the steel gang. The concrete was mixed with hot water and was still warm when placed in the form. Over this section in each abutment and pier was erected a shelter of canvas, and two oil stoves were placed in each. These were kept going for three weeks on account of the unusually cold weather for that month. The heat was not great enough to dry out the concrete—in fact, it was kept damp by melting snow on the bridge and canvas, but it did let it set under very favorable conditions, and proved to be as hard as any when points for shoes were set.

The steel was placed by company force, which has been found much cheaper than by contracting it. All work was done by a large derrick car with a capacity of 45 tons, except the placing of the new girders, where the division wrecking crane took one end and the derrick the other. A creosoted floor for ballast deck was placed after the laying of the floor beams, and the track put in service on the south bridge while the floor was being put in on the north side.

A NEW DUPLEX SPIKE SLOT HYDRAULIC PUNCH

The Watson-Stillman Co., Aldene, N. J., has brought out a new hydraulic punch for cutting out two spike slots in railroad or conductor rails at one setting. The advantages of this tool are that two holes can be punched on opposite sides of the rail at



Duplex Spike Slot Punch

one operation in exact alinement, thus saving in the time usually consumed in laying out centers and changing the machine from one side of the rail to the other.

By referring to the illustration it will be seen that one punch is attached to a chain. To use the machine this punch is removed, the tool is then placed against the rail and the loose punch replaced in position. The punches are then run down to the rail by pinions which mesh into racks on the rams, and a few strokes of the pump lever completes the operation, the return being effected by means of the racks and pinions. The whole action

takes only two minutes and requires but a small amount of effort.

The punch is built compactly and is designed to give maximum strength for minimum weight, so that it may be easily and quickly handled when time is a factor. The working parts are readily accessible for cleaning and the punches and dies are removable for sharpening, renewal, etc.

THE ROADMASTERS' CONVENTION

The thirty-third annual convention of the Roadmasters' and Maintenance of Way Association will be held at the Auditorium Hotel, Chicago, from September 7-10 inclusive. From the interest already shown, this meeting should be one of the largest attended in the history of this association. In addition to individual papers, several committee reports will be presented, including those on new and experimental track accessories and tools, and on the proper organization of section forces and methods for handling and policing track (1) for high-speed, heavy traffic railroads; (2) for lightly constructed railroads carrying heavy traffic; (3) for large terminals.

The program in detail is as follows:

Tuesday, September 7, Morning—Convention called to order at 10 a. m.

Afternoon—2 p. m. to 6 p. m. Business session. Reading of committee reports and general discussion.

Evening—7:30 to 10 p. m. Business session. Reading of committee reports and general discussion.

Wednesday Morning—9 a. m. to noon. Business session. Reading of committee reports and general discussion.

Afternoon—12:45 p. m. Members will leave the Chicago & North Western Terminal on a special train at 1 p. m. to inspect various terminals, including the new clearing yard.

Thursday Morning—9 a. m. to noon. Business session. Reading of committee reports and general discussion.

Afternoon—1:30 p. m. to 6 p. m. Business session. Election of officers. Selection of the next convention city.

Evening—A theatre party for the ladies will be given by the Track Supply Association. The fourth annual banquet will be given by the Track Supply Association for the members and guests of the Roadmasters' and Maintenance of Way Association at the Auditorium Hotel.

Friday Morning—9 a. m. to noon. Business session. Reading of committee reports and general discussion.

Afternoon—1:30 p. m. to 6 p. m. Business session. Reading of committee reports and general discussion.

Equally promising is the outlook for the exhibit of the Track Supply Association. Up to August 12, 59 firms had made reservations for space as compared with a total of 51 last year, which exhibit was the largest up to that time. As in the past the exhibits will be confined exclusively to tools and appliances for the track department and will consist almost entirely of full sized units rather than models. In addition to the regular track accessories ordinarily found, such as rail anchors, guard rail clamps, tie plates, splices, switchstands, etc., there will be other exhibits such as acetylene lights, motor cars, track tools, etc. As in previous years the exhibit will be located on the top floor of the Auditorium Hotel, adjacent to the convention hall.

The following firms will exhibit:

Aeme Supply Company.
American Flexible Bolt Company
American Guard Rail Fastener Company
American Hoist & Derrick Company
American Steel & Wire Company.
American Valve & Meter Company
The Anchor Company
Ajax Forge Company
T. B. Bowman.
Carnegie Steel Company.
Commercial Acetylene Railway Light & Signal Company
Composite Tie Plate Corporation
Bruce V. Crandall.
Creep Check Company
Cretar Adams Company
Dalton Risley & Associates
Daniels Safety Device Company
The Duff Manufacturing Company
The Efficiency Rail Anchor.
Elliot Frog & Switch Company
Fairbanks, Morse & Co.
Fairmont Machine Company
Franco Manufacturing Company

Exhibitors at Roadmasters' Convention (Continued.)

Frictionless Rail.
 Hatfield Rail Joint Company.
 Hayes Track Appliance Company.
 Harry C. Holloway.
 Hubbard & Company.
 Indianapolis Frog & Switch Co.
 Ingersoll-Rand Company.
 Kelly-Derby Company.
 Keystone Grinder Manufacturing Company.
 Lackawanna Steel Company.
 Madden Company.
 Berton W. Mudge & Co.
 M. W. Supply Company.
 National Lock Washer Company.
 National Malleable Castings Company.
 Northwestern Motor Company.
 P. & M. Company.
 Pennsylvania Steel Company.
 Pocket List of Railroad Officials.
 Positive Rail Anchor Company.
 O. & C. Company.
 The Rail Joint Company.
 Railroad Supply Company.
 Railway Age Gazette.
 Railway Equipment & Publication Company.
 Ramapo Iron Works.
 Reading Specialties Company.
 Sellers Manufacturing Company.
 Stanford, Arthur L.
 Templeton-Kenly Company.
 Track Specialties Company.
 Union Switch & Signal Company.
 U. S. Bolt Company.
 Verona Tool Works.
 William Wharton, Jr., & Co., Inc.

THE ANNUAL COST OF TIES

By J. G. SULLIVAN

Chief Engineer, Canadian Pacific, Winnipeg

Formula (2), submitted by the Tie committee of the American Railway Engineering Association last March, gives the annual cost to maintain a tie as follows:

$$I + A = CR(1 + R)^N - 1$$

Where C = First cost of tie in place.

A = Amount at compound interest which will provide for renewal at the end of the life of the tie.

R = Rate of interest.

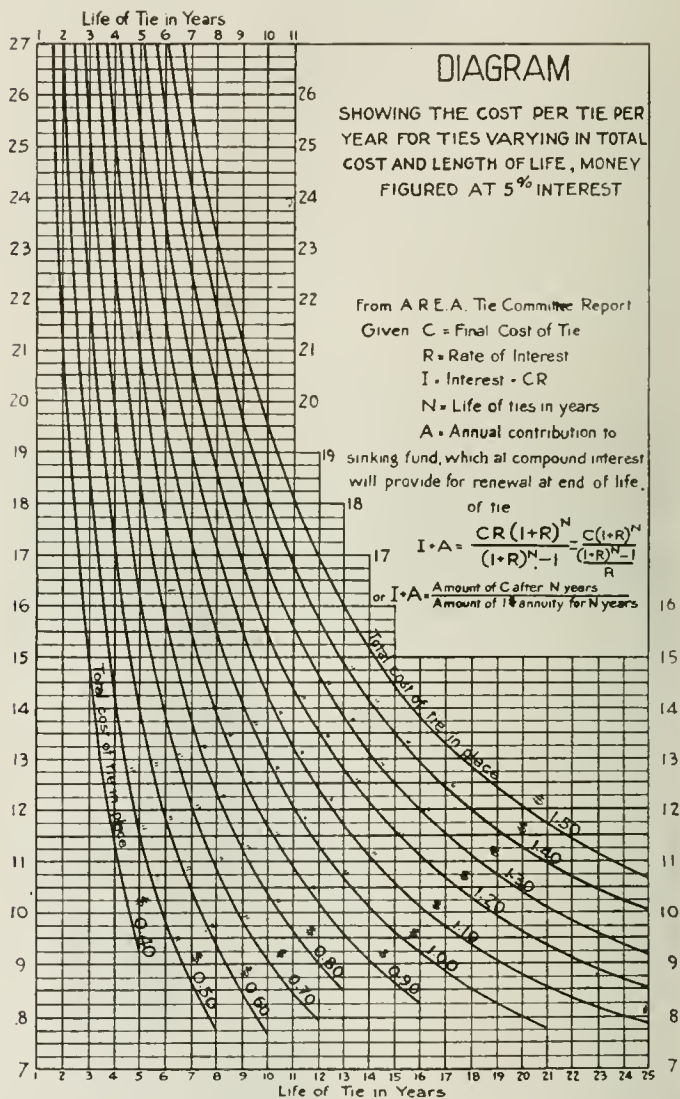
N = Life of tie in years.

I = Interest on the first cost.

While this formula appears somewhat complicated, it is not

so formidable if it is divided up into factors which can be taken from compound interest tables.

For the use of our tie department and engineers, I have had three diagrams made up, showing the value of I plus A, from which the annual cost per tie can be taken for ties costing from \$0.40 to \$1.50, and varying in life from 2 to 25 years. These diagrams would be much easier to use if they showed only the value of "A"; that is, the amount required to be subscribed annually to form a sinking fund which would purchase a tie. To this would be added direct the interest on the first



Curves Showing the Cost Per Tie Per Year for Varying Original Costs and Life

cost of the tie. This would have a slight advantage over the present form in a case where the cost of the present tie will differ from the estimated cost of the new tie. The same result, however, can be obtained by taking from the diagram the annual cost, using the estimated value of the new tie, deducting from this the interest per annum at the given rate on this difference. For example, if we estimate that it will cost \$0.80 to renew a tie which cost \$0.75 in place, and will last 8 years, money figured at 5 per cent, we take from the diagram the annual cost of an \$0.80 tie lasting 8 years, which is \$0.124 and deduct from this the interest at 5 per cent on the difference in the actual cost and the estimated cost of the renewal, 5 cents, which is \$0.25, making the annual cost \$0.1215 instead of \$0.124.

ANNUAL COST OF TIES LASTING VARIOUS LENGTHS OF TIME, COSTING IN PLACE VARIOUS SUMS MONEY FIGURED AT 5% INTEREST													
LIFE IN YEARS	COST IN PLACE												
	\$0.40	\$0.50	\$0.60	\$0.70	\$0.80	\$0.90	\$1.00	\$1.10	\$1.20	\$1.30	\$1.40	\$1.50	
1	0.420	0.525	0.630										
2	0.215	0.269	0.322	0.376	0.430	0.484	0.538						
3	0.147	0.184	0.221	0.257	0.294	0.331	0.368	0.405	0.442				
4	0.113	0.141	0.169	0.198	0.226	0.254	0.282	0.310	0.338	0.367	0.396	0.423	
5	0.092	0.115	0.139	0.162	0.185	0.208	0.230	0.254	0.278	0.301	0.324	0.345	
6		0.098	0.118	0.138	0.157	0.177	0.196	0.216	0.236	0.256	0.276	0.294	
7		0.086	0.104	0.121	0.138	0.155	0.172	0.190	0.208	0.225	0.242	0.258	
8		0.078	0.093	0.109	0.124	0.139	0.156	0.171	0.186	0.202	0.218	0.234	
9			0.084	0.098	0.112	0.126	0.141	0.155	0.168	0.182	0.196	0.210	
10			0.077	0.091	0.104	0.117	0.129	0.142	0.154	0.168	0.182	0.195	
11				0.084	0.096	0.108	0.120	0.132	0.144	0.156	0.168	0.180	
12				0.079	0.090	0.102	0.113	0.124	0.136	0.147	0.158	0.169	
13					0.085	0.096	0.107	0.117	0.128	0.138	0.149	0.160	
14						0.090	0.101	0.111	0.121	0.131	0.141	0.151	
15						0.087	0.096	0.106	0.116	0.125	0.135	0.144	
16						0.083	0.092	0.101	0.111	0.120	0.129	0.138	
17							0.089	0.098	0.107	0.115	0.124	0.133	
18							0.086	0.094	0.103	0.111	0.120	0.129	
19							0.083	0.091	0.099	0.108	0.116	0.124	
20							0.080	0.088	0.096	0.105	0.112	0.120	
21							0.078	0.086	0.094	0.101	0.109	0.117	
22								0.084	0.091	0.099	0.106	0.114	
23								0.082	0.089	0.096	0.104	0.111	
24								0.080	0.087	0.094	0.102	0.109	
25								0.078	0.085	0.092	0.100	0.107	

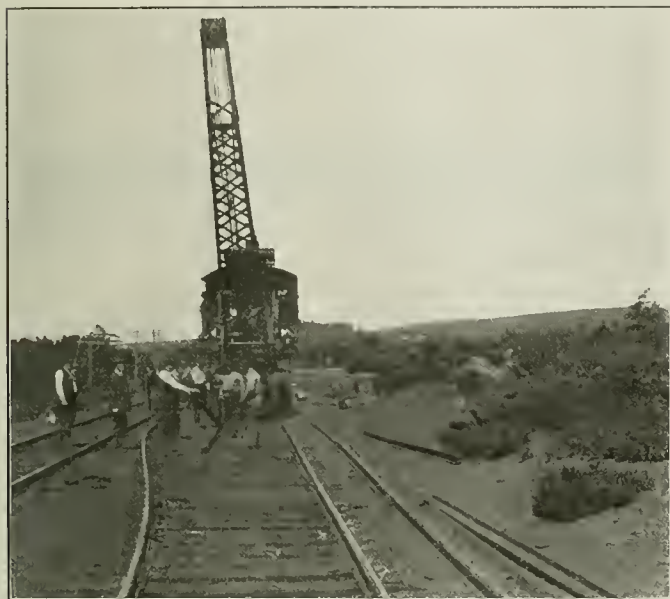
The Annual Cost of Ties of Various Life and Original Cost

THE UGANDA RAILWAY.—The new Port Bell-Kampala Railway in Uganda was opened for all classes of traffic on July 1.

Laying Rail with the Help of Locomotive Cranes

Lehigh Valley Finds That Laying Rail with Cranes Is
More Economical and Interferes Less with Operation

The Lehigh Valley has been employing locomotive cranes experimentally when relaying rail to throw out the old rail and place the new, thereby doing away with the customary tong men. One of the early trials of this method was made on the Beaver



Heeling in a Rail on the Beaver Meadow Branch

Meadow branch in the anthracite coal territory on June 28. On this day $2\frac{1}{2}$ track miles of 76-lb. and 80-lb. rail was replaced with 90-lb. rail in 14 hours actual working time, with one crane. A total of 832 33-ft. rails were laid in 840 minutes, the machine also throwing out the old rail as it moved forward.

Eighty-six men were employed on this work. Fourteen men



Throwing Out the Old Rail

pulled the spikes from the old rails in advance of the machine. It was necessary to pull both rows of spikes on the greater portion of the work and many rail braces had to be removed from the old rail. Six men assisted the machine in handling the rail, one operating the rail clamps, one man spiking each end of the rail in place, one man forcing the rail in against the row of old

spikes with a bar, and one man on each end to guide the new rail in place. Two men cut the joints on the old rail at intervals of about 15 rail lengths. On curves, eight men adzed the ties on both sides of the rail and removed a large number of small tie plates. Twenty-five men spiked and gaged the new rail, 25 put on the splices and six men with picks and shovels moved the ties to enable these splices to be inserted.

The line was double tracked at this point and the rail gang was given the use of the eastbound track while the work was under way. The locomotive crane worked on a heavy descending grade with a maximum of 2.5 per cent. for 5,000 ft. This grade was for the most part on curves up to 13 deg. Under these severe conditions no trouble was experienced in operating the locomotive crane. An old locomotive tank was placed back of the crane to provide sufficient water, as there were no water stations in this vicinity.

As this was the first time that this gang had worked with a machine in this manner, some delay was experienced. Also, as the new rail had a considerably larger base than the old it was necessary to remove the old tie plates and to adze the ties before the new rail could be laid. About five rail lengths of old rail was thrown out at a time.

Based on this experience, a stretch of 4.7 track miles, including four switches, was relaid with 100-lb. rail and all the old material



Working on the Buffalo Division

loaded on cars on the Buffalo Division on July 15. Four locomotive cranes were employed for this work, one starting on each rail at the outer limits of the work and all working towards the center. The organization was similar to that described previously. A foreman, six laborers and a crane operator accompanied each crane, while other men followed the cranes, full bolting and spiking the new rail and uncoupling the old rail.

The first crane started work at 6:23 a. m., and the last crane at 7:45 a. m. The last crane completed work at 12:51 noon. The four cranes were employed 20 hours and 27 minutes, including 73 minutes total detention. In this interval 1,313 rails were laid, or an average of 64 per crane hour. The maximum average per crane hour was 76.5.

Following these cranes were air loaders picking up the old material. After the locomotive cranes had completed laying the rail they returned and assisted in this work, all material being loaded ready for shipment at 6:30 p. m.

Based on these results the Lehigh Valley now proposes to

adopt the standard practice of unloading all new rail with machines, laying it with locomotive cranes and picking up the old rail by machinery the same day. This will not only result in the work being done faster and more economically, but will reduce very materially the interference with operation.

This method has been devised under the general direction of G. L. Moore, engineer maintenance of way.

THE ITALIAN-ENGLISH COURSE OF THE PENNSYLVANIA RAILROAD

Of the 140,000 employees of the Pennsylvania Railroad east of Pittsburgh and Erie, over 11,000 are Italians. Practically all of these men have entered the service of the road in the last few years and their numbers are increasing steadily. They are found in nearly all branches of the service as is illustrated by the following census taken on the Manhattan Division:

Conductor	1	Stoker operator	1
Engineer	1	Laborers	344
Clerks	3	Stewards	14
Foreman	1	Boiler cleaners	2
Assistant foremen	2	Coal trimmer	1
Stenographers	2	Sweeper	1
Telegraph operator	1	Assistant doorman	1
Signalman	1	Wiper	1
Painters	4	Repairmen	4
Riggers	16	Car builder	1
Watchmen	2	Wireman	1
Scalemen	4	Blacksmith helpers	2
Shop hand	1	Track walkers	5

The greatest number are to be found in the maintenance of way department. This is illustrated more particularly by a similar census of 553 Italian workmen employed on the West Jersey & Seashore Railroad and the Camden Terminal Division.

CONVERSAZIONE

INGLESE	PRONUNZIA IMITATA	ITALIANO
Good-morning, foreman.	<i>Guat morning, formän.</i>	Buon giorno, foreman.
What tools shall we use today?	<i>Guat tuls shall vüi ius tudëi?</i>	Che ferri useremo oggi?
Today we use the track jack.	<i>Tudëi vüi ius thi träck giäcc.</i>	Oggi usiamo il cavalletto delle rotaie.
What is the track jack?	<i>Guat ts thi träck giäcc?</i>	Cosa è il cavalletto delle rotaie?
The track jack is a tool used to raise the track.	<i>Thi träck giäcc is ä tul iusd tu rës thi träck.</i>	Il cavalletto delle rotaie è un arnese usato per alzare le rotaie.
How do you raise the track?	<i>Hau du iü rës thi träck?</i>	Come alzata le rotaie?
Place the jack against the base of the rail.	<i>Plës thi giäcc äghënst thi bës ov thi rël.</i>	Colloca te il cavalletto contro la base della rotaia.
Move the handle down.	<i>Muv thi handl daun.</i>	Muovete il manico giù.
On what side of the rail do you place the jack?	<i>On guat said ov thi rël du iü plës thi giäcc?</i>	Da quale lato della rotaia mettete il cavalletto?
On the outside of the rail.	<i>On thi autsaid ov thi rël.</i>	Dal lato esteriore della rotaia.
Why do you place it on the outside?	<i>Guat du iü plës it on thi autsaid?</i>	Perchè lo mettete fuori della rotaia?
To prevent accidents.	<i>Tu privënt accidënts.</i>	Per impedire degl'incidenti.
What accidents?	<i>Guat accidënts?</i>	Quali incidenti?

A Typical Page of Conversational Lesson

Subdivision foremen	7	Crossing watchmen	73
Subdivision assistant foremen	11	Bridgemen	7
First laborers	4	Station laborer	1
Track watchmen	57	Car cleaners	15
Laborers	380		

A considerable number of these men are advancing from the ranks of laborers to positions of responsibility. A canvass several months ago showed that there were 75 Italian section foremen and 187 assistant foremen on the road. On the Pittsburgh Division 27 of the 53 track foremen and 42 of the 52 assistant foremen were Italians. Men of this nationality take to track work readily and many other efficient workmen would be promoted to assistant foremen and foremen if they were able to read and write the English language. To assist these men to acquire a knowledge of English, the railroad is preparing an Italian-English correspondence course for all who desire to avail themselves of



THE TRACK GAUGE
Fig. 4

Inglese

THE TRACK GAUGE

The track gauge shown in Fig. 4 is to ascertain the correct distance between rails. Its length is four feet eight and one-half inches. Anyone using it must take care to place it across the track, at right angles to the rail, as shown in Fig. 5. This shows how to use the gauge to determine the proper distance between rails. The end of the single point of the gauge is placed first on one of the rails and the forked end on the other. The two points of contact of the forked end of the gauge should each be against the rail.

Italiano

LA MISURA DELLE ROTAIE

The track gauge è la misura per ottenere la distanza esatta tra le rotaie. Essa è lunga quattro piedi e otto inches e mezza. Chi l'adopera deve aver molta cura a collocarla a traverso le rotaie, a guisa ad angolo retto con la rotaia, come è dimostrato nella Fig. 5. Questo dimostra come si usa la misura per determinare la dovuta distanza tra le rotaie. L'estremità della punta semplice della misura è posta prima su d'una delle rotaie, e poi l'estremità che termina a forca sull'altra. Ciascuna delle due punte di contatto della forca dovrebbe essere contro la rotaia.



CORRECT WAY TO USE TRACK GAUGE
Fig. 5

A Typical Page Illustrating the Use of Track Tools

the opportunity of educating themselves in this regard, and over 2,000 men are already enrolled. This course is conducted by an Italian, the lessons being prepared with the co-operation of officers of the road experienced in the various subjects covered.

At the present time 12 pamphlets have been prepared. The first three give corresponding English and Italian words side by side and also short elementary sentences, including common track terms. The next five give descriptions and instructions regarding the use of the common tools, such as the jack, the gage and the ballast fork, with photographs showing the right and wrong ways of using them. Lesson 10 gives in detail the various signal rules,

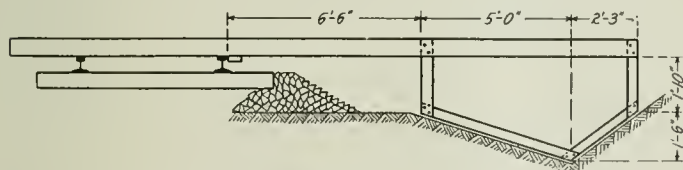
with illustrations, taken from the standard book of rules. Lesson 11 is devoted to the procedure of naturalization, while lesson 12 is a general discussion of the elementary rules for the preservation of the health. In these books the English and the Italian are placed side by side, so that the men can learn the corresponding terms to express the same idea. All illustrations and lessons refer directly to track work, incorporating the standards of the road.

DIGGING TRACK DITCHES

BY KENNETH L. VAN AUKEN.

Some track men do not take the trouble to do a first-class job of ditching, but leave the ditch with poor lines on the sides, an uneven bottom and various other irregularities which are not only unsightly, but greatly reduce the actual drainage afforded to the track. In most cases it is just as easy and cheap to do a good job. The whole problem is to organize the gang and to arrange the work so that no extra dirt is excavated and so that a correct line and bottom are assured. The foreman should take advantage of the ability of his best laborers to raise the standard of the entire work. In any gang there will be some men who are more conscientious than the rest, and who do much better work. The organization should be based, if possible, on a nucleus of such men with the idea that they will serve as guides to the others, and also as a measure by which the foreman can ascertain if the work is being done correctly.

Next to the correct placing of the men the efficient use of good tools and appliances is of the greatest importance. One of the most necessary implements for a ditching gang is a template to insure uniformity in the shape and gradient of the ditch. The template, or ditch gage, usually consists of a long plank or board to the end of which is attached a framework consisting of four strips, shaped to the standard ditch section. If available an old



A Simple Ditch Gage

spot board containing a level bubble may be utilized. When this template is placed across one or both of the rails in proper line and level, the gage will give the correct position of the ditch cross section. To insure correct line of the ditch a cleat or block may be nailed on the top strip of the gage at a point that will accurately center when this block is in bearing against the outside of the rail head.

While the ditch gage is an excellent tool, it is not always possible to use it on roads where the cuts are not all of standard width. In many cases it is necessary to change the alignment of the back of the ditch to prevent digging into and loosening the slope, or it may be necessary to vary the distance between the front line of the ditch and the track, while it is sometimes required to change the slope of the sides or the shape of the ditch entirely. When the front of the ditch has to be changed the ditch line should be set so that there will be no abrupt turn.

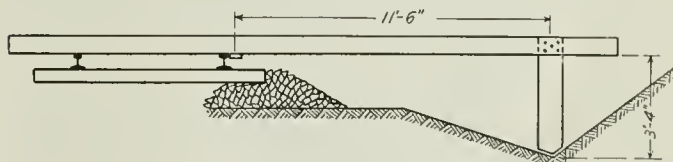
Where the ditch gage described above cannot be used a modification of this tool is found very useful. This consists of a straight board or strip similar to that used with the ditch gage, to which a single board is nailed on the outer end in a perpendicular position, to indicate the depth of the bottom of the ditch below the top of rail. A thumb screw may be used to fasten the short piece to the top strip, and then the depth of the ditch may be gradually increased or decreased as desired, by raising or lowering the perpendicular strip by means of the adjusting thumb screw.

The regular ditch gage is usually made for the shallowest depth of ditch. When it is desired to make a ditch deeper than this, a rule is used to measure down below the bottom of the framework. Where the standard practice of the road

requires the ditch to be widened as the depth increases, the increase in width should be obtained by moving the back ditch line further away from the track; the front ditch line should be kept straight and parallel with the track line if possible.

Ordinary No. 2 shovels are usually furnished for ditching. These can be used fairly well in loose material, but in hard clay special shovels or heavy bladed spades can be used to much greater advantage. One has only to note the kind of shovels used by the experienced excavators in large cities to realize what kind of a tool is best fitted for digging in hard material. These laborers, who follow excavating as a trade, will cut about three inches off the bottom of an ordinary No. 2 shovel, and cut the sides on a bevel to make the bottom about two inches narrower than the top. It is surprising how much dirt one of these excavators can handle with a shovel of this kind. They keep their shovels well sharpened, and use some sort of a metal plate on their shoes, which enables them to put more pressure on the shovel. The use of spades also results in a marked economy, provided the spades have backs of sufficient weight and strength. A cheap spade will be bent or broken a few minutes after it is placed on the job, particularly if it gets into the hands of an unskilled laborer.

It is much better to use some special kind of shovel or spade for excavating than to use ordinary No. 2 shovels supplemented by picks, in fact the use of picks should ordinarily be prohibited in ditching. A man will spend more time choosing between his shovel and pick than he does in actual work; and will frequently use the pick in material which is so soft that



A Depth Gage for Irregular Ditches

it is not needed, which means of course that he is wasting time.

The ditching gang on one division was organized somewhat as follows:—Two men were furnished a ditch gage like the one described and started out ahead of the gang, digging holes to the proper depth and line at intervals of about ten feet. Their work served to indicate the proper depth and slope of the sides of the ditch to the other laborers of the gang. The two best men in the gang were assigned to this work so that the foreman was sure that it would be done right. His supervision was thereby reduced to seeing that the rest of the laborers dug out the ditch between, in accordance with the holes excavated by the leaders.

This organization obviated the necessity for a gang of finishers and kept the laborers from digging out the dirt too deep. Two tie lines, one on each side of the ditch, insured good alignment. The traffic was quite heavy where this work was in progress and when it was impossible to have the loading train continuously on the work, the laborers were kept busy digging the ditch and piling the dirt on the shoulder. Then when the work train again came out the men were all used to load the material on cars. Although this involved handling the dirt twice it resulted in the most efficient use of the work train as the loose dirt could be loaded much quicker than it could have been taken directly from the ditch. Where the traffic is heavy the main problem is to get the greatest efficiency out of the work train. The foreman did not push the men on the work of digging out the ditch when the work train was away, but rather encouraged them to take it easy. Then when the train arrived the work of loading was pushed as rapidly as possible.

It is extremely difficult to do good ditching in a wet clay cut by hand—it may even require men on the cars to take the clay off the shovels. While there may be some question as to the use of a ditching machine in a dry cut where there is not much material to be moved, its use is surely advisable in wet cuts

where a large amount of excavation is required. At such a place the use of a ditcher will result in an immense saving, and in fact it is about the only way in which a real job of ditching can be done. It is almost impossible to keep a gang of laborers at all where the work becomes very disagreeable.

It is hardly necessary to state that ditching should always be started at the lower end of a cut, and yet one often sees this rule violated. If the ditch is begun at the upper end of the cut and there is a rain before the work is completed the water which cannot drain out will put the ground in such condition that it may be impossible to do any work for several days; while if the ditch is started from the lower end of the cut the water which finds its way to the ditch will have a ready outlet.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since July 16, 1915:

New Lehigh Valley Passenger and Freight Terminal at Buffalo.—The Lehigh Valley has started construction recently on a comprehensive terminal development at Buffalo. This work was described in an illustrated article in the issue of July 23, page 158.

The Metropolis Bridge Over the Ohio River.—The Chicago, Burlington & Quincy and the Nashville, Chattanooga & St. Louis have joined in the construction of a railroad extending from Metropolis, Ill., fifteen miles east to Paducah, Ky., including a bridge across the Ohio River. This structure is 5,442 feet in length, with a channel span 723 feet long. The general details were given in an illustrated article in the issue of July 23, page 160.

The Pennsylvania's 1915 Rail Specifications.—The Pennsylvania has been engaged for two years in the preparation of specifications for carbon steel rails and in the design of a new 125-lb. section, both of which embody several unusual features. These specifications and a diagram of the section were published in the issue of July 23, page 165.

The Engineer in Maintenance Work.—The relative opportunities offered to the engineer in construction and maintenance work were discussed editorially in the issue of July 30, page 183, the trend of the editorial being that greater opportunities for promotion and for continuous employment are presented in the maintenance of way department.

The Essential Qualities of Good Steel Rails.—A frank discussion of the present status of rail manufacture and of some of the difficulties now confronting the securing of rails of the proper quality was presented by Gustav Lindenthal in the issue of July 30, page 187. Mr. Lindenthal also suggests a new section of rail which is better adapted to rolling than the present T-rail.

The Railway Lines of Syria and Palestine.—The seldom heard of lines of these countries were described in an illustrated article in the issue of July 30, page 199. This article was largely devoted to the physical characteristics and the types of construction of these roads.

The Alaskan Government Railroad.—The progress on the construction of this line from Seward to Fairbanks was outlined in an article in the issue of August 6, page 230.

Ventilating the Stampede Tunnel of the Northern Pacific.—The Northern Pacific has recently placed in service a ventilating system at its Stampede Tunnel, two miles long, located at the summit of the Cascade Mountains near Easton, Wash. The equipment installed here was described in an illustrated article in the issue of August 6, page 234.

Canadian Pacific Draw Span Over the Lachine Canal.—An electrically-operated double track deck plate girder swing bridge over the Lachine Canal near Montreal, Que., has recently been opened to traffic by the Canadian Pacific. This bridge, which includes a deck plate girder swing span 239 feet 7 inches long, was described in the issue of August 6, page 239.

New Pittsburgh North Side Freight Station of the P. R. R.—The Pennsylvania Railroad has recently completed a new freight station for the handling of local and transfer freight in Pittsburgh, embodying a number of interesting features, which were described in an illustrated article in the issue of August 6, page 245.

Underground Cables on the Pennsylvania Railroad. The Pennsylvania has recently completed the placing of its telephone, telegraph and signal cables underground from Jersey City to Rahway, N. J. The details of this interesting work were presented in an illustrated article in the issue of August 13, page 269.

A New Coal Dock for the Cincinnati, Hamilton & Dayton at Toledo.—During the season of closed navigation last winter, the Cincinnati, Hamilton & Dayton constructed a modern coal handling plant at Toledo. This, the most recent of the lakes' coal handling plants, was described and illustrated in the issue of August 13, page 273.

Solid Deck Trestles and Bridges on the Illinois Central.—In the construction of 34 miles of second track north of Memphis, Tenn., the Illinois Central built about 9,500 feet of concrete trestles. The interesting details of the design and construction were presented in an illustrated article in the issue of August 13, page 279.

A New Bridge Over the Missouri River at Kansas City.—The Chicago, Burlington & Quincy has recently let contracts for the construction of a new bridge across the Missouri River at Kansas City to replace the old Hannibal bridge originally built in 1869. The new structure is designed for a live load consisting of two E-90 engines followed by 7,500 lb. per ft. of track. Nickel steel will be used for the eye-bars and silicon steel for all main truss members. The details of this structure were presented in an illustrated article in the issue of August 13, page 284.

SAFETY FIRST IN BRIDGE INSPECTION

Bridge inspection must be made with a minimum of scaffolds if it is to be done quickly and efficiently, and it requires a cool head and well knit muscles. A bridge inspector is thrown almost entirely on his own resources in his effort to gain access to all parts of the structure, for, as a rule, little thought is ever given by the designer to the arrangement of details, or the addition of special devices which will be of assistance to the inspector in climbing around on a large steel bridge or viaduct.

On the Chicago, Milwaukee & St. Paul a special effort has been made to make all parts of steel bridges accessible to inspection with the minimum of risk. One feature of high viaducts which has always been a formidable obstacle to anyone who has found it necessary to climb tower columns is the large gusset plates used for bracing connections which are frequently from 6 to 8 ft. deep. This has been overcome satisfactorily as shown in the accompanying sketch. Handholes are provided in



Sketch Showing the Use of Hand Holes in Gusset Plates

the plates at convenient intervals as a substitute for the lacing which is interrupted by the presence of the large plates. The idea was originated by C. F. Loweth, chief engineer, after having observed personally the risk to which men were subjected in climbing by these plates.

Another serious matter for the inspector has been the inspection of plate girder spans more than 5 ft. in depth. This has been overcome at very little expense by providing 15/16-in. holes in the outstanding legs of the web stiffeners, to be used as holds either for a finger or a hook as the man walks along the bottom flange of the girders.

Devices such as these can be had at very little additional expense aside from the exercise of thoughtfulness on the part of the designer, and as a rule require no particular refinement of workmanship. For instance, in the case of a handhole, all that is necessary is the removal of burrs and sharp edges which would tend to cut the hands.

General News Department

The New York Central, which has in New York City three private telephone exchanges, at Grand Central Terminal, at Mott Haven passenger car yard, and at the West Side Freight Terminals, is introducing the automatic or "girlless" exchange.

The Interstate Commerce Commission has withdrawn the option which railroads heretofore had under the commission's accounting rules of charging the cost of additions and betterments amounting to \$200 or less to either property account or to expenses. These small expenditures must now be charged to property account.

The Pennsylvania Railroad reports that the Broadway Limited, the 20-hour train of that company, running daily between New York and Chicago, 908 miles, arrived in Chicago on time on 92 per cent. of its trips during the first six months of 1915, and was more than two minutes late only on 15 out of the 181 days. The eastbound train was on time 163 days; and on time or not over 5 minutes late over 90 per cent of its trips. Throughout the month of June it arrived in New York on time every day.

The Pacific Mail Steamship Company has sold five of its largest steamships to the Atlantic Transport Company. This is in preparation for the discontinuance, heretofore announced, of the line between California and Asia, made necessary by the severe requirements of the new "seamen's law." The last sailing from San Francisco for the Orient will be August 25. The new owner expects to operate two of the ships through the Panama Canal and the others on the Atlantic.

The Committee of Engineers which has been organized to present matters to the New York Constitutional Convention, and whose report on the qualifications of public service commissioners was noticed in the *Railway Age Gazette*, August 6, page 244, has written a letter urging the adoption of an amendment introduced by A. R. Latson providing for the abolishment of a number of existing state departments and their consolidation into a department of engineering and public work, which would have charge of all public lands, state buildings, parks, roads and canals, and of the conservation and development of the natural resources belonging to the state. The office of state engineer and surveyor, commissioners of the land office and the canal board would be abolished, their duties being transferred to the new department. The plan would insure continuity of policy by the provision of three commissioners instead of a single head to administer the department, the incumbents to serve for long overlapping terms.

The United States Civil Service Commission announces an examination, September 14, for candidates for the position of assistant supervisor of accounts in the division of valuation, Interstate Commerce Commission, salaries from \$3,600 to \$4,800. Applicants must be not over 50 years old. In the rating of candidates experience will count 85 per cent. and the announcement issued by the Commission prescribes the following conditions: "Applicants must show in their applications that within the last seven years they have had at least five years' responsible practical accounting experience in railroad or other common-carrier service, as controller, assistant controller, auditor or assistant auditor, or in public practice (as certified public accountant) in the direction of the examination of accounts of common carriers or other important public utilities, and drawing and presenting, by written report, conclusions from the facts developed in the investigations of the accounts of such utilities, or in the supervision of the accounting work of the Interstate Commerce Commission; or that they have had five years' combined experience in the several services indicated; or that they have had within the two years last past satisfactory responsible experience for at least six months with a State commission in the supervision of the accounts of common carriers, or in charge of such commission's valuation accounting work of common carriers, reporting to a state commission engaged in the effectual regulation of the

accounts of such carriers, and that immediately preceding such experience they have had at least five years' responsible accounting experience in common-carrier corporate, fiscal and general accounts, or in the supervisory examination of the accounts of public utilities, or that within the last seven years they have had at least five years' combined experience in the services indicated. Certified public accountants applying for this examination must show, in their applications, that they hold certificates obtained as the result of examination. Accounting experience acquired in the position of auditor of small steam or electric railroads or of other common carriers with limited operations, or accounting experience of a routine or non-responsible character with larger carriers, or public accounting experience along commercial lines, will not be considered. No exception can be made to these requirements."

Disastrous Flood at Galveston

The city of Galveston, Texas, on August 16, 17 and 18 suffered from a hurricane and tidal flood which is reported to rival in costliness the disaster of 15 years ago. More than a score of persons were drowned and hundreds of buildings were destroyed, including large grain elevators. By the destruction of a part of the bridge or causeway by which all trains enter the city, railroad communication will be suspended for probably two weeks. In south and central Texas half the crops have been ruined, involving losses of many millions.

New Locomotive Inspection Rules

In accordance with the Act of Congress, passed last March, to extend the authority of the Interstate Commerce Commission over the inspection and testing of the entire steam locomotive and tender, rules and instructions have just been formulated by the Division of Locomotive Boiler Inspection. These will be considered at a conference with a railroad committee on August 23, at which time it is hoped that an agreement may be reached before presenting the rules to the Commission for approval. These rules are set forth in a 15-page pamphlet and cover ash pans, brake and signal equipment, cabs, warning signals and sanders, draw gear and draft gear, driving gear, lights, running gear, tenders and throttle and reversing gear.

The Ticket Seller's Best Asset

[By Oscar L. Mitchell, General Southern Agent, New York Central, in *L. & N. Passenger Bulletin*.]

Having been in the harness of the passenger traffic department for almost 25 years, I would like to say a word to the beginners. . . . It should be your pleasure to see to it, as far as you possibly can, that every single passenger or party using your line is made comfortable and happy all the way, whether his journey starts on your road, ends there or whether you are one of the intermediary lines; when you satisfy and please this man you earn his friendship, that of his family and of his friends, and he is always glad to see you and to help you. Let me tell you, you need the help and friendship of everyone possible. Of course, you can't have everybody strong for you, but try to have no one strong against you. The best asset you can have is a pleased and satisfied customer. A Hebrew friend of mine once told me, when you shake a man by the hand, put your heart in it, so that he can feel the beats are for him, and that you do not want to beat him. Getting through with a man quickly and getting rid of him, as some agents are prone to do, is bad business not only for your company but for yourself. Whatever you do don't argue with a customer. You know, very likely, what his wishes are. It is an old story to you, but he may not travel more than once a year and is absolutely in the dark and cannot always grasp your ideas and terms readily. . . . Take good care of the little things and you will get a chance at some of the big ones. . . .

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JUNE, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses			Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) last year.	
		Passenger.	inc. misc.	Total.	Way and structures.	Maintenance of equipment.	Traffic.					Trans- portation.	Miscel- laneous.	General.	Total.
Alabama Great Southern	309	\$271,280	\$87,394	\$358,674	\$42,541	\$98,358	\$11,229	\$131,532	\$7,643	\$285,388	\$9,124	\$285,388
Ann Arbor	294	131,188	43,244	174,432	20,205	26,564	5,145	67,483	8,573	128,433	10,580	128,433
Arizona Eastern	367	105,379	34,418	139,797	24,534	36,288	3,067	60,155	11,677	143,868	9,821	143,868
Atlanta & Western Point	93	41,365	33,717	75,082	16,003	7,817	4,900	26,341	4,234	60,400	5,525	60,400
Atlanta, Birmingham & Atlantic	639	134,827	40,986	175,813	199,856	34,633	35,455	89,196	10,841	180,958	12,190	180,958
Atlantic & St. Lawrence	167	57,101	4,829	61,930	77,347	28,498	24,445	47,484	3,617	107,265	19,918	107,265
Baltimore & Ohio System	4,535	6,820,413	1,207,581	8,028,000	8,662,956	915,781	1,421,997	153,083	22,577	5,406,404	3,022	5,406,404
Bangor & Aroostook	632	262,607	48,265	310,872	331,674	23,418	52,504	68,848	15,275	165,703	14,021	165,703
Boston & Maine	2,302	2,434,593	1,434,487	3,869,080	4,035,833	644,930	391,819	1,571,882	109,627	2,784,950	197,744	2,784,950
Buffalo & Susquehanna R. R. Corp.	253	100,130	6,269	106,399	109,411	256,634	31,135	1,123	9,790	99,240	2,600	99,240
Buffalo & Susquehanna Railway	91	17,165	5,921	23,086	17,411	3,701	5,375	11,266	3,215	24,073	1,600	24,073
Carolina, Clinchfield & Ohio of S. C.	248	156,353	12,938	169,291	173,426	23,701	23,421	7,800	10,507	98,114	7,249	98,114
Central New England	304	231,527	35,701	267,228	373,006	101,531	25,697	1,948	1,332	6,359	481	6,359
Central of New Jersey	683	1,911,440	503,300	2,414,740	2,546,066	306,495	443,309	20,930	46,167	1,647,066	120,483	1,647,066
Central Vermont	411	235,810	126,207	362,017	34,837	78,274	8,093	125,402	5,294	207,497	189,416	207,497
Chesapeake & Ohio Lines	2,371	2,852,859	496,515	3,349,374	3,636,151	533,563	708,791	57,669	79,269	2,441,588	114,920	2,441,588
Chicago, Burlington & Quincy	9,366	4,724,120	1,789,896	6,514,016	7,260,412	1,465,079	976,401	139,171	184,504	5,075,446	462,342	5,075,446
Chicago, Det. & Can. Gd. Trunk Jctn.	60	62,023	16,475	78,498	95,176	17,451	17,451	1,428	1,444	52,207	3,638	52,207
Chicago & Eastern Illinois	1,282	740,049	225,123	965,172	1,068,103	246,070	275,686	17,747	7,339	978,539	89,564	978,539
Chicago & Erie	270	431,655	49,845	481,500	528,320	89,137	63,110	208,815	11,706	391,692	20,500	391,692
Cincinnati, Hamilton & Dayton	1,003	708,954	126,201	835,155	920,355	225,599	310,374	18,284	19,520	827,397	92,957	827,397
Cincinnati, New Orleans & Tex. Pac.	1,387	567,024	122,301	689,325	777,922	159,614	153,336	20,818	20,818	497,820	31,109	497,820
Colorado & Southern	1,080	432,462	114,914	547,376	590,035	110,006	136,279	14,336	26,047	472,384	117,651	472,384
Cripple Creek & Colorado Springs	87	92,732	25,427	118,159	120,075	17,582	11,995	29,905	2,805	65,657	4,454	65,657
Delaware & Hudson Co. R. R. Dept.	881	1,598,262	208,839	1,807,101	1,914,316	121,112	290,764	20,066	56,034	1,214,214	700,175	1,214,214
Denver & Salt Lake	2,577	1,241,878	466,997	1,708,875	1,865,747	343,164	481,313	456,905	48,360	1,145,130	73,306	1,145,130
Denver & St. Louis	255	106,372	32,951	139,323	145,818	16,566	23,749	44,067	5,268	91,707	9,276	91,707
Denver & Toledado Shore Line	70	109,014	47,145	156,159	109,544	13,982	6,150	1,353	2,793	52,916	5,182	52,916
Detroit, Grand Haven & Milwaukee	191	230,628	47,145	277,773	314,358	21,898	28,522	20,974	4,179	161,634	8,294	161,634
Detroit, Toledo & Ironton	441	110,843	10,899	121,742	132,249	19,000	14,716	3,697	5,043	95,996	36,253	95,996
Duluth, Winnipeg & Pacific	1,885	3,717,075	745,188	4,462,263	4,906,192	529,615	921,756	168,428	30,524	3,311,932	1,093	3,311,932
Erie	1,988	3,717,075	745,188	4,462,263	4,906,192	529,615	921,756	168,428	30,524	3,311,932	1,093	3,311,932
Fort Worth & Denver City	454	219,373	96,001	315,374	341,351	62,690	67,005	6,706	16,941	277,267	12,429	277,267
Galveston, Harrisburg & San Antonio ..	1,350	566,394	237,056	803,450	903,198	133,217	130,187	30,455	37,432	61,954	21,245	61,954
Georgia	307	112,102	56,728	168,830	184,513	24,231	19,167	12,920	8,637	135,628	38,886	135,628
Georgia, Southern & Florida	395	86,636	46,496	133,132	160,880	20,102	16,059	6,019	13,740	123,140	10,139	123,140
Grand Trunk Western	347	536,185	109,619	645,804	701,379	91,292	94,272	14,849	11,993	438,193	263,186	438,193
Great Northern	8,102	3,413,027	1,170,161	4,583,188	5,193,623	872,939	566,263	106,305	113,541	3,102,457	2,091,166	3,102,457
Gulf & Ship Island	308	100,689	24,456	125,145	118,518	15,818	17,960	35,244	6,812	78,494	7,582	78,494
Gulf, Colorado & Santa Fe	1,038	804,271	249,355	1,053,626	1,124,352	180,264	183,458	31,142	51,394	923,680	204,673	923,680
Houston, East & West Texas	801	80,603	26,995	107,598	118,831	20,230	18,704	2,272	3,661	95,308	23,233	95,308
Houston & Texas Central	801	325,127	131,307	456,434	403,435	104,283	76,955	17,149	19,622	408,245	85,190	408,245
Illinois Central	4,767	3,465,873	1,094,497	4,560,370	4,881,498	944,299	1,384,526	97,298	135,787	4,144,897	736,502	4,144,897
Kansas City, Mexico & Orient	740	157,949	27,185	185,134	196,647	52,032	39,175	8,800	9,173	213,221	16,575	213,221
Kansas City Southern	827	607,100	1,161,171	1,768,271	792,226	143,045	132,861	27,309	38,476	605,531	186,695	605,531
Lehigh & Hudson River	97	146,396	9,228	155,624	162,612	23,768	17,602	5,523	6,350	104,778	57,837	104,778
Lehigh Valley	1,442	3,019,842	369,889	3,389,731	3,634,848	365,672	758,668	87,898	107,431	2,519,978	1,114,870	2,519,978
Louisiana & Arkansas	270	1,114,452	140,377	1,254,829	1,291,195	24,574	25,861	3,188	5,964	89,490	39,404	89,490
Louisiana Rv. & Navigation	351	129,829	27,864	157,693	170,011	26,610	23,878	6,005	3,247	130,772	48,437	130,772
Louisville & Nashville	5,034	2,948,565	887,703	3,836,268	4,175,584	882,473	696,703	124,856	116,857	3,176,776	998,808	3,176,776
Midland Valley	380	75,041	31,126	106,167	112,856	14,313	13,379	2,262	8,128	80,935	31,221	80,935
Minneapolis & St. Louis	1,646	594,172	169,766	763,938	815,624	98,868	106,279	19,588	21,809	531,638	30,303	531,638
Minn. St. Paul & Sault Ste. Marie	4,103	1,355,534	505,471	1,861,005	2,055,470	346,807	169,208	59,139	55,009	1,362,820	88,763	1,362,820
Missouri, Oklahoma & Gulf of Texas	10	9,331	304	9,635	9,834	2,003	14,545	360	742	28,179	18,345	28,179
Missouri Pacific	3,931	1,715,456	423,313	2,138,769	2,342,038	381,807	348,511	54,548	55,946	1,700,517	61,521	1,700,517
Mobile & Ohio	1,122	738,807	89,596	828,403	882,440	56,075	120,853	34,228	30,528	792,336	32,953	792,336
New Orleans Great Northern	283	101,414	24,197	125,611	17,159	23,397	3,911	5,523	5,945	104,778	4,995	104,778
New Orleans, Mobile & Chicago	403	103,073	18,968	122,041	139,477	17,701	18,469	3,552	7,991	103,681	35,606	103,681
New York Central Railroad	5,979	9,137,854	1,023,338	10,161,192	15,404,351	1,802,283	2,123,225	231,808	383,509	9,284,278	6,160,273	9,284,278
Northern Pacific	6,461	3,457,804	1,329,412	4,787,216	5,335,773	866,263	283,322	127,696	87,403	2,978,337	2,357,336	2,978,337
New York, Susquehanna & Western	140	195,488	45,059	240,547	207,899	21,686	37,491	106,620	5,120	173,336	97,564	173,336
Norfolk & Western	2,044	3,751,206	427,551	4,178,757	4,330,286	635,179	770,232	1,070,907	63,857	2,603,320	172,966	2,603,320
New York, New Haven & Hartford	2,005	3,017,299	2,614,655	5,631,954	6,327,988	598,572	840,290	70,156	1,667,566	3,283,303	3,040,685	3,283,303
Northwestern Pacific	401	116,989	197,043	314,032	353,865	406,647	42,004	5,571	7,454	208,813	145,052	208,813
Oahu Ry. & Land Co.	114	82,204	18,946	101,150	108,513	10,298	18,003	24,832	4,958	58,744	49,769	58,744
Oregon Short Line	2,181	1,083,484	457,024	1,540,508	1,674,354	259,627	217,774	35,256	53,104	1,007,233	118,396	1,007,233
Oregon-Washington R. R. & Nav. Co.	2,027	767,638	419,249	1,186,887	1,314,264	176,811	153,447	42,735	59,367	808,552	517,912	808,552
Panhandle & Santa Fe	670	231,438	71,578	303,016	344,334	90,822	64,736	4,435	5,901	230,166	18,192	230,166
Pere Marquette	2,286	937,699	326,126	1,263,825	1,455,976	318,583	256,814	32,060	38,758	1,182,490	42,305	1,182,490

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JUNE, 1915—Continued

Name of road.	Average mileage operated during period.	Operating revenues				Operating expenses				Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total.	inc. misc. structures.	Way and equipment.	Maintenance of equipment.	Traffic.	Trans. portation.	Miscellaneous.	General.	Total.	
Pittsburgh, Shawmut & Northern.....	294	\$133,277	\$7,734	\$141,011	\$105,593	\$33,773	\$14,826	\$1,425	\$43,901	.....	\$4,775	\$98,700	\$18,823
Richmond, Fredericksburg & Potomac.....	88	156,791	80,663	237,454	275,325	35,947	20,767	84,885	3,454	.....	6,852	155,482	3,025
St. Louis & San Francisco.....	4,749	2,189,715	856,852	3,046,567	3,268,793	472,493	846,220	74,316	1,081,161	.....	88,231	2,535,247	117,941
St. Louis, Iron Mountain & Southern.....	3,363	1,609,606	21,033	1,630,639	2,213,180	353,038	360,845	67,944	696,349	10,056	69,302	1,542,028	93,133
St. Louis, San Francisco & Texas.....	235	44,232	21,083	65,315	71,382	19,813	22,167	2,296	42,744	.....	4,186	91,207	-21,044
St. Louis Southwestern.....	943	382,872	91,419	474,291	511,125	39,674	82,140	25,840	161,315	3,287	24,265	336,025	16,920
St. Louis Southwestern of Texas.....	811	211,694	79,493	291,187	302,537	47,064	70,436	11,366	137,684	945	17,368	269,998	52,702
San Antonio & Aransas Pass.....	124	181,638	79,694	261,332	283,114	65,069	54,398	7,442	138,608	.....	10,185	275,538	-30,260
San Pedro Los Angeles & Salt Lake.....	1,132	512,207	340,207	852,414	918,710	18,481	124,328	32,263	231,988	22,153	18,184	547,626	53,690
Southern in Mississippi.....	281	39,016	19,090	58,106	64,046	98,982	4,074	1,981	34,121	.....	3,913	63,020	-8,167
Spokane International.....	163	44,669	11,845	56,514	59,260	12,349	4,750	2,122	19,606	.....	3,003	41,831	-18,116
Spokane, Portland & Seattle.....	556	189,892	130,374	320,266	375,460	19,731	17,089	11,110	93,524	3,956	13,977	272,207	103,254
Tennessee Central.....	294	78,445	32,691	111,136	118,310	70,789	11,256	7,983	43,555	.....	6,911	83,986	34,324
Texas & New Orleans.....	469	246,923	80,603	327,526	333,906	17,099	92,498	4,966	120,685	6,006	10,919	308,060	25,846
Texas & Pacific.....	1,944	885,782	324,679	1,210,461	1,320,919	172,391	290,101	39,145	644,505	9,557	43,934	1,206,069	114,850
Toledo, Peoria & Western.....	248	46,423	34,820	81,243	93,142	20,282	29,107	2,285	42,202	.....	3,768	97,644	19,001
Toledo, St. Louis & Western.....	451	344,828	31,501	376,329	403,640	73,854	96,687	17,730	139,688	.....	8,176	336,135	67,575
Trinity & Brazos Valley.....	315	33,488	11,066	44,554	49,586	14,236	9,113	2,293	27,454	.....	7,136	60,232	-3,414
Union Pacific.....	129	47,430	32,490	79,920	96,655	17,263	32,356	3,776	37,915	56	3,083	94,449	2,207
Union Pacific & Southern.....	3,617	2,778,679	985,334	3,764,013	4,338,391	566,954	553,251	113,447	1,008,963	85,380	111,058	2,438,456	189,935
Virginia & Southwestern.....	240	120,734	11,843	132,577	136,540	25,448	25,078	2,109	39,099	.....	3,997	95,731	40,809
Wabash.....	2,519	1,592,234	526,580	2,118,814	2,320,510	503,618	456,772	97,404	959,480	14,641	77,848	2,108,936	121,574
Washington Southern.....	36	43,954	38,905	82,859	115,325	10,924	13,355	39,478	1,481	1,481	2,887	69,962	45,343
Western Pacific.....	943	337,700	228,556	566,256	615,020	99,090	58,970	22,039	167,127	17,831	17,561	382,618	232,402
Western Ry. of Alabama.....	133	43,273	35,313	78,586	98,274	26,958	28,846	5,666	26,387	1,703	4,499	92,385	5,889
Yazoo & Mississippi Valley.....	1,382	733,468	135,965	869,433	910,241	153,313	150,787	17,177	302,908	1,416	26,825	651,967	258,274

REVENUES AND EXPENSES OF RAILWAYS

FISCAL YEAR ENDING JUNE 30, 1915

Name of road.	Average mileage operated during period.	Operating revenues				Operating expenses				Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total.	inc. misc. structures.	Way and equipment.	Maintenance of equipment.	Traffic.	Trans. portation.	Miscellaneous.	General.	Total.	
Alabama Great Southern.....	309	\$3,336,119	\$1,033,538	\$4,369,657	\$4,776,630	\$1,149,707	\$156,042	\$1,694,659	\$35,381	\$109,044	\$3,653,734	\$1,122,897	\$22,645
Ann Arbor.....	295	1,633,469	528,377	2,161,846	2,456,821	314,401	61,347	928,700	4,634	91,116	1,645,879	665,023	43,996
Arizona Eastern.....	367	1,220,331	329,048	1,549,379	2,200,787	281,838	344,897	589,302	12,140	126,506	1,377,672	823,114	322,069
Atlanta & West Point.....	93	589,243	428,846	1,018,089	1,185,338	168,218	254,235	64,036	373,328	20,475	55,890	934,379	75,070
Atlanta, Birmingham & Atlantic.....	642	1,900,988	502,610	2,403,598	2,656,433	421,847	517,585	146,149	1,162,483	277	125,769	2,374,111	136,682
Atlantic & St. Lawrence.....	167	1,101,855	301,080	1,402,935	1,557,152	239,236	252,136	47,251	700,264	319	29,411	1,279,475	277,677
Baltimore & Ohio System.....	4,535	70,780,809	14,059,940	84,840,749	91,815,797	8,985,627	16,002,589	1,905,496	34,254,572	557,613	2,228,274	63,925,908	27,890,290
Bangor & Aroostook.....	632	2,026,867	631,082	2,657,949	3,763,398	521,796	583,209	36,643	1,069,672	20,184	123,056	2,347,980	1,415,418
Boston & Maine.....	2,302	27,043,544	15,518,233	42,561,777	46,673,049	7,195,081	6,695,420	443,690	20,193,692	200,169	1,181,720	35,909,772	10,763,277
Buffalo & Susquehanna R. R. Corp.....	253	1,329,060	79,436	1,408,496	1,444,898	270,211	459,582	14,684	433,654	.....	69,358	1,247,489	197,409
Butt, & Susquehanna Railway.....	91	161,120	75,986	237,106	266,458	52,511	86,570	6,283	139,131	.....	29,411	314,225	19,200
Carolina, Lynchburg & Ohio.....	248	1,911,951	170,284	2,082,235	2,351,162	235,529	277,794	81,193	424,441	.....	116,510	1,121,660	1,009,493
Central New England.....	304	4,420,827	15,204	4,436,031	4,955,046	802,451	396,203	20,248	24,975	.....	9,389	2,672,640	1,482,392
Central of New Jersey.....	683	21,361,621	5,805,513	27,167,134	28,742,256	2,550,456	5,347,465	346,288	9,962,503	149,435	599,273	18,951,307	9,790,949
Central Vermont.....	411	2,667,745	925,932	3,593,677	3,899,659	479,339	607,876	102,156	1,748,141	24,919	84,880	3,047,311	852,348
Chesapeake & Ohio Lines.....	2,369	31,288,536	5,696,088	36,984,624	39,464,037	4,694,522	8,243,170	650,406	12,896,078	232,347	873,883	27,556,414	11,907,623
Chicago & Eastern Illinois.....	1,282	10,295,909	2,755,021	13,050,930	14,210,602	2,252,547	3,171,644	282,201	5,374,796	95,756	1,605,904	11,605,904	2,604,697
Chicago & Erie.....	270	4,931,781	569,991	5,501,772	6,030,494	901,497	505,727	223,451	2,731,893	26,966	155,047	2,552,656	202,993
Chicago, Burlington & Quincy.....	9,366	62,509,484	20,185,564	82,695,048	91,125,061	11,360,210	15,415,123	1,629,676	29,117,164	832,154	2,087,071	60,441,367	30,683,694
Chicago, Dear & Can. (ed. Trunk Jctn.....	60	659,264	171,403	830,667	969,098	103,043	148,182	19,289	507,468	.....	17,246	795,227	173,871
Cincinnati, Hamilton & Dayton.....	1,011	7,227,281	1,483,122	8,710,403	9,735,922	1,628,594	2,127,246	234,447	4,304,052	36,325	255,322	8,571,712	1,154,260
Cincinnati, New Orleans & Tex. Pac.....	337	7,176,550	1,680,910	8,857,460	9,432,251	1,620,001	2,103,581	296,201	2,975,660	74,614	241,007	6,807,448	2,104,493
Cleveland & Southern.....	1,939	5,708,135	1,384,646	7,092,781	7,562,227	972,225	1,756,078	128,033	2,413,104	4,680	246,764	5,357,783	423,150
Cripple Creek & Colorado Springs.....	87	180,128	41,900	222,028	225,643	31,240	22,843	6,280	57,616	.....	7,179	125,160	10,244
Delaware & Hudson Co., R. R. Dept.....	881	18,677,039	2,722,559	21,400,598	22,701,942	1,619,182	3,699,840	311,582	8,179,474	153,100	752,689	14,702,656	7,999,286
Denver & Rio Grande.....	2,571	15,911,102	4,449,044	20,360,146	21,823,236	2,541,539	3,992,351	477,425	6,290,955	345,487	651,215	14,289,671	7,533,565
Denver & Salt Lake.....	255	1,235,595	321,469	1,557,064	1,645,085	200,188	280,851	27,515	5,971,162	.....	82,863	1,115,108	529,978
Detroit & Toledo Shore Line.....	79	1,464,234	594,894	2,059,128	2,171,160	148,066	115,773	21,743	422,944	.....	33,812	742,338	728,822
Detroit, Grand Haven & Milwaukee.....	191	1,705,717	554,894	2,260,611	2,655,553	358,112	403,565	78,364	1,336,805	9,889	57,321	2,244,076	411,477
Detroit, Grand Haven & Milwaukee.....	191	1,705,717	554,894	2,260,611	2,655,553	358,112	403,565	78,364	1,336,805	9,889	57,321	2,244,076	411,477

Figures shown here are for two months, ending June 30, 1915.

REVENUES AND EXPENSES OF RAILWAYS

FISCAL YEAR ENDING JUNE 30, 1915—Continued

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses			Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.			
		Freight.	Passenger.	Total.	Way and structures.	Maintenance of equipment.	Trans. portation.							
Detroit, Toledo & Ironton.....	441	\$1,496,246	\$161,384	\$1,767,580	\$231,830	\$275,478	\$5,407	\$1,000,288	\$69,442	\$1,631,443	\$136,136	\$58,200	\$77,918	\$929,133
Duluth, Winnipeg & Pacific.....	185	1,045,132	200,684	1,245,816	184,016	212,423	24,502	470,506	73,537	912,120	314,348	64,106	250,182	—27,421
Eric & Western.....	1,088	40,728,552	8,030,348	48,758,900	5,771,539	13,071,307	1,141,663	19,870,294	1,247,559	41,352,467	13,427,912	1,593,712	11,807,487	—1,487,487
Fort Worth & Denver City.....	454	3,586,364	1,421,939	5,008,303	589,381	856,307	85,006	2,088,513	473,393	3,645,186	1,471,225	144,716	1,326,559	310,441
Galveston, Harrisburg & San Antonio.....	1,350	7,360,225	2,963,054	10,323,279	1,652,648	1,880,228	354,343	4,875,556	112,405	9,251,980	1,060,151	504,114	1,453,907	—42,578
Georgia Southern & Florida.....	307	1,848,643	725,511	2,574,154	311,921	509,560	143,307	1,210,494	90,163	2,332,379	439,191	54,749	403,083	—255,027
Grand Trunk Western.....	347	5,056,697	1,679,897	6,736,594	204,555	420,101	84,899	1,191,569	1,843,662	723,111	116,180	253,405	98,013	—8,015
Great Northern.....	8,102	47,147,314	13,164,887	60,312,201	8,261,205	7,149,929	1,167,536	18,243,491	1,258,466	36,798,928	30,334,375	4,627,044	25,703,241	1,412,470
Gulf & Ship Island.....	308	1,227,492	302,542	1,530,034	208,771	350,286	20,985	434,800	83,314	1,110,352	52,654	92,057	430,234	—100,964
Gulf, Colorado & Santa Fe.....	1,938	12,463,304	2,944,656	15,407,960	2,394,539	2,419,759	340,177	5,865,830	433,911	11,540,192	4,810,193	622,115	1,843,327	—74,871
Houston, East & West Texas.....	191	970,713	305,304	1,276,017	242,684	404,292	31,117	560,702	38,843	1,051,927	309,932	59,766	249,796	385,524
Houston & Texas Central.....	804	4,613,313	1,475,505	6,088,818	1,196,421	934,642	186,387	2,627,577	31,172	5,152,223	1,381,264	326,445	1,053,272	—861,002
Illinois Central.....	4,768	44,446,222	12,851,677	57,297,899	8,066,250	13,962,760	1,238,732	22,314,115	1,540,627	47,975,197	14,136,356	3,233,838	10,878,473	—
Kansas City, Mexico & Orient.....	827	7,731,118	1,140,618	8,871,736	1,132,078	1,185,016	336,196	3,397,007	.....	6,478,821	3,557,075	574,316	2,977,274	—151,951
Kansas City Southern.....	97	1,619,429	114,883	1,734,312	243,923	234,423	17,279	643,917	.....	489,009	622,199	50,645	371,555	13,662
Lehigh Valley.....	1,444	35,929,666	4,043,799	40,973,465	4,433,925	8,207,491	959,830	15,250,528	141,507	913,935	29,947,388	1,689,109	10,874,683	451,223
Louisiana & Arkansas.....	279	1,427,149	205,136	1,632,285	301,837	281,988	34,209	446,522	.....	49,556	1,113,721	566,230	82,400	483,574
Louisiana Rv. & Navigation.....	551	1,615,700	282,334	1,898,034	377,392	223,530	68,780	802,470	.....	63,559	1,535,730	111,655	376,314	—30,253
Louisville & Nashville.....	5,034	36,933,794	10,859,047	47,792,841	8,093,389	10,310,563	1,349,705	17,449,812	1,249,517	39,431,789	12,174,226	2,145,109	10,023,032	—2,263,103
Midland Valley.....	380	900,598	405,252	1,305,850	271,551	336,965	475,397	475,397	.....	1,800,823	331,916	69,933	241,430	45,784
Minneapolis & St. Louis.....	1,646	7,615,044	1,021,654	8,636,698	1,171,303	1,383,529	214,058	3,886,942	.....	6,003,594	3,208,381	432,070	2,776,305	459,117
Minneapolis, St. Paul & Sault Ste. Marie.....	4,103	19,814,289	5,805,715	25,620,004	3,507,353	5,972,532	597,521	9,230,305	169,149	17,811,374	9,951,851	1,135,439	8,816,439	46,815
Missouri, Oklahoma & Gulf of Texas.....	19	121,811	3,303	125,114	19,897	52,232	2,762	62,105	.....	143,502	2,010	17,516	—17,516	—25,866
Missouri Pacific.....	3,921	21,245,405	4,714,086	25,959,491	3,791,709	5,442,983	687,806	11,088,205	93,395	699,951	21,699,164	6,026,513	1,757,642	—
Mobile & Ohio.....	1,122	9,120,432	2,233,754	11,354,186	1,060,127	1,868,535	460,405	4,168,832	31,189	349,192	7,033,656	3,048,403	2,600,762	1,063,843
New Orleans Great Northern.....	283	1,173,546	280,117	1,453,663	206,453	255,898	31,283	479,089	2,096	76,320	1,051,139	548,561	512,992	195,540
New Orleans, Mobile & Chicago.....	403	1,399,285	278,012	1,677,297	242,564	242,564	46,098	628,611	89	1,320,686	450,787	75,838	374,129	—292,449
New York Central Railroad.....	5,979	51,056,891	20,853,465	71,910,356	9,030,678	16,314,469	1,433,945	28,444,038	21,127,223	58,519,571	25,152,918	4,831,818	20,316,126	—
New York, New Haven & Hartford.....	2,003	31,179,319	27,010,799	58,190,118	7,729,264	9,780,330	423,369	23,958,702	592,054	1,611,243	44,126,634	2,743,920	18,500,888	3,844,661
New York, Susquehanna & Western.....	140	2,306,580	527,111	2,833,691	479,746	667,849	28,325	1,365,088	.....	67,045	1,033,666	84,104	938,945	161,733
Norfolk & Western.....	2,044	36,550,550	4,297,044	40,847,594	5,738,074	8,341,419	699,827	12,561,665	109,468	836,607	27,831,815	15,155,228	381,515	—
Norfolk Pacific.....	6,664	43,833,637	13,619,114	57,452,751	8,523,057	7,317,074	1,191,567	19,897,056	939,338	1,104,712	37,108,049	26,063,604	1,879,371	—
Northern Pacific.....	401	1,342,563	1,012,062	2,354,625	601,741	501,057	61,580	1,370,680	.....	2,599,104	969,308	190,480	778,882	130,711
Oahu Ry. & Land Co.....	114	800,720	233,212	1,033,932	118,446	1,141,442	8,086	262,225	50,635	549,865	678,886	87,244	591,640	34,307
Oregon Short Line Co.....	2,165	13,803,919	4,434,660	18,238,579	2,801,410	2,822,342	378,185	4,994,187	308,315	652,541	11,880,519	8,087,406	6,800,172	1,486,628
Oregon, Washington R. R. & Nav. Co.....	2,003	9,722,698	4,330,584	14,058,282	1,804,445	1,824,855	468,162	5,059,700	145,426	10,057,449	5,386,607	1,030,104	4,335,163	183,671
Panhandle & Santa Fe.....	670	3,109,924	1,731,979	4,841,903	829,801	1,811,887	46,930	1,237,267	110,814	3,034,077	1,007,824	117,140	494,967	404,967
Pere Marquette.....	2,286	12,562,523	3,938,086	16,500,609	2,002,282	3,492,973	379,126	7,022,741	53,045	500,859	13,444,014	4,584,196	4,069,502	5,831,648
Pittsburgh, Shawmut & Northern.....	294	1,682,859	119,500	1,802,359	206,229	481,050	19,933	600,837	.....	1,448,918	385,137	19,767	365,371	64,744
Richmond, Fredericksburg & Potomac.....	88	1,525,413	986,443	2,511,856	250,106	370,005	43,440	1,038,833	54,542	1,852,763	1,053,066	87,847	967,014	—7,714
St. Louis & San Francisco.....	4,747	28,182,182	10,022,662	38,204,844	4,901,386	5,215,881	802,617	13,683,611	1,080,621	27,858,045	10,043,341	1,268,264	11,755,204	1,785,384
St. Louis, Iron Mountain & Southern.....	3,365	22,438,307	5,150,540	27,588,847	2,883,629	4,350,094	729,388	9,488,215	97,496	784,857	20,860,506	9,023,123	7,662,566	2,788,734
St. Louis, San Francisco & Texas.....	235	773,710	289,232	1,062,942	280,341	208,503	27,321	555,544	.....	1,124,787	16,244	14,735	138,550	—
St. Louis Southwestern.....	943	5,350,380	1,147,167	6,497,547	781,835	1,172,679	306,340	1,991,569	38,313	310,900	4,578,848	403,876	1,044,708	—701,560
St. Louis, Southwestern & Texas.....	811	2,541,262	884,890	3,426,152	484,049	903,369	143,804	1,817,238	9,258	3,803,305	—83,017	177,903	261,666	28,083
San Antonio & Aransas Pass.....	724	2,503,321	1,017,034	3,520,355	877,302	731,311	79,377	1,842,718	139,593	3,620,005	177,051	159,979	16,207	486,670
San Pedro, Los Angeles & Salt Lake.....	1,382	6,024,777	2,633,890	8,658,667	432,581	1,414,435	386,608	3,036,483	189,441	219,278	6,178,839	3,310,068	2,795,941	—47,301
Southern in Mississippi.....	181	507,322	308,749	816,071	260,211	602,269	27,917	468,085	.....	900,666	101,874	—10,146	—158,315	—
Spokane International.....	163	561,083	156,651	717,734	143,371	56,559	26,922	230,224	41,308	508,317	245,918	51,134	104,581	191,058
Spokane, Portland & Seattle.....	556	2,561,720	1,441,810	3,993,530	441,689	94,524	1,053,254	1,777,938	160,610	2,538,128	1,878,560	640,800	1,235,487	211,373
Tennessee Central.....	294	1,066,478	382,337	1,448,815	189,091	344,617	64,605	578,814	82,664	1,259,451	221,953	165,720	188,007	—188,007
Texas & New Orleans.....	469	2,521,740	1,023,764	3,545,504	676,924	956,971	95,163	1,581,253	127,069	3,527,638	383,048	175,296	2,777	—
Texas & Pacific.....	1,944	12,443,990	4,067,980	16,511,970	1,956,172	2,916,404	445,170	7,919,309	160,043	13,857,387	4,087,250	856,136	3,225,552	369,150
Toledo, St. Louis & Western.....	431	3,084,042	330,384	3,414,426	573,700	844,225	199,811	1,783,306	98,822	3,496,054	1,130,105	230,182	888,922	356,216
Toledo, Peoria and Western.....	248	656,677	400,647	1,057,324	200,049	332,007	28,386	531,006	.....	1,335,269	39,983	73,200	33,255	16,725
Trinity & Brazos Valley.....	315	723,886	178,800	902,686	240,373	133,459	34,648	486,348	.....	1,080,107	—8,515	53,060		

† No figures reported for year. Operations began July 8, 1914.

* Operations shown here are for six months, ending June 30, 1915.

The "Old Guard" of the B. & O.

About a thousand members of the "old guard" who have served the Baltimore & Ohio Railroad for a generation, held their first annual reunion at Berkeley Springs, W. Va., on Thursday, August 12, the Martinsburg division of the Veterans' Association being the host.

The reunion brought together many of the older employees from all parts of the system, some of whom have spent more than 50 years in railroad service and had not met since they separated during the Civil War. There were 60 men present who had worked for the railroad a half century.

General Manager C. W. Galloway was the leader of a large delegation from Baltimore, who were carried in a special train, with members of their families and their grandchildren. Mr. Galloway is the third generation of his family to see service on the Baltimore & Ohio, and is the grandson of the first horse-driver and later the first locomotive engineer of the road.

Z. T. Brantner, superintendent of the shops at Martinsburg, W. Va., is the president of the Veterans' Association.

Conemaugh Division Roll of Honor

The "roll of honor," adopted as a substitute for bulletins telling of punitive discipline, as put in use by Andrew Keiser, superintendent of the Conemaugh Division of the Pennsylvania Railroad, was noticed in the *Railway Age Gazette* of March 26 last, page 689. With a view to reducing the number of cases requiring discipline, Mr. Keiser posted a bulletin showing the names of all conductors, enginemen, brakemen and firemen whose record of freedom from discipline was clear for the whole twelve months of the year 1914, omitting from the list men who had not been in active service throughout the whole year. About 400 men out of 700 found their names on the list.

Mr. Keiser has now reported the results for the first six months of 1915, and he shows, as compared with the first half of 1914, a decrease of 62 per cent. in the number of cases requiring discipline; 71 per cent. decrease in the total number of days' suspension of employees, and 72 per cent. reduction in the amount of wages lost by employees because of suspension. This last item represents a saving to employees and their families of \$5,666.

Low-Cost Life Insurance for Employees

The Brooklyn Rapid Transit Company, operating and controlling extensive surface and elevated street car lines in Brooklyn, N. Y., has issued a circular to employees announcing that if a sufficient number of persons employed by the company and its subsidiaries shall take advantage of the offer, the company will have their lives insured by the Travelers Insurance Company, of Hartford, and the employer will pay half the premium on a policy of \$1,000. The insurance will be what is known as term insurance, insurance taken for one year, but renewable from year to year. Under this arrangement, the premium to be paid increases each year. For example, for a person of eighteen years it is \$7.47; twenty-one years, \$7.59; thirty years, \$8.14; thirty-five years, \$8.65; forty years, \$9.46; fifty years, \$13.64; sixty years, \$27.72; sixty-five years, \$42.65, and so on. These represent the gross sums, paid by the railway company, one-half in each case to be subsequently deducted from the employee's pay on the payroll. Term insurance is not usually favored by insurance companies, but in this case, apparently, the Brooklyn Rapid Transit Company has secured concessions by promising a large contract. Employees will have the privilege of changing to ordinary forms of policies, with cash surrender privileges, etc., and will not have to take a new medical examination; that is to say, will have the same privileges as though the final contract had been made when insurance was first taken out. The company's offer to bear one-half the expense applies only to a policy of \$1,000, but employees may take larger policies, at their own expense, within certain limits. If 5,000 employees accept this offer, no medical examination will be required. If less than 5,000, but more than 1,000, the insurance company will ask a certificate of the railway company's physician, but no rigid medical examination will be required. The employee must be over fifteen years of age, and must have been in the employ of the company for two years or more; and it is said that there are over 8,000 persons thus eligible. Employees must be members of the Employees' Benefit Association, if eligible thereto, so that there may be no competition between the two schemes of insurance. In the case of pensioned

or disabled employees, the railway company expects to pay the entire premium on \$1,000.

The plan will not go into effect unless at least 1,000 employees desire to join.

Chief Interchange Car Inspectors and Car Foremen

The seventeenth annual convention of the Chief Interchange Car Inspectors' and Car Foremen's Association of America will be held at Murphy's Hotel, Richmond, Va., September 14-16. This is the first time that the meeting of the association has been held so far south, and it is suggested that this will offer a good opportunity for southern railroad men to attend.

Foundry and Machine Exhibition

The Foundry and Machine Exhibition will be held on Young's Million Dollar Pier, Atlantic City, from September 25 to October 1. This is the first time in three years that the exhibit has been held in the east and there will be a keen interest in it in that section particularly. Business conditions in this line are improving everywhere, and the attendance promises to be large and the exhibit a profitable one for the exhibitors. From all indications, therefore, the exhibit should be as successful as the one in Chicago last year. C. E. Hoyt, the secretary, has opened an office in the Bourse, Philadelphia, for the convenience of exhibitors and others desiring information or help of any kind.

Master Blacksmiths' Convention

The twenty-third annual convention of the International Railroad Master Blacksmiths' Association was held at the Walton Hotel, Philadelphia, Pa., August 17 to 19, T. F. Buckley, foreman blacksmith, Delaware, Lackawanna & Western, presiding. The meeting was opened with prayer by the Rev. Father Stapleton, followed by the president's address and the address of welcome, by Edward J. Catell, statistician of the city of Philadelphia. C. E. Chambers, superintendent of motive power, Central Railroad of New Jersey, spoke on the "Progress of Foremen Blacksmiths in Railroad Service," and Charles E. Carpenter, president of E. F. Houghton & Co., gave a talk on general subjects, concluding with a brief reference to heat treatment of steel. A further report of the convention will appear in a later issue of the *Railway Age Gazette*.

The following companies have exhibits at the convention:

Acme Machinery Company, Cleveland, Ohio.—Machine forgings manufactured with Acme machines. Represented by C. W. Durschlag.

Ajax Manufacturing Company, Cleveland, Ohio.—Machine forgings, products of Ajax forgings machines. Represented by J. R. Blakesley, A. L. Guilford, J. A. Murray and C. E. Wicks.

Anti-Borax Compound Company, Fort Wayne, Ind.—"E-Z" welding compound. Represented by Chas. O. Kahre.

Houghton, E. F., & Company, Philadelphia, Pa.—Case-hardening materials, quenching oils and compounds, finished heat-treated products and a line of mechanical leathers. Represented by Emil Nissen, W. J. Boyd and J. W. Kelley.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the *Railway Age Gazette* for each month.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 8 W. 40th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.

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

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

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

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Landon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.

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

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

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

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

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

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

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

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

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

MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.

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

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

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

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

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May. Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

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

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

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

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

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

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

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

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, October 19-21, Colorado Springs, Colo.

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

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

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

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

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broadway St., Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, 1st Tuesday in month, except June, July and August, Hotel Astor, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.

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

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-10, 1915, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

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

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

Traffic News

A regular meeting of the Southern Classification Committee will be held at the Hotel Sherman, Chicago, on November 8. The docket closes 30 days prior to that date.

The Canadian Pacific expects to carry 15,000 harvest workers to the northwest provinces between August 19 and August 28. Reduced fares are provided and special trains will be run where necessary.

The troublesome Shreveport rate situation may bring on a clash between the Interstate Commerce Commission and the Texas Commission. Railroad Commissioner Earle B. Mayfield, of Texas, threatens to have the state attorney general file suit against the Texas railroads to enjoin them from obeying the recent order of the federal commission commanding them to apply the same freight rates to Dallas and other points in Texas as are applied to Shreveport.

The express companies operating in New York state have filed with the Public Service Commission, Second District, new tariffs for the transportation of merchandise showing increases similar to those which have been allowed for interstate traffic, the changes to take effect September 1. In Georgia the express companies have presented a petition, asking similar authority, to the State Railroad Commission, and that body will give a hearing on the subject August 25.

A committee of Texas shippers has requested of the Interstate Commerce Commission a suspension until January 1 of its supplementary order in the Shreveport case. The basis of the request is stated to be: First, that great confusion is certain to follow the establishment of new rates; and second, that the Texas Commission has now before it applications from Texas carriers for an advance in rates which are likely to be decided before the end of the year.

The Southern Railway and its affiliated lines are to make exhibits at thirty state, district and county fairs in the North and Middle West during the coming fall. A fine collection of grains, grasses and forage crops will be shown. From the wheat-growing section of the South, grain sheaves will be shown from fields yielding as high as 40 bushels to the acre. The first two exhibits will be shown at fairs in Indiana. For all fairs in the middle west a special exhibit tent has been provided, arranged so that a large number of people can see the exhibit at the same time.

Duluth shipping interests are preparing to contest before the Interstate Commerce Commission the general advance in rail and lake rates recommended on July 14, at a meeting in Chicago between representatives of eastern trunk lines, boat lines and Duluth-Twin City lines. The hearing will begin in Chicago on September 29. The shippers propose a scale of lake class rates from Buffalo to Duluth, based on 35 cents first class. The Duluth interests rely upon the latest decision of the commission to the effect that any class rates that exceed 83 cents, first class, from New York to the Twin Cities, rail-lake-and-rail, with corresponding rates from other points, would be unreasonable.

To show the magnitude of automobile traffic on Long Island General Manager McCrea, of the Long Island Railroad, has had a count made of the motor cars driven across his tracks. On Sunday, August 8, at the Merrick Road crossing, in Springfield, 9,408 automobiles passed between midnight and midnight. Of these 4,245 were eastbound and 5,163 westbound. At the Barnum Island road crossing, on the Long Beach branch, 4,739 cars passed in the same period, of which 2,620 were eastbound and 2,119 westbound. In the single hour from 11 a. m. to noon on Sunday, 845 motor cars passed over the Merrick road crossing. This is at the rate of more than 14 cars a minute, or about one every four seconds. Nearly all of these cars must have crossed the Long Island tracks at other points, not once but several times. Heavy pole gates similar to those recently put up on the Long Beach branch have been installed at Central Islip. The road has been authorized by the supervisors of Nassau county to install at certain points traffic posts similar to those used by the New York City traffic squad, to serve as route indicators for motorists.

The Arkansas Rate Situation

W. B. Biddle, receiver and chief traffic officer of the St. Louis & San Francisco, has issued a statement concerning the rate situation in Arkansas, appealing especially to "any person who believes in a square deal."

The Arkansas state freight rates have been in litigation for nearly eight years, and have twice been reviewed and passed upon by United States courts. In the first place it was held by the courts that the rates that the railroads were permitted to charge, taken in connection with the passenger rates then in force, did not give the carriers a reasonable compensation; that the roads were entitled to an increase of 33 1/3 per cent in their revenue. This decision of the courts was followed by a conference between the commission and the railroads, which resulted in the so-called "court tariff." The court tariff gave the Frisco road an increase of only 13 1/2 per cent in its freight revenues, but it was accepted in good faith, as an experiment, with the intention of asking for a revision if the results were unsatisfactory. This tariff remained in effect until the decision of the supreme court in the Minnesota rate case.

At that time the Frisco voluntarily reinstated its previous commission tariff, the one condemned by the court as affording inadequate revenue, so that pending the final hearing for the Frisco's application for higher rates the public might have the benefit of the low rates. This tariff was again taken into court and a decision rendered in April, 1915, which declared that under the rates established by the commission business was done at an actual loss. The Frisco then prepared and issued a new tariff, having in mind that the decision gave the road opportunity to submit a tariff that would represent the carrier's views of reasonable and defensible freight rates. Officers of other important Arkansas lines were consulted and changes were made at their suggestions. The Arkansas commission was advised of the terms of the tariff and a conference was requested for the purpose of securing an expression from the commission; but the tariff was rejected without any analysis of its terms. Thereupon the new tariff was put into effect by the Frisco. It was at once attacked by the commission; and, upon hearing, the court held that the new rates were unreasonable wherever they were in excess of the interstate rates then in effect into or out of Arkansas. The court, however, did not say that the revenue derived from the new tariff was excessive, either as a whole or as applied to the rates that were higher than the interstate rates; nor did the decision say that the new rates were unreasonable in and of themselves. Another new tariff was consequently prepared and went into effect on July 26, 1915.

In explanation of Frisco Tariff No. 2806, the one which was rejected by the commission, Mr. Biddle emphasizes the fact that it was intended to represent the views of experienced and responsible traffic men as to what constitutes fair and defensible freight rates. As it was, confessedly, a tariff made by the railroad itself, the rates shown therein could probably be held to be the maximum rates that the carrier felt that it should be permitted to charge. Mr. Biddle says:

"The rates carried by other lines in the state of Arkansas are not voluntary rates; they are made by the Arkansas commission and are protested by the roads. Many of the interstate rates into or out of the state of Arkansas are not voluntary rates; many of the rates carried in the surrounding states are not voluntary rates; so that in submitting what was believed to be a reasonable tariff some of these conditions were ignored to a large extent."

It is further stated that while the new tariff represented the judgment of the road's officers as to a reasonable basis of rates, the Frisco did not then and does not now hold that every rate in the new tariff is the proper one. The road is prepared to discuss the rates with the commission or with interested shippers, and make such modification as may be reasonable. In the matter of joint rates with other lines, the Frisco has never desired nor intended to discontinue making joint rates. It is ready to make them today; but so long as a different basis of rates prevails on different lines it is difficult to see how this can be accomplished. In conclusion, the statement insists that this is a plain business proposition; the road believes itself entitled to greater compensation than it is receiving and is preparing to use all honorable means to accomplish this result.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Rates on High Explosives to New England Points

Nitro Powder Company v. West Shore et al. Opinion by the Commission:

The commission finds that the present C.L. and L.C.L. rates on high explosives from Kingston and Port Ewen, N. Y., to Boston, Mass., and to other New England points, are unreasonable to the extent that they exceed the first-class and double first-class rates, respectively, between these points. One reason for these high rates is the lack of joint rates. The commission, therefore, describes through routes and joint rates for the future, and awards reparation. (35 I. C. C., 77.)

Cement Rates from Cape Girardeau, Mo.

Cape Girardeau Portland Cement Company v. St. Louis & San Francisco et al. Opinion by Commissioner Meyer:

The commission finds that the rates on cement in carloads from Cape Girardeau, Mo., to points in southern Arkansas, which are not at least three cents per 100 lb. lower than the rates from St. Louis, Mo., to the same points are discriminatory. In like manner it is found that the rates from the same point to points in Louisiana west of the Mississippi, to points in Mississippi, except points on the Mississippi river, and to points in Kentucky and Tennessee, west of the Tennessee river, except Paducah, Ky., and Memphis, Tenn., which are not at least two cents per 100 lb. lower than the rates from St. Louis, are discriminatory. Combination rates on cement in carloads from Cape Girardeau to points in southern Illinois are found unreasonable and discriminatory in favor of competing points in Missouri, Illinois and Indiana, and reasonable maximum joint rates are prescribed. (35 I. C. C., 109.)

The Ogden Gateway Case

In re increased passenger fares via the Denver & Rio Grande through the Ogden and Salt Lake City gateway. Opinion by Commissioner Harlan.

A very brief resumé of this case was given in this column last week. The Union Pacific has proposed to cancel the joint passenger fares in effect since 1897 in connection with the Denver & Rio Grande between points in the territory of the Oregon Short Line and points east of and including Colorado common point territory. The issue originally dealt with a proposed cancellation of through rates, which would have eliminated an option whereby patrons traveling between the eastern points designated and points on the Short Line could use the Denver & Rio Grande between Denver and Ogden or Salt Lake City. The decision was enlarged, however, to include all the joint rates in effect with the Rio Grande mentioned.

The route via the Union Pacific and the Short Line from Omaha to Pocatello, Idaho, is 383 miles shorter than the shortest route over the Burlington to Denver, thence by the Rio Grande to the gateway and the Short Line beyond. The Union Pacific in addition to operating the most direct route to this and similar points, also operates the faster and more adequate service. The route of the Rio Grande has been used very extensively by passengers to and from points on the Short Line, the reason being that the scenic effects over the former are among the best in the country.

The Union Pacific contends that it has a legal right under Section 15 of the act, to cancel the through route arrangements and joint passenger fares in question because the route over the Rio Grande requires it to short haul itself. It wishes to give its system a longer haul than it now enjoys on this traffic and alleges that the rates (made on the basis of its own direct line) over the circuitous Denver & Rio Grande route are not sufficiently remunerative to either system.

The commission agrees with the carriers' contentions and will allow the cancellations proposed. It meets with approval a sug-

gestion that the round-trip tickets to Yellowstone Park be made available in one direction over the Rio Grande, and suggests itself that a through service still be maintained over the latter, although at higher rates than the present ones.

The commission does not perceive from the language of the act that it has any larger or different powers when dealing with tariffs by which it is proposed to cancel an existing through route than it has in connection with establishing a through route and just rates applicable thereto where no such route has already been established. The long continuance of a through route and of joint rates on traffic moving over it is often a fact of substantial importance and one that must always be considered; it has never been held, however, to be a controlling factor in any case. "Our authority in such matters is statutory and can not be enlarged by the previous course of the carriers. We think it clear that we have no power under Section 15, nor should we assume the power, to prevent the cancellation of through routes and joint rates voluntarily established by the carriers when, as in this case, the circumstances and conditions are such as would not warrant an order to compel such arrangements if not already in effect."

Commissioner McChord dissents (35 I. C. C., 131.)

The Cummins Amendment

The commission has issued the following:

"On May 7, 1915, the commission issued a report expressing tentatively its views upon various questions arising in connection with the Cummins amendment (*Cummins amendment*, 33 I. C. C., 682). Among other things, attention was called to the provision of Section 10 of the act penalizing any person who by false statement as to value, or by any other device, obtained or attempted to obtain transportation for property at less than the regular rates. The numerous inquiries regarding this matter indicate confusion in the minds of many as to the application of Section 10, and seem to render desirable a further expression of opinion by the commission upon this point.

"There is no provision in the act to regulate commerce, including the Cummins amendment, that requires a declaration as to the value of property shipped in interstate commerce; nor has the commission issued any ruling that requires such declaration.

"The Cummins amendment does, however, provide that if the goods are hidden from view by wrapping, boxing, or other means, and the carrier is not notified as to their character, 'the carrier may require the shipper to specifically state in writing the value of the goods.' In such cases rates and charges for transportation, dependent upon the value of the property shipped as specifically stated in writing by the shipper, may be established and maintained.

"It is the view of the commission that, so far as declarations as to value are concerned, the prerequisites for the application of Section 10 are—First, the election of the carrier to require a shipper to state in writing the value of the goods; second, the existence of graded rates or charges dependent upon the value of the property shipped; and, third, that the shipper shall knowingly and wilfully by false statement as to value obtain or attempt to obtain transportation for such property at less than the regular rates."

Anthracite Coal Rates to Chicago

Opinion by Commissioner McChord:

The commission finds that the carriers have justified a proposed increase of 25 cents per gross ton on anthracite coal, prepared sizes, all-rail in carloads from anthracite mines in north-eastern Pennsylvania to Chicago and Chicago rate points and to points of connection between eastern and western lines near Chicago, such as Joliet, Kankakee, Griffith and others, and to the other points of connection between such lines, Peoria, East St. Louis and St. Louis.

Through rates are effective on all of the lines from the mines to Chicago and to Chicago rate points and to Peoria, East St. Louis and St. Louis. Of the through rates, \$1.75 formerly constituted the division accruing to the trunk line carriers for the haul from the mines to Buffalo as opposed to the local rate of \$2 on all lines for that haul. But to points intermediate to Chicago and to other points in Ohio, Indiana and Michigan, to which no through joint rates apply, the rate applicable is made by the combination of the local \$2 per gross ton rate from the

mines to Buffalo and the local or reshipping rate from Buffalo west to destination, by which combination there is brought about a freight charge of 25 cents a gross ton more to those points which commonly take the same rate as Chicago than the former joint through rate to Chicago.

The entire increase of 25 cents is apportioned as compensation for that part of the through haul between the mines and Buffalo on shipments via Buffalo on the lines running to Buffalo, so that on such shipments carriers will receive no increase for that part of the through haul between Buffalo and the named points of destination, and the rate to Buffalo will be uniformly \$2, regardless of the destination of the shipments. But as to shipments moving west, not via Buffalo, over the Erie or Pennsylvania railroads, which extend by their own rails from the mines to Chicago, the increase is necessarily apportioned over the entire mileage from the mines to Chicago.

Respondents assert that they have proposed the increased rates in view of a complaint that certain discriminations against dealers in and consumers of anthracite coal in Ohio, Indiana and Michigan have been created by the effective rates.

This issue is determined by the commission's finding in the *Rates for Transportation of Anthracite Coal* (35 I. C. C., 220), where a rate of \$2 per gross ton was found to be reasonable for the haul from the mines to Buffalo. Nothing has been made to appear here that would warrant the commission's requiring the trunk-line carriers to accept less revenue on the transportation here involved than they receive to the intermediate points in Ohio, Indiana and Michigan. (35 I. C. C., 702.)

Rates on Railroad Fuel in Southeastern Territory

In the matter of rates, divisions, rules, regulations and practices governing the transportation of railroad fuel and other coal. Opinion by Commissioner Meyer:

The Seaboard Air Line, the Atlantic Coast Line and the Charleston & Western Carolina purchase the greater part of their fuel coal from the Clinchfield Fuel Company and other mines on the lines of the Carolina, Clinchfield & Ohio (owned by the same interests that own the Fuel Company) or its connections.

In 1914 these three carriers purchased something over 800,000 tons of coal from mines on the Clinchfield or its connections. The total tonnage of bituminous coal hauled by that railroad was 1,206,000; the railroad fuel coal constituted about two-thirds of this traffic, and about one-half of the total tonnage of all kinds. This shows how important it is that producers on the Clinchfield should secure the contracts of these three roads.

The fuel coal purchased by the Seaboard and moving via the Clinchfield is received at various junction points. Much of the Seaboard coal is delivered to it by the Clinchfield Railway at Bostic. The coal is billed to Ellenboro, but all of it is transported to Charlotte, Munroe, Hamlet, and Wilmington, N. C., which are points on the Seaboard beyond Ellenboro. Ellenboro is a small town of three or four hundred inhabitants, about 5 miles from Bostic, the junction point. The haul from the point of origin to Bostic performed by the Clinchfield Railway is approximately 240 miles, and so to Ellenboro the haul is approximately 245 miles. The joint through rate on coal between the points of origin and Ellenboro, the billed destination, is \$2.15 per ton. Under the divisions in effect at the present time the Clinchfield Railway receives 99 cents for its haul of 240 miles and the Seaboard receives \$1.16 for its haul of 5 miles. Below are shown the distances from Bostic, the junction point, to Ellenboro and to the points of consumption, together with the joint rates and divisions now effective from the mines to these points:

Station.	Miles from junction.	Rate per ton.	C., C. & O. division.	Seaboard division.
Ellenboro	5.7	\$2.15	\$0.99	\$1.16
Charlotte	72	2.25	1.35	.90
Munroe	97	2.25	1.35	.90
Hamlet	149	2.40	1.32	1.08
Wilmington	260.8	2.05	.92	1.13

The coal moves over the Clinchfield on a revenue waybill reading to Bostic, final destination Ellenboro. Upon the arrival of the coal at Bostic it is "reconsigned" by the agent to the various points of actual consumption, and the agent at Bostic takes into his accounts the Ellenboro waybills and issues from that point what are known as company deadhead waybills. That agent pays to the Clinchfield Railway its division of 99 cents of the Ellenboro rate. The coal is moved from Bostic to Ellenboro in through trains without stopping at that point. There is nothing in the entire transaction to indicate that the coal was at any time

destined to Ellenboro, except that that point was named in the initial waybill. The other two carriers receive their coal under like arrangements.

The findings of the commission are as follows:

The character of a shipment and not formal incidents, such as billing, determines the rate and divisions applicable. The rates and divisions to points of actual destination must be applied to railway fuel coal shipments here involved, and the application of rates and divisions to fictitious billed destinations is unlawful and can not be justified by the theory that such rates and divisions would be proper rates and divisions to the average point of actual destination.

A railroad company as shipper is entitled to the same consideration as any commercial shipper and no more, even when the shipment moves in part over the rails of such railroad company. It follows that in such case the carrier is entitled to a division of the joint through rate. But the division must be fixed by the same considerations which would determine divisions upon a through commercial shipment in which the railroad had no interest other than that of carrier. The divisions now received out of the joint rate on supply coal by the Seaboard Air Line, the Atlantic Coast Line, and the Charleston & Western Carolina for the hauls from their junctions are special and abnormal divisions.

The commission may fix divisions when a railroad company is the shipper or is owned by the shipper so that the division of a through rate might be the means of indirectly reducing transportation charges or effecting discriminations. Divisions here involved will not be fixed by order at this time, but carriers will be expected to adjust them to meet views herein expressed.

The commission may order that such divisions be filed with it and it is so ordered as to the divisions applicable to fuel coal shipments herein involved.

The commission states:

"The question of the proper method of handling fuel-coal rates and divisions is an old one, and the commission is impressed with the fact that some of the carriers have not endeavored to meet the views heretofore announced. We shall therefore look with great care to the steps taken by the carriers to meet the views herein set forth, and the next time we have to deal with a situation like that here presented we will do so under the criminal provisions of the act." (36 I. C. C., 1).

STATE COMMISSIONS

The Chesapeake & Curtis Bay Railroad Company has applied to the Public Service Commission of Maryland for authority to exercise its franchise, the purpose of the company being to take over the tracks in Baltimore which are owned by the United States Asphalt Company. It is proposed to extend these tracks to serve additional industries; but the Baltimore & Ohio is objecting to this proposal, claiming that the territory in question has been developed by the B. & O.

The Missouri Public Utilities Commission and the railroads of the State on August 10 reached an agreement under which grain rates will be increased approximately five per cent., subject to the approval of the Interstate Commerce Commission. The rates agreed upon are substantially the old schedule of interstate rates that were effective before the statutory rates were put in force. They are made applicable to both St. Louis and East St. Louis, without bridge toll, and will absorb necessary switching charges at points of origin and destination; and they also will permit milling-in transit or re-handling at intermediate points in Missouri without additional charge.

COURT NEWS

Railroad Not Liable for Injuries Caused by Ditch Constructed but Not Owned by It

A railroad company built its road through an unimproved street of a town, and its franchise from the town required it to square up the sides and bottom, and construct concrete retaining walls for the sides and bottom, of a certain ditch running along the street, which supplied its natural drainage. The ditch had no connection whatever with the railroad, and its improvement as required by the town was of no benefit to the railroad. The Alabama Supreme Court holds that the railroad was not liable for injuries to a pedestrian from falling into the ditch.—*Bush vs. Seaboard Air Line* (Ala.) 68, So. 1011.

Liability for Injury to Stalled Automobile

Through some unknown cause an automobile engine stopped on a railroad crossing in the open country. A heavy passenger train was speeding towards the crossing at 55 miles an hour from a point in plain view half a mile away. The occupants of the car stepped out and began to try to crank it and push it from the track. The engineer of the train made an emergency application of the brakes as soon as he had a chance to discover that the car was stalled on the track, but the train was not stopped in time to prevent a smash. The court held that, as the train could not have been stopped in time to avoid a collision with the automobile without serious injury to the railroad's property by the abrupt stoppage, the company was not negligent nor liable for the value of the car.—*McBeth v. Atchison, T. & S. F.* (Kan.), 148 Pac. 621.

[Liability for Assaults by Fellow Passengers]

In Massachusetts a passenger sued a carrier for damages for an assault by another passenger in a train, where the conductor, and later a trainman, saw and knew that the passenger who was complained of, Peters, threatened plaintiff and did him some little violence, yet took no measure to protect plaintiff. The trial court directed a verdict for the defendant. In reversing and ordering judgment for the plaintiff, the Massachusetts Supreme Court said that a railroad company is not obliged to foresee the impossible or highly improbable, and it is not called upon under ordinary circumstances to expect that one passenger will assault another; or that because one passenger is engaged in frolic or sport with another, such conduct will result in injury to one of them. But where the circumstances and surroundings, conduct, speech or manner of one passenger toward another is such that violence or harm is likely to result, and the carrier has reasonable notice of such circumstances and conduct, and has the opportunity to take measures to prevent the threatened violence, then it becomes its duty to protect the threatened passenger. The conductor's knowledge alone might not have been sufficient to indicate the recurrence of trouble; but when the trainman came upon the scene, knew the plaintiff's complaints and saw Peters' conduct and heard his speech and did nothing, it became a question for the jury whether the company complied with the obligation resting on it of using the highest degree of caution in looking forward to and preventing injury to passengers, from all sources, consistent with its undertaking. *Lenberg v. New Haven* (Mass.), 108 N. E. 1046.

Steamship Owned by Railroad—Status Under Federal and State Liability Acts

In an appeal from an award of the New York Workmen's Compensation Commission for the death of an employee of the Southern Pacific while unloading a steamship berthed alongside a pier in the Hudson river, the New York Court of Appeals was called upon to decide as to the applicability of the act to the facts of the case. The steamship was owned by the railroad and plied between New York and Galveston. It did not appear that it was in any way operated in connection with a line of railroad. The railroad contended that the federal employers' liability act applied, and not the State compensation act. The court held that, as far as the present case was concerned, the railroad was a carrier by water. The act applies only to carriers by railroad. There is nothing in it indicative of a purpose to apply it to carriage by water if such carriage happen to be conducted by a railroad corporation, and not otherwise—to apply one rule of liability to transportation by a steamship line, if owned and operated by a railroad corporation, and a different rule to precisely similar transportation not thus controlled. The federal act provides a rule of liability of carriers by railroad for injury or death resulting "by reason of any defect or insufficiency due to its negligence, in its cars, engines, appliances, machinery, track, roadbed, works, boats, wharves or other equipment." It was held that the words "boats" and "wharves" might be given due effect by applying them as adjuncts or auxiliaries to transportation by railroad. The employment in which the deceased was engaged was not governed by the federal statute and the workmen's compensation act applied to it. At the same time the court held the latter statute to be constitutional. Decided July 15, 1915.

Railway Officers

Executive, Financial, Legal and Accounting

Asa G. Chandler, vice-president of the Atlanta & St. Andrews Bay, has been elected president, with headquarters at Atlanta, Ga., succeeding A. B. Steele, resigned.

Benjamin S. Crow has been appointed assistant general counsel of the Oregon Short Line, with headquarters at Salt Lake City, Utah. He will assume his new duties on September 1.

B. F. Bush, chairman of the board and president of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, at St. Louis, Mo., has been appointed receiver for both these roads.

Operating

Paul F. Keating, superintendent of the Breckenridge division of the Great Northern, at Breckenridge, Minn., has been transferred to the Willmar division, with headquarters at Willmar, Minn.

John Bose, assistant superintendent of the Louisville & Nashville, at Mobile, Ala., has been appointed superintendent of the Louisville division, with headquarters at Louisville, Ky., vice E. E. Snyder, deceased.

A. V. Burr, superintendent of the Pullman Company at Houston, Tex., has been transferred in the same capacity to St. Louis, Mo., and H. J. Clark, district superintendent at New Orleans, La., succeeds Mr. Burr. Effective September 1.

E. M. Wrenne, assistant superintendent of transportation of the Nashville, Chattanooga & St. Louis, at Nashville, Tenn., has been appointed acting superintendent of transportation, succeeding to the duties of his father, M. J. C. Wrenne, deceased.

Joseph A. Caviezel, superintendent of the Alabama, Tennessee & Northern, at York, Ala., has been promoted to general superintendent, with headquarters at York, in charge of the operating and maintenance departments, and the office of superintendent has been abolished.

Traffic

R. J. Darnley has been appointed general agent of the Chicago, Burlington & Quincy, at Rockford, Ill., succeeding A. G. Everett, resigned.

William T. Price has been appointed commercial agent of the Union Pacific, with headquarters at Pueblo, Col., succeeding L. M. Tudor, assigned to other duties.

The jurisdiction of C. A. Fullen, general agent of the Chicago Great Western at Winnipeg, Man., has been temporarily extended to include the territory of the Fargo agency.

Thomas J. Kenniff has been appointed commercial agent of the Chicago, Milwaukee & St. Paul, with headquarters at Minneapolis, Minn., succeeding Truman H. Clark, resigned to engage in other business.

Omar Sanders, traveling freight agent of the Atlanta, Birmingham & Atlantic, at Birmingham, Ala., has been appointed commercial agent, with offices at Atlanta, Ga., vice Walter I. Middleton, granted leave of absence.

G. H. Corse, Jr., general passenger agent of the San Francisco Overland Routes, with headquarters at Yokohama, Japan, and Hongkong, China, has resigned to become special agent of the passenger department of the Union Pacific, with headquarters at Chicago.

The jurisdiction of the general freight agent of the First division, of the Atlantic Coast Line, has been extended to include all points north of the Savannah river. James F. Mead, assistant general freight agent at Jacksonville, Fla., has been appointed assistant general freight agent with office at Savannah, Ga., with jurisdiction in Georgia, Florida and Alabama, and his former position has been abolished. Robert Taylor, citrus fruit agent at Jacksonville, has been appointed division freight agent with office at Jacksonville.

E. W. Johnson has been appointed general dairy agent of the Merchants' Despatch (New York Central), with office at Chicago, and the position of general western agent has been abolished. G. B. Horr has been appointed western dairy agent, with office at Chicago, and the position of assistant general western agent has been abolished. S. D. Parkhurst has been appointed eastern dairy agent, with office at New York, vice E. E. Overpeck, deceased, and David P. Skinner has been appointed dairy agent, with office at Chicago, vice Mr. Parkhurst.

Purchasing

Edward J. Price, whose appointment as general storekeeper of the St. Louis & San Francisco, with headquarters at Springfield, Mo., has been announced, was born at Marion, Ill., on June 28, 1870. He was educated in the common and night schools and entered railway service on September 21, 1888, as messenger boy with the Union Pacific at Kansas City, Mo. He left the Union Pacific in June, 1891, and went to the Atchison, Topock & Santa Fe, which road he remained with until November, 1913, when he was appointed traveling storekeeper of the St. Louis & San Francisco, from which position he is now promoted as above noted.

OBITUARY

Elmer E. Snyder, superintendent of the Louisville Division of the Louisville & Nashville, at Louisville, Ky., since 1902, died on August 4, at the age of 53.

Mendes Cohen, a former well-known railroad engineer, died at his home in Baltimore, Md., on August 13, at the age of 84. Mr. Cohen began his career in the locomotive works of Ross Winans at Baltimore. From 1851 to 1855 he was in the engineering department of the Baltimore & Ohio Railroad. From 1855 to 1875 he served the following companies as superintendent, assistant superintendent, controller or president: The Hudson River Railroad, the Ohio & Mississippi and the Philadelphia & Reading; the Lehigh Coal & Navigation Company, and the Pittsburgh & Connellsville Railroad. He was long president of the Maryland Historical Society, retiring only two years ago.

M. J. C. Wrenne, superintendent of transportation of the Nashville, Chattanooga & St. Louis, at Nashville, Tenn., died in that city on August 10. He was born in August 1847, at Limerick, Ireland, and began railway work in May, 1861, as a clerk in the superintendent's office of the Nashville & Decatur, now a part of the Louisville & Nashville. Since May of the following year, he had been in the continuous service of the Nashville & Chattanooga, and its successor, the Nashville, Chattanooga & St. Louis, having served consecutively as clerk in the transportation department, trainmaster, superintendent, and then as general superintendent until January, 1899, when he was appointed superintendent of transportation.

THE RAILWAY ACCIDENT RECORD OF AUSTRALIA.—The various Australian states come out well in the matter of railway accidents, the latest five years to which statistics extend showing an average of 0.10 fatalities per 1,000,000 passengers carried in New South Wales. The corresponding average in Victoria was 0.09 per 1,000,000 passengers, and in South Australia 0.11. In the United Kingdom the average was 0.08 per 1,000,000 passengers carried; in Germany, 0.08 per 1,000,000 passengers; in Austria, 0.08 per 1,000,000 passengers; in Hungary, 0.26 per 1,000,000 passengers; in Belgium, 0.09 per 1,000,000 passengers; in Sweden, 0.08 per 1,000,000 passengers; in Hungary, 0.26 per 1,000,000 passengers; in the Netherlands, 0.07 per 1,000,000 passengers, and in Switzerland, 0.12 per 1,000,000 passengers. In the United States the average came out at 0.51 per 1,000,000 passengers carried. The worst showing was, however, made in Russia in Europe, which figured with an average of 1.47 fatalities per 1,000,000 passengers, and Asiatic Russia with an average of 4.19 per 1,000,000 passengers. The number of persons injured per 1,000,000 passengers carried was 2.36 in New South Wales, 3.37 in Victoria, and 3.68 in South Australia. In the United Kingdom the average came out at 2.15 per 1,000,000 passengers, in Germany at 0.44, in Austria at 1.92, in Hungary at 1.24, in Belgium at 3, in Sweden at 0.25, in Norway at 0.16, in the Netherlands at 0.48, and in Switzerland at 0.93.—*Engineering, London.*

Equipment and Supplies

LOCOMOTIVE BUILDING

THE ATLANTIC COAST LINE has ordered 10 Pacific type locomotives from the Baldwin Locomotive Works.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS has ordered 3 Mallet (2-8-8-2), 5 Mikado and 2 Pacific type locomotives from the Baldwin Locomotive Works.

THE WISCONSIN & NORTHERN has ordered 1 superheater ten-wheel type locomotive from the American Locomotive Works. This locomotive will have 20 by 26 in. cylinders; 63-in. driving wheels and a weight of 168,000 lb.

THE SOUTH DAKOTA CENTRAL has ordered one ten-wheel and one Mikado type locomotives from the American Locomotive Company. The ten-wheel locomotive will have 18 by 24 in. cylinders, 60-in. driving wheels and a total weight of 136,000 lb. The Mikado type locomotive will have 20 by 28 in. cylinders, 52-in. driving wheels and a total weight of 178,000 lb.

CAR BUILDING

THE VIRGINIA-CAROLINA is in the market for 120 30-ton box cars.

WELLS, FARGO & CO. are inquiring for 35 express refrigerator cars.

THE PENNSYLVANIA LINES WEST are in the market for 100 underframes for caboose cars.

THE PITTSBURGH & LAKE ERIE has ordered 20 underframes from the Merchants Despatch Transportation Company.

THE NEW YORK CENTRAL has ordered 500 50-ton all steel automobile cars from the Haskell & Barker Car Company for the Michigan Central.

THE ATLANTIC COAST LINE is in the market for two 74-ft. coaches, one 70-foot combination passenger and baggage cars and two 70-foot baggage and mail cars.

IRON AND STEEL

THE SOUTHERN has ordered 4,000 tons of rails from the Maryland Steel Company.

THE PHILADELPHIA & READING has ordered 8,000 tons of rails from the Pennsylvania Steel Company and 2,000 tons from the Bethlehem Steel Company.

THE WESTERN PACIFIC has ordered 164 tons of steel for four 75-ft. single track deck plate girder spans in California, from the American Bridge Company.

THE CHICAGO GREAT WESTERN has ordered 167 tons of steel for three 70-ft. through plate girder spans, from the American Bridge Company.

THE CHICAGO RAILWAYS COMPANY has ordered from the American Bridge Company 309 tons of steel for girders and tie rods for the Van Buren street tunnel.

THE DENVER UNION TERMINAL COMPANY has ordered 419 tons of steel for passenger, baggage and express subways at Denver, Colo., from the American Bridge Company.

THE CHICAGO & WESTERN INDIANA has ordered 2,650 tons of rails from the Illinois Steel Company and 3,500 tons of steel for track elevation bridges, from the Morava Construction Company.

THE HANKOW-SZECHUAN GOVERNMENT RAILWAY of China, Robert W. Hunt & Co., Pittsburgh, Pa., consulting engineers, will receive bids until September 25 for 845 tons of steel for eight bridges on the Hankow-Ichang section. Specifications may be obtained from Robert W. Hunt & Co., Pittsburgh, Pa., for \$2.50.

Supply Trade News

It is reported that the French government is negotiating for the purchase of 6,000,000 white oak ties for railroad building in France.

The Walter A. Zelnicker Supply Company, St. Louis, has purchased the stock and good will of the Bintliff Supply Company (successor to Bintliff & Herb), who were engaged in a general railway, mill and factory supply business and specialized in railroad track tools.

W. K. Millsapps, southwestern representative of the Grip Nut Company, Chicago, with headquarters at Houston, Tex., died on August 6, at Houston. Prior to his connection with the Grip Nut Company he was for several years general storekeeper of the Sunset Central Lines.

Charles B. Ellis, assistant to J. L. Replogle, vice-president and general manager of the American Vanadium Company, with office in New York, has become associated with the Bartlett-Hayward Company, Baltimore. Mr. Ellis was for many years with the Cambria Steel Company.

The Virginia Bridge & Iron Co., Roanoke, Va., has opened a branch office in the First National Bank building, Denver, Colo., to cover the territory embraced in the states of Kansas, Colorado, Arizona, New Mexico and Utah. The office will be in charge of A. R. Peyton, who has been associated with the Virginia Bridge & Iron Co. for some years as contracting engineer.

The Mesta Machine Company, Pittsburgh, Pa., has recently received an order from James B. Ladd, consulting engineer, Philadelphia, for a 1,500 H. P. mill engine for the Broken Hill Proprietaries Company, Ltd, New Castle, N. S. W. The engine is for rolling mill service, and is to be of the heavy-duty tandem compound Corliss valve type. This engine, when installed, will make the fourth unit that the Mesta Machine Company has built for the Broken Hill Proprietaries Company.

Arthur M. Torrey, for the past four years in charge of the soliciting department of Hildreth & Co., recently resigned from that position to take charge of the engineering contract department of W. S. Barstow & Co., New York. This company is engaged in engineering and construction work in various parts of the country, and also controls the General Gas & Electric and the Eastern Power & Light corporations, operating some 40 public utilities in the eastern and middle western states.

Joseph T. Ryerson & Son, Chicago, have recently completed a new warehouse on Westside avenue, Jersey City, N. J. The company has maintained an office at 30 Church street, New York, and a warehouse at Boonton for some time. The new plant in Jersey City will put it in a much stronger position for handling its iron, steel and machinery business in the New York district and the east in general. The warehouse is located on a ten-acre site at the junction of the Hackensack river and Newark bay, thus affording facilities for making water shipments to all parts of New York harbor and adjacent waters. The building is 350 ft. by 250 ft. and covers a ground area of 87,500 sq. ft.

The Bethlehem Steel Company has purchased the plant of the Detrick & Harvey Machine Company, Baltimore, Md. The directors of the latter have elected the following officers: A. D. Mixsell, president; W. F. Roberts, vice-president; J. W. Neidhardt, vice-president and general manager, B. F. Jones, secretary and treasurer, and F. A. Shick, auditor. Mr. Neidhardt, as vice-president and general manager, will be the local representative of the Detrick & Harvey Company at Baltimore. This company was formed in 1884 by John S. Detrick and Alexander Harvey, and these two occupied the positions of president and secretary and treasurer, respectively, until Mr. Harvey's death last November, when Curran W. Harvey, his son, succeeded his father. The company manufactures planers, horizontal drill-

ing and boring machines, vertical boring and turning mills and special machinery. It will continue to engage in this business.

The Harrisburg Water Laboratories have been organized for the chemical and bacteriological examination of water, sewage, trade wastes and other associated substances. The organization consists of Lesley McCreath, junior member of the firm of Andrew S. McCreath & Son, analytical and consulting chemists, Harrisburg, Pa., who still retains his interest in said firm; Dr. George R. Moffitt, city chemist and bacteriologist, pathologist to the Harrisburg Hospital and head of the Moffitt Bacteriological Laboratory, and Farley Gannett, consulting engineer and late engineer of the Water Supply Commission of Pennsylvania. The laboratories are equipped and prepared to test and analyze samples of the above substances, submitting reports with interpretation of same.

The New York Air Brake Company, on August 18, declared the regular quarterly dividend of 1½ per cent. Following the meeting President Charles A. Starbuck made the following statement: "In addition to its regular business the company has undertaken orders for high explosive shells and cartridge cases aggregating \$16,581,500 for delivery within the next twelve months, on which substantial payments have been made and in which there is no cancellation clause. The orders taken are for material which is simple to manufacture, and deliveries already have commenced and are giving satisfaction. The company is fully equipped to take on large additional orders for high explosive shells and cartridge cases, and negotiations are pending which are likely to result in large additional business running into 1917."

The United States Circuit Court of Appeals for the seventh circuit has just handed down a unanimous opinion in the suit of the O & C Co. against Otto R. Barnett and the P & M Co., affirming the decision rendered last April by Judge Sanborn of the United States District Court for the Northern District of Illinois, Eastern Division, sustaining the exclusive selling contract of the O & C Co. for the Vaughan rail anchor and enjoining the P & M Co. from selling the same anchor. This decision is based upon a contract of April 30, 1907, between the O & C Co. and the parties controlling the patents for the Vaughan rail anchor, granting the former company the exclusive sales rights. The owners of these patents gave a selling license to the P & M Co. on April 1, 1915. In this decision this license is declared void.

TRADE PUBLICATIONS

TRACK SUPPLIES.—The Track Specialties Company, New York, has issued a book containing simple rules for the computation of shortened switch leads and rules for the location of derailleurs. This book also contains information and illustrations of the various track accessories made by this company.

DRAG-LINE BUCKET.—The Brown Hoisting Machinery Company, Cleveland, Ohio, has issued a booklet describing the Brown-hoist-Shnoble drag-line bucket which it is now making. This book shows a number of photographs of this bucket in actual service and gives considerable data concerning its performance.

BUMPING POSTS.—The Railway & Traction Supply Company, Chicago, has issued a pamphlet showing illustrations of its Hercules steel bumping posts, 39 of which were installed by the United States government at the ends of the towing tracks used by the electric towing engines at the locks along the Panama canal.

GASOLINE MOTOR CARS.—The McKeen Motor Car Company, Omaha, Neb., has issued a new booklet describing its various types of railway motor cars and also a new highway motor car with rubber-tired wheels for street and road service and with railroad flanged wheels for operation on urban railroad lines. This car has a seating capacity of 27 and a new spring pneumatic cushion chair for every passenger. The booklet also describes this company's new 300-hp. motor car for railway service containing a 70-ft. post office compartment and express and baggage compartments. It is designed to pull a standard steel railroad coach for passengers, with a capacity to supersede locomotive train service consisting of five units, locomotive, tender and three cars.

Railway Construction

ATLANTIC COAST LINE.—This company has under consideration plans for the construction of a line, it is said, from St. Stephen, S. C., southwest via. Ridgeville and Walterboro to Yemassee, about 75 miles.

CANADIAN ROADS ELECTRIC.—Engineers of the Hydro-Electric Power Commission of Ontario are now at work south of Hamilton surveying for an electric line from Hamilton to Port Dover and other points on Lake Erie. The plans call for building also to St. Catharines and all intermediate points, including a branch line to Dunnville and Cayuga. F. Gaby, Toronto, Ont., chief engineer of the Hydro-Electric Power Commission. (October 30, p. 818.)

CHATTANOOGA TRACTION.—This company is planning to build an extension, it is said, from Chattanooga, Tenn., north to Hixson, about 8 miles. The company now operates a line from Chattanooga to Signal Mountain.

CLEVELAND & OHIO CENTRAL ELECTRIC.—The amended articles of incorporation changing the name of the Cleveland, Barberton, Coshocton & Zanesville to the Cleveland & Ohio Central Electric, which have been filed, provide also for changing the route authorized under the charter from Cleveland, Ohio, to Zanesville, through Barberton and Coshocton to a line running from Cleveland to Wooster, through Brooklyn, Parma and Royalton townships in Cuyahoga county, and Kinckley, Granger, Sharon and Wadsworth townships in Medina county, and Milton, Chippewa, Green, Wayne and Wooster townships, in Wayne county, through the towns of Sharon, Wadsworth, Rittman and Smithville and into the town of Wooster.

CLEVELAND, BARBERTON, COSHOCTON & ZANESVILLE.—See Cleveland & Ohio Central Electric.

FAIRMONT HELEN'S RUN.—See Western Maryland.

MAINE ROADS (ELECTRIC).—The question of building 33 miles of electric line in Maine is now under consideration, it is said. The projected route is from Topsham, Me., north to Monmouth. F. B. Teeling, Litchfield, Me., is interested.

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has given to the Dock Contractor Company, the lowest bidder, for \$1,692,370, the contract for building Section No. 2 of Route No. 29. This section is to be a two-track subway under Nostrand avenue, from Church to Flatbush avenues, in the borough of Brooklyn. (July 30, p. 219.)

OREGON ROADS.—Plans are being made by Kendall Brothers, Pittsburgh, Pa., to build a line from Roseburg, Ore., north to Umpqua, about 30 miles. The City of Roseburg will issue \$300,000 of bonds, the proceeds of which are to be used in aid of the project.

PACIFIC & IDAHO NORTHERN.—A public meeting was held recently at New Meadows, Idaho, and resolutions were adopted favoring the construction of a new north and south railroad between New Meadows, Idaho, and Lewiston, or the construction of an extension of the Pacific & Idaho Northern, from New Meadows north to Lewiston, about 120 miles.

PETERSBURG & APPOMATTOX (ELECTRIC).—A contract has been let to the Vaughan Construction Company, Incorporated, of Shawsville, Va., and Roanoke, it is said, to build the electric line from Petersburg, Va., northeast to City Point, about 12 miles. The construction work is to be finished by February, 1916. (April 2, p. 767.)

RAPID TRANSIT COMPANY OF ILLINOIS.—Incorporated in Illinois with \$100,000 capital and headquarters at East St. Louis, Ill. The plans call for building an interurban line from East St. Louis southeast, via Chester, Murphysboro and Carbondale, and northeast through the coal fields. J. Vonnahme, D. P. Roberts, C. B. Vonnahme and M. Harned, all of East St. Louis, and L. T. Hoeltman, Collinsville, are incorporators.

RICHMOND, RAPPAHANNOCK & NORTHERN.—Surveys are now being made and construction work is to be started soon, it is said, on a line from West Point, Va., northeast to Urbanna, 17 miles. The company was incorporated with \$300,000 capital on July 30 by capitalists of Richmond, Va. Warner Moore, president; H. L. Lewis, O. J. Sands, C. Thompson and C. Wortham are said to be interested. This is an independent enterprise, and is not connected with the Richmond & Rappahannock River, which plans to build an extension to Urbanna in the near future.

RICHMOND & RAPPAHANNOCK RIVER.—See Richmond, Rappahannock & Northern.

ROLLA, OZARK & SOUTHERN.—This company will build a line from Rolla, Mo., on the St. Louis & San Francisco, to Anutt, a distance of about 18 miles. There will be one bridge across Dry Fork Creek. About one-third of the work has been completed. J. Ellis Walker, Rolla, Mo., is secretary of the company.

SOUTHERN OREGON TRACTION COMPANY.—This company has taken over the Rogue River Valley Railway, which operates about six miles of line between Medford and Jacksonville, Ore., and will electrify it. A portion of the overhead equipment has been purchased. The line at present is operated by gasoline motor cars and steam locomotives.

WESTERN MARYLAND.—The route of the line now being built under the name of the Fairmont, Helen's Run, is from a connection with the Baltimore & Ohio near Chiefton, Marion County, W. Va., in a general northerly direction, crossing West Fork river, thence up Helen's Run to Ida May shaft, with a spur line up Martin's Run to Carolina shaft. The grading contract was let recently to A. L. Anderson Brothers, Altoona, Pa., and bids are now being asked for the steel on bridges, including one steel structure 560 feet long. There will also be five trestles on the line, and a storage yard is to be constructed at Chiefton. Most of the construction will be side hill work; the line is to be built through a mountainous country. The maximum grade to mines will be 1.8 per cent. and maximum curvature 12 degrees. (August 13, p. 301).

RAILWAY STRUCTURES

ALGIERS, LA.—Work has been started on the substructure of the new shops to be built at Algiers for the Morgan's Louisiana & Texas Railroad & Steamship Company. The cost of the improvements will be about \$250,000. (May 28, p. 11140.)

CHICAGO, ILL.—The Chicago & North Western has awarded a contract for the substructure of the bridge over the north branch of the Chicago River south of the Deering station to the Great Lakes Dredge & Dock Company, Chicago. A new interlocking plant will also be built.

DALLAS, TEX.—The city commission has engaged John F. Wallace, of Chicago, to make a survey looking to extensive grade crossing elimination and to prepare a program. The proposed improvements will involve an expenditure of several million dollars. The railroads entering Dallas are now building a new union station, which, with other improvements, will cost about \$5,000,000.

OELWEIN, IOWA.—A fire on August 2 destroyed the store house of the Chicago Great Western at this place, and most of the contents. The estimated loss is \$75,000. Plans are now being prepared for a new structure.

PITTSBURGH, PA.—A contract has been let for building a combined freight house and storehouse for the Pittsburgh & Lake Erie, in Pittsburgh. The new building will be of steel, brick and concrete construction, 188 ft. by 320 ft., and seven stories high.

WEST TULSA, OKLA.—The St. Louis & San Francisco has awarded a contract to Fairbanks, Morse & Co. for a concrete conveyor type coaling and sanding station, to be erected at this place.

WILLOW SPRINGS, MO.—The St. Louis & San Francisco has awarded a contract to Fairbanks, Morse & Co. for a large capacity concrete conveyor type coaling and sanding station, to be erected at this place.

Railway Financial News

CANADIAN NORTHERN.—Wm. A. Read & Co., New York, have bought from the Canadian Northern and have sold to the public, at 98½, \$11,500,000 two-year 5 per cent collateral notes dated September 1, 1915. At this price the notes yield about 5.75 per cent on the investment. These notes are secured by the deposit of \$15,333,334 Canadian Northern general mortgage 4 per cent bonds due 1934. The Dominion Government unconditionally guarantees both principal and interest of the pledged bonds. The notes are convertible at par into bonds at 85 on or before maturity.

CHICAGO, ROCK ISLAND & PACIFIC.—The receivers have asked the court for permission to abrogate the lease under which the Keokuk & Des Moines is operated.

KANSAS CITY, VIADUCT & TERMINAL.—The first mortgage 4½ per cent bonds protective committee proposes to extend the protective agreement which expires by limitation January 1, 1916, for a period of two years, within which time the committee expects to find a purchaser for the property. The committee consists of William C. Lane, R. Walter Leigh, Lawrence E. Sands, Richard C. Storey, with William C. Dooley, secretary.

KEOKUK & DES MOINES.—See Chicago, Rock Island & Pacific.

LAKE ERIE & PITTSBURGH.—Authority has been received from the Ohio Public Utilities Commission to issue \$3,540,000 first mortgage 5 per cent refunding bonds to be guaranteed by the Pennsylvania and New York Central.

MACON (GA.) TERMINAL CO.—The company has sold \$1,600,000 of an authorized issue \$3,000,000 first mortgage 5 per cent bonds of July 1, 1915-1965. These bonds are guaranteed principal and interest jointly and severally by the Central of Georgia, the Georgia, Southern & Florida, and the Southern Railway. The terminal is to be used as a union passenger station, for which the three roads will pay rental on a wheelage basis.

MISSOURI PACIFIC.—B. F. Bush, president, has been appointed receiver of the Missouri Pacific and of the St. Louis, Iron Mountain & Southern.

NEW YORK, NEW HAVEN & HARTFORD.—Counsel for the directors who have been accused by the Government of violating the Sherman Anti-Trust Law have asked Judge Hunt to direct the Government to give more details in its bill of particulars, claiming that the Government was holding back important evidence to be used as a surprise against the accused directors.

PITTSBURGH, SHAWMUT & NORTHERN.—The New York State Public Service Commission has authorized Frank Sullivan Smith, receiver, to issue \$1,700,000 certificates of indebtedness, bearing interest at 6 per cent. and running for two years. The issue has been authorized by the Supreme Court of New York State and the United States District Court, for the Western District of Pennsylvania. The new certificates will be used solely for exchange at par for certificates outstanding which mature on August 1 and September 1. The older certificates have paid 5 per cent.

ST. LOUIS, IRON MOUNTAIN & SOUTHERN.—See Missouri Pacific.

ASIA MINOR RAILWAYS.—Press despatches report that the Turks have begun to construct a railway line in hot haste between Zungduduk, on the Black sea—the coal port which has been repeatedly shelled by the Russians—and Ada Bazar, a town near the head of the Gulf of Ismid, in the Sea of Marmora. This is for the purpose of transporting coal owing to the difficulties of doing so by sea. Five thousand Greeks and Armenians are engaged on the work, under the supervision of German engineers and surveyors. Another line is being constructed from Angora, on the Bagdad Railway, in Anatolia, towards Erzerum, in Armenia—over 300 miles. So far about 7 miles have been laid. These works have been paid for by moneys taken from the agriculture banks.

ANNUAL REPORT

THIRTIETH ANNUAL REPORT OF THE BUFFALO, ROCHESTER & PITTSBURGH RAILWAY COMPANY

The Directors of the Buffalo, Rochester and Pittsburgh Railway Company submit to the Stockholders the following report for the year ending June 30, 1915:

ROAD OPERATED.

	1915. MILES.	1914. MILES.	INCREASE. MILES.
Owned	367.06	367.06	
Leased	89.90	89.90	
Trackage rights	129.52	129.52	
Total length of road operated....	586.48	586.48	
Second track:	208.33	207.32	1.01
Sidings	372.71	360.48	12.23
Total miles of tracks, all steel rails	1,167.52	1,154.28	13.24

The tracks were increased by 1.01 miles of second track, constructed at Creekside, Pa., and 12.23 miles of new sidings.

INCOME.

OPERATING INCOME:	1915.	1914.	INCREASE OR DECREASE.
Revenues	\$9,479,935.75	\$10,734,691.00	—\$1,254,755.25
Expenses	6,935,252.30	7,965,117.27	—1,029,864.97
Net revenue	\$2,544,683.45	\$2,769,573.73	—\$224,890.28
Tax accruals	230,000.00	234,000.00	—4,000.00
Uncollectible revenues	596.27	.....	596.27
	\$230,596.27	\$234,000.00	—\$3,403.73
Income	\$2,314,087.18	\$2,535,573.73	—\$221,486.55
Miscellaneous income	450.48	Dr. 362.89	813.37
Total operating income.	\$2,314,537.66	\$2,535,210.84	—\$220,673.18
Non-operating income	718,195.23	820,587.10	—102,391.87
Gross income	\$3,032,732.89	\$3,355,797.94	—\$323,065.05
DEDUCTIONS FOR INTEREST AND			
RENTALS	2,120,013.33	2,001,013.78	118,999.55
Net income	\$912,719.56	\$1,354,784.16	—\$442,064.60
APPROPRIATIONS:			
Pension and Fire Insurance			
Funds	21,508.47	16,432.49	5,075.98
Special appropriations.....	111,211.09	348,351.67	—237,140.58
TOTAL APPROPRIATIONS:	\$132,719.56	\$364,784.16	—\$282,064.60
Surplus available for dividends.	\$780,000.00	\$990,000.00	—\$210,000.00

A special appropriation of \$111,211.09 was made from Net Income, being part of the \$125,000 paid into the Sinking Funds under Equipment Agreements Series A, B and C, out of which \$45,797.26 was applied to retire \$46,000 of Equipment Bonds Series C, and the balance was reserved for the purchase of new rolling stock.

Profit and Loss account was charged with \$536,380.61. Of this amount \$14,284.45 is the remaining part of the payments into the above mentioned Sinking Funds, including accrued interest, and is also available for the purchase of new rolling stock; \$216,298.83 represents the cost of Equipment bonds Series D, E and F paid off during the year, less one-half of the principal refunded by 4½% Consolidated Mortgage bonds held in the Treasury of the Company; \$180,797.33 covers the full amount paid into the Sinking Funds, including accrued interest, to retire bonds under Equipment Agreement Series G; and \$125,000 is the principal of Series H bonds paid off during the year.

DIVIDENDS.

Dividends in cash were paid on:		1915.	1914.
Preferred stock	\$6,000,000	6% \$360,000	6% \$360,000
Common stock	10,500,000	4% 420,000	6% 630,000
Total	\$16,500,000	\$780,000	\$990,000

Since the close of the fiscal year, your Board of Directors has declared semi-annual dividends of three per cent. on the preferred stock and two per cent. on the common stock, payable August 16, 1915.

CAPITAL STOCK.

There has been no change during the year in this account. The total outstanding Capital Stock of the Company amounts to \$16,500,000, and consists of \$6,000,000 preferred stock and of \$10,500,000 common stock.

FUNDED DEBT.

In accordance with the provisions of the Consolidated Mortgage of 1907, \$1,020,000.00 4½% bonds were received from the Trustee to apply on payments made for improvements and betterments, and the securities placed in the Treasury of the Company. The Trustee also delivered to the company \$205,000.00 Consolidated Mortgage 4½% bonds, representing 50% of Equipment Bonds, Series D, E and F, retired during the year.

These bonds, added to those in the Treasury of the Company, made a total of \$2,400,000.00, of which \$1,000,000.00 were sold during the year for corporate purposes, leaving a balance of \$1,400,000.00 held in reserve.

Under the terms of the Sinking Funds for the redemption of Equipment Bonds, \$640,000.00 were retired, as follows: \$46,000.00 Series C; \$115,000.00 Series D; \$117,000.00 Series E; \$178,000.00 Series F; and \$184,000.00 Series G.

Also the first annual installment of \$125,000.00 Series H bonds was paid, as provided for in that Equipment Agreement.

The net result is an increase of \$235,000.00 in the bonded debt of the Company, outstanding on June 30, 1915.

COST OF ROAD.

Capital account has been charged during the year with \$882,008.80 for investment in road, as follows:

Lands for yard tracks, Rochester, N. Y.....	\$121,617.64
Other lands	4,639.65
Storage warehouse, Rochester, N. Y.....	163,318.88
Subway, Saxton St., Rochester, N. Y.....	24,931.36
Elimination of grade crossing, Scottsville, N. Y.....	23,431.00
Increased weight of rails, frogs and fastenings.....	64,856.87
Stone ballast	18,459.05
Improving bridges and culverts.....	80,272.97
Automatic block signals.....	70,641.45
Power plant building and machinery, Du Bois, Pa.....	128,711.00
Power transmission and distribution system, Du Bois, Pa.....	27,954.35
Shop machinery	16,453.94
New station, Sykes, Pa.....	6,237.88
Yard extensions, sidings, etc.....	130,482.76
Total	\$882,008.80

The six-story concrete storage warehouse at Rochester, N. Y., referred to in last year's report, was completed and is now in operation.

Automatic electric block signals were installed between Buffalo Creek, N. Y., and Ashford, N. Y., a distance of 45 miles, making 139.64 miles of single track and 137.68 miles of double track, a total of 277.32 miles, under this system, being 47% of the entire main line mileage of the road.

The new power house at Du Bois Shops, Pa., was completed April 1, 1915. It accommodates new electric machinery now furnishing sufficient power to meet the growing needs of the plant at that point.

A new station was constructed at Sykes, Pa.

Among the important work still in progress may be mentioned:

Subway, Saxton Street, Rochester, N. Y.

Strengthening of steel bridges.

Replacing of timber bridges, trestles and culverts in permanent form.

COST OF EQUIPMENT.

Expenditures were made for new rolling stock as follows:	
Seventeen locomotives	\$407,639.91
Five hundred steel underframe box cars.....	433,145.32
Five hundred steel underframe gondola cars.....	454,630.33
One locomotive crane hoist.....	7,524.80
Steel underframes applied on two thousand two hundred and twenty-four freight cars	149,542.13
Steel side stakes applied on one thousand eight hundred and fourteen freight cars	26,840.86
Sundry other betterments, including re-classification or transfer of three passenger cars and eighty-four freight cars.....	122,958.18
There was credited for equipment sold, transferred or destroyed, the following values, charged in part to Operating Expenses, and the balance representing the depreciation since June 30, 1907, charged to Accrued Depreciation account:	

Seven passenger train cars.....	\$59,838.99
Nine hundred and ninety-eight freight train cars..	472,970.63
Ten work equipment cars.....	4,374.62
	537,184.24

Making a net increase of..... \$1,065,097.29

The total tractive power of engines aggregates 11,627,535 pounds, an increase of 984,280 pounds over last year.

The average tractive power of each engine increased 1,217 pounds, being 35,999 pounds as against 34,782 pounds last year.

The total carrying capacity of cars in freight service now amounts to 751,531 net tons, an increase of 14,033 tons over last year.
The average carrying capacity or efficiency of each freight car increased .90 ton, being 43.19 tons, as against 42.29 tons last year.

The reserve for accrued depreciation of equipment on June 30, 1915, is as follows:

On equipment owned.....	\$2,149,524.00
On leased equipment.....	203,377.98
Total	\$2,352,901.98

PASSENGER REVENUES.

The gross passenger revenue amounted to \$1,101,980.50, a decrease of 6.96 per cent., or \$82,436.49, caused chiefly by the shrinkage of local travel in the mining regions.

The average rate received per passenger per mile increased .057 cent, being 2.186 cents, as compared with 2.129 cents a year ago.

The average distance each passenger was carried decreased .07 mile, being 26.94 miles, against 27.01 miles last year.

Passengers carried in 1915.....	1,871,322
Passengers carried in 1914.....	2,059,683
A decrease of 9.15 per cent., or.....	188,361
Passengers carried one mile in 1915.....	50,415.391
Passengers carried one mile in 1914.....	55,632,097
A decrease of 9.38 per cent., or.....	5,216,706

FREIGHT REVENUES.

The average rate received per ton per mile increased .15 mill, being 4.77 mills, as compared with 4.62 mills last year.

The average distance each ton was hauled decreased 7.21 miles, being 153.83 miles, against 161.04 miles a year ago.

The revenue tonnage moved was as follows:

	1915.	1914.	INCREASE.	DECREASE.
Bituminous coal	7,107,857	8,176,430		1,068,573
Coke	362,403	393,358		30,955
Iron ore	417,178	699,702		282,524
Pig and bloom iron.....	258,461	265,521		7,060
Other freight	2,782,136	2,760,038	22,098	
Total	10,928,035	12,295,049		
A decrease of 11.12 per cent., or.....				1,367,014

Tons moved one mile in 1915.....	1,681,022,418
Tons moved one mile in 1914.....	1,980,012,951

A decrease of 15.10 per cent., or..... 298,990,533

The result for the year is a loss of 12.36 per cent., or \$1,131,251.63 in gross freight revenue.

Coal and coke traffic decreased 1,099,528 tons, or 12.83%, due to the disturbed business conditions in the territory served by your shippers.

The depression in the iron and steel industry existing throughout the year, caused a reduction of 289,584 tons, or 30.00% in iron ore, pig and bloom iron.

Other freight shows a slight increase.

The decision of the Interstate Commerce Commission, granting an increase of not over five per cent. in freight rates, became effective at various dates after December 16th, 1914. This did not apply to coal, coke, iron ore and other specified commodities. A careful estimate indicates that such increases added about 41,000 to our revenues this year.

EXPENSES.

Operating Expenses decreased \$1,029,864.97, or 12.93 per cent., in which each primary expense account participated, as follows:

	Decrease.	Per Cent.
Maintenance of way.....	\$180,698.99	12.48
Maintenance of equipment.....	80,839.83	3.65
Traffic	8,786.70	5.84
Transportation	735,562.36	18.96
Miscellaneous operations	12,396.13	45.82
General	11,580.96	4.76
Total	\$1,029,864.97	12.93

The reduction of train mileage was a large factor in accomplishing the above decrease, but the increased efficiency resulting from previous improvements, and the enforcement of economies wherever practicable, contributed their share to the saving made. In attaining this result the Company did not depart from its policy of maintaining roadway and equipment at its usual high standard.

The operating ratio decreased 1.04 per cent., being 73.16 per cent., against 74.20 per cent. last year.

The percentage of each group of operating expenses to operating revenues for the past five years, is as follows:

	1915.	1914.	1913.	1912.	1911.
Maintenance of way.....	13.17	13.49	14.23	12.52	12.57
Maintenance of equipment....	22.53	20.65	19.74	18.94	19.35
Traffic	1.50	1.40	1.30	1.26	1.44
Transportation	33.17	36.15	32.71	32.88	32.11
Miscellaneous operations.....	.15	.25	.....	.....	.....
General	2.44	2.26	2.05	2.14	1.81
Total.....	73.16	74.20	70.03	67.74	67.28

The average cost per ton per mile is 3.21 mills, being .02 mill less than last year.

The average number of revenue tons carried one mile per revenue freight train mile, excluding the mileage of helping engines, increased 13.56 tons, being 707.16 tons, against 693.60 tons a year ago.

The average number of revenue tons carried one mile per revenue freight engine mile, including the mileage of helping engines, increased 23 tons, being 477, against 454 a year ago.

The averages for the past ten years are as follows:

YEAR.	TRAIN LOAD.	ENGINE LOAD.
1906	525	418
1907	543	435
1908	530	371
1909	597	400
1910	638	420
1911	635	430
1912	647	439
1913	710	462
1914	694	454
1915	707	477

The average number of revenue passengers carried one mile per revenue passenger train mile is 37, being 3 less than last year.

The non-revenue traffic, not included in any of the other figures of this report, is as follows:

	1915.	1914.
Number of passengers.....	275,504	323,720
Number of passengers carried one mile..	11,522,375	13,098,629
Number of tons.....	867,023	1,106,032
Number of tons carried one mile.....	83,299,093	108,941,868

FIRE INSURANCE FUND.

The assets of this fund were increased \$1,468.03 during the year, and now amount to \$283,975.50 in interest-bearing securities and cash.

PENSION FUND.

The assets of this fund, created July 1, 1903, were increased \$9,623.70 during the year, and now amount to \$207,199.62 in interest-bearing securities and cash.

There were sixty-one pensioners upon the roll on June 30, 1915, a net increase of four during the year.

GENERAL REMARKS.

The Ontario Car Ferry Company, Limited, paid a dividend of 5 per cent for the year ending December 31, 1914. The sum of \$12,485 received on the \$249,700 of this Company's stock was credited to Non-operating Income account.

The second boat under construction for the Ferry Company, referred to in last year's report, is to be delivered about September 1st, next.

On November 16, 1914, Mr. O'Donnell Iselin was elected a Director to fill the vacancy in the Board caused by the resignation of Mr. Lewis Iselin.

Comparative statements and statistics of the operation of your road for the year, in which the figures for the preceding year were recast as far as possible to agree with the new Classification prescribed by the Interstate Commerce Commission effective July 1, 1914, are submitted herewith.

The acknowledgments of the Board are renewed to the officers and employees for their faithful and efficient services.

By order of the Board,

WILLIAM T. NOONAN,
President.

ROCHESTER, N. Y., July 31, 1915.

PROFIT AND LOSS ACCOUNT.

June 30, 1915.

CREDIT.

By Balance Surplus, June 30, 1914.....	\$3,964,008.29
By Unrefundable overcharges.....	2,159.90

MISCELLANEOUS CREDITS.

Adjustment of old accounts.....	\$15.03
Unclaimed wages, etc.....	2,280.25
Discounts on funded debt retired.....	7,563.75
Unreleased premiums on funded debt retired.....	202.22
Total.....	10,061.25
Total.....	\$3,976,220.44

PROFIT AND LOSS ACCOUNT—(Continued)

DEBIT.	
To appropriation for new rolling stock under Equipment Agreements Series A, B and C, the balance being appropriated from Net Income	\$14,284.45
Appropriation for retiring bonds, under Equipment Agreements Series D, E, F, G, and H..	522,096.16
Premium on funded debt retired.....	6,596.25
Loss on retired road.....	3,140.31
MISCELLANEOUS DEBITS.	
Adjustment of old accounts.....	\$197.01
Abandoned surveys	8,930.32
	9,127.33
Total.....	555,244.50
By Balance Surplus, June 30, 1915.....	\$3,420,984.94
	=====

COMPARATIVE INCOME ACCOUNT.

OPERATING REVENUES.			INCREASE OR DECREASE.
	1915.	1914.	
FREIGHT—			
Coal	\$5,040,100.92	\$5,904,105.54	—\$864,004.62
Coke	318,637.93	338,339.13	—19,701.20
Merchandise	2,663,951.27	2,911,497.08	—247,545.81
Total.....	\$8,022,690.12	\$9,153,941.75	—\$1,131,251.63
PASSENGER	1,101,980.50	1,184,416.99	—82,486.49
OTHER TRANSPORTATION—			
Excess baggage	9,907.05	9,344.93	\$562.12
Parlor and chair car.....	10,983.75	12,923.45	—1,939.70
Mail	52,956.47	52,834.38	122.09
Express	100,237.62	101,076.18	—838.56
Other passenger train.....	5,128.79	3,645.13	1,483.66
Milk	21,352.80	16,732.63	4,620.17
Switching	88,437.02	93,138.59	—4,701.57
Special service.....	.....	2,596.00	—2,596.00
Total.....	\$289,003.50	\$292,291.29	—\$3,287.79
INCIDENTAL—			
Dining and buffet.....	9,755.03	12,232.74	—2,477.71
Station, train and boat priv- ileges	4,066.17	4,058.93	\$7.24
Demurrage	10,439.55	21,866.00	—11,426.45
Ganson St. Docks.....	38,251.00	61,878.50	—23,627.50
Sundry sources	3,749.88	4,004.80	—254.92
Total.....	\$66,261.63	\$104,040.97	—\$37,779.34
TOTAL OPERATING REVENUES.	\$9,479,935.75	\$10,734,691.00	—\$1,254,755.25

OPERATING EXPENSES.

Maintenance of way and structures	\$1,267,253.94	\$1,447,952.93 —\$180,698.99
Maintenance of equipment...	2,135,354.18	2,216,194.01 —80,839.83
Traffic	141,766.76	150,553.46 —8,786.70
Transportation	3,144,597.92	3,880,160.28 —735,562.36
Miscellaneous operations...	14,658.25	27,054.38 —12,396.13
General	231,621.25	243,202.21 —11,580.96
TOTAL OPERATING EXPENSES..	\$6,935,252.30	\$7,965,117.27 —\$1,029,864.97
NET OPERATING REVENUE...	\$2,544,683.45	\$2,769,573.73 —\$224,890.28
TAX ACCRUALS	230,000.00	234,000.00 —4,000.00
UNCOLLECTIBLE REVENUES...	596.27	..... \$596.27
OPERATING INCOME	\$2,314,087.18	\$2,535,573.73 —\$221,486.55
MISCELLANEOUS OPERATING INCOME		
	450.48	Dr. 362.89 \$813.37
NON-OPERATING INCOME—		
Hire of freight cars.....	446,058.22	561,079.12 —115,020.90
Rent from other rolling stock	11,131.46	..... 11,131.46
Rents—Joint facilities	156,280.94	165,011.18 —8,730.24

NON-OPERATING INCOME—(Continued)

Rent—Miscellaneous	11,175.15	12,544.31 —1,369.16
Dividend on stocks owned..	12,485.00	12,485.00
Income from securities, loans and accounts	71,972.89	66,381.78 5,591.11
Release of premium on funded debt	9,018.57	3,402.71 5,615.86
Miscellaneous	73.00	Dr. 317.00 390.00
TOTAL NON-OPERATING INCOME	\$718,195.23	\$820,587.10 —\$102,391.87
GROSS INCOME	\$3,032,732.89	\$3,355,797.94 —\$323,065.05

DEDUCTIONS FROM GROSS INCOME.

RENTS—FOR LEASED ROADS—			
Allegheny & Western Railway	\$272,000.00	\$272,000.00	
Clearfield & Mahoning Railway	86,500.00	86,500.00	
Mahoning Valley Railroad..	15,000.00	15,000.00	
	\$373,500.00	\$373,500.00	
For rolling stock other than freight cars	707.42	..... \$707.42	
Joint facilities	289,917.11	298,005.03 —\$8,087.92	
Miscellaneous	16,898.70	16,883.87 14.83	
Total rents.....	\$861,023.23	\$688,388.90 —\$7,365.67	
INTEREST ON FUNDED DEBT—			
First Mortgage Bonds—Roch. & Pitts. Rd.....	78,000.00	78,000.00	
Consol. Mort. Bonds—Roch. & Pitts. Rd.....	235,200.00	235,200.00	
General Mort. Bonds—B. R. & P. Ry.....	221,350.00	221,350.00	
Consol. Mort. Bonds—B. R. & P. Ry.....	431,177.50	343,915.00 \$87,262.50	
First Mortg. Bonds—L., P. & C. Rd.....	17,500.00	17,500.00	
Equipment Agreements	454,350.49	415,422.38 38,928.11	
Total.....	\$1,437,577.99	\$1,311,387.38 \$126,190.61	
INTEREST ON UNFUNDED DEBT.	1,412.11	1,237.50 174.61	
TOTAL DEDUCTIONS FROM GROSS INCOME	\$2,120,013.33	\$2,001,013.78 \$118,999.55	
NET INCOME—	\$912,719.56	\$1,354,784.16 —\$442,064.60	

DISPOSITION OF NET INCOME.

APPROPRIATIONS—			
Pension Fund	\$9,459.45	\$6,623.14 \$2,836.31	
Insurance Fund	12,049.02	9,809.35 2,239.67	
New Equipment	65,413.83	74,104.38 —\$8,690.55	
Retirement of Equipment bonds	45,797.26	274,247.29 —228,450.03	
DIVIDENDS—			
PREFERRED STOCK—			
(No. 42) 3% on \$6,000,000, payable August 15, 1914	180,000.00	180,000.00	
(No. 43) 3% on \$6,000,000, payable February 15, 1915	180,000.00	180,000.00	
COMMON STOCK—			
(No. 29) 2% on \$10,500,000, payable August 15, 1914	210,000.00	315,000.00 —105,000.00	
(No. 30) 2% on \$10,500,000, payable February 15, 1915	210,000.00	315,000.00 —105,000.00	
Total Appropriation of Income	\$912,719.56	\$1,354,784.16 —\$442,064.60	
INCOME BALANCED TRANSFERRED TO PROFIT AND LOSS.....

Railway Age Gazette

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Not all railway men will agree with Mr. Garner in his condemnation of the practice of handling tonnage on local freight

Handling Tonnage on Local Freight Trains

trains, in an article on this subject on another page. No one will approve of the practice of overloading local freight trains in the direction of light tonnage, as was done in the instance he cites, but any cars which a local train can haul in the direction of prevailing tonnage not only help the division tonnage statement, but also reduce the amount of light train movement in the opposite direction. The problem is purely an economic one. On a run over a long district or in which a train has a great deal of switching to do, it may be difficult for it to get in to its terminal without overtime without bringing in any additional cars. In

such a case the advisability of loading the train down will depend on the relation between the amount of overtime created and the value of the additional service performed. On most roads many local freight trains can haul considerable tonnage in addition to their local cars without creating much overtime. The extent to which such trains should be loaded requires special consideration in each case. No general rule can be laid down because the length of engine district, the number of opposing trains, and the amount and character of the local work to be done may make utterly impracticable on one district what is entirely economical on another.

A clear-headed superintendent, explaining recently a butting collision which occurred on his road, where the conductor,

Difficulty of Weeding Out All Bad Men

the engineman and the fireman, of an extra, all forgot a regular passenger train, the schedule of which they well knew, said that the collision was due to the fact that three "weaklings" had been assigned to the same crew. The conductor had once been dismissed for causing a collision, and was not a strong character. The engineman had been suspended three times, and was known to indulge to some extent in gross immoralities. Both were cigarette smokers. The fireman had no flaws in his record, but had had a scandalous domestic difficulty. "And," says the superintendent, "having in the service such men as these, the best way to frame up a collision is to get them together in the same crew." This is a very interesting lesson. It suggests that a superintendent has important responsibilities in the handling of his men which cannot be delegated. Only the superintendent himself, aided by trainmasters of strong character, can extirpate such faults as these. Reports by the Interstate Commerce Commission and other public authorities are pretty sure to stop short of any profitable investigation of men's habits off duty (unless they get drunk); and yet these may be elements of grave danger; and the public remains in ignorance. Most superintendents, no doubt, will reflect that it is impossible to keep a large force of trainmen free from a small percentage of weak men, and, unless full of courage to follow the matter constantly and of ambition to make the most creditable possible record, will be contented with that reflection. Perhaps it would be a good rule (not to be published, however) to make sure of at least one wholly trustworthy man on every train. This would be far from ideal, and when we say this we shall not be accused of dealing in counsels of perfection; but it is a condition, not a theory, that confronts us.

The report of H. W. Belnap, chief of the division of safety, to the Interstate Commerce Commission on the butting collision of passenger trains on the Western Maryland at Thurmont, Md., in June, noticed in our last issue, is a forceful document. He describes the circumstances with but little waste of words, and the cause of the disaster is clearly indicated. He places the immediate responsibility on the dispatcher, where it belongs. He gives that officer whatever benefit can accrue to him, from the claim that he had been overworked, but also puts in the testimony which weakens this claim. The report does not decide how far the dispatcher's claim should be accepted; neither does it discuss the weakness in the code of rules by reason of which an experienced dispatcher can fall into such a dangerous error; but so far as concerns the lesson for the future, these features are not important. The inadequacy of the American train despatching system, as a means of securing satisfactory safeguards against butting collisions, has long since been demonstrated, and the report, wasting no words on this point, goes directly to the main issue, the need of the space interval system. Mr. Belnap had recommended the introduction of the block system, on this road, three times, in connection with three butting collisions, over

The Lesson of Four Collisions

two years ago, and he says now that that system is "urgently required." He might have used equally strong language in 1912. And he gives the road ample latitude. He does not call for automatic signals, costing \$1,500 to \$2,500 a mile. He does not commit the government to any plan or method or apparatus; he simply calls for an adequate block-signal system; not necessarily any costly devices. Station agents, with nothing but red flags and lanterns, can and do maintain an "adequate block-signal system." Automatic signals do, indeed, constitute the ideal system; but the non-automatic system was introduced last year on over 8,000 miles of railway in this country, much of it by such companies as the Southern Pacific, the Chicago, Milwaukee & St. Paul, the New York Central Lines, and the New York, New Haven & Hartford. This report contains instructive reading for all railroads which do not use the space interval.

ALTON, NEW HAVEN, FRISCO—AND NOW ROCK ISLAND

ALTON, New Haven, Frisco, and some more, and now Rock Island! The Interstate Commerce Commission has written some unpleasant reports as a result of its investigations of the managements of various railways. But one of the most disgusting of them is the one issued last week regarding the Rock Island. Persons may differ as to the construction that should be put on a number of details which the commission mentions, such as the salaries and bonuses paid to certain officers. But these are minor matters. The only way the interpretation put on them affects the picture as a whole is to make it a little blacker or not quite so black. Regarding the important and essential points covered by the commission's report, there is room for difference of opinion. Taken together, they make up a record which for sordidness and dishonorableness in corporate management has hardly been surpassed.

There are two separate and distinct aspects of the Chicago, Rock Island & Pacific case which should be and must be kept separate, if any fair judgment is to be passed on it. One is the relation between the railway company and its management and the public served by its 7,000 miles of line. The other is the relation between the controlling interests in the company and the other security holders.

The Interstate Commerce Commission, in its report, which was printed in last week's issue of the *Railway Age Gazette*, almost in full, failed to keep these two aspects of the case separate. This may be partly due to the fact that it is doubtful whether the commission can with propriety make an investigation of the relations between the various class of security holders of a railway company. Consciously or unconsciously, the commission may have felt it necessary to drag in a measure of wrong to the general public, which no line of the very voluminous testimony taken justifies. There was not one shred of evidence to show that the actions of D. G. Reid or W. H. Moore, reprehensible as they may have been in some cases, and undoubtedly bad railroading as they were in other cases, had any effect on the freight or passenger rates or any important effect on the service of the Rock Island. Confusing the question of rates and service with the disposition of profit, does a positive harm. On the other hand, it has been a good thing to put before the investing public an account of methods pursued by these men in their control of the railway company.

It is not enough that the railways of the United States should be beset by increasing expenses and taxes, and by unfair regulation which aggravates the increases in their outgo while denying to them adequate additions to their income. Some of them must also, at this critical juncture, be subjected to ruinous forms of financial mal-administration.

Alton, New Haven, Frisco, and some more; and now Rock Island. What next?

But the people who are sensible and have the welfare of both the railways and the public at heart will not let their indignation be excited by the story of what the Diamond Match and tin plate magnates have done to the Rock Island blind them to the facts as to how the mismanagement of the property came about,

as to who was responsible for it, as to who suffered from it, and as to the means which should be adopted to prevent such mismanagement in the future.

The initial wrong was done when a small group of men, by a comparatively small investment, acquired control of the management of a property representing a very large investment. The difference between the small investment they made and the large total investment which the Rock Island system represented, was property which belonged to other people. There is a flagrant defect in the government of a country whose laws permit a man or set of men to acquire autocratic control of a property by any means except actual purchase of at least a majority interest in it with their own money. But if the law allows this the man or men who get control will, if they have a sense of honor, recognize the fact that this vests in them a trusteeship; and it is the well-recognized moral and legal duty of a trustee to manage the trust property with the greatest care. He has no right to take even such risks with it as he would take with his own.

Apparently the notion that the peculiar character of their control of the Rock Island imposed on them special duties and obligations never entered the heads of the Reid-Moore crowd. They used its resources—which belonged mainly to other people—in the most reckless manner. They used them to get control of the Frisco, and lost \$6,500,000 belonging to those who owned the Rock Island. They used them to buy into the Alton, and lost \$6,370,000 more of the same people's money. They lost still more by frequent changes in the operating management, which made it necessary to pay bonuses to various persons. The real owners of the property—those who owned stock and bonds representing the bulk of the actual cash investment in it—had a right to have their property carefully and judiciously managed and developed. But those in control, whose investment was only a fraction of the total, managed the road and used its financial resources as if they owed no responsibility or duty to anyone on earth. The commission charges that even the reports of the directors to the stockholders were misleading. The method of bringing the receivership proceedings in the Chicago, Rock Island & Pacific case indicates strongly that Messrs. Reid and Moore don't give a hang whether the other security holders suffer or not. Those who oppose the increased intervention of government in business often make use of the phrase "rights of property." In view of Alton, New Haven, Frisco, Rock Island and other such transactions, the question naturally arises, "Whose rights of property?" Those who owned a majority interest in the Rock Island clearly had some rights of property. These were disregarded and trampled under foot by the minority owners. The term "rights of property" becomes a misfit when used as an argument against government intervention to prevent ruthless and unscrupulous minorities from dealing with a property as if it were their own and so managing it as to ruin if not actually to loot the majority. The time has come to recognize in this country the principle that men who want to speculate should be restricted to speculation with their own money, and that one of the inalienable "rights of property" is to have it protected from use as a speculative football by those who do not own it.

The worst feature of the Rock Island fiasco is the one above touched on—the injury done to innocent investors by a controlling faction apparently devoid of any sense of duty. But it has other bad features. From President Mudge down the personnel of the Rock Island's working organization is excellent. It includes some of the finest, cleanest, ablest railway officers in the United States. Nobody familiar with the facts doubts that Mr. Mudge and his subordinates have run the road as well as it could be run with the resources at their disposal. But financial mismanagement has unduly and unnecessarily restricted their resources. In consequence, they have been unable to make the improvements in the plant and operating methods required in the interest of the most efficient and economical working. Again, the Rock Island scandal has reflected odium on the managements of all the railways of the United States.

Along with the Alton, New Haven, Frisco and other similar offenses against good business and good morals it has contributed toward so prejudicing the public and regulating authorities against the railways as to render it impossible for them to get fair treatment.

It is to be wished that such mismanagement of railways could be stopped by publicity and the voluntary concerted action of railway financiers and executives. But experience shows that the hope that it will ever be stopped in this way is illusory. There is no way to keep unscrupulous financiers out of the railway business. There is no means except government intervention by which to keep them from committing depredations after they get into it. Therefore, as the commission points out, "by this case the need of some limitation on the issuance of stocks and bonds by common carriers, whether directly or through holding company devices, or otherwise, is again demonstrated." And legislation should go still farther than this. Some steps should be taken to hold directors up to the recognition and performance of the duties of their trusteeship. As the commission says elsewhere in its report, "This record emphasizes the need of railway directors who actually direct. * * * It suggests the need of a law to charge such directors with individual responsibility for the dissipation of corporate funds."

We don't want management of the railways of this country by the Interstate Commerce Commission or any other government body or bodies. We want management of them by their directors and officers. But the law and its administration should be made such that no man who accepts a position of trusteeship on our railroads can fail to perform his duties without being held responsible. When it is known that strict responsibility and accountability will go with every duty assumed there will be fewer outrageous and successful attacks made upon the "rights of property" by those who voluntarily assume the duty of managing large concerns.

FREIGHT TERMINAL CHARGES AT NEW YORK

THE railroads centering in New York City appear to have decided to acquiesce in the decision of the Interstate Commerce Commission disapproving a large part of their proposed increases in charges for lighterage, storage and other terminal services at that city. Some of the increases are approved, and the traffic managers seem disposed to go on for a while with what the commission has given them; though all of the proposed changes were the result of a careful attempt, made in good faith, to carry out the suggestions of Mr. Brandeis and of the commission, that this feature of the freight business should be put on a paying basis. There is no question but that a thorough investigation will show that many services are still unremunerative, and it will be the duty of the railways to put their evidence in better shape and to renew their application as soon as practicable.

The decision of the commission leaves the way open for a new application. As reported in the *Railway Age Gazette*, July 30, page 213, the significant part of the decision is in the last two paragraphs, in which it is said that (1) the tariffs are ambiguous, inconsistent and lacking in desirable uniformity, and (2) that as lighterage and other local charges have come to be understood as a part of the through freight rate, they must not be increased without considering the whole freight rate. Both problems are easily dealt with. We do not mean that it will be a small task to make uniform tariffs of terminal and harbor charges, or that it will be easy to convince the commission that a freight rate from St. Paul or St. Louis to Brooklyn or Astoria ought to be advanced, when the proof that it is too low involves such a complicated study; but in both cases it can be said that the men who are familiar with the field will know just what to do. A satisfactory degree of uniformity of tariffs may be unattainable, but the traffic men will know when they have done all that can reasonably be done; and with that the commission will, no doubt, be satisfied. As to the feasibility of showing that

many of these services are done too cheaply, there is no doubt in the minds of those best acquainted with the business; it is only a question of patient study.

To appreciate fully the New York terminal situation, it is necessary to read Commissioner Meyer's full report. The document is so full of facts that it is not susceptible of satisfactory condensation. As a brief outline, we print in another column the statement made by Mr. McCain before the commission. This complicated freight-traffic field, with its 68 stations in New York and Brooklyn, besides many others on the New Jersey side, largely dependent on water transportation, constitutes perhaps the most costly and confused aggregation of dissimilar units to be found anywhere in the world. The present customs, under which the railroads do a vast amount of non-railroad service, are the result of strenuous competition among a half dozen powerful railway carriers; and this competition is a growth of 30 years and, in some of its elements, 40 or 50 years. In those years of railroad wars, when passengers were carried for a cent a mile, livestock a thousand miles for a dollar a car, and thousands of cars of all kinds of goods at rates below cost, the recklessness of spirit that was cultivated in traffic managers' minds pervaded all branches of the service, lighterage and storage among the rest. Why should a railroad terminating in Jersey City be doing business in Brooklyn? Or, assuming that a rail carrier, like a tramp steamship, may do anything under the sun, why perform the service at cost or less? Excessive competition; no other reason. A great ship needing a full load cannot sail for Europe until she is filled with 500 cars of grain; but why should the railroad, to accommodate the ship, hold these cars from a week to a month for nothing? Excessive competition. In the old days the New York Central would at times have three thousand cars of corn and wheat standing on its tracks in New York at once; and make not a cent of charge. Why? The same reason as before.

Commissioner Meyer, in his decision, includes a scientific, legal and precise statement of the principles which govern this business; but about the only principle that exercises the traffic manager's mind is to get down to a reasonable basis—a fair price for what he gives—as rapidly as possible. Flour used to be stored in railroad warehouses a whole year for nothing! At last a time limit was imposed, 60 days. Then this was reduced to 30 days, then 20, then 10; and now, in the face of the solemn declaration of the dealers that their business will be ruined, the commission agrees to a limit of five days.

Much of the confusion and disagreement connected with this business is due to one simple cause, the bigness of the city. The business of carting freight through the streets of Manhattan suffers from the same cause, and is very costly. A mere glance at the list of stations, showing their locations, explains many things otherwise inexplicable. The costliness of all kinds of freight transportation in and around the city and the baffling nature of the problem of reducing this cost are strikingly indicated by the magnitude of the engineering and construction schemes which during the past 20 years have been proposed for relieving the situation, and the entire failure of all of them, thus far, to secure acceptance.

The Interstate Commerce Commission's report throws very little light on the financial problem as a whole. The proposed charge of 12 cents a ton for handling freight at shippers' and consignees' docks was shown to be low, but it was disallowed; evidently because of the radical nature of the change which would be effected. That the city would be put to an additional expense of \$100,000 for unloading steel for new subways was one of the striking passages in the report; but Commissioner Meyer does not say but that a charge should be imposed after this subway contract shall have been completed. An adequate charge for unloading may indeed amount to an increase of eight per cent in the freight bill on a shipment from Pittsburgh or St. Paul; but on many commodities, very likely, such an increase is needed, to abolish a discrimination against other cities. Indeed, a thorough study may show that the long-continued and

tremendous competition at New York has resulted in the permanent establishment of many rates which give it undue preference as against smaller cities. As equity between different cities is a cardinal point in the Interstate Commerce Commission's creed, this case certainly merits further study.

The financial problem as a whole is not perhaps susceptible of very satisfactory treatment; it is too big to be comprehended. The freight brought to and taken from New York city and harbor by the railroads in a year aggregates 25 or 30 million tons, a very large part of which has to take a water journey in the harbor, long or short. At the most common rate, 60 cents a ton, this means 15 to 18 millions of dollars for lighterage; and the value of the storage, on very costly ground, whether it is or is not charged for, adds other untold millions. Some freight is lightered for less than 60 cents, and some is not lightered at all; but there is a large volume on which the 60-cent allowance is less than cost. Thus, we see, the freight business of New York harbor, measured by gross cost, is equal to half the total traffic, both passenger and freight, of a railroad as large as the Michigan Central, the Lackawanna or the Lehigh Valley.

"DEPARTMENT OF PUBLIC POLICY AND RELATIONS"

THE executive committee of the Associated Railroads of Pennsylvania and New Jersey recently made an interesting report, recommending the establishment by the railways of the United States of a permanent "department of public policy and relations." This is the committee which carried on such an energetic and skilful campaign a few months ago for the repeal of the extra crew laws in Pennsylvania and New Jersey. Part of its report was published in the *Railway Age Gazette* of July 30, page 210. The proposed department, which should have a branch on each railway, should "represent the railroads in matters of public interest and in such other respects as may be deemed proper along the lines adopted by this committee in the recent campaign."

There can be no question as to the need of the railways for better organization to handle their public relations. They are beset with criticisms and attacks. Formerly there was a general and successful agitation for reductions of their rates. This having abated, efforts are being made from numerous sources to secure various kinds of regulation of their physical operation. Certain of their organized employees are especially active, their main aim being to get legislation to force the roads to employ more men than they need. There is, however, another side to the matter. The managements of individual railways permit, or cause to be done, many things which are impolitic or wrong and which incense the public, and much of the regulation proposed or adopted is provoked by such conduct on the part of the railways.

The railways have at present different organizations which are performing more or less successfully some of the functions that would naturally belong to a department of public policy and relations. The Special Committee on Relations of Railway Operation to Legislation has done good work in developing a constructive policy in regard to the regulation of operation, in conducting on behalf of the railways hearings before public bodies, and in carrying on negotiations with the Interstate Commerce Commission and other regulating authorities. Similar committees in many of the states have done good work. The Bureau of Railway Economics has been useful and effective in compiling and publishing accurate statistical and other information bearing on numerous railway matters. A number of very effective advertising and publicity campaigns have been carried on through different organizations, some of them permanent, others temporary. In many ways the most important organization of all is the Railway Executives' Advisory Committee on Federal Relations, which has been doing constructive work in harmonizing the points of view of the railway managements themselves and trying to bring about better relations between them and the federal authorities. The American Railway Association has never concerned itself much with regulation, although certain committees have co-operated with the regulating authori-

ties and shippers in solving knotty problems relative to demurrage and kindred matters.

It would be a mistake to form a new department, such as that proposed, in addition to all the organizations now dealing in one way or another with public relations. Its functions would overlap those of existing organizations, and there would result a waste of energy and money, and probably friction. But it is worth while considering whether it is not desirable to create such a department, and substitute it for some of the existing organizations and co-ordinate it with the rest.

There would be several very serious obstacles in the way of its success. If it were understood to be intended to police the management of railways themselves, to promote fair and constructive regulation as well as oppose unfair regulation, and to use only legitimate and avowable methods in doing so, it might be favorably received by the press and public. It would not be so received if there was not manifested any purpose to use it to correct the shortcomings in the public policy of the railways themselves. It may be said that the reason why some organizations for more or less similar purposes have met with criticism, and been even blacklisted by the newspapers, has been that they were not well or tactfully managed. But how the proposed department would be managed would depend on who managed it, and to make it a success would require fairness, honesty, executive ability, knowledge of railway matters and diplomatic talent.

A very serious question is as to the attitude which would be assumed toward such an organization by the executives of the railways. The managers of our railways are very able men, but in the railway business great minds do not always run in the same channels. In consequence, the task of representing them in negotiations or speaking for them is a different matter from that of representing and speaking for a unified organization such as the American Telegraph & Telephone Company. Any one who in acting or speaking for them pleases some of them is apt at the same time to displease others. Furthermore, there are still differences of opinion among them as to the value of such work as would be done by the "Department of Public Policy and Relations." There are many railway executives who fully appreciate both the importance of educating public opinion and the ability, skill and special training required to do such work. There are others who have little appreciation of its importance and difficulty or of the special attainments required for it.

Even though it were feasible to get the railways to support some such central organization, it is questionable if they could be prevailed on to let it police their own acts. A committee of the American Railway Association a few years ago recommended that the association undertake the investigation of important accidents on behalf of all the railways. The report was pigeon-holed just as quickly as the association could reach it. Finally, it is questionable if the roads could be induced to establish departments of public policy and relations in their own organizations. Every large railway ought to have an officer of high rank charged exclusively with the studying and handling of its public relations; but many of them have not even competent publicity agents; and there is not one which has learned to use its advertising appropriation so as to derive the most benefit from it.

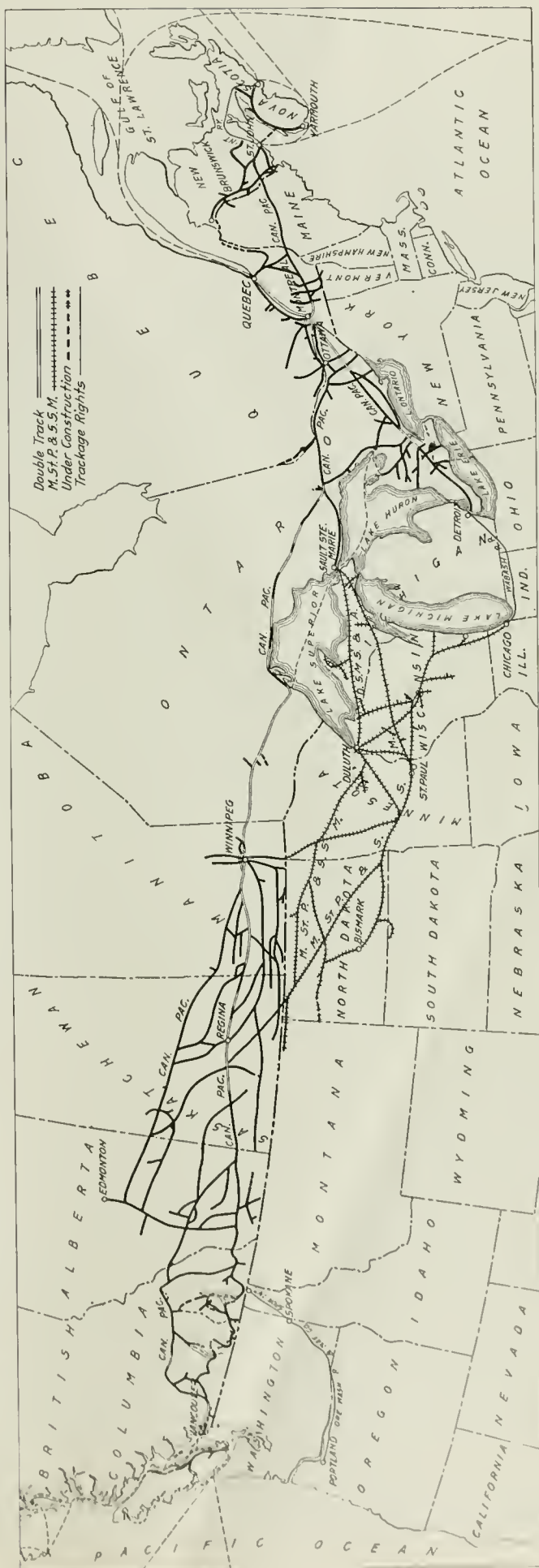
The committee of the Associated Railroads of Pennsylvania and New Jersey has done a good service in making recommendations adapted to cause discussion as to what the railways should do to improve their public policy and relations. Probably some step ought to be taken toward co-ordinating all the work now being done by different organizations in respect to national and state regulation. But the best results will never be obtained until the railways individually, and groups of railways in the same territory, make greater efforts to improve their local conditions and public relations. If the railways individually and in groups would take more advantage of the many opportunities constantly open to them to establish better relations with the public by remedying defects of services by having their officers meet and talk with the citizens more, by making more and better use of the various channels available to get before the public the

The greatest danger to the future of the railways consists in the fact that, while the attitude of the public toward them has changed greatly, it is still so prejudiced against them that it is inclined to receive favorably almost any additional restrictive regulation of them. The greatest problem of the railways, as respects their public relations, is, therefore, not merely to devise means of more energetically fighting such proposed regulation, but to devise and carry out a program which will so completely change the attitude of the public to one of friendliness and sympathetic interest that instead of its first impulse being to favor every proposal for restrictive regulation, its first impulse will be to oppose it. In carrying out such a program strong organizations representing and working for all the roads can help a great deal. But they cannot carry it out alone, and they cannot be raised to their maximum practicable efficiency unless the various individual roads and groups of roads carry out those parts of the program which they alone can under any circumstances carry out.

CANADIAN PACIFIC

TWO or three months ago there was some speculation as to whether the Canadian Pacific would earn its dividend, and whether, if it did earn it by a small margin, the directors would see fit to declare the full 10 per cent rate. The full 10 per cent is made up from two sources; seven per cent is paid from the operation of the railway lines and facilities directly connected with their operation, such as sleeping cars, and 3 per cent is paid from "special income," which is made up of the interest and dividends received on securities owned, earnings of steamship lines, hotels and commercial telegraph. The company by heavy cuts in expenses succeeded in earning the 7 per cent from the operation of the railway lines, and through the receipt of larger special income, which not only paid the 3 per cent, but left a substantial margin over, had a final surplus of \$3,300,000.

It was generally known for some time before the close of the fiscal year that the Canadian Pacific would show a very much smaller gross income from railway operation in the year ended June 30, 1915, than in the previous year. The question, therefore, was as to the ability of the management to cut down expenses correspondingly to the falling off in earnings, and as to how much effect the business depression had had on the company's special income. Even to a good many who have followed the recent history of the Canadian Pacific it will come as a surprise that with a reduction in gross earnings from \$129,815,000, earned in 1914, to \$98,865,000, or 24 per cent, expenses could be held down more than correspondingly, so that the operating ratio was 66.04 in 1915, as against 67.32 in 1914. The loss of \$31,000,000 in revenue is serious enough to tax the resourcefulness of any railroad management in America, even if it had occurred under ordinary conditions and had been spread over two or three years. To have this loss occur, however, all in one year and at the same time have exacting demands made on the company for military service is a problem so vast as to be not easily comprehensible. There have been railroad managements in the United States which have had very great losses in gross revenue and which have in a period of two or three years reduced their



The Canadian Pacific System

expenses to correspond, but seldom, if ever, has the problem been met so quickly and on such a large scale.

It is remarkable that the management was able to divide this drastic saving in expenses quite evenly between maintenance and transportation. The following table shows the percentage of gross earnings consumed by each class of operating expenses which are usually shown in United States reports, the Canadian Pacific showing separately certain other expenses mentioned later:

	1915	1914
Maintenance of way and structures.....	11.5	12.6
Maintenance of equipment.....	11.4	12.8
Traffic expenses.....	3.0	2.8
Transportation expenses.....	32.5	32.6
General expenses.....	4.0	3.3

The classes of expenses which the Canadian Pacific shows separately are parlor and sleeping car expenses, lake and river steamers and commercial telegraph. The expenses in 1915, as compared with 1914 for these accounts, are as follows:

	1915	1914
Parlor and sleeping car.....	\$1,111,253	\$1,348,979
Lake and river steamers.....	1,051,782	1,183,397
Commercial telegraph.....	1,382,507	1,613,688

The revenue from sleeping cars, express, telegraph and miscellaneous in 1915 was \$12,694,000, as compared with \$15,069,000 in the previous year.

In 1915 the Canadian Pacific carried 7,734,400 ton miles of revenue freight, a decrease of 27.04 per cent as compared with the previous year. The mileage made by freight trains was 16,896,000, which is less by 30.08 per cent than the mileage in 1914. Thus the average trainload of revenue freight was 411 tons in 1915, as against 407 tons in 1914, and this despite the fact that whereas loaded car mileage decreased 23.17 per cent, empty car mileage decreased only 14.94 per cent. It is true that there was a large decrease in the tonnage of non-revenue freight carried, due to the comparatively small construction work carried on last year, and that the average non-revenue freight per train-mile was 52 tons, as against 57 tons in 1914, so that the total trainload was about the same in the two years—463 tons in 1915 and 464 tons in 1914. The actual load behind the drawbar including weight of equipment, was very materially increased because of the greater proportion of empty cars. Undoubtedly a part of the freight handled in 1915 was for the use of the British government and had to be handled on very fast schedule.

Revenue passengers carried totaled 13,086,000 in 1915, a decrease of 15.30 per cent; but there was a big falling off in through travel, so that the average passenger journey was 88 miles as against 102 miles the year before. This made a reduction in passenger mileage of 26.44 per cent. Passenger-train mileage amounted to 17,977,000 and was less by 16.48 per cent than passenger-train mileage the year before. There was, therefore, apparently no drastic cutting of service, and the movement of troops, of course, had to be done on special schedules, with the consequent danger of congestion and probability of higher cost.

Even a management that has set as high standards for itself as the Canadian Pacific might well feel that it had made a new record in the year ended June 30, 1915.

The case with which earnings from outside operations could be made to supply the necessary margin of safety which even the remarkable cut in expenses could not effect is not so much of a surprise to most people who are at all familiar with the vast resources which the Canadian Pacific has in addition to its 12,917 miles of railroad. The statement of this special income from outside operations is not made in exactly the same way in 1915 as in 1914, which prevents an exact analysis of how the increase was made. In 1915 the earnings from ocean steamships were combined with that from hotels and the total amounted to \$4,370,000. In 1914 the earnings from ocean steamships are shown separately and amounted to \$784,000. In 1915 the net earnings of Pacific coast steamships, commercial telegraph and news department are combined and amount to \$1,494,000. In 1914 these earnings from Pacific coast steamships, commercial telegraph and news department are added to the earnings from

hotels and amount to \$2,134,000. If there is no significance to the fact that the word "net" is left off from the earnings of hotels in 1915, and apparently there cannot be any, since in the table showing receipts and expenditures the special income is shown as a net figure against which there is no expenditure, the combined earnings of ocean steamships, hotels, Pacific coast steamships, commercial telegraph and news department for 1915 amount to \$5,864,000, as against \$2,918,000 in the previous year.

The only sales of securities which the Canadian Pacific made during 1915 were the issue of £504,914 (\$2,524,570) 4 per cent preference stock, for which it received \$2,182,763, and £611,797 (\$3,058,985) consolidated debenture stock, for which it received \$2,781,731, and the Victoria Rolling Stock & Realty Company bonds, which were held in the treasury in 1914, and for which the company received \$13,630,000. The company redeemed £2,074,000 (\$10,370,000) first mortgage 5 per cent bonds and deposited funds for the redemption of the remaining bonds, so that the Canadian Pacific has the unique position among large railroads of having almost no funded debt except its equipment obligations. The total paid for the redemption of bonds or deposited against their redemption in 1915, was \$13,875,658. In addition the company paid off \$1,570,000 equipment trusts and spent \$9,090,000 for additions and improvements to its main line and branches and \$1,596,000 for additions and improvements to its leased lines. At the beginning of the year the company had \$36,778,000 cash on hand, with total current liabilities of \$22,035,000. At the end of the year the company had \$17,055,000 cash on hand, and \$12,552,000 current liabilities.

The following table shows the principal figures for operation in 1915, as compared with 1914:

	1915	1914
Mileage operated.....	12,917	12,044
Freight revenue.....	\$60,737,737	\$81,135,295
Passenger revenue.....	24,044,283	32,478,147
Mail revenue.....	1,389,334	1,132,715
Sleeping car, express, telegraph and miscellaneous.....	12,693,856	15,068,667
Total operating revenues.....	98,865,210	129,814,824
Maintenance of way and structures.....	11,400,539	16,426,582
Maintenance of equipment.....	11,307,965	16,617,247
Traffic expenses.....	2,990,164	3,626,612
Transportation expenses.....	32,083,170	42,250,286
General expenses.....	3,963,204	4,322,104
Parlor and sleeping car expenses.....	1,111,253	1,348,979
Lake and river steamer expenses.....	1,051,782	1,183,397
Commercial telegraph expenses.....	1,382,507	1,613,688
Total operating expenses.....	65,290,582	87,388,896
*Net operating earnings.....	33,574,627	42,425,928
*Net railway income.....	23,128,117	32,198,617
Special income.....	9,475,181	6,472,028
Net available for dividends.....	29,294,906	38,670,645
Dividends.....	29,169,906	26,031,654
Pension fund.....	125,000	125,000
Surplus.....	3,308,392	12,513,991

*It is not plain whether the taxes are deducted before arriving at net earnings or are included with fixed charges and deducted before arriving at net railway income.

NEW BOOKS

Universal Directory of Railway Officials. Compiled under the direction of S. Richardson Blundstone, Editor of *The Railway Engineer*. Bound in cloth; 580 pages; size, 6 in. by 9 in. Published by the Directory Publishing Company, Ltd., 15 Farringdon Avenue, London, E. C. Price, 10s.

The twenty-first edition of this directory of railway officers of the entire world does not seem to have suffered very appreciably because of the war. The compiler, however, has found it necessary to omit the sections relating to the railways of Germany, Austria, Hungary and Turkey and it has not been possible to correct the sections dealing with the railways of Belgium and certain parts of France. The information in the directory has been compiled from official sources. It is remarkably well arranged and includes not only the names of the officers of the railways, but also the gage of each railway, the number of its cars and locomotives and the location of its general and other officers. The roads, naturally, are classified in alphabetical order by countries and the latter by continents, but there is an alphabetical index of all the lines and also an alphabetical list of all the officers mentioned. The book is indispensable to railway supply firms doing a foreign business. It is unfortunate that copies are not on sale in this country.

American Association of Railroad Superintendents

Abstracts of Committee Reports and Papers Presented at the Twenty-Eighth Annual Convention at San Francisco

The twenty-eighth annual convention of the American Association of Railroad Superintendents was held at the Sutter Hotel, San Francisco, Cal., on August 19 and 20, with an attendance of nearly 150. President Charles Burlingame, superintendent of the Wiggins Ferry Company, St. Louis, presided. After an opening prayer by Dr. George E. Burlingame, pastor of the First Baptist Church of San Francisco, J. Emmet Hayden gave an address of welcome in behalf of Mayor James Dolph, Jr.

MR. SPOULE'S ADDRESS

William Sproule, president of the Southern Pacific, then addressed the meeting on "The Public Influence of the Railroad Superintendent," in which he said in part:

If I were asked to point to any branch or phase or activity of the railroad service for the typical railroad man I would without question point to the superintendent. He has to deal with all phases of human nature, either directly or indirectly, either under his personal touch or his official control. He has to deal alike with the mechanism of railroading, and with the minds of men. In the great stress of his duties and the personal strain that is on him during all of his waking hours, he is apt to be so wrapped up in his business that there is obscured to his mind the fact that he is a personage in his walk of life, exercising a wide influence of which he is largely himself unconscious.

Not only does he control the mechanical organism which makes his division a living thing, serving the purposes of the public and of the owners at the same time, but he deals, through his organization, with the traveling public and the shipping public and the thinking public in general. Of the community, the largest percentage, for example, form their opinion of the railroad and its service by the people connected with the railroad with whom they come in contact. I might perhaps say, and you will probably agree with me, that a very large proportion of the public form their opinion from their contact with the clerk in the ticket office, to whom they come for information; the ticket clerk, when he sells them their tickets; the baggageman, the trainmen, the conductor, the enginemen, and last, but not least, the redcap. The handling by these men of the public gives the stamp of approval or disapproval on the part of the public, in large measure, and these men are all under the influence and control of the superintendent.

To-day, more than any other period, is a time when business men have to meet the minds of other men. Never was communication so swift, so broad and human intercourse so active as to-day. It has made the minds of men correspondingly active. We are, so to speak, in a condition of mental fermentation all of the time. It makes us a nervous sort of people. Now, when we, as railroad men, do business, we have to remember this, not only with respect to the men in the service, but more particularly with respect to the people out of the service, as they are the people to whom we wish to sell the only wares we have to offer, transportation. In doing it we have to meet their minds. They expect of us service, not as a private corporation, not as the representatives of private capital, but as the representatives of private capital devoted to public service, and they expect our conduct toward them to be that of public servants.

This is not altogether an undesirable attitude of the public mind. The more we adapt ourselves to it the better railroad men we are, the more useful are we to the public and the more likely are we to get results for the stockholders and the security holders with results satisfactory to the public. It is true that in the transition period, which has run along now for a generation, between the time when railroads were regarded as

strictly private property, to the present, when they are regarded as private property under public control, we have learned that a continuance indefinitely of the policy of regulation, without recognition of responsibility with it, will not make for the service of the public or meet the public needs. And to you it falls to help us to make that difficulty plain to the public mind. Their minds need to meet ours upon that question. In proportion as the public come to realize that the railroads are endeavoring to give the public good service and are actuated by direct motives, with direct methods, in the same proportion will they accord us, I believe, their confidence and will realize that the railroad business is in precisely the same situation as any other business and as the business of every other concern, namely: there must be such a margin between the income of the railroads and the expenses of the railroads as to make the railroad business attractive for capital, which is merely the savings of the people, and to make those savings secure when invested in the railroad business.

In the process of bringing that conviction home to the public, I know of no factor greater than the influence of the division superintendent. His attention to the public wants, his desire to meet the wishes of the shippers, to serve the traveling public well, to make them feel at home upon his road and upon his division; that influence of the superintendent is bound to extend into every avenue of the service, into every phase of employment within the railroad service, and the influence of the superintendent extending throughout his jurisdiction, will be felt by a greater number of people than any amount of literature, so-called, circulated through pamphlets and the public press. This widespread influence will help greatly to give living effect to the things that we are trying to impress on the public, so that the public may see things in our way and we at the same time look into the public mind to see wherein we can stand on common ground. In the railroad business this is of great importance, because a railroad, once built, is laid, for the purposes of men to-day, forever. And we to-day are laying the foundations for the future in the public attitude toward the carriers, which finds reflection in governmental attitude toward us, and we are laying, above all, the foundation for an efficient public service, one of growing and of increasing efficiency of which this nation can well be proud. Let us build so well that private ownership may accomplish all that good government should desire.

I am delighted to say that in my own railroad career, which is now getting gradually to be a long career, I have always found the division superintendent to be co-operative with other departments, anxious to find out the wise thing to do for the company, thinking about it, developing his own theories and plans, full of initiative, anxious about his men, desirous for them and besides this so self-sacrificing, as to himself, that he constitutes in that fact a tribute to the service.

Gentlemen, in these manifold influences of yours the attention which you give to the shipping and traveling public and to the people generally is of growing importance, and together with the technical and active and human attention you necessarily give to the company, within its own organization, constitute the superintendent a man of increasing force in the service and in the community; a man of increasing importance to the company, and that increasing importance will redound to your interest and inevitably be recognized by the companies you serve.

THE SUPERINTENDENT

W. R. Scott, vice-president and general manager of the Southern Pacific, read a paper on "The Superintendent, Past, Present and Future," in which he reviewed the course of development

from the days when the superintendent was in entire charge of all departments and through the period of more intricate organization when the traffic department came into existence and competition in rate-making came into play. He then continued:

Competition in rates is past; but that does not mean that competition is dead. Competition in service remains, and herein appears at once the opportunity and the responsibility of the superintendent. This competition of service will represent something finer and higher than the usual things which we have expected from struggles. It will not be secret and conspiring, seeking its ends by unfair means, but will be open and square in the sight of all men. Its motto will bear no such brutish legend as "The survival of the fit." Its method will not be to kill the unfit, but rather to teach him how to be fit. Your association is one of the evidences of this form of competition.

The orderly progress of the work demands that the railroad superintendent of the future be greater in his accomplishment than the superintendent of the present or of the past. New and complex problems will confront him and to him will be assigned the duty of satisfying the public. With rates handled and approved by government, the existence of the present day traffic department, as such, will not be necessary, but it will be organized along different lines. We will have our rate bureaus for the purpose of assisting in hearings on rate matters before commissions and tribunals and for the co-ordination of connecting lines for the proper divisions of rates, and we will have solicitors for traffic. Inasmuch as no favor can be given to shippers to induce traffic to travel by any particular channel, the only thing that will govern the securing and movement of traffic will be service in addition to solicitation, and service the most important of all. The superintendent is responsible for the service rendered and the cost of it, about 75 per cent of the total expenses of railroads being disbursed under his direction. The solicitors for service, therefore, should be on the superintendent's staff, as he is the man charged with the responsibility of rendering the service and is in constant personal touch with the patrons of the line and for this reason can best serve and satisfy them. Competition will be measured by the quantity and quality of service rendered the public for the published price. As illustrative of my meaning, you and your predecessors have so trained your forces that railroad travel on many lines is perhaps more safe so far as danger or risk of accident is concerned than is the ordinary life at home.

But there are other matters to be considered. Loss of freight between origin and destination; loss of freight at originating point due to improper marking or checking; damage to freight as a result of rough handling. There are constant drains on railway revenues. All such matters are within the superintendent's jurisdiction, and correction of these defects and the rendering of perfect service will be the best advertisement that any railroad can have. And this, together with courteous treatment of the public by officers and employees, will be the determining factor in the railroad's popularity.

The superintendent of the future will probably see quite a change in the relation of government to railroads. It may take one of two forms. If the public is satisfied that the business of the railroads is efficiently and economically administered it is possible that additional earnings will be permitted to enable the railroads to make improvements and add the facilities that are so much needed to keep up with the growth and development of the country, as well as to overcome the constantly increasing expenses of the railways, which will continue through increased wage allowances and the increasing cost of materials. The other form would be government ownership if the public continues to be misled by politicians who insist upon harassing the railroads and clamoring for their further repression. This has had the effect of misguiding a good many railway employees and the tendency now is for presentation on their part of the choice of granting extravagant wage increases for a day's work or having the service paralyzed. If the latter policies are adopted it will do much to hasten government ownership of railroads.

The superintendents of to-day can do more than any other set of men to counsel the great organizations of railroad employees along the lines of reasonable action, which in the end must mean so much for their welfare. Much good has been done by these organizations in the past in controlling their men and improving the service of the railroad. But the most can be done by such treatment of the public and such service to the patrons that the last lingering resentment against railroads will be buried with the past.

PRESIDENT'S ADDRESS

President Burlingame in his address referred to the rapid growth of the association, both in membership and in usefulness, since its reorganization in 1911, when the membership was changed from railroads to individuals. He recommended an amendment of the articles of association to include in the membership general superintendents of transportation, superintendents of transportation, general inspectors of transportation, assistant superintendents of transportation, assistant general superintendents and assistant trainmasters. He also recommended an increase in the number of members on committees. He spoke of the increasing recognition on the part of general officers of the value and importance of the association, saying he had adopted the policy of asking the approval of superior officers to the appointment of their superintendents as committee members in order to insure their co-operation, and that of 50 vice-presidents and general managers so addressed, 41 had given favorable replies.

He outlined the field for the work of the association toward improving the efficiency of operation as follows: Reducing the number of cars handled in proportion to the amount of freight and the number of passengers transported; reducing the consumption of fuel and other supplies; reducing to a minimum the amount of labor necessary to the movement of freight, to be brought about by a careful analysis of the conditions surrounding the transportation of freight at different points, and watchful supervision of the various elements necessary to bring about maximum results with minimum expense; creating in the minds of the employees an enthusiastic spirit and morale; reducing hazards to both life and property; bettering the working condition of employees; providing service satisfactory to the patrons; standardizing practices as far as possible and preventing loss and damage to freight.

The members of the Superintendents' Association, he said, being directly connected with operation, should be the best qualified to recommend changes in operating rules and methods, to be referred to the American Railway Association, in the interest of standardization. One of the important subjects for the superintendents to consider is the waste in wrong routing of good order empty cars and the setting back of bad order cars. At St. Louis a plan is being tried by which each superintendent will keep a record of all cars wrongly delivered by each connection from day to day, and at the end of the month reports showing wrong deliveries with the date, number, initials, cause of set-back and percentage of cars set back to the total of cars delivered will be sent to the superintendents of delivering lines under personal cover. If proper action is not taken to reduce the number of set-backs the matter will be taken up by the general managers of the lines involved.

TRAIN DESPATCHERS AND DIVISION OFFICIALS

J. P. Finan, despatcher, Atchison, Topeka & Santa Fe, read a paper on "Train Despatchers and Division Officials," in which he said in part:

There is no test of man's ability in any department of the railroad more severe than service as a train despatcher. There is no position where so little consideration is shown for the rights and feelings or failures of man as the train despatcher's, yet they are a class upon whom a great deal depends for the safe and efficient operation of the division and their duties are such that no man can perform them without meriting, at times, even just criticism.

If the train despatcher makes a mistake, which he sometimes

does, he usually pays for it with usurious interest. He is often criticised and censured in a manner not conducive to safe and efficient operation. When such criticism or censure borders on abuse, as it sometimes does, it results in discontent and reduced efficiency. It unnerves the despatcher and makes him dissatisfied, afraid and uneasy, and while in that mental attitude he is not capable of doing good work. Any official who thinks such a method is the best way to deal with his train despatchers, thereby confesses his inability to wisely govern and efficiently direct other men of intelligence and moral rectitude.

When a train despatcher must be criticised or censured, the object should be prevention and not punishment. He should be admonished or corrected in a way that will still leave him a useful and loyal employee, whose sense of justice and self-respect remains unwounded. It costs railroads something to make a train despatcher. If he has done good work for a year or so, he is too valuable a man to be driven out of the service by harsh treatment or thrown in the scrap heap because of some slight mistake or oversight.

The ever present expectation of being called to account is a most wholesome check upon a train despatcher. It makes him watchful and furnishes an incentive which inclines him to hold others to a strict accountability and carefulness in the discharge of their duties. But he expects and appreciates, and I may venture to say, deserves, consideration and courteous treatment.

Division officials should remember that the arbitrary power they exercise is delegated to them in the interest of the company and should never be wielded except to advance its affairs. The best interests of the company demand that you accord to the train despatcher about the same kind of treatment you expect and wish to receive from your superior officers. When the train despatcher is harshly criticised, or severely censured, he loses his mental equilibrium for a time, much to the detriment of the service, and if such treatment continues to be a regular thing, he becomes dissatisfied and begins to look around for another position.

It is highly important that those who fill positions of responsibility should remain uninterruptedly in the service. The train despatcher is no exception to this rule. Without continuity of service on the part of its train despatchers, a division can never hope to maintain a very high degree of efficient operation. Wherever this principle is practiced, you will find a safe and efficient service and where there are constant deviations from it, you will find just the reverse.

Frequent and abrupt changes of despatchers should be avoided as they tend to disturb the minds of the men and lessen their interest in the service. They should not be censured or criticised needlessly. To do so is to unsettle the service and lessen the zeal and loyalty of the men. Mistakes that are not discreditable, or that do not result from inherent wrong, should not be judged too severely. Those who are supposed to pass judgment should be considerate of the conditions which contribute to bad results.

Failure to recognize these plain principles, of which I speak, has, upon two occasions, aggravated an attempt to form a protective organization for train despatchers. In 1892 the attempt dismembered and disrupted the Train Despatchers' Association. In 1911 a considerable number of members left the association, following the Baltimore convention, because that convention wisely, and practically unanimously, defeated the resolution which was intended to change the constitution in a manner which would have made of the Train Despatchers' Association a protective organization.

The cause of such dissension, remember, was not so much a question of wages or hours of service, but that a great many train despatchers felt that they were not treated with the same fairness and consideration accorded other railway employees, nor that which was due their standing as train despatchers, and smarting under a sense of discrimination, looked towards labor unionism as a remedy, mistakenly, as I believe.

Train despatchers easily adapt themselves to their income,

whatever it may be, and do so cheerfully and happily, as long as its permanency is assured. But when doubts develop, that moment they become afraid, uneasy, discontented and open to improper suggestions.

It may not be well known to you, but it is a regrettable fact, nevertheless, that a considerable proportion of train despatchers are criticised and censured in such a manner that they do not feel secure in their positions. And while, perhaps, such fears may be largely groundless, they do exist and tend to disturb the minds of many train despatchers, thereby lessening their usefulness. And until this feeling is removed, until this apprehension is entirely eliminated from the lives of train despatchers, railway operation will be the loser in the value of the service rendered by this class and the element so affected will still contend that concerted action on the part of train despatchers, through some organized effort, is necessary in order to secure them the fair treatment they feel they deserve and should have.

There should be no more reason for a protective organization for train despatchers than there is for such an organization for superintendents. Train despatchers may not be formally recognized officials, on all railroads, but they cannot be divorced from the intimate relationship they hold with the division officials. It can readily be seen that their positions should be considered from every standpoint of official capacity and are not similar, in any sense, to the positions held by other employees who are affiliated with and obligated to organizations demanding from them a loyalty paramount to the loyalty they owe to the company.

It is only fair to admit, however, that some railroads do consider their train despatchers as members of their official family and treat them as such, according to them every kindness and courtesy that is consistent and possible to give, such as two weeks' vacation, at full pay, once a year, sending one despatcher from each division to the annual convention of the Train Despatchers' Association, compensating such men for time and expenses while absent from duty on that mission; granting system annual passes to despatchers and dependent members of their families, all of which fully establish a substantial recognition of the official status of the train despatcher.

I point with pride to the Santa Fe as one of the great railway systems which have adopted this policy of dealing with their train despatchers, and whatever it may cost them to maintain such a policy, they do not look upon it as an expenditure, but as an asset—an investment which yields large and important returns in increased loyalty and devotion to the service on the part of their train despatchers.

Is it not, therefore, worth while for all railroads to adopt some uniform method of dealing with train despatchers and to inaugurate some definite plan which will insure justice and fair treatment? Then this "protection" idea, which seems to be sticking in the minds of so many train despatchers will soon fade away—those fears of arbitrary dismissal will soon be banished and you will have a force of train despatchers contented with their positions, zealous and efficient in the performance of their duties and of unquestionable loyalty to the service.

COMMITTEE REPORTS

A sub-committee of the transportation committee consisting of F. L. Meyers, superintendent, Atchison, Topeka & Santa Fe, Las Vegas, N. M., and E. Richards, superintendent of the St. Louis Southwestern at Pine Bluff, Ark., presented a report on marking and packing of freight, arriving at the conclusion, from a review of the rules issued or recommended by the various associations or departments, that practically every requirement has been covered, but that there remains the essential of securing the enforcement of the rules. The committee, therefore, offered a resolution, which was adopted, recommending that the enforcement of rules covering the marking and packing of freight be placed under the jurisdiction of the weighing and inspection bureaus in different sections of the country and that they employ such additional force as is required to properly conduct the work.

In connection with the report of this committee W. S. Williams, superintendent of the St. Louis division of the Illinois Central, submitted a paper on "Methods of Checking Transportation Expense," describing a plan adopted on the Illinois Central in September, 1914, by which each superintendent makes out in advance a monthly allotment to cover transportation expenses and secures approval for it.

The committee on nominations, in addition to its selection of officers for the ensuing year, presented a supplementary report on "How to Get Train and Enginemen to Take More Interest in Their Work to Protect Themselves and the Company." Summing up, the committee said, the desired results can best be obtained by:

Elimination by careful selection in employing. Elimination of careless, slothful and undesirable employees as opportunity presents itself. Just discipline, tempered with mercy when conditions warrant, and absence of favoritism. Personal contact and cultivation of *esprit du corps* and feeling of personal responsibility for results.

A. E. Boughner, superintendent, Missouri, Kansas & Texas, Sedalia, Mo., chairman of the arbitration committee, reported that no disputes had been referred to it. Two subjects assigned to the committee were discussed in papers by individual members.

W. Smith, assistant superintendent, Indiana Harbor Belt, submitted a paper on "How to Obtain Better Results in Handling Cars in Yards and in Trains by Switchmen and Trainmen," and A. Shepherd, superintendent terminals, Missouri Pacific, Kansas City, submitted a paper urging the establishment of uniform charges for reconsigning freight shipments. This was referred to the transportation committee.

The committee on membership submitted a paper by W. N. Cox, late superintendent of transportation and machinery of the Western Railway of Alabama, on "How We Can Increase the Membership of this Organization, Thereby Making It More Useful," and a paper by F. C. Syze, assistant superintendent, Baltimore & Ohio, Staten Island, N. Y., on "How to Bring About a Better Feeling Between Yard and Train and Enginemen."

The committee on interchange car inspection, M. Marea, general superintendent, St. Louis, Troy & Eastern, chairman, presented resolutions making recommendations to the American Railway Association which were adopted, as follows:

That the American Railway Association again be urged to consider the matter of uniform lettering, it being the recommendation of this association that the sides of cars be lettered at the seal pin as follows: Facing the "B" end of car the left-hand side door to be lettered "L," the door on the opposite side to the right facing the "B" end to be lettered "R."

That the American Railway Association be asked to establish as uniform practice the plan of stenciling all car department information on the ends of cars and only information pertaining to the transportation department on the sides.

That end doors on box car equipment be abolished.

That the American Railway Association be requested to urge upon its members a closer observation of M. C. B. Rule 1, that each railway must give to foreign cars the same care as to lubrication, repairs, etc., as to its own cars.

That a uniform steam hose coupling with a maximum sized port opening be adopted as standard.

That the delivering road shall pay cost of transfer or rearrangement of lading when due to defective equipment unsafe to run according to M. C. B. rules, unless without transfer repairs can be made in 24 hours as per M. C. B. Rule 107.

That the rules adopted by the American Railway Association for the inspection and certification of box cars before loading with freight subject to damage be adopted locally by interested carriers at interchange points and that the plan be extended to provide for a uniform inspection certificate to make the delivering line responsible for the fitness of cars delivered; cars delivered without certificate cards to be considered as having been delivered in error.

The association thereupon recommended that all defects on freight car equipment be declared car owner's, except defects growing out of accidents such as wrecks, collisions, etc., and that a general adjustment committee be appointed to arbitrate car damage claims.

The association also adopted a resolution which had already been sent to the American Railway Association and the Master Car Builders' Association, recommending that there be no changes in the existing M. C. B. rules until October, 1916, to afford an opportunity of fully developing the effect of the rules put into effect last year.

The committee on train rules, J. E. Scott, train despatcher, Gulf, Colorado & Santa Fe, chairman, presented a progress report and was authorized to continue its work of formulating proposed changes in the standard code.

The committee on resolutions, D. S. Farley, superintendent, Atchison, Topeka & Santa Fe, Amarillo, Texas, chairman, presented a report on "Cost Per Day of an Engine and Crew in Road and Yard Service," and a resolution, which was adopted, that it is impracticable to recommend any uniform price per day for the rental of an engine and crew, and that further action be taken by the association to establish a minimum rate of charge for rental of locomotives and that other costs, incidental to wages, supplies, etc., obtain in accordance with the rates of pay and expenses of the owning company. The committee presented a table for eight roads for the month of October, 1914, showing that the cost of operating switch engines 10 hours a day varied from \$26.17 to \$39.33.

The committee also presented a paper by E. D. Devans, general superintendent of the Buffalo, Rochester & Pittsburgh, on "Efficiency or Discipline Systems," describing the modification of the Brown system adopted by his road in 1912. This aroused some discussion, in which various members described the methods of discipline used on their roads. The consensus of opinion was that the system of record suspensions was greatly superior to the plan of actual suspensions.

At the request of the Cincinnati division a resolution was discussed that a suitable receptacle be placed on the side of each car in which home route cards may be placed. The general opinion was that the card should go with the car, but one or two members thought it should accompany the billing and the subject was referred to the transportation committee.

E. H. Harman, secretary, presented a report showing the rapid increase in membership, which was 12 in 1911, 74 in 1912, 145 in 1913, 266 in 1914 and 501 in 1915.

W. E. Williams, general manager of the Missouri, Kansas & Texas, delivered an address on "The Railroad as a Public Servant."

E. W. Camp, attorney for California of the Atchison, Topeka & Santa Fe Coast lines, presented a paper on "The Railroad and the Hobo."

The following were elected officers for the ensuing year: President, Charles Burlingame, superintendent Wiggins Ferry Company, St. Louis (re-elected); first vice-president, W. S. Williams, superintendent Illinois Central, Carbondale, Ill.; second vice-president, C. E. Rickey, superintendent terminals Queen & Crescent, Cincinnati, Ohio. Executive committee: A. G. Smart, superintendent Chicago, Burlington & Quincy, Aurora, Ill.; B. B. Tolson, superintendent Mobile & Ohio, Murphysboro, Ill.; O. F. Clark, superintendent of transportation Grand Trunk, Chicago, Ill.; J. E. Taussig, general superintendent Texas & Pacific, Dallas, Tex., and H. R. Saunders, superintendent Chicago, Rock Island & Pacific, Kansas City, Mo.

Members of the association and their families went to the convention in a special train by courtesy of the Atchison, Topeka & Santa Fe and the Southern Pacific. Saturday, August 21, was Railroad Superintendents' Day at the Panama-Pacific International Exposition and the members were entertained at the exposition grounds. On August 22 the party was taken for a trip on the bay for the purpose of inspecting the docks and various points of interest, followed by a trip to Mt. Tamalpais via the Northwestern Pacific and the Mill Valley & Mt. Tamalpais.

Building Concrete Caissons in the Platte River

The Burlington Used This Construction at Ashland, Neb.,
and Also a New Type of Reinforced Concrete Pile

By J. H. MERRIAM,

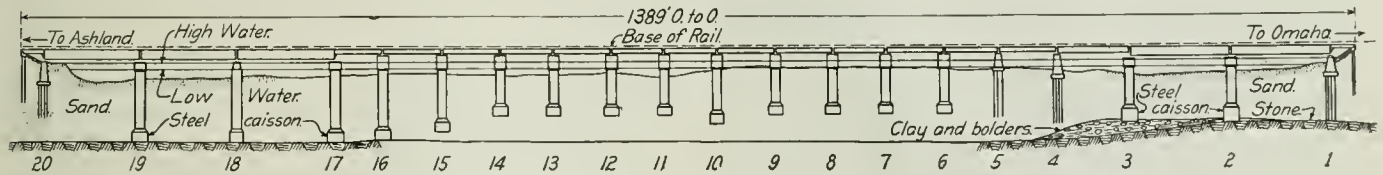
Resident Engineer, Chicago, Burlington & Quincy, Kansas City, Mo.

The Chicago, Burlington & Quincy has recently completed a permanent bridge over the Platte river on the Chicago-Denver main line, near Ashland, Neb. This is the first permanent structure of its kind on the lower Platte river, and consists of deck plate girder spans varying from 50 to 105 ft. in length and supported by 20 concrete piers of various types. The most satisfactory design from the construction standpoint was the cylindrical caisson, with a square base, which was sunk by means of open dredging.

Because of the shallow water in the Platte river it was possi-

The inside of the base is pyramidal in shape, converging into a cylinder 8 ft. in diameter at a height of 9 ft. above the cutting edge and forming an open well 8 ft. in diameter. After removing the forms, excavation was carried on through the open well by means of a clam shell bucket and a stiff-leg derrick or by the use of a track derrick with either a clam shell or an orange-peel bucket.

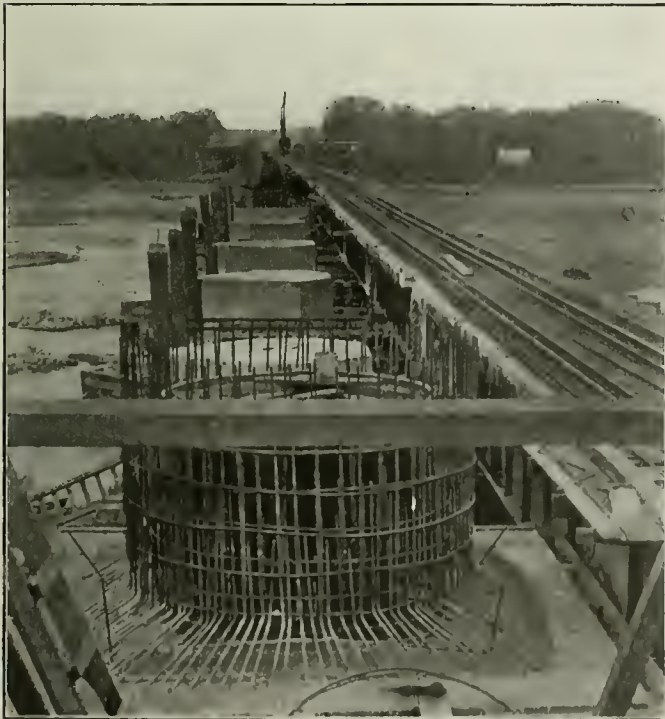
The time required to sink these caissons was materially influenced by various obstructions encountered, some of which required the services of a diver, who was lowered inside of the



General Elevation of the Platte River Bridge

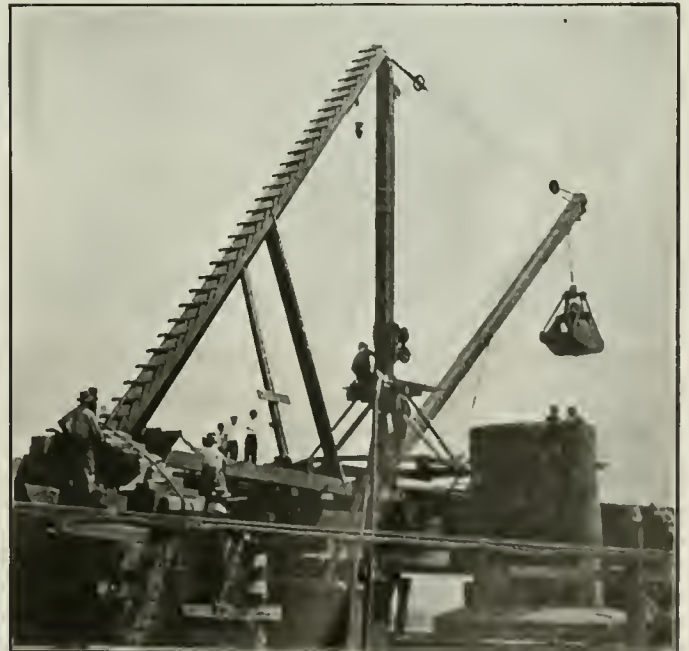
ble to build a diversion dam of brush and rock above the proposed locations of each pier, in this manner obtaining still water in which a wooden cofferdam measuring 24 ft. square and 4 to 6 ft. in depth was placed and anchored in position. By filling this with sand to the surface of the water, a bar was formed on which forms for the bottom section of the caisson were placed and filled with concrete. The outer sides of this section are vertical for a

caisson to remove logs, rocks and other obstacles. The caissons were sunk an average of 8 ft. per 10-hour day, the best time made being 20 ft. in 20 hours' continuous dredging. When it was necessary to start dredging after it had been discontinued over night or for a period of 5 or 6 hours, considerable excavation was necessary to start the movement of the caisson. The use of dynamite exploded in the excavated pit in the bottom of the caisson after each 5 to 8 cu. yd. of sand had been removed was found to assist materially in the sinking. A drop of from 2 to 10 in. was accomplished at times in this manner, using a 1/2-lb. stick



Looking East from Pier No. 11, Pier No. 10 in Foreground Showing Reinforcement of Bottom Section

distance of 10 ft. and then converge to form a cylinder 11 ft. in diameter at a height of 12 ft. above the cutting edge. This cylinder was extended upward in 13-ft. sections as sinking progressed. Wooden forms lined with galvanized iron were used for both the inside and outside, and were constructed to permit their removal and use on other piers.



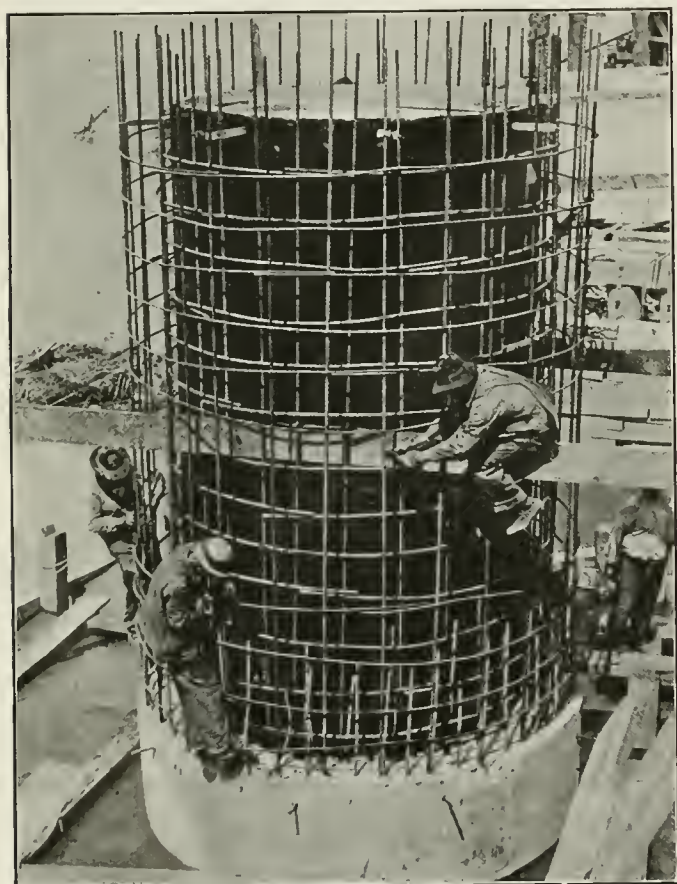
Excavating Inside of Steel Caisson by Use of Stiff-Leg Derrick and Clam Shell

of 40 per cent. dynamite. The use of dynamite also reduced the amount of excavation necessary for sinking as these shots kept the cutting edges well down in the sand and prevented the sand from running in from the outside.

Very little trouble was experienced in keeping these caissons in a vertical position except when some obstruction was encoun-

tered under one side of the cutting edge. When this happened it was sometimes necessary to place a shore or brace, usually a 12-in. by 12-in. timber, against the low side, and as sinking progressed this brace would force the caisson back to its proper position. Quite often it was possible to keep the caissons plumb by regulating the excavation in the bottom.

In order to found the cutting edge on bed rock the last 3 or 4 ft. of sinking was accomplished by lowering the water on the inside. The resultant reduction in the pressure caused the sand to be forced in under the cutting edge, at the same time permitting the caisson to settle by its own weight to within a few inches of bed rock. Sand around the cutting edges which could not be removed was thoroughly grouted with Portland cement. The bottom was then sealed with a 5-ft. course of 1:2:4 concrete placed through the water in a $\frac{3}{4}$ -yd. drop-bottom bucket. After this had set for 12 hours a second course was placed, making a



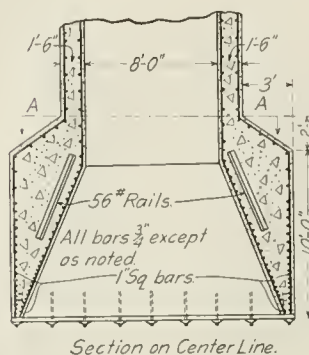
Inner Form and Reinforcement of Upper Section of Concrete Caisson

total of 10 to 14 ft. of sealing material. This was then allowed to set for 24 hours, when the caisson was unwatered and the filling of concrete was carried on in the dry. A 1:3:6 mix was used to fill the core above the sealing course. Piers were then completed to the proper height with a reinforced concrete cap of octagonal shape, with the upstream side carried out to a point, to form an icebreaker.

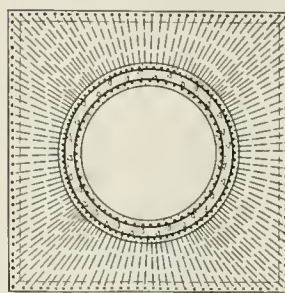
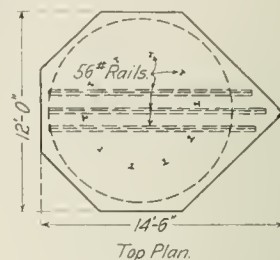
Piers 6 to 16 inclusive, except pier 11, were built in this manner. At pier 11 the water was too deep to admit using the diversion dams and it was necessary to erect forms, and concrete the bottom section of this caisson on a suspended platform. This was accomplished by spanning the location of the new pier with two 60-ft. girders placed 13 ft. center to center on pony bents built on old bridge seats. Crosswise of these girders two pairs of smaller girders were placed from which a platform was suspended by means of six 2-in. lowering screws 24 ft. long. Forms were erected on this platform and concrete was placed to a sufficient depth properly to embed and anchor six eye-bars to which six $2\frac{1}{2}$ -in. lowering screws were attached. This method was fol-

lowed to aid in supporting the load as the concreting progressed.

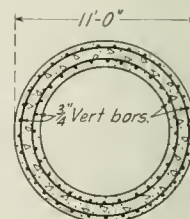
After the forms were removed the six 2-in. screws were released and the platform was removed from under the caisson, throwing the entire weight of approximately 175 tons on the six $2\frac{1}{2}$ -in. screws. The caisson was then lowered to the bed of the



Section on Center Line.



Section AA.

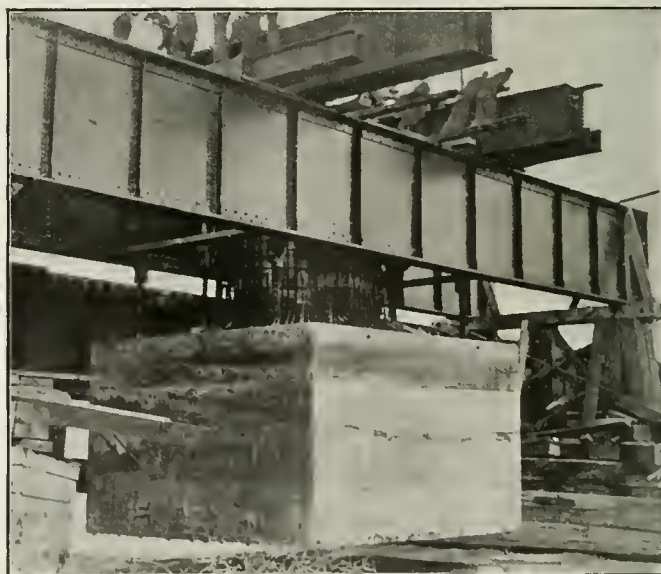


Section of Cylinder above Base

Details of Concrete Caisson and Caps for the Piers 6 to 16

stream by means of these screws operated with wrenches on top of the cross girders. After landing on the bed of the stream the screws were moved and sinking was carried on, as with the piers previously described.

Caissons for piers 2, 3, 17 and 19 are of steel construction, cylindrical in shape, and measure 18 ft. in diameter at the base.



Pier No. 11. Lowering Bottom Section of Caisson by Means of Screws

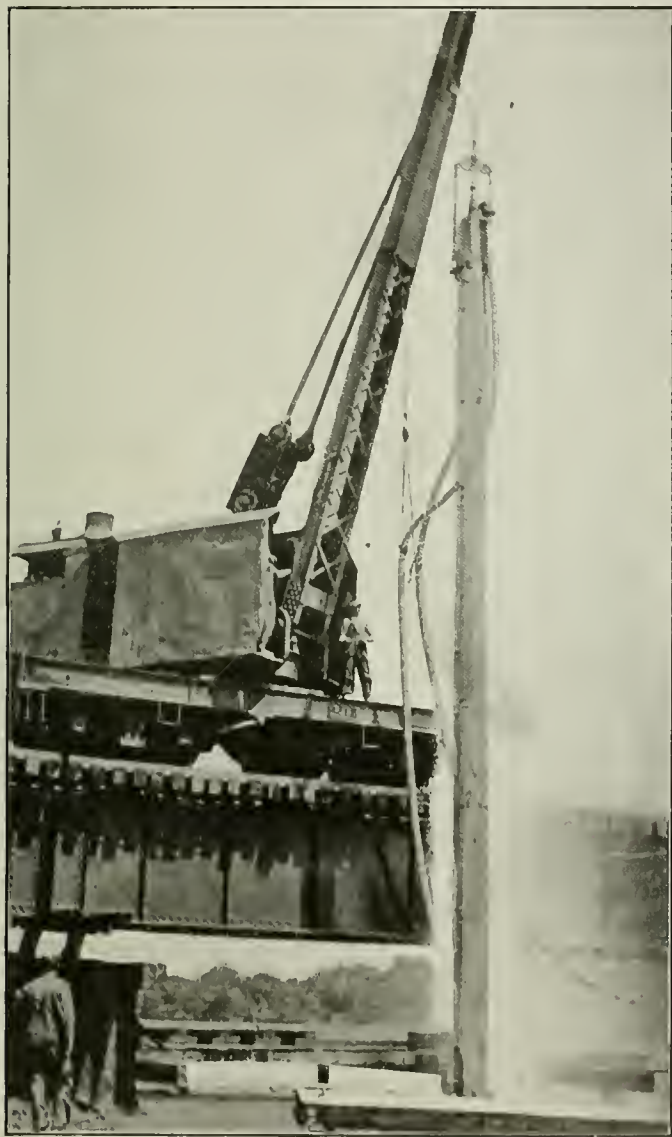
They have vertical sides to a height of 16 ft., where they converge to a cylinder 11 ft. in diameter. This steel shell was lined with 18 in. of concrete, leaving an 8-ft. well through which a dredge bucket was operated. The bottom sections of these caissons were assembled and riveted together on the bank and were then carried out and set in place by a locomotive crane. Addi-

tional sections were added in 20 ft. lengths. This type of caisson was concrete reinforced with 15-in. I-beams placed vertically in the 18-in. lining wall. These caissons were used for deep foundations, although the concrete type of caisson was later found to be equally satisfactory. These piers were finished to proper height with an octagonal cap similar to those described previously except that icebreakers were designed differently in order to afford greater protection because these piers are somewhat lower than those built in midstream.

Piers 1, 4 and 5 are built on Bignell concrete piles; piers 1 and 4 resting on 36 piles each, and pier 5 on 21 piles, sunk to depths of 57, 62 and 50 ft., respectively, below low water. The tops of

one, with water at a pressure of 100 to 150 lb. per sq. in., was connected to the 4-in. pipe and the other, with water at a pressure of 250 to 300 lb., was connected to the 2-in. pipe. The high pressure was used at the point of the pile through the inner pipe, to loosen and displace sand in front of the pile in sinking. The lower pressure in the 4-in. pipe supplied the side openings with enough water to keep the sand loose and to give it an upward movement to overcome the side friction. The piles sank by their own weight. The high pressure water was supplied by one Knowles Special 20 in. by 8 in. by 18 in. duplex pot valve pump through 800 ft. of 6-in. wrought iron pipe and the low pressure water was supplied by one Dean Brothers 16 in. by 8 in. by 18 in. duplex pump, through an 8-in. pipe of the same length.

The east bank block is also supported on 50-ft. Bignell concrete piles, 12 of which were sunk to a depth of 35 ft. below low water and were capped with concrete. They support the east end of a 25-ft. slab, weighing 80 tons. Two of these slabs are used, one at each end of the bridge. They were manufactured at the Burlington concrete plant at Havelock, Neb., each slab being made in two parts, measuring 3 ft. deep, 7 ft. wide and 25 ft. long. The west bank block is similar to the east one, except that it is supported



The Bignell Concrete Pile. The Spray Is Due to Discharge from the Water Outlets in the Sides of the Pile

these piles were embedded in a concrete cap on which the piers were built in the ordinary manner. These Bignell concrete piles are a new type and these are the first of their kind to be used. They are 16 in. square, 50 ft. long, weigh 12,300 lb. each, and are made of reinforced concrete. Each pile has a 4-in. pipe through its entire length, reducing to 2 in. at the bottom. This pipe is tapped at intervals of $1\frac{1}{2}$, 2, 4, 8 and 12 ft. from the bottom or point of the pile by $\frac{3}{4}$, $\frac{1}{2}$ and $\frac{3}{8}$ -in. pipes, which are fitted with elbows turned up on the faces of the pile, thus furnishing 5 openings on each side. In addition a 2-in. pipe extends through the 4-in. pipe and fits into the reducer at the point, the 2-in. pipe being fitted with a brass nozzle to reduce the opening to $1\frac{1}{8}$ in.

Water is applied at the top of the pile through two $3\frac{1}{2}$ -in. hose;



Moving Girder Spans from Temporary Piers to New Piers

by twelve 30-ft., 14-in. by 14-in. solid concrete piles. Pier 20 is similar to pier 1, except that foundation piles are white oak instead of concrete.

Pier 18, which was the last pier to be completed, presented many difficult problems, owing to the nature of obstructions in the river bed through which it was sunk. A cofferdam 19 ft. square, was planned, but before driving a Davis calyx core drill was used to drill holes 18 in. apart on the proposed line of the cofferdam to penetrate through the obstructions. Each hole was blasted with 5 to 15 lbs. of 60 per cent. dynamite and sheet piling was then driven with but little trouble. By the use of dynamite, divers, dredge buckets and sand pumps, this cofferdam was finally cleaned out and the obstructions were removed. It was then filled to the surface of the water with sand on which forms were erected for a concrete caisson similar to those used at piers 6 to 16. Thereafter work proceeded without interruption until the pier was completed.

Three new spans were placed at each end of the new bridge. The remainder of the spans were obtained from the old bridge, and it was necessary to divert traffic for 34 hours while they were shifted from the old to the new piers. This was accomplished by the use of one 75-ton and one 100-ton derrick, which picked up each entire span with ties and rails in place, raised it 7 ft., moved it longitudinally 25 ft. and swung it to place on the new piers 14 ft. out. These three movements required from 20 to 45 min. for each span. Thirteen spans were moved in this manner, during the worst storm of the winter, the high wind and heavy snow greatly retarding the work. The actual time for changing all the spans was 10 $\frac{1}{2}$ hours.

The entire bridge is covered with a reinforced concrete ballast deck. The deck slabs were pre-molded and placed on the bridge in 5-ft. sections. Each slab measures 14 ft. wide by 10 $\frac{1}{2}$ in.

thick, and is provided with two 1¾-in. drain holes. Joints between slab sections are calked with oakum, tar and cement. Expansion joints at the ends of each span are covered with apron plates.

Fascine type willow mattresses were constructed to protect the new fill at the east end of the bridge and to maintain a channel under the long spans at this point. A peculiar characteristic of the Platte river is that it has invariably, adjoining one bank, a main channel and against the other bank a secondary channel. These channels are from ¼ to ½ mile apart, with stretches of extremely shallow water and a sand bar between. The banks are low and overflow only at times of ice gorges in the early spring. The fall is great and the current rapid and during the high water the amount of silt carried is considerable. As might be expected in a stream of so great a fall, the sand is rather heavy, although it is readily scoured when the stream is confined. For this reason it has been found the better practice to narrow the stream to as great an extent as prudence will permit, thereby causing the channel to scour and provide wider and deeper openings at the time of the spring break-up for the passage of the very heavy ice which often forms, and to reduce the width of the sand bars between the channels to a minimum. These characteristics determined the design of this bridge in a large measure.

It will be noted that on either side very deep foundations were carried to bed rock or hard pan, while in the middle of the bridge, where the depth would be the greatest in ordinary streams, the foundations are carried only to a stratum of coarse sand or fine gravel. This material has demonstrated its bearing power and the probability of scour in this location is thought to be extremely remote.

The narrowing of the original bridge by about 300 ft., as anticipated, has resulted in slightly increasing the depth of the channel in low water and it is believed that a further increase in channel depths will be secured during the next floods.

Work was begun in July, 1912, and completed in June, 1915. It has been handled under the general direction of C. H. Cartlidge, bridge engineer, and C. R. Fickes, assistant engineer, with the writer as resident engineer on the ground.

ACCURATE FREIGHT BILLING

The method of making out way bills with machines on a piece-work basis employed at the Chicago, Rock Island & Pacific freight station at Burr Oak, Chicago, was described in the *Railway Age Gazette* of May 14, page 1008. One unusual feature of the results secured at this point is the high degree of accuracy attained. Since the publication of this article the following information has become available, concerning the record made by one of the men employed in making way bills. From January 1 to August 1, this man made an average of one error for each 357 tallies billed. In July his record averaged one mistake in 500. Out of 67,733 tallies billed in one period, 190 errors were made. This is a record for errors of 0.0028.

Under the system employed any mistakes made in the billing of any tally, including the advance or prepaid charges, commodity items, destinations, car references, block loading numbers, consignees, consignors, weights and special notations, are charges against the billers. Any man making a record of 0.005 is penalized two points for all errors made, while any man making a record better than 0.005 is not penalized. In this way the careful biller is encouraged, while the careless one is penalized. It is believed that the record referred to above is one of the best which has ever been made in regular routine work.

THE RAILWAYS OF THE BELGIAN CONGO.—The final link in the railways and river line of communication between the mouth of the Congo and Lake Tanganyika has just been completed. Now ocean-going vessels can go up as far as Matadi, 85 miles from the mouth of the river; thence a railway of 260 miles runs to Stanley Pool; from there the river is navigable again to Stanleyville, a distance of 1,000 miles, and so on, the river being used wherever possible.—*The Engineer*, London.

HOW A DESTROYED FRENCH RAILROAD HELPS ITS EMPLOYEES

By WALTER S. HIATT.*

The whole-hearted sacrifices made by the entire French nation in the present war are astonishing, and not the least astonishing of these sacrifices is the financial one made by the railroads on behalf of their employees. If one did not understand the spirit of unity and brotherhood awake today in France, it might be believed that in time of war the railroads were preparing for peace, cementing now the goodwill that should exist between employer and employee.

The Eastern Railroad (chemin de fer de l'Est), with the single exception of the Northern Railroad (chemin de fer du Nord), has and still is suffering more severe physical and financial disaster because of the German invasion than any other of the French lines. A good half of the 500-mile line of trenches, beginning at Laon, running south to Rheims, and thence to Verdun, Nancy, and Belfort, is in territory adjacent to the tracks of the Eastern Railroad. The latter, in consequence, is seriously crippled. On half of its system it can do no business at all, and that half is the part which brought in its greatest revenue because of its connections with the Belgian and German railroads and because of the mines and manufactures of the north of France. It will be unable to rebuild its burnt stations, replace its dynamited bridges, repair the road bed and re-establish its service until many months after the cessation of hostilities. On a rough count nearly 300 of its stations lie to the north of the French lines; it has had 49 steel and stone bridges destroyed.

The traffic receipts of the company during 1914, these figures taking in only the first six months of the war, fell off 25 per cent., or \$15,000,000, counting the \$6,500,000 paid as transport charges by the war department. Unlike four of the other five French railroads, it has sustained not only this vast physical damage but it has also not had any considerable passenger or freight receipts to draw from, except during last August, when it had more passengers than it could well handle.

However, its operating expenses, normally \$6,000,000 for six months, did not diminish in proportion, being for this particular half year only a little over \$1,000,000 less than usual. One of the many reasons for this is found in the increased expense entailed in the operation of military trains, the operation of these trains being much more complex than that of the ordinary trains.

In the face of these conditions, this railroad from the very beginning of the war has done its best to provide for those of its employees who have suffered and are suffering loss of work because of the war, or who have been mobilized as active soldiers under the flag when there was no positive need of them on the railroad. As a French soldier is paid a cent a day, it can be understood that his family or dependents cannot live without help. Some 400 of the railroad's employees are now soldiers and to these employees the company is paying one-half their regular salaries. In case the employee is married, it is paying the other half to the wife with an additional ten cents a day for each child in the family. The railway is paying regular salaries to those employees thrown out of work by the German occupation. It is also paying additional sums to those employees who have been given work away from their regular stations.

Further, this railroad at its annual meeting voted the usual annual sum of nearly \$5,000,000 for the benefit of its employees, and even this does not include pensions for accidents, salaries during vacations (each employee is allowed 52 days of vacation each year), bonuses for meritorious service, or the free fares given both to employees and their families. Of this total \$3,250,000 goes into a pension fund for retired employees, their widows and orphans. The rest is divided among the many established branches of the company's paternal or welfare work. Among these branches are funds for funerals, for medicine, for employees with large families, for child birth expenses, for orphan children, for loans without interest, and other purposes.

* Our special European correspondent.

The Railroad Master Blacksmiths' Convention

Flue Welding, Steel Treatment, Piecework, Reclaiming
Scrap, Spring Making, Drop Forgings, Electric Welding.

The twenty-third annual convention of the International Railroad Master Blacksmiths' Association was held at the Hotel Walton, Philadelphia, Pa., August 17-19. The opening exercises were briefly reported in the *Railway Age Gazette* of August 20, page 361.

ADDRESS BY C. E. CHAMBERS

C. E. Chambers, superintendent motive power of the Central Railroad of New Jersey, addressed the convention in part as follows:

No part of the railroad organization is more interesting to me than the blacksmith department; from the time I was a boy on an Illinois farm I have never ceased to be keenly interested in that work. No part of our great railroad organization has undergone more revision than the smith shop. True, many things are done nearly the same as in former years; flue welding still resembles the practice of many years back, excepting slight changes in scarfing and preparation. But spring making and repairing has been simplified and perfected by improved devices for assembling and banding, so that much of the manual labor has been reduced, and a much better spring is produced. The oil, acetylene, electric and thermit welding processes have entirely revamped some of our smith shop practices. Where formerly it was necessary to always remove an engine frame and take it to the smith shop for repairs, such a practice now would be almost an impossibility by reason of the extreme size and many complications of construction, which would not only increase the cost of repairs, but would hold the locomotive out of service very much longer. Quite frequently we can make a weld and return to service the same, or next day, what with our old system would require from 7 to 10 days, or possibly longer.

One of your subjects for consideration at this convention, that of Heat Treatment of Metals, is deserving of careful study; not only is it desirable for new material, but annealing adds much to the life of many parts of locomotives and cars by periodically following up this practice while in service. No subject to be considered at this convention should receive more careful attention than reclaiming scrap. Everything must in time find its way to the scrap bin, but should not until it has served its last purpose. But there is a dividing line beyond which it is more economical to cast aside the old and use the new.

Your conventions, as all others, are returning to us the best service that is in man. You are always able to go back to your home road with some new idea, or new process, which is just a little better or more economical than your former practice.

FLUE WELDING

E. J. Haskins (New York Central) stated that 400 modern engines were maintained at the Elkhart, Ind., shops, and that the flue welding and wedging was handled in the blacksmith shop. He gave in detail the procedure of handling the tubes from the boiler through the shop and back to the boiler again. About five men are used in the tube department to handle from 6,000 to 8,000 tubes per month of nine working hours per day. All safe ends are made from new stock and no difficulty has been experienced in successfully welding steel on steel, or steel on iron. When bringing the tubes to a welding heat great care should be exercised to heat uniformly and not too rapidly, thus not overheating the safe ends and making them brittle. Superheater flues and the two-inch tubes are electrically welded in the back tube sheets and when so welded are expected to last three years. Several other members in referring to this subject stated that all flue welding on the roads with which they were connected was handled in the boiler shop.

CARBON AND HIGH SPEED STEEL

H. W. Loughridge (Pittsburgh & Lake Erie) called attention to the need of literature on the subject of heat treatment of high carbon and high speed steel couched in plain practical terms which would be of use to the blacksmith. From the fact that most carbon steel has a very limited range of treatment more difficulty is encountered in handling it than in handling the high speed steels, which are less sensitive and less easily ruined in forging and hardening. Owing to the growing use of high speed steels the tendency is to heat carbon steels too high because high temperatures are required when handling the high speed steels. The majority of failures in carbon steel may be traced to excessive temperatures either in the forging, annealing or hardening operations. A temperature of 1,400 deg. F. to 1,600 deg. F. is sufficient for forging and hardening most carbon steels, while high speed steels require from 1,800 deg. F. to 2,300 deg. F. Where such instructions are available it is best at all times to follow the instructions of the steel makers.

In tempering taps and dies at the McKees Rocks, Pa., shops of the Pittsburgh & Lake Erie, two muffle furnaces are in constant use. One is kept at 1,400 deg. to 1,450 deg. F., while the other is kept between 2,000 deg. and 2,200 deg. F. Carbon steel taps and dies are hardened in the low temperature furnace and are cooled in clean water at about 60 deg. F., being then drawn in oil at 450 deg. to 500 deg. F. High speed steel is first preheated in the low temperature furnace and then put into the high temperature furnace and held at about 1,900 deg. to 2,000 deg. F., then quenched in oil and drawn to 500 deg. or 600 deg. F.

In the discussion the necessity for evenly heating all hardening steels was emphasized. Although care on the part of the blacksmith is necessary to prevent warping of tools in hardening and ruining of metal, it was the general opinion that many failures are charged to him for which he is not responsible. This is because he does not have sufficient information as to the quality of the steel and the treatment it requires.

MAKING AND REPAIRING FROGS AND CROSSINGS

F. A. Watts (Delaware, Lackawanna & Western) described at some length the methods used in the frog and switch shop of the Lackawanna at Dover, N. J., where a large amount of work is handled. The shop is divided into three departments; a blacksmith shop where all forging, plate work, rod work and switch stand shafts are repaired, the planing and drilling room, and the erecting floor where the work is assembled, bolted up, riveted and finished ready for shipment. The plan is so arranged that a minimum amount of handling is required from the rail pile to the finished frog and switch storage and special facilities for handling are installed. A 16-ft. 6-in. switch of 101-lb rails can be turned out at a labor cost of approximately \$4.00. The cost of cutting up old stock, handling of scrap material to and from the hammer and placing it in piles ready for shipment never exceeds 20 cents per frog. All material fit for future use or which can be reclaimed is saved and again placed in service at a net saving to the company of \$25,000 per year more than would be received if the material were used for scrap.

PIECEWORK

P. T. Lavender (Norfolk & Western) laid stress on the value of the piecework system in bringing out the best in a man, teaching him how to handle himself efficiently and making him self-reliant. Piecework prices are established on the Norfolk & Western on all standard work which will be ordered in sufficient quantities. Dies and formers are first made for the drop hammer, the forging machine or bulldozer, and then tried out to see that they finish the work in accordance with blue prints. The workman and the foreman then agree on the price to be paid.

A. W. Ackley (Delaware, Lackawanna & Western) spoke of the erroneous ideas which some foremen hold that piecework is simply a means of increasing wages and that they are at liberty to alter the prices in a way which shows favoritism. He emphasized the necessity of promptly adjusting the price when new tools or new methods of turning out a certain piece of work have been devised. The blacksmith foreman should see personally all work coming to the shop and be in a position to say just what work is necessary in each case, otherwise where several prices obtain for certain classes of repair work, depending on the extent of the repairs, unnecessary work will be done and the highest price will prevail. In setting prices care should be taken to see that work is being performed in accordance with the methods given in the instructions, otherwise too much time may be consumed and an unduly high price established.

J. H. Daltry (Erie) said that after a man has worked on piecework he does not want to return to day work. Very little work has to be done over, since under such conditions it must be done on the workman's own time, thereby creating a tendency toward greater care in the future.

RECLAIMING SCRAP

Thomas M. Ross (Buffalo, Rochester & Pittsburgh) stated that old arch bars, drawhead pockets, truss rods, etc., were being rerolled into different sizes of round iron, which is then used in the manufacture of bolts, grab irons, etc. Old steel crank pins are used for making wrenches and small forgings, and coil springs are extensively used in the manufacture of car repair drift pins and pinch bars. Car repairers, hammers and coal picks are made from tire steel, but it is not suitable for tools that must withstand blows from sledges, owing to the tendency to break off chunks.

J. Tootell (Chicago & North Western) said that the North Western has been sorting out scrap for about 20 years, each year going into the practice a little more extensively. About five or six years ago the reclaiming of everything having a usable value was taken up and two shops built. From 20 to 25 cars of scrap are now unloaded each day, about five old cars are burned and seven broken up each day. All scrap is sorted as it is unloaded and is then distributed to the various shops where the reclaiming is to be done.

C. L. Gay (Atlantic Coast Line) stated that all round iron used on the Atlantic Coast Line from $\frac{1}{2}$ in. to 1 in. is provided from rerolled material. A large quantity of manufactured material which has been used and thrown on the scrap pile is also sorted out and straightened, and then returned to service. Mr. Gay presented statements showing the output and the saving effected by the rerolling mill at the South Rocky Mount, N. C., shops of the Atlantic Coast Line. On an output of 51,803 lb. of rerolled iron from $\frac{1}{2}$ in. to 1 in. in diameter, which was reclaimed in the month of December, a net saving of \$14.98 was effected. This covered only 11 days during which the rolls were in operation.

SPRING MAKING

Thomas E. Williams (Chicago & North Western) described at some length the process of spring making as carried out at the Chicago shops. He stated that so far as possible all spring work for a system should be concentrated at the main shop of the railroad because spring work should under no conditions be attempted without proper machinery. As a rule it is not advisable to install such machinery at outlying points on account of the small amount of work to be done. When sufficient spring work is handled to justify the installation and operation of proper spring making machinery, expansion is very easily taken care of by merely adding to the force. At the Chicago shops four machines are required to prepare the steel for use and these are operated by one man and two helpers. Should the amount of work increase the capacity of the plant could be increased without additional equipment. Mr. Williams stated that all spring bands on the North Western are machine made, the material being bent into a U-shape on a bulldozer and welded in a forging machine. No broken bands are repaired,

as the machine bands are so cheap as to make this practice inadvisable. The bands are applied to the spring at a temperature of about 1,850 deg. and squeezed into place in a press, where they are held until cool.

C. V. Landrum (Nashville, Chattanooga & St. Louis) found that springs rolled with a convex roller on the bottom were cupped so that when loaded the edges of the plates were in tension and the centers in compression. By reversing these conditions and placing the edges of the plates in compression he stated that the number of failures had been considerably reduced. The plates are rolled and hardened at the same heat and another hot plate is then rolled on the adjoining cool plate, which is all the drawing the plates get. The quenching is done in crude oil, cooled by an air blast. Mr. Landrum emphasized the necessity of always getting the same grade of steel and believes that if this were possible spring failures could be reduced to a large extent. When different grades of steel are mixed together, calling for different treatment, the blacksmith cannot tell one grade from the other and some of the steel of necessity receives the wrong treatment.

George P. White (Missouri, Kansas & Texas) described the process used on the Missouri, Kansas & Texas, stating that all springs are repaired on a store department shop order. A stock of springs is thereby kept on hand and those repaired are not necessarily returned to the engine from which they were taken. They go through the shop in lots of not less than six of each class. After the springs are entirely fitted up they are turned over to a helper to flash the temper. This is done in a muffle chamber at a much lower temperature than the fitting furnace, thereby eliminating a large number of broken plates caused by the edges of the steel being drawn while the center remains hard. Less trouble is also experienced from the springs not standing up under the load due to the temper being drawn too far.

In the discussion the need of proper appliances on the manufacture of springs was emphasized and the question of tapering the ends of the leaves received considerable attention. This practice has been abandoned on the Pennsylvania and the Lehigh Valley, but many of the members still believe that tapering is justified.

CASE HARDENING

C. V. Landrum (Nashville, Chattanooga & St. Louis) gave an outline of the practice which he follows in case hardening. The old method is used, the work being packed in a mixture of bone meal, old leather, pulverized charcoal and a sprinkling of prussiate of potash. A drum, 12 in. in diameter, is used for packing the work, the length varying from two to four feet, depending on the amount of material to be hardened. A slight flange is turned on the end of the drum which is placed on end and a piece of $\frac{1}{4}$ in. or $\frac{3}{8}$ in. iron cut to fit is dropped into it. About two inches of fire clay is placed on top of this and the packing is done in the usual manner. Space is left at the top for two or three inches of fire clay which is held in place by another $\frac{1}{4}$ in. or $\frac{3}{8}$ in. iron plate, held by a bolt passing through holes in the drum. This drum is then placed in the furnace and a temperature of 1,600 deg. to 1,700 deg. F. is maintained for about eight hours, the carbonized case under this treatment being about $\frac{1}{8}$ in. deep. For quick work, such as is required in a roundhouse job, a mixture of $\frac{3}{4}$ lb. of prussiate of potash to one gallon of pulverized charcoal is used, the work being packed in a pipe just large enough to accommodate it and kept at the highest practicable temperature for a period of 1½ hrs. Under this treatment a penetration of carbonization of $\frac{1}{16}$ in. will be effected.

J. W. McDonald (Pennsylvania Railroad) presented photographs of several forgings, and of the dies and blocks used in their manufacture which were formed under the steam hammer. Many forgings can be successfully made in this manner, some of them at a cost nearly as low as would result from the use of a drop hammer, but usually at a somewhat higher cost. Dies for this purpose are usually cup blocks, which are closed by top and bottom blocks, which are driven into position by the

ram of the steam hammer. After this operation the only additional labor is that required to trim off the flash and this may often be done by placing the forgings in the flue rattler for a few hours. It is necessary in forming work in cup dies that just the right weight of material be used, otherwise the tools are subjected to a severe strain caused by the surplus stock finding its way between the cup and the plunger or block. The cup blocks are made from billet steel or scrap axle steel, while the top and bottom blocks are made of tool steel.

In the discussion, H. E. Gamble stated that the drop hammers at the Juniata, Pa., shops of the Pennsylvania Railroad were being run night and day. The largest dies in use in this shop measure 12 in. by 30 in. by 36 in. and weigh 3,560 lb. each, being made of vanadium cast steel. Difficulty is still experienced, due to the breaking of hammer rods and dies, heat cracks appearing in the latter because of continuous use.

ELECTRIC WELDING

Joseph Grine (New York Central) stated that in the opinion of the committee on electric welding, operators of this equipment in locomotive shops should be placed under the supervision of the blacksmith foreman, because of his knowledge of the properties of and the effect of heat on iron and steel. Owing to the specialized nature of this work it can be handled better by one man with access to all departments than by each department separately, thus facilitating standardization of welding practice. Because he handles work from all departments the blacksmith foreman is in an advantageous position to balance the welding work in the various departments. Blacksmith foremen were criticised for trying to avoid or shirk this responsibility.

Welding machines are used at the Depew, N. Y., shops on a large number of operations and it is conservatively estimated that the annual saving is approximately \$30,000 at that shop alone. A list of some of the operations handled by the electric welder is as follows: Broken frames, cracked cylinders; front deck castings; fireboxes; tubes welded in back tube sheet; sharp flanges filled in on tires; flat spots filled in on tires; mud rings welded and reinforced. The method of welding frames was described in the report. A plate is secured to the bottom of the rail after the crack has been cut out to an angle of 45 deg. on both sides, upon which the weld is built. After completely filling in the V's the weld is reinforced by welding on a layer of $\frac{5}{8}$ in. round bars, the ends of which extend beyond the filled-in material. Considerable data was presented relative to the strength of electric welds in boiler plates, the efficiency of the welds ranging from 82 to 99 per cent. of the strength of the unwelded material.

C. A. Slenker (Long Island) described a method of electrode welding, using a "weltrode," which is a metallic rod covered with slag. With this type of electrode it is claimed to be unnecessary for the operator to carefully hold the rod, as the slag on the end rests on the work and excludes the air from the molten metal. As the wire melts away the slag is also melted. After the application of each layer of metal the slag forming on the surface is broken away with a scaling hammer and the surface is cleaned with a wire brush, leaving the metal clean and bright for the application of the next layer. This system is controlled by the Quasi-Arc Weltrode Company, Newark, N. J.

P. T. Lavender (Norfolk & Western) said that the metal electrode method was employed at the Roanoke shops, a softer weld being produced than with the carbon electrode and separate filling piece, since there is no tendency for carbon to be carried into the weld. The action of the arc in carrying the metal from the electrode to the work makes it possible to weld on a vertical wall or overhead, this method being largely used in overhead repairs in fireboxes and welding tubes in locomotive boilers. Mr. Lavender presented the results of a test made at the Roanoke shops to determine the relative tensile strength of coke butt welded, electrically butt welded and new unwelded boiler tubes. The electrically welded tubes showed an average efficiency of

90.6 per cent., the minimum efficiency out of six specimens being 80 per cent. The average efficiency of the coke welded tubes was 87 $\frac{2}{3}$ per cent.

The discussion brought out the fact that lamination in electric welds may be avoided by applying each successive layer of metal against the direction of application of the preceding layer. Trouble has been experienced by some of the members in welding tubes into back tube sheets from the cracking of the bridges. Troubles of this nature are overcome in some cases by skipping about the sheet to points a considerable distance apart, thus tending to equalize the expansion and giving a better opportunity for the sheet to cool.

HEAT TREATMENT OF METAL

No papers were presented on this subject, but it brought forth considerable discussion. Some members doubted the advisability of heat treating large parts under present conditions. The difficulties of handling heat treated parts in the repair shop were touched on. Where heat treated side rods are brought into the shop to be slightly lengthened or shortened the heating of the material to do this work destroys the effect of the heat treatment and unless it is again subjected to the heat treating process it will return to service without its original properties and the advantages of the heat treatment are lost.

OTHER BUSINESS

The following officers were elected for the next year: President, T. E. Williams, Bettendorf Company; first vice-president, W. C. Scofield, Illinois Central; second vice-president, John Caruthers, Duluth, Missabe & Northern; secretary-treasurer, A. L. Woodworth, Cincinnati, Hamilton & Dayton; assistant secretary-treasurer, George B. White, Missouri, Kansas & Texas; chemist, G. H. Williams, Boston, Mass. Chicago received the largest number of votes as the place of meeting for the next convention.

GOVERNMENT MONEY TO GO BY MAIL AT EXPENSE OF RAILROADS

The treasury department, acting in concert with the post office department, has decided that all public moneys transported between the treasury, the sub-treasuries and the banks shall be carried by registered mail, instead of by express. The express companies have hitherto earned about \$500,000 yearly by the performance of this service, and approximately half of this sum or \$250,000 annually, was paid by them to the railroad companies for the facilities of transportation. Both the railroads and express companies will be deprived of these revenues, but the railroads, unlike the express companies, will not be relieved of the service, since the facilities of the railroads must be used as before. Setting forth this injustice, the committee on railway mail pay (Ralph Peters, New York City, Chairman) has issued a circular, which says:

For carrying the public moneys and securities as mail the railroads will receive no compensation whatever until the government again weighs the mails to ascertain the tonnage being carried. This is done only once in four years. Even then the rates the railroads will receive for transporting the funds will be so utterly inadequate, by comparison with the unusual value of such shipments and the fair worth of the service to the government, as to amount practically to nothing.

The rates paid the railroads for carrying the mails are based upon the service of transporting such things as letters, printed matter and small merchandise. Rates commensurate with service of this character cannot, by any recognized economic principles, be held commensurate with the service of carrying enormous sums in money and negotiable securities, the shipments of which by the government probably exceed two billions of dollars annually.

The new arrangement has enabled the treasury department to claim a saving equivalent to the entire amount hitherto paid to the express companies; but it would be a great error to suppose that the revenue loss to the carriers will be a real saving to the

government. There is to be imposed upon the post office department the performance of important new duties hitherto regarded as lying wholly outside the proper scope of the postal service. The cost of insuring moneys in transit, hitherto borne by the express companies, and included by them in their charges, must now be assumed by the treasury department. The net results of the change, therefore, seem to be:

1. To oblige the railroads to render for practically nothing the actual transportation service required in effecting transfers of the public funds.

2. To separate the risk of insurance in transit from the general transportation duty and turn this business over to new interests, at rates not as yet disclosed.

3. To transfer from the express companies to the post office department the duties involved in the actual handling, collection, delivery and custody of thousands of extremely valuable packages not hitherto carried in the mails.

The only tangible saving to the government lies in the substantial elimination of payment to the railroads for the transportation service. In other respects nothing but a change in agencies is effected, which is as likely to increase as to decrease costs. This must be held true unless the post office department is to be credited with the ability to operate more efficiently, and at lower labor costs, than the express companies, or unless the treasury department is enabled to obtain abnormally low premium rates from the insurance companies, by reducing the risk in transit at the expense of the railroads. The risk assumed, in the case of money shipments, certainly depends largely upon the degree of physical protection afforded, and it may well be anticipated that the railroads will be called upon, from time to time, to carry not only the government's money, but also to carry, free, armed guards as "agents in charge of the mails," or even to furnish special cars without additional compensation.

When the treasury department last summer shipped \$100,000,000 in gold from Philadelphia to New York, as "parcel post," the post office department required four special cars, for which no additional payment was made, and also the transportation for the round trip of 100 guards without payment of fare.

The laws of this country limit the post office department to the payment of an indemnity "not to exceed \$100 for any registered piece." The indemnity on the parcel post, upon payment of an extra insurance charge, is limited to \$50 per package. In the International Postal Union mails the indemnity limit is 50 francs per piece, or about \$9.35.

Does it not seem apparent, from the small amount of indemnity permitted by law, that Congress has never intended that the mails should go beyond a service of ordinary convenience to the general public?

If the treasury department can use the post office department, and consequently the railroads, in the manner contemplated by the order respecting the shipment of public moneys, what is to prevent the war and navy departments from shipping their supplies by mail, with United States troops and marines as armed guards, to be carried free by the railroads as "agents in charge of the mails"?

BUSINESS MEN STUDYING MAIL-PAY QUESTION

The Railway Business Association, George A. Post president, has issued a pamphlet appealing to business men in every state to study the mail-pay question and take it up with senators and congressmen. The space method, advocated by the postoffice department, is vigorously opposed. In ten years, according to this bulletin, the postoffice receipts increased 100.5 per cent and total railway mail pay only 27.7 per cent. "It is our earnest hope," says Mr. Post, "that the government which requires that rates of transportation to private shippers shall be reasonable shall free its own procedure from all suspicion of unreasonableness and unfairness."

The association urges that mail pay shall not again be made a rider on an appropriation bill or dealt with at the crowded end of a session. Continuing, Mr. Post says:

1. Mail pay ought to be adjusted according to some fair standard fairly applied.

2. Mail pay ought not to be affected by the postoffice department balance-sheet. The roads should receive not what the department is willing to pay them, but what the service is worth. Two successive postmasters-general have advocated government ownership of certain public utilities. These considerations ought not to enter into the fixing of compensation.

3. Congress should lay down the rule that compensation shall be equivalent to what private shippers would pay for similar service. There is no more reason for taking the postal deficit out of the railways than out of letter carriers or building contractors. Congress should not hold the roads down to the lowest possible limit. Poor railroads make a poor country.

4. Fixing of rates and measurement of service to be paid for should be subject to review by some government body not directly interested in showing a surplus for the postoffice department. The postmaster-general is an interested party. He should not have final arbitrary authority over matters in dispute between the railroads and his department.

5. Amount of railway service to be paid for should be determined by measurement of actual service performed over a test period, never by arbitrary estimate not subject to a check-up by the facts. Under the weight system now in use department subordinates report what the scales record. Under the proposed space system they would perform a function involving judgment and putting a much greater strain upon their impartiality as between the carrier and the government.

6. Weight should be a factor as well as car-miles and should be taken at least annually. The present law provides for quadrennial weighings. This is too seldom. Increase of actual weight between weighings involves a great loss to the carriers, as notably shown following the establishment of the parcel post.

7. Total mail pay for each road should be large enough to include fair compensation for every facility furnished, and for every service rendered. . . .

A CAR DUMPING MACHINE WITH IMPROVED FEATURES

Conneaut Harbor, Ohio, is an important port on Lake Erie for the transfer of ore coming from the Minnesota ranges to cars which are hauled by the Bessemer & Lake Erie to the steel mills in the Pittsburgh district. In common with the practice at other



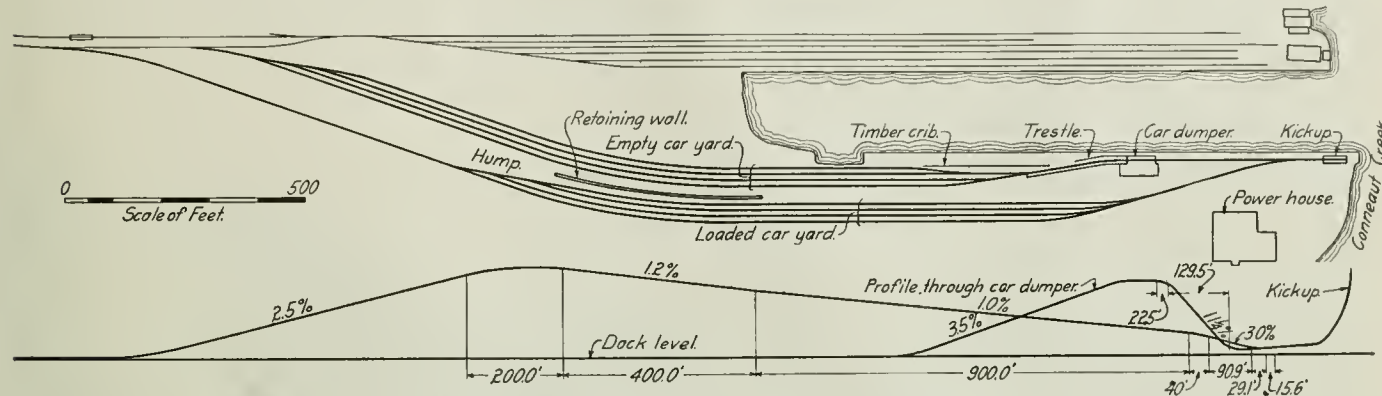
The New Load and Empty Yards from the Top of the Dumper

ports, many of the boats bringing ore in are loaded with coal for the return trip to Duluth or other upper lake ports. In order to do this loading more quickly and economically a new dumper was built at Conneaut Harbor last year, which is designed to

unload 100-ton capacity cars at the rate of one a minute. The improvement included a rearrangement of the yard serving the dumper and the construction of a new concrete dock. The Pittsburgh & Conneaut Dock Company owns and operates the dumper in conjunction with the Bessemer & Lake Erie.

Coal intended for loading boats at this point is left in the

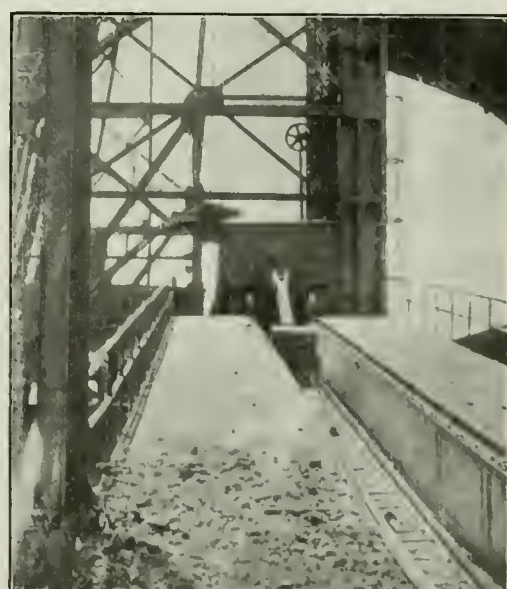
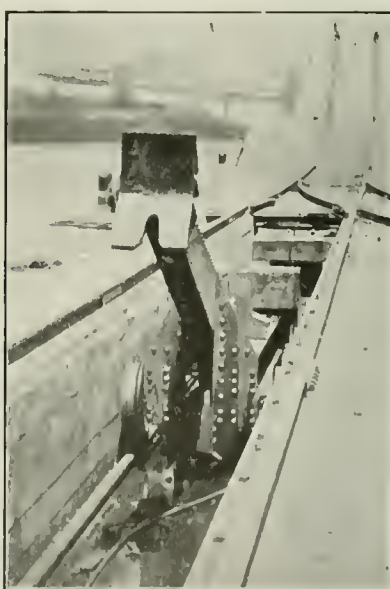
sashes being of this material. It is located on a concrete foundation containing about 1,900 cu. yd., which is supported on piles 35 ft. to 40 ft. long, driven through hardpan for a loading not to exceed 10 tons per mile. The entire foundation is reinforced heavily with bars and in addition the piers supporting the cradle are reinforced with rails. The foundation and the concrete dock



Track Plan and Profile at New Conneaut Coal Dumper

Albion yard, about 15 miles from the dock, and is brought from there as needed. The new yard adjacent to the dumper provides four storage tracks for loaded cars, each about 1,200 ft. long and four empty car tracks, each about 1,300 ft. long. The grade in the load yard rises at the rate of 2.5 per cent. to a summit from which it descends at the rate of 1.2 per cent. and then at 1 per cent. to the kickup beyond the dumper. A heavy switch engine pushes 20 cars to the top of this dump and leaves them on the descending grade with the brakes set. When they are wanted at the dumper they are started one at a time, running under the guidance of a rider down to the kickup, which throws them back over the mule pit. They are pulled by the mule up the 11.25 per

cent. grade to the platform of the McMyler dumper and after being elevated and dumped they run by gravity down a 3.5 per cent. grade to the empty yard. The load and empty yards are separated by 430 ft. of concrete retaining wall alongside the dump, and are lighted by a row of electric lights supported on poles set between the two yards. The indirect feed, as the system of reversing the direction of movement of the cars before they reach the dumper is called, was worked out for this location to reduce the elevation of the yard tracks somewhat and also to allow the dumper to be located nearer the lake, thus requiring a shorter slip.



Three Positions of the Mule Car. 1—With the Arm Lowered. 2—With the Arm Raised, and 3—Pushing a Loaded Car Onto the Dumper

cent. grade to the platform of the McMyler dumper and after being elevated and dumped they run by gravity down a 3.5 per cent. grade to the empty yard. The load and empty yards are separated by 430 ft. of concrete retaining wall alongside the dump, and are lighted by a row of electric lights supported on poles set between the two yards. The indirect feed, as the system of reversing the direction of movement of the cars before they reach the dumper is called, was worked out for this location to reduce the elevation of the yard tracks somewhat and also to allow the dumper to be located nearer the lake, thus requiring a shorter slip.

The dumper is constructed entirely of steel, even the window

smaller weights, which are suspended from cables on the rear of the framework, operating on suitable guides attached to the steel columns.

The difference between the highest and lowest dumping elevations is 27 ft. 9 in., which is covered by the travel of the apron girder. The apron is set at an angle of 37.5 deg. with the horizontal, the center of the discharging spout being 33 ft. 5 in. from the center line of the front column to the dumper frame. A trap door is provided near the end of the pan to allow coal to be dropped through when loading unusually high vessels. The load on the vessel is trimmed by a special rotating nozzle. The framework of the dumper is designed with a view to safeguarding the

men working around it, all ladders having safety guards and all dangerous edges being protected by steel fences.

The approaches to the dumper are of concrete and steel trestle construction, with a special reinforced concrete kickup extending about 17½ ft. above the dock level at the end of the receiving track. The coal is wet down in the cars, just before they are pushed up the incline to the dumper, by an automatic tank supported over the mule car tracks.

The "mule" car is of a type especially designed for this installation, running on a track which is depressed for the full length of the incline, thus preventing the possibility of a loaded car coming down from the kickup and striking the mule before it has returned to its pit from the last trip. The top of the mule car rails is 3 ft. 8 in. below the top of the main rails and except when pushing the car up the incline the entire mule is below the level of the upper rails. To make this possible and also to allow it to engage the coupler of a car to push it up the grade, a pivoted and counterweighted arm about 17 ft. 6 in. long is provided. This arm is automatically raised to a position to engage the coupler of a car, when the mule is started forward, by a link connecting the counterweight to a friction bearing on the rear

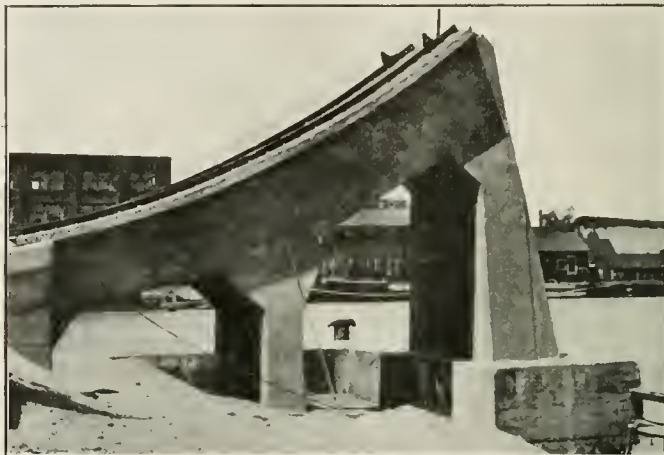


The Completed Dumper

axle of the truck. When running on the 11.5 per cent. grade the counterweight is just sufficient to balance the parts so that the entire force exerted by the cable is transmitted to the car in pushing it up to the dumper. As a vertical curve is used in the main track at the upper end of the incline and the mule car track continues straight, two auxiliary rails inside the rails of the lower track are used to engage rollers on the counterweights of the arm and thus to alter its position to conform with the difference

in elevation between the two tracks. A rear cable is used to drag the mule down the grade rapidly. This important adjunct was developed by P. J. Fickinger, master mechanic of the dock company.

The new plant is operated from the old power house some distance away, the steam being piped to the engine room in the base of the structure. The larger units are operated by steam, the main dumping engines being 22 in. by 30 in., with two cylinders, and the mule engine 18 in. by 24 in., also with two cylinders. A new feature of this installation is the electrical operation of all the smaller movements, including the pan, the trimmer and the



The Reinforced Concrete Kickup

elevator screws. This enables one man located on the end of the pan to control all movements of the pan and chute. In this way it is possible to deliver the coal in the hold of the vessel with the minimum breakage and delay. With a steam operated machine the man on the end of the chute controls only the telescopic chute and the trimmer and it is therefore necessary to signal the operator in the house on the end of the machine when it is necessary to change the elevation of either end of the pan. This requires so much delay that the pan is usually placed at a high position and the coal allowed to run. With this dumper at Conneaut, the chute operator delivers this coal exactly as he wishes. He can raise or lower the inner or outer ends of the pan, swing the telescope back and forth and revolve the trimmers separately or simultaneously.

In addition to this operator, one man is required to control the mule car, one for the cradle, and one in the engine room. This machine has transferred 315 loads from cars to vessels in seven hours, an average rate of 45 cars an hour. It has also transferred 53 cars of coal in one hour.

The foundation for the new plant was built by the dock company with its own forces and the superstructure was erected by the McMyler-Interstate Company, Cleveland, Ohio.

LILLE-WARSZAW EXPRESS.—The German military authorities, only 11 days after the capture of Warsaw, put on through passenger trains, connecting the extremes of occupied enemy territory. A train leaves Lille at 6:40 a. m., Brussels at 8:30, and Berlin at midnight, arriving at Warsaw in time for luncheon the next afternoon. The first trip of the new train eastward from Berlin carried a party of seven American war correspondents. From Lille, northern France, eastward to Warsaw, is about 800 miles.

EFFECTS OF THE WAR ON SWISS RAILWAYS.—The Swiss railways are suffering severely from the effects of the war. In June the State railways' receipts for passenger traffic amounted to \$901,200, as compared with \$1,474,409 for the corresponding month of 1914, and the revenue from the goods traffic receded from \$1,981,397 to \$1,688,200.—*Engineering, London.*

FLOOD DAMAGE TO RAILROADS IN MIDDLE WEST

After an interval of 15 years the city of Galveston has been visited with a hurricane closely approximating in severity that of 1900. The storm commenced about 9 a. m. Monday, August 16, after a number of days of severe wind from the southeast which backed the water through the jetty and through San Luis Pass into Galveston Bay. The fury of the storm extended inland for a distance of 75 to 80 miles and continued at its height for 12 hours, ending 7 a. m. Tuesday. Compared to the storm



(Courtesy of St. Louis Globe-Democrat)

Gravois Road, St. Louis, near crossing of the St. Louis, Iron Mountain & Southern

of 1900, the damage to property was relatively small, a condition which may be very largely accounted for by the fact that the Galveston seawall withstood the storm. The only water entering the city was that resulting from the increased level of the water in Galveston bay and West bay.

Contrary to early reports, no damage was done to the bridge portion of the Galveston Causeway. The rumor of damage to the bascule span came about through the fact that a derrick

very largely washed out, though it is expected that the track will be rebuilt in a very short time on timber cribbing. On the Virginia Point end the filling was washed out for a length of 4,200 ft., allowing the concrete protection slabs, railing, etc., to cave in, while the tracks were washed away. The sheet piling, however, suffered no damage. It will be necessary to build a pile trestle for almost the entire distance in order to open rail communication.

Water damage on the rail lines extended as far as Seabrook on the G. H. & S. A. (20 miles); Texas City Junction on the G. H. & H. (4 miles), and Hitchcock on the G. C. & S. F. (8 miles). The damage to the tracks consisted very largely in washing them off of the embankments. The decks of the trestles on the Santa Fe line had been anchored down to the bents in anticipation of



(Courtesy of St. Louis Post-Dispatch)

The Delmar, St. Louis, Station of the Wabash

flood conditions, and except in cases where the trestles were entirely washed out, the damage to them was slight. The lines were reopened for operation as far as the causeway the middle of this week, and through rail connection with the city will be had within the next ten days or two weeks as soon as the break in the causeway can be closed.

The damage to railway property on the island was slight. The new Southern Pacific 1,000,000 bushel elevator sustained



(Courtesy of St. Louis Post-Dispatch)

Water 20 ft. over Main Line of the Missouri Pacific at Valley Park, 21 miles West of St. Louis, on Sunday, August 22.

barge slipped its moorings during the height of the storm and drifted toward the bridge, making it necessary to raise the lift span to avoid damage. The barge became stranded in the channel so that it was impossible to close the bridge. The embankment approach on either end of the Causeway was seriously damaged. Nineteen hundred feet on the Galveston end was

practically no injury, while the other elevators of older construction suffered small damage to carriers and spouting systems. A number of freight cars were carried away, as well as a considerable quantity of cotton and other freight, but the damage was by no means as serious as in 1900.

The storm which attacked Galveston reached St. Louis at 7

p. m. Thursday, August 19, and resulted in the greatest rainfall ever reported in the Mississippi valley for a corresponding length of time. The official rain gage on the roof of the Chemical Building recorded 7.2 in. for the 24 hours ending 7 o'clock Friday, August 20. By 11 o'clock that night it registered 8 in. Corresponding observations were noted elsewhere in the vicinity. The greatest damage to the city resulted from the overflow of the River des Peres, a small stream running through the western part of the city and discharging into the Mississippi near the southern city limits. The banks of this stream are occupied at various places by the Wabash, Missouri Pacific, Iron Mountain, Rock Island and Frisco lines. The storm did not interfere with the operation of any trains Thursday evening, though the water in this stream was rising fast, the mail trains leaving St. Louis shortly after midnight getting away without much delay.

By daylight on Friday the water was 4 ft. over the tracks of the Wabash at the Delmar station located about 5 miles from the Union Depot, and the tracks of all of the other railroads leaving St. Louis on the west side, except the Missouri, Kansas & Texas, and the Burlington, were submerged in many places.

As the storm abated in Missouri it moved across the Mississippi into Illinois, causing trouble to the railways entering St. Louis from the east. The conditions were reported to have been worse than they were following the cyclone of May 27, 1896. Freight traffic was virtually tied up, every effort being directed to arrange detour routes for the passenger trains.

Practically no trains could reach the St. Louis Union Station Friday morning from the west and few attempts were made to get out the westbound trains Friday night. By the time trains were started running west on Saturday, nearly all lines were closed for eastbound passenger trains, except by long detours. The only lines east out of St. Louis which were not interrupted were the Clover Leaf and the Illinois Central, the latter being used by most of the roads to Litchfield, or beyond. Traffic was restored on most of the lines by Sunday evening, though through traffic on the Frisco and the Iron Mountain could not be resumed for a considerably longer time on account of washouts in the path of the storm southwest from St. Louis, particularly on the Meramec and Black rivers.

THE KAISER'S WAR TRAIN.—According to a report from a correspondent of one of the London papers at Zurich, Herr Paul Schmeder has just written a large volume in which he tells the German public all about the life which their war lord leads at the front. The Kaiser's special train, in which he makes his famous and frequent rushes from one front to the other, consists, according to Herr Schmeder, of 10 coaches constructed on modern lines—comfortable certainly, but not luxurious. At the beginning of the war the special train was painted a whitish-blue color, so that the troops and civilians were always able to recognize and cheer the emperor as he passed. But the fear that hostile aviators might find the task of dropping bombs upon the war lord made easier if they were aware of that fact has resulted in the periodical repainting of the train in various colors. "The necessity for this precaution," adds Herr Schmeder, "will be obvious when I mention that a train, purposely made to resemble in color and in form that of the Kaiser's, was promptly bombarded by French flying men shortly after leaving the Frankfort Railway station."—*Railway Gazette, London.*

BULGARIA AND THE DEDEGATCH RAILWAY.—It is reported that a convention ceding to Bulgaria the Turkish portion of the Dedegatch Railway was signed in Constantinople on July 22. Under the new arrangement Bulgaria obtains the whole extent of the line traversing Turkish territory, together with the stations Karagach, Demotika and Kuleli Burgas. The Bulgarian frontier will coincide with the course of the River Maritza, all territory west becoming Bulgarian. Round Karagach Station, Adrianople, Bulgaria claims a zone of one mile, 1,522 yards. If this is conceded the new line will be constructed, affording Turkey independent access to Adrianople.

THE LOCAL FREIGHT TRAIN

By F. H. GARNER,

Inspector of Transportation, Union Pacific, Omaha.

One of the knottiest problems that confronts the operating official to-day is the satisfactory handling of local freight trains. It is of the greatest importance that local freight trains move out of the initial terminal absolutely on time. As a rule they are carded so that, if running on time, they will not interfere with passenger trains and time freight trains. Much care should be exercised in getting a crew that understands every phase of local work. The brakemen should be thorough switchmen and above all things, must not be afraid of plenty of good, hard work.

I have in mind a district on a certain railroad where a local train was scheduled to leave a station at 6 a. m. While the switching was not heavy, this train was handling generally from eight to ten cars of merchandise, with merchandise for every station loaded in all of the cars. The train crew was getting in from three to five hours' overtime unloading merchandise every day. After checking up the movement of the train for several days it was arranged to have these eight or ten merchandise cars which came from three directions, placed at a transfer platform and worked during the night into cars that could be set out with all the merchandise for the heavier stations. These set-out cars averaged about 10,000 lb. of merchandise each, and resulted in the handling of seven merchandise cars over the district instead of ten, and the crew setting out practically every pound of freight that they had been unloading. The result was that the train was at a good many stations waiting for time instead of being from one to five hours behind schedule.

I have never been in favor of handling tonnage on local freight trains. I believe if the local freight train does the local work and gets over the district on schedule time without overtime, it is doing all that can be, and should be, expected of it. The mistake is too often made by chief dispatchers and trainmasters of hanging on a few extra cars to help their tonnage statement. In checking up the tonnage I have found instances where local freight trains were so overloaded that the crews were getting in from two to three hours' overtime for the sake of hauling a few extra cars over the district, while at the same time, through trains were being run light in the same direction. I also believe it is a good plan where the local switching is heavy and where the local has a good many cars to pick up which will bring it into the terminal with 45 to 50 cars, that after it has accumulated some 10 or 15 loads, these should be set out at some point on the district for through trains to pick up and haul into the terminal.

On many lines, especially in the West, chain gang crews are being used on local freight trains. This is a mistake. Crews should be assigned to locals, as the men in an assigned crew become familiar with the work and are able to handle it with much greater celerity than a crew not accustomed to local switching. Furthermore, in checking up the damage to freight, caused by its being improperly handled and investigating claims incident to perishable freight being carried by stations, I have found that an assigned crew carries very little freight by, and that the men are more particular when unloading to see that the freight is properly broken down so that it will ride without damage between stations. The station switching is also handled more satisfactorily by an assigned crew. This is probably due to the fact that the members of the chain gang crew know that they probably will not catch the local again for two weeks, and everything they can pass on to the next man they usually do. It is a good plan where one local is run in each direction daily to have the westbound local do the station switching for both directions up to a designated point, instead of having both locals switch until they meet.

ROLL OF HONOR IN AN ENGLISH STATION.—In the main booking hall (ticket office) at Liverpool Street Station in London, nearly the whole of one side has been taken up with a roll of honor of the 3,800 employees of the Great Eastern Railway who have joined the colors.

NEW YORK FREIGHT TERMINALS, 1914

In connection with the recent hearings held by the Interstate Commerce Commission on the application of the railroads terminating at New York harbor for authority to make advances in rates for lighterage, storage and other terminal services, Mr. McCain, chairman of the Trunk Line Association, described the principal features of the situation, as they existed at the time the railroads' application was made, in a statement the substance of which follows:

A—New York City Freight Stations

Because of the location of the boroughs of Manhattan, Brooklyn, Queens and the Bronx across New York harbor from their rail terminals on the New Jersey shore, the trunk lines have 68 freight stations on and adjacent to the Manhattan, Bronx and Brooklyn waterfront, which are (with a few exceptions) served inwards and outwards by through cars by means of car-floats, equipped with tracks of capacity of 8 to 24 cars each, these car-floats being towed across the harbor by tugs. As many of these stations are merely piers, with no inland tracks, the freight is necessarily received from and delivered to shippers' or consignees' drays on the piers or bulkheads, and the railroad performs the labor of loading or unloading the cars upon the piers upon both carload and less than carload shipments.

These stations are owned or leased and operated by the individual roads, except those on the Brooklyn waterfront operated by the Bush Company, New York Dock Company, Jay Street Terminal and Brooklyn Eastern District Terminal, each of which so-called "contract terminal companies" furnishes car-float service and station facilities at the expense of several competing railroads. The Harlem terminal, on the waterfront near 138th street and Park avenue, also jointly serves several competing roads.

The same general rates as apply to or from the New Jersey shore stations are applied to or from these New York and Brooklyn stations, except upon short-haul business, where the rates are too low to absorb the harbor and station expense.

The trunk lines also handle freight across the harbor in cars on car-floats in conjunction with the Long Island Railroad and the South Brooklyn Railway, and serve numerous stations in the eastern and southern sections of Brooklyn one-half to six or eight miles inland, applying the same rates as to or from stations on the Brooklyn waterfront.

By means of this car-float and station service the trunk lines in effect have extended their rails across New York harbor.

B—Lighterage Service on Domestic Carload Freight

There are many private and public piers in New York harbor, as indicated in paragraph "O," which are at or nearer the factory or warehouse of shipper or consignee than carriers' pier stations, and many years ago the practice of lightering freight to or from these special piers was inaugurated. This lighterage is performed by lighters or barges, some of which operate with their own steam, but are generally towed by tugs in the same manner as car-floats, and the service on inbound freight (*vice versa* upon outbound freight) involves transfer from car to lighter at the rail terminal pier on the New Jersey shore, the towage of the lighter across the harbor and the unloading from the lighter to the floor of the wharf at destination, substantially the same rates being applied as to or from adjacent stations.

A considerable list of articles and commodities is excluded from lighterage service because their weight or character involves excessive handling cost or damage to lighters or other freight. These excluded articles and commodities are either received from or delivered to shippers or consignees at certain specified New York or Brooklyn stations, or from or to the lighters of shippers or consignees at the rail terminal piers on the New Jersey shore.

C—Freight Interchanged with Coastwise Vessels

Carload shipments (other than those excluded from lighterage) are interchanged at the vessel's pier—less quantities are handled via the New York or Brooklyn station nearest the vessel's pier, the intervening service being performed by dray.

Most of the trunk lines operate through rates via New York in connection with several of the southern coastwise lines, in which event the lighterage or cartage expense is absorbed upon both carloads and less quantities in both directions. In the absence of through rates, the local rates North and South of New York apply, plus (in the case of L.C.L.) the cost of transfer drayage.

D—Import and Export (Other than Bulk Grain)

Carload shipments (other than those excluded from lighterage) are interchanged at the vessel's pier; the lighterage-free rate includes handling to or from the vessel or floor of the pier. Less quantities are handled via the New York or Brooklyn station nearest the vessel's pier, the cost of intervening drayage being absorbed by the inland carriers on import shipments (with certain exceptions specified in tariffs) to competitive western points, but is not absorbed on L.C.L. export shipments.

E—Car Float Service in Lieu of Lighterage

Fruits, fresh meats and various other commodities or articles liable to damage from exposure or handling by lighter, also certain articles and commodities which are excluded from free lighterage, are given free service in cars on floats, in lieu of lighterage to or from private or public piers, when in quantities of six carloads or more in one shipment; this six-car minimum being applied because of the expensive equipment and service involved. If this freight is loaded or unloaded at the private or public pier by shipper or consignee, an amount not exceeding 12 cents a ton, minimum \$2 per car, is allowed shipper or consignee for the labor expense, except on fresh meats in bulk and articles excluded from free lighterage.

F—Carload Freight Excluded from Free Lighterage

The railroad transportation rates on this freight apply to or from the piers at the rail terminal on the New Jersey shore, and private lighters which perform harbor service on such freight are in the category of drays performing equivalent land service, at expense of shipper or consignee.

G—Auxiliary Lighterage Equipment

When any trunk line has not the requisite species or number of lighters to handle certain freight offered, "outside" or independent lighters are temporarily hired or chartered, on a basis not exceeding 60 cents a ton (except on lumber and heavy articles on which higher rates are allowed), subject to agreement by the owner of the lighter that no part of the allowance shall be rebated, directly or indirectly, to the owner of the freight.

H—Free Storage of Inbound Lighterage-Free C.L. Package Freight for Domestic Delivery

This freight is granted 10 days' free time in the covered piers at the New Jersey rail terminal (exclusive of day of arrival, Sundays and holidays), after which it may be reordered to lighterage or station delivery, and New York rate protected; when reordered to an ultimate delivery station it is granted three additional days free time (exclusive of day of arrival, Sundays and holidays), so that the same carload of freight may get an aggregate of 15 days' free time, exclusive of Sundays and holidays. If the freight remains at the rail terminal piers beyond the 10 days' free time, nominal rates of storage are assessed.

I—Free Storage of Lighterage-Free Export Package Freight in Carloads

This freight is allowed 30 days free time at the New Jersey terminal; if not then ordered for export, nominal rates of storage are assessed, unless the freight is under through bills of lading to foreign countries.

J—Free Storage of Less-than-Carload Export Freight

This freight is granted 10 days free time at stations on the New York or Brooklyn side, pending cartage to steamer; if not removed within the 10 days free time it is placed in public store.

K—Hay and Straw

Owing to inflammable character and peculiar conditions, this traffic is handled under a different set of rules.

L—Grain, in Bulk, for Domestic Delivery

This traffic, under agreement with the New York Produce Exchange, is unloaded from cars into railroad elevators or

lighters, or held for track delivery and, unless ordered for immediate delivery, is subject to storage charges. The rates, which include free lighterage to points within lighterage limits in lots of 4,000 bushels or more, apply to alongside private or public piers, the discharge of the grain being at the expense of consignee.

M—Grain, in Bulk, for Export

This traffic, by agreement with the New York Produce Exchange, is unloaded from cars to railroad elevators or lighters and is granted free storage for 10 days by the railroads, after which storage charges accrue. The rates applicable to the New Jersey shore include delivery to alongside vessels within free lighterage limits. If the grain is lightered to a ship at a berth pier, the discharge of the grain from the lighter into the ship is performed by the floating elevators of the International Elevating Company at the expense of the grain. If vessel goes to the railroad terminal for the grain, it is discharged by the railroad company into the vessel at a charge of one-half cent per bushel, which accrues in addition to the freight rate.

N—Six Months Free Storage of Coarse Freights

Sundry coarse freights, such as stone and structural iron, in carloads, which are not liable to damage from the weather, are given the privilege of storage on railroad lands at the rail terminals on the New Jersey shore, a nominal charge being assessed to cover the cost of unloading and reloading and six months' storage. This freight retains its free lighterage privilege to any station or lighterage delivery in the harbor.

O—Restricted Area of Free Lighterage

The existing free lighterage limits, which, in some instances, are 12 to 15 miles from the rail terminals on the New Jersey shore, are the result of endeavors on the part of one or more trunk lines to equalize by lighterage service the location of freight stations of other trunk lines along the shore of New Jersey, Staten Island, the Harlem river and immediately beyond Hell Gate.

NOTE.—The rail terminus of the New York Central at West Sixtieth street, Manhattan, and that of the Baltimore & Ohio at St. George, Staten Island, are to be treated, in all consideration of this subject, on the same basis as the terminals on the New Jersey shore.

LIST OF FREIGHT STATIONS IN NEW YORK CITY AND ON THE WATERFRONT OF NEW YORK HARBOR.

(Abbreviations are explained at end of article.)

MANHATTAN

Name of Station.	Location	Road.
Piers 2 and 3, N. R.	Foot Morris St.	Lehigh Valley
Piers 4 and 5, N. R.	Foot Morris St.	Pennsylvania
Pier 7, N. R.	Foot Rector St.	B. & O. R. R.
Piers 10 and 11, N. R.	Foot Cedar St.	C. R. R. of N. J.
Pier 13, N. R.	Foot Cortlandt St.	D. L. & W.
Piers 16 and 17, N. R.	Foot Barclay St.	N. Y. C. & W. S.
Piers 20 and 21, N. R.	Foot Chambers St.	Erie R. R.
Pier 22, N. R.	Foot Worth St.	B. & O. R. R.
Pier 23, N. R.	Foot Franklin St.	N. Y. O. & W. and W. S.
Piers 27, 28 and 29, N. R.	Foot Laight St.	Pennsylvania
St. John's Park	Laight, Varick, Beach and Hudson Sts.	N. Y. C. R. R.
Pier 31, N. R.	Foot Desbrosses St.	N. Y. C. & W. S.
Pier 34, N. R.	Foot Canal St.	N. Y. O. & W.
Pier 34, N. R.	Foot Canal St.	Lehigh Valley
Pier 39, N. R.	Foot W. Houston St.	Central Vermont
Pier 41, N. R.	Foot Le Roy St.	N. Y. C. & W. S. ¹
Pier 46, N. R.	Foot Charles St.	Erie R. R. ²
26th St. Yard	Foot No. 26th St.	C. R. R. of N. J.
Pier 66, N. R. and 27th Street Yard	Foot W. 27th St.	D. L. & W.
Pier 68, N. R.	Foot W. 28th St.	Erie R. R.
28th Street Station	Foot W. 28th St.	New York Central
33rd Street Station	Foot 30-33rd St.	W. S., N. Y. O. & W.
36th Street Station	Foot 36th St.	Pennsylvania
37th Street Station	Foot 37th St.	Manhattan Ter. Co. ⁵
Pier 80, N. R.	Foot 40th St.	C. R. R. of N. J.
Pier 81, N. R.	Foot 42nd St.	N. Y. C., W. S., N. Y. O. & W.
42nd St. Station and Pier 83, N. R.	Foot 42nd St.	Erie Railroad
49th Street Station	Foot 49th St.	New York Central ⁴
60th Street Station	Foot 59-72nd St.	New York Central
130th Street Station	Foot W. 130th St.	Manhattan Ter. Co. ³
131st Street Station	Foot W. 131st St.	
Inwood	Inwood Ave. & Bolton Road, Inwood, N. Y.	New York Central
Pier 4, E. R.	Foot Broad Street	NYC—WS—NYO&W ¹

Pier 7, E. R.	South St. and Coenties Slip	Erie
Pier 21, E. R.	Foot Dover Street	B. & O.
Pier 22, E. R.	Foot James Slip	Penna. (L. I. R. R.) ⁵
Pier 26, E. R.	Foot Catherine Street	D. L. & W.
Pier 29, E. R.	Foot Market Street	Central Vermont
Pier 34, E. R.	Foot Rutgers Street	NYC—WS—NYO&W
Pier 31, E. R.	Foot Pike Street	N. Y. N. H. & H.
Piers 45, 46 and 49, E. R.	Foot Jefferson Street	N. Y. N. H. & H.
(Old Nos.)		
Piers 38, 39 and 40, E. R.	Foot Montgomery Street	N. Y. N. H. & H.
Stanton St. Station	Foot Stanton Street	Erie R. R. ⁴
Pier 70, E. R.	Foot E. 22nd Street	N. Y. N. H. & H.
43rd St. Station	Foot E. 43rd Street	Lehigh Valley ⁷
104th St. Station	Foot E. 104th Street	Erie R. R. ⁴
124th St. Station	Foot E. 124th Street	Lehigh Valley
Harlem River Station	Foot E. 125th Street	Pennsylvania

BRONX

Name of Station	Location	Road
Port Morris	Ft. E. 138-142nd Sts.	New York Central
Harlem River	Ft. E. 132nd St. & Lincoln Av.	N. Y. N. H. & H.
Bronx Terminal	Ft. E. 133rd St. & 3rd Av.	C. R. R. of N. J.
Harlem Transfer	Ft. E. 135th St. & Harlem River	Harlem Transfer Co. ⁸
E. 149th St. Terminal	Ft. E. 149th St. & Harlem River	Lehigh Valley
Westchester Av.	Westchester & Brook Av.	New York Central
Melrose Junction	Morris Av. E. 155E. 161st St.	New York Central ⁴
Claremont Park	Vanderbilt Av. & E. 171st St.	New York Central
Higbbridge	W. 170th St. & Harlem River	New York Central ⁴
Morris Heights	W. 177th St. & Harlem River	New York Central
Kingsbridge	Kingsbridge, N. Y.	New York Central

LONG ISLAND CITY

Name of Station	Location	Road
Queensboro Terminal	Foot 13th & 14th Sts.	Brooklyn E. D. Term. ⁹
Pidgeon St. Station	Foot Pidgeon St., Hunters Point	B. E. D. T. ¹⁰
Long Island City	Foot 3rd, 4th & 5th Sts.	L. I. R. R.
Woodside	Woodside, L. I.	L. I. R. R. ¹¹
Blissville	Blissville, N. Y.	L. I. R. R. ⁴

BROOKLYN

Name of Station	Location	Road
Brooklyn Eastern District Terminal	Foot N. 4th to N. 10th Sts., Williamsburgh	B. E. D. T. ¹²
No. Fourth St. Station	Ft. N. 4th & N. 5th Sts.	Pennsylvania
No. First St.	Ft. N. 1st St.	N. Y. N. H. & H.
Lackawanna Wallabout Terminal	Ft. Clymer Street	D. L. & W.
Wallabout Pier 2	Wallabout Basin	Pennsylvania
Wallabout Basin	Washington Av. & Wallabout Market	NYO&W—NYS—WS
Wallabout Pier 4	Wallabout Basin	B. & O.
Wallabout Pier 5	Freeman Av., Ft. C. St.	L. V. R. R.
Wallabout Station	Clinton Av. & Metz St.	Erie R. R.
Jay Street Terminal	Foot Jay & Bridge Sts.	Jay St. T. Co. ¹³
Fulton Terminal	Fulton St. to Atlantic Ave.	New York Dock Co. ¹³
Baltic Terminal	Foot Baltic Street	New York Dock Co. ¹³
Atlantic Terminal	Hamilton Av. to Walcott St.	New York Dock Co. ¹³
Lackawanna South	Foot 25th St., So. Brooklyn	D. L. & W.
Brooklyn Terminal	40th to 52nd Sts., So. Brooklyn	Bush T. Co. ¹³
Busb Terminal	Montrose St. & Bushwick Av.	L. I. R. R.
Bushwick Av.	Atlantic & East New York Avenues	L. I. R. R.
East New York	Flatbush Av. & Avenue I	L. I. R. R.
Vanderveer Park	Gravesend Av. & 47th St.	L. I. R. R.
Parkville	14th Av. & 62nd St.	L. I. R. R. ⁴
Bath Junction	Foot 65th St., South Brooklyn	L. I. R. R.
Bay Ridge		
SOUTH BROOKLYN		
29th Street	First Av. & 29th	Bush T. Co.
36th Street	First Av. & 36th	Bush T. Co.
48th Street	First Av. & 48th	Bush T. Co.
52nd Street	First Av. & 52nd St.	Bush T. Co.
63rd Street	First Av. & 63rd St.	Bush T. Co.
39th St. and 3rd Av	South Brooklyn	So. Brooklyn Ry.
Greenwood	9th Av. & 20th St.	So. Brooklyn Ry.
Kensington	Av. C & Gravesend Av.	So. Brooklyn Ry.
Bath Beach	18th & Bath Aves.	So. Brooklyn Ry.

STATEN ISLAND

Name of Station	Location	Road
St. George Lighterage	St. George, S. I.	B. & O.
St. George	St. George, S. I.	S. I. R. T.
American Dock Terminal	Tompkinsville, S. I.	S. I. R. T.
Tompkinsville	Tompkinsville, S. I.	S. I. R. T.
Stapleton	Stapleton, S. I.	S. I. R. T.
Clifton	Clifton, S. I.	S. I. R. T.
Rosebank	Rosebank, S. I.	S. I. R. T.
Arrochar	Arrochar, S. I.	S. I. R. T.
South Beach	South Beach, S. I.	S. I. R. T.
New Brighton	New Brighton, S. I.	S. I. R. T.
Sailors Snug Harbor	Snug Harbor, S. I.	S. I. R. T.
Livingston	Livingston, S. I.	S. I. R. T.
West New Brighton	W. New Brighton, S. I.	S. I. R. T.
Port Richmond	Port Richmond, S. I.	S. I. R. T.
Mariners Harbor	Mariners Harbor, S. I.	S. I. R. T.
Arlington	Arlington, S. I.	S. I. R. T.

Name of Station	Location	Road
Edgewater (Undercliff)	Edgewater, N. J.	W. S.
Edgewater (Undercliff)	Edgewater, N. J.	N. Y. S. & W.
Weehawken Terminal	Weehawken, N. J.	W. S.—N. Y. O. & W.
Weehawken	Weehawken, N. J.	Erie
Willow Av.	Weehawken, N. J.	W. S.
Hoboken		
14th Street	14th St. & Hudson River	H. Mfrs.
5th Street	Foot 5th and 6th Sts.	H. Mfrs.
1st Street	1st and Marshal Sts.	W. S.
Hoboken City	Hoboken, N. J.	D. L. & W.
Hoboken Terminal	Waterfront, Hoboken and Jersey City	D. L. & W.
Jersey City	10th & Henderson Sts.	Erie
Jersey City Terminal	Waterfront	Erie
Long Dock	Pavonia Av.	Erie
Marion	Marion (Jersey City)	Pennsylvania
Jersey City	2nd & Henderson Sts.	Pennsylvania
Jersey City Terminal	Montgomery to 6th Sts.	Pennsylvania
Warren Street	Foot Warren Street	Bklyn. E. D. T. ¹⁴
Jersey City Terminal	Morris Canal Basin	L. V.
Jersey City Terminal	Waterfront	C. R. R. of N. J.
Grand Street	Grand St. & Pacific Av.	L. V.
Jersey Avenue	Jersey Av. & Morris Canal	C. R. R. of N. J.
Johnston Av.	Foot Johnston Av.	L. V.
Communipaw	Communipaw Av.	C. of N. J. Nat. Dks. Ry.
Pacific Av.	Pacific Av.	C. R. R. of N. J.
West Side Av.	West Side Av.	C. R. R. of N. J.
Claremont	Claremont, N. J.	C. R. R. of N. J.
Claremont Yard	Claremont, N. J.	Natl. Dks. Ry.
Eagle Oil Works	Claremont, N. J.	Natl. Dks. Ry.
National Storage	Black Tom	National Dks. Ry.
Greenville Piers	Greenville	Pennsylvania
Greenville	Avenue D.	CRRofNJ—Nat. Dks. Ry.
Bayonne:		
E. 49th Street	Ft. E. 49th St.	C. R. R. of N. J.
E. 49th Street	Ft. E. 49th St.	Nat. Dks. Ry.
E. 33rd Street	Ft. E. 33rd St.	C. R. R. of N. J.
E. 22nd Street	East 22nd St.	C. R. R. of N. J.
E. 22nd Street	East 22nd St.	Nat. Dks. Ry.
W. 8th Street	Av. C. & W. 8th St.	C. R. R. of N. J.
Constable Hook	Constable Hook	C. R. R. of N. J.
Constable Hook	Constable Hook	Nat. Dks. Ry.

With the foregoing list the reader will understand the abbreviations of the names of the railroads. Other abbreviations are: N. R., North River; E. R., East River.

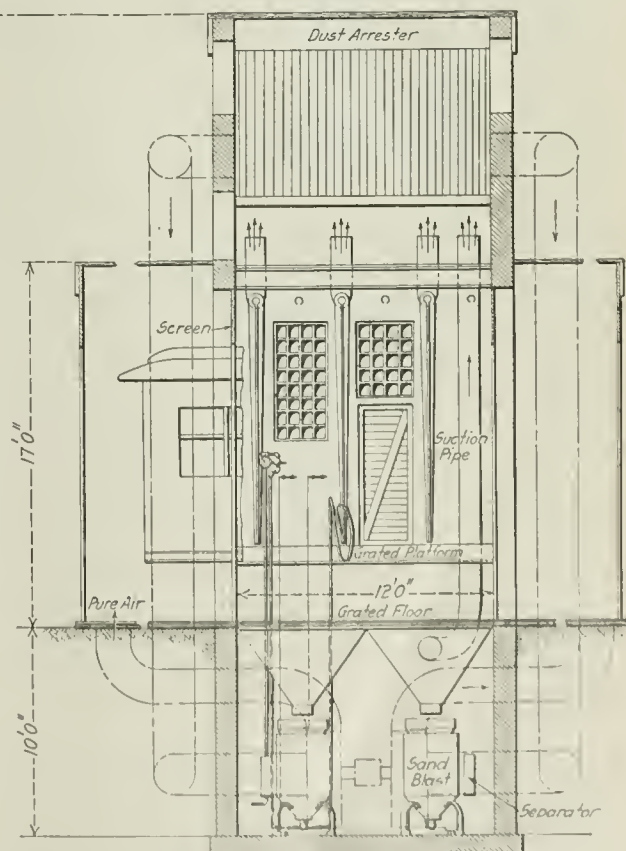
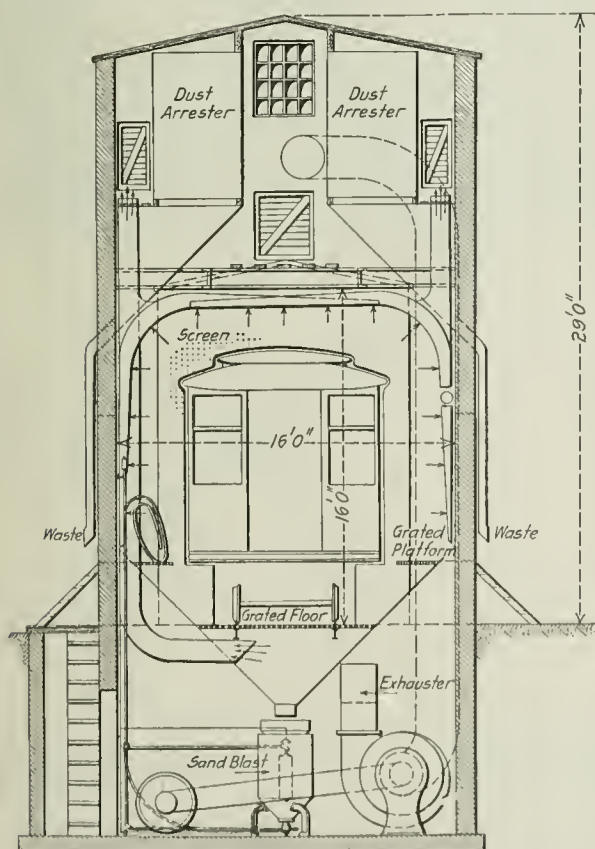
Footnotes:

¹ Inbound c. L. only. ² Inbound c. L. only; outbound any quantity. ³ Joint terminal for Baltimore & Ohio, Erie, Lehigh Valley, Central of New Jersey. ⁴ c. L. only; ⁵ Joint terminal for Baltimore & Ohio and Erie. ⁶ Outbound only. ⁷ Eastbound c. L. only; westbound any quantity. ⁸ Joint terminal for Delaware Lackawanna & Western, Erie, Baltimore & Ohio. ⁹ Joint terminal for B. & O.; Central N. J.; Erie; L. V.; N. Y. O. & W.; N. Y. C.; W. S. ¹⁰ Joint terminal for D. L. & W., Erie. ¹¹ L. c. L. only. ¹² Joint terminal for all trunk lines. ¹³ Joint terminal for all trunk lines; local freight handled in c. L. only at Fulton and Atlantic terminals. ¹⁴ Joint terminal for B. & O.; D. L. & W.; Erie; Central Vermont; Lehigh Valley; N. Y. O. & W.; N. Y. C.; N. Y., N. H. & H.; West Shore.

PLANT FOR SAND BLASTING STEEL CARS

Sand blasting is generally conceded to offer an effective means of cleaning steel cars from old paint, mill scale, rust, etc., leaving an ideal surface to receive and retain paint. To meet the demand for an economical means of sand blasting steel cars the plant shown herewith has been developed by the Mott Sand Blast Manufacturing Company, New York and Chicago. In designing this system the purpose has been to so arrange the apparatus that the sand may be handled by gravity, thus eliminating the use of elevating machinery, and reducing the cost of the structure required to house the equipment, and to provide an effective system of ventilation with a minimum expenditure of power.

The plant is installed in a building consisting of a sand blast room 12 ft. long inside, and of sufficient width to allow operators to work on both sides of the car, to each end of which is connected a shelter bay of sufficient length to house a car of the



Sectional Views of the Sand Blasting Room, Showing the Arrangement of the Apparatus

The companies owning or operating freight stations in New York and vicinity, as shown in this table, are the following:

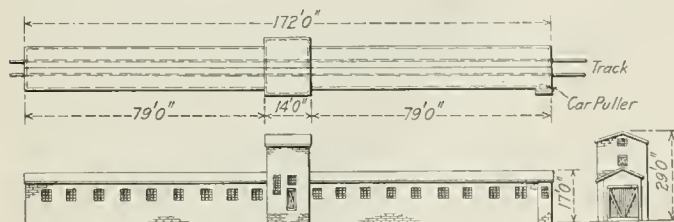
Baltimore & Ohio R. R.	Manhattan Terminal Company
Brooklyn Eastern District Terminal	National Dks. Ry.
Bush Terminal Company	New York Central R. R.
Central Railroad of New Jersey	New York New Haven & Hartford R. R.
Central Vermont Ry.	New York Ontario & Western Ry.
Delaware, Lackawanna & Western R. R.	New York Susquehanna & Western R. R.
Erie R. R.	Pennsylvania R. R.
Harlem Transfer Company	South Brooklyn Railway
Hoboken Mfrs. R. R.	Staten Island Rapid Transit Co.
Jay Street Terminal Company	West Shore R. R. (N. Y. C.)
Lehigh Valley Railroad	
Long Island Railroad	

greatest length which the plant will be required to handle. The portion of the building containing the sand blast room is a two-story structure with a basement, the latter containing the sand blast machines and the motor-driven double exhauster, while the second story contains the dust arrester.

The openings between the sand blast room and the shelter bays are closed by soft curtains designed to conform closely to the outline of the sides and roof of the car. The entire floor of this room is a steel grating, below which are hung two steel hoppers for collecting the abrasive material as it drops from the cars and

directing it to the top of the two sand blast machines, one of which is placed directly below each hopper. The sand blast machines are fitted with screens and automatic filling valves, and by this arrangement all elevating machinery is dispensed with. Sectional grating platforms extend along either side of the room, near the bottom of the car body. These are for the use of the operators working on car bodies; in order to provide access to the underframes or the trucks, or to make the room available for cleaning structural work, the sections are hinged to the side walls so that they may be either in part or all raised against the sides of the building.

The dust arrester in the second story of the blast room is of the manifold cloth screen type and removes all dust from the air passing through it. Hoppers for the collection of the dust are built in below the screens, and are suitably connected to waste chutes extending out through the sides of the building. Suction pipes from the dust arrester lead to a double exhaustor in the basement below the blast room. The cleaned air is discharged from these exhaustors into the shelter bays, about 10 ft. back from the blast room, thus causing a slight increase of pressure in the shelter bays and inducing a steady flow of air from them into the sand blasting room. The air passes through the small



Type of Building Required to House the Mott Sand Blasting Plant

openings between the curtains and the car body and prevents dust from entering the shelter bays. To the intake side of the dust arrester are connected a number of pipes with slotted openings running down either side of the room and across the roof of the car. Eight of these branches are used, and through them the dust is collected and withdrawn to the arrester. Other suction pipes are placed in the hoppers above the sand blast machines for withdrawing the dust from below the floor.

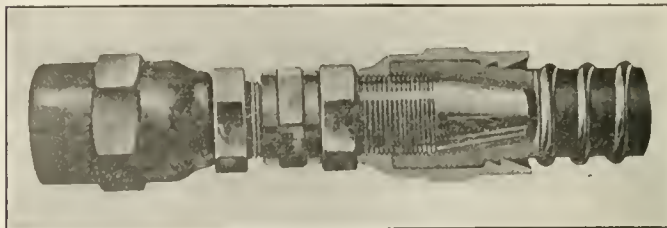
By closely confining the sand blasting operations in a 12 ft. room and by collecting the dust close to its point of origin it is possible to secure adequate ventilation with a low requirement for power. It is claimed that only 25 h.p. is necessary to effect eight changes of air per minute in this room. The ventilation is also materially benefited by the return of the clean exhaust from the fans into the shelter bays on either side of the sand blast room.

The sand blast machines are fitted with $\frac{3}{8}$ -in. or $\frac{1}{2}$ -in. nozzles, and when supplied with air at a pressure of 80 lb. per sq. in. will clean from 4 to 8 sq. ft. of surface per minute, or a total of 8 sq. ft. to 16 sq. ft. per minute for both machines. The apparatus is designed to use any abrasive material, preference being given to metal abrasives as being cheaper and decreasing the amount of dust created.

THE AUSTRALIAN GAGE QUESTION.—The question of the unification of the railway gages of Australia continues to retain an important position. At a recent conference of state premiers, called to consider this subject, a resolution was adopted proposing that a commission of two leading railway experts, preferably from outside Australia, should be appointed to consider this matter from all points of view. It is suggested that the appointment should be made by the commonwealth and the mainland states. The commissioners would be asked to advise upon the need of a uniform gage, the most suitable gage in view of the present circumstances and future prospects, the best method of carrying out unification, the benefits that will accrue to the states and the probable cost. But the most interesting proposal is that one expert should be brought from the United States and one from the United Kingdom. Various suggestions have been made as to nominations.

HOSE COUPLING

A coupling has recently been developed by the National Hose Coupling Company, People's Gas Building, Chicago, which provides a positive means of application to a rubber hose. As indicated in the illustration, the hose is inserted in the corrugated



National Hose Coupling

socket and a steel taper expander is screwed into the socket, forcing the hose out against the corrugation. The ends of the socket and the expander are rounded to prevent injury to the hose. No special tools are required for application.

QUICK ACTION LEVER HAND BRAKE

The lever hand brake shown in the photographs has been in service on a number of cars for more than a year and a half. It is known as the Klasing car brake and in place of the usual type of brake shaft and hand wheel employs a lever and tension rod. The lever has an extension handle and to it is secured a pawl, engaging ratchet teeth on a vertical quadrant. The lever is pivoted to the quadrant, the latter being secured to the top of the car so that the short end of the lever projects over the end of the

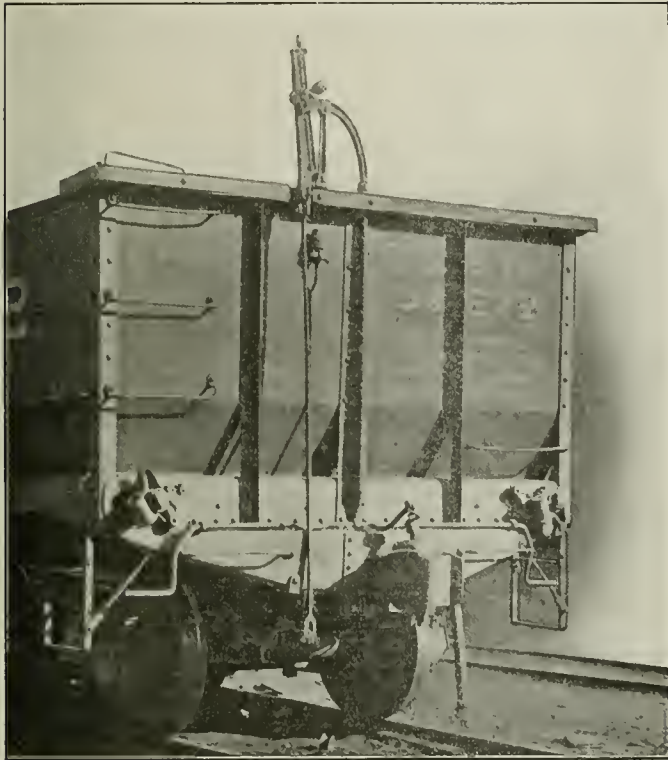


Details of Klasing Car Brake

roof. A bell crank is secured to the end sill directly below the end of the operating lever, to which one of its arms is connected by a tension rod. The other end of the bell crank is connected to the brake rod, which is provided with an adjustable jaw for taking up slack.

The purpose of this design is to facilitate quick action in the application of the brake, and it is claimed to eliminate an element of danger to the brakeman incurred in changing his position when operating the usual type of hand brake. The pawl is controlled by a small weight, thrown forward by hand to engage the ratchet.

This brake is sold by D. R. Niederlander, successor to the Adreon Manufacturing Company, Security Building, St. Louis,

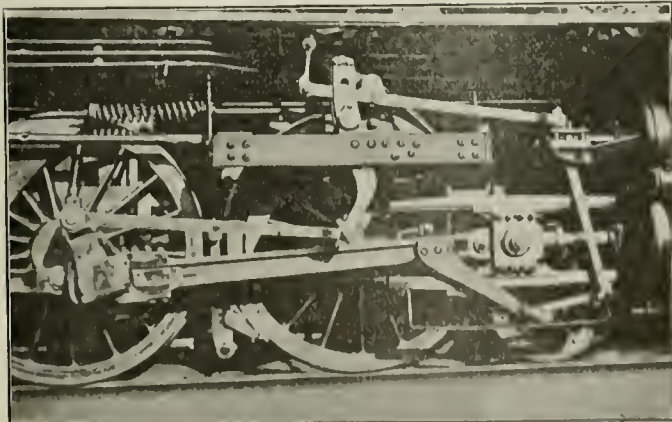


The Brake Applied to a Gondola Car

Mo. It may be applied to the top of box cars, to the top of gondolas, and to the end sills of baggage and tank cars, and it is equally suitable for application to box or gondola cars with end steps. The travel of the bell crank is 13 in., which is more than provided by the air brake. The maximum height of the lever above the roof of a box car is about 15 in. with the extension handle collapsed.

KINGAN-RIPKEN VALVE GEAR DEVICE

The engraving shows a new feature that is applied to outside valve gears for the purpose of overcoming the slow action which the combination lever imparts to the Walschaert and similar valve gears. The bottom connection to the combination lever is made to the main rod, as indicated in the illustration, instead of



Application of the Kingan-Ripken Device to the Walschaert Gear

to the crosshead, as is customary. This gives the combination lever a different movement, in that it responds to the up and down movement of the main rod. As the piston is on the last half of the stroke this causes the release, compression and pre-admission to occur later in the stroke with the same cut-off, thereby giving a longer period of expansion, less compression and less pre-admission with the same amount of lead. At the end of the piston travel, the main rod being in the center of its oscillatory movement, the arrangement will have no effect upon the lead, but as the piston leaves the end of its travel and the main rod again assumes an angle, a quicker, larger and longer-maintained port opening is obtained with the same cut-off, and also a longer cut-off with the reverse lever in the same position. It is also claimed that this arrangement will give a more even distribution of steam to the cylinders; it will permit more uniform valve events and allow the use of a shorter cut-off with its consequent saving of steam. This fact, combined with the longer maximum cut-off obtainable, should provide a quicker starting, faster, more powerful and more economical engine.

A number of locomotives on the Minneapolis, St. Paul & Sault Ste. Marie have been equipped with this device. The patents are controlled by the Kingan-Ripken Company, 2627 Lincoln street, N. E., Minneapolis, Minn.

HOW TO TREAT THE PUBLIC

Dr. Frank Crane, a clergyman, whose wisdom is being circulated by the New York, New Haven & Hartford, discourses on politeness as follows:

"It is a great temptation for the busy clerk to drop into machine-like ways. It does not require so much vitality. But it is a mistake. I do not refer so much to the feelings of the customer. . . . Let us go to the strictly business and selfish side. Do you know that your greatest asset is being human? 'Ah!' you reply, 'I'm so tired and worn out that I have no vitality left to palaver over people.'

"Then put on politeness. I mean it. Act the part, if you cannot feel it. Form the habit of smiling, pretend to be deeply interested in each person, learn how to make your voice sympathetic, lay in a store of agreeable phrases to hand out to each one. This is not hypocrisy. It is business. Do you realize that it is the human clerk that is in demand, that attracts customers, that stands the best chance for promotion?

"The public is a great baby,' somebody said. It's true. I'm one of 'em. I confess I flee a sour-ball clerk as I would a soured glass of milk. Why not humor the public, then?

"I know a ticket agent in Worcester, Mass. His name is Jim Healy. I consider him the best agent in the United States. Because you can't get him out of humor. I used to go into his office and pretend to want a railway ticket just to get under his delightful influence. . . ."

DINING SERVICE ON THE INDIAN RAILWAYS.—The following is part of a communication which recently appeared in the Indian press. "It is an open secret that except on the State Railways no arrangements have been made by the railways in general to supply food to the Mohammedan passengers, and on almost all lines they have to be content with the Hindu food, which is supplied on railways or at some big stations. They have either to take the food provided in the restaurant cars, which, however, is repugnant to their religious feelings, or to carry it with them if they want a better fare. On the state railways, especially on the North Western Railway—which is a model in this respect—there are most convenient arrangements for the supply of an excellent food to Mohammedans at modern rates; indeed, the refreshment rooms there are as commodious and well-furnished for Hindu and Mohammedan passengers as for European passengers, where the best food is obtainable at moderate rates. The Great Indian Peninsula Railway has taken the lead in the matter of reform and has arranged to provide a better food for the Mohammedans at important stations of its system, and all its new waiting rooms will be provided with Mohammedan and Hindu refreshment rooms separate from each other."

General News Department

It is reported that at a meeting of the Eastern Association of Trainmen, comprising representatives of the Brotherhood of Railroad Trainmen and the Order of Railway Conductors, which will be held in Cleveland beginning October 19, action will be taken looking to the starting of a demand for an eight-hour day. It is expected that other brotherhoods will unite with those named.

The city of Baltimore has a City Planning Commission, and the mayor has laid before it an elaborate plan for a belt railroad, connecting all the railroads entering the city. The proposed belt would cost about \$17,369,000, but the mayor says that none of this money would come out of the taxpayers. Much of the proposed line is underground and the motive power would have to be electricity. It does not appear that the railroad companies have been consulted concerning this extensive scheme.

The Governor of Pennsylvania announces that the state must make a beginning in the enormous task of abolishing highway grade crossings throughout the state, and he proposes that the 36 grade crossings on the Lincoln highway be attended to first. This highway runs through Lancaster, York, Gettysburg, Chambersburg, Bedford and Greensburg. Following the governor's announcement the chairman of the Public Service Commission has directed the engineers of the commission to make a careful examination of the 36 crossings mentioned.

The New York State Civil Service Commission announces that applications will be received at the office of the commission in Albany until September 8 for the position of expert appraiser and special agent for the Bureau of Special Franchises of the State Tax Department; salaries for appraisers \$3,000, and for special agents \$1,800 to \$2,100. Candidates for appraiser must be between 30 and 50 years of age. They must have education as engineers and knowledge of the tax law of the State in its relation to special franchises, with ability to appraise physical property and special franchises of steam railroads; also telegraph and telephone, and water, gas and electrical properties.

South Carolina Grade Crossing Law

The Legislature of South Carolina, at its last session, passed a law giving the Railroad Commission "full authority to provide such rules and regulations with reference to the crossing of railroad tracks by public highways as in its judgment will be conducive to the public safety; and furthermore, upon complaint, shall investigate and may require that any necessary crossings be made either above or below grade, so as to avoid, as far as possible, any grade crossings." This is the only law pertaining to railroads passed in South Carolina this year.

Progress on the Rogers Pass Tunnel

Material progress is being made on the Rogers Pass tunnel, 26,400 ft. long, which is being driven through the Selkirk mountains by the Canadian Pacific, and which has been under construction since September, 1913, described in *The Railway Age Gazette* of December 11, 1914. The pioneer headings which were driven 50 ft. to one side of the main tunnel have been driven 10,740 ft. from the east end and 8,870 ft. from the west end up to July 29. On this same date, 6,544 ft. of main heading had been completed on the east side and 7,469 ft. on the west side. The full section of the tunnel has been taken out for a distance of 5,216 ft. from the east portal and 3,754 ft. from the west portal.

Telegraph Typewriter on the Seaboard Air Line

Telegraph typewriters, made by the American Telegraph Typewriter Company, are being tried on the line of the Seaboard Air Line between Norfolk, Va., and Jacksonville, Fla., 657 miles. The machines are operated duplex over an iron wire, with regular Morse repeaters at Savannah, 527 miles from Norfolk. The transmitting machine is a typewriter operated by keyboard, while the receiving apparatus is automatic. The

electric impulses are as simple as those of Morse sending, and at times the printer is used on one side of the duplex while Morse sending goes on on the other side. Provision is made in this system for the use of perforating machines and an automatic transmitter.

Panama Canal 50 Years Ahead of Time

"We have recently completed the Panama Canal, a work which it would have been better to have left for 50 years rather than to have put it through with the speed with which the government has done it, because we find that we are not prepared to handle the questions of transportation arising by virtue of the completion of the canal at this time, bearing in mind the fact that the cities in the West, tributary to the coast, east as far as the eastern section of Montana, have a population of only 7,000,000 people. Last year the freight shipments from the Atlantic seaboard to Western territory amounted to 170 train loads, and shipments eastbound about half that amount."—F. R. Hanlon, traffic manager of the port of Seattle, Wash., address before convention of United Yardmasters' Association at Seattle.

General Baggage Agents

The meeting place of the General Baggage Agents' Association has been changed from Los Angeles to Kansas City. The date is October 11.

The Roadmasters' Convention

On page 351 of the issue of August 20 we published the program of the Roadmasters' Association, which will be held in Chicago from September 7-10, inclusive. Since this date the program has been changed to the extent that Wednesday will be devoted to an inspection of the various terminals and the Stock Yards, Chicago, a special train leaving the North Western terminal at 9 a. m. and returning at 5 p. m. Otherwise the program remains as announced.

International Association for the Prevention of Smoke

The tenth annual convention of the International Association for the Prevention of Smoke will be held at Hotel Sinton, Cincinnati, Ohio, September 8, 9 and 10. Of the papers to be presented those which will be of special interest to railroads are the following: Value of Publicity in Smoke Abatement Work and Methods of Obtaining It; Smokeless Locomotive Operation Without Special Apparatus; Various Methods of Eliminating Smoke From Roundhouses in Chicago; How Smokeless Operation of Locomotives Was Obtained in Washington, D. C.; What the Railroads Have Done to Abate Smoke in Cincinnati, and Enforcing a Smoke Ordinance.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 8 W. 40th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.

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

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 4-8, 1915, Detroit, Mich.

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

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.

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

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

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

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

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

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

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

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

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio.

MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.

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

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

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brishane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

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

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May. Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

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

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

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

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 7-10, 1915, Chicago.

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

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

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

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St., Chicago. Annual meeting, October 19-21, Colorado Springs, Colo.

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

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

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

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

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

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

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.

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

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-10, 1915, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

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

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

Traffic News

The Pacific Northwest Demurrage Bureau went out of existence on July 31, and its work has been taken over by the Pacific Car Demurrage Bureau.

A new steamship service from Los Angeles and San Francisco to Panama has been established by the Mexican National Steamship Company. A boat leaves Los Angeles every two weeks stopping at 14 ports on the round trip.

The Traffic Bureau of the Houston (Tex.) Chamber of Commerce, is to be reorganized and, beginning September 1, J. A. Morgan, heretofore traffic manager of the National Cooperative Association, is to be at the head of the bureau. Mr. Morgan was formerly for many years on the Missouri Pacific, where he was agent at important stations.

The Southern Railway has finished its new coal handling plant at Charleston, S. C., and it will be put in operation September 1. It will have a capacity of 40 cars an hour, which is as fast as any ship now in the coal carrying trade can take it. In preparation for a greatly increased movement of coal to Charleston, the Southern has provided storage room for 400 cars.

The New York State Public Service Commission announces that the principal railroads have issued new regulations to go into effect September 15, under which motion picture films will be transported in baggage cars and charged for at the regular excess baggage rate for gross weight, with minimum collection of 25 cents for any shipment, upon presentation of proper transportation and provided that at the time of checking shipper declares in writing the value of the property and that payment is made for such value in excess of \$25 in accordance with the rule.

The Lehigh Valley, with a view to bringing farmers and commission merchants in closer relation with each other, has issued a directory of farm products grown along its lines. This directory, which will be sent to the markets in New York, Philadelphia, Boston and the far western cities, as well as to the farmers and merchants themselves, is so arranged that the names of those dealing in a certain product are listed under that head. For example, all the farmers, commission merchants and dealers handling apples are shown under "Apples;" those handling potatoes under "Potatoes," etc.

The Interstate Commerce Commission has authorized the Atchison, Topeka & Santa Fe, in connection with the Mallory Steamship Company, to make low rates on freight from California points to the principal cities on the Atlantic seaboard, to meet the competition of the Panama Canal. These rates are the same as those recently announced by the Southern Pacific and noticed in the *Railway Age Gazette* of August 13, page 294. On asphaltum, beans, peas, canned goods and barley, in carloads, the rate is 40 cents per 100 lb.; dried fruit, in boxes, 60 cents; in sacks, 80 cents. In these special tariffs the Interstate Commerce Commission allows the suspension of the long and short haul rule, the rates from California to some intermediate points being from 30 cents per 100 lb., or more, higher than the through rate.

THE PRODUCTION OF PIG-IRON IN GERMANY.—The Union of German Iron and Steel industries reports that the production of pig-iron within the German Customs Union in the month of April (30 working days) amounted to 938,679 tons against 938,438 tons in March (31 working days). The daily production for April averaged 31,289 tons against August, 1914, 18,925 tons; September, 19336 tons; October, 23,543 tons; November, 26,299 tons; December, 27,545 tons; January, 28,198 tons; February, 28,701 tons and March 30,272 tons. The production during April comprised:—Foundry pig, 210,488 tons; Bessemer pig, 14,426 tons; Thomas pig, 56,138 tons; steel, etc., 125,023 tons; puddle pig, 21,361 tons. The Rhenish-Westphalian district produced 410,054 tons; Lorraine, 143,510 tons; Luxemburg, 125,432 tons.—*Engineering, London.*

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has issued a ruling to the effect that freight tariffs on import and export freight must show the names of the countries to or from which such freight rates apply.

The commission has ordered a second suspension, until March 14, of proposed advances in the freight rates on berries from certain points in North Carolina to New York City and other Eastern points, filed by the Seaboard Air Line. These advances were originally suspended from May 17 last to September 14, but the commission has not had time within which to complete its investigation of their reasonableness.

Increased rates on coal by the Pennsylvania Railroad from Clearfield and other points in Pennsylvania to Providence, R. I., have been suspended from September 21 to March 21.

Increased rates on coal by the Illinois Central and the Chicago & Alton from Wenona and other points in Illinois to various destinations in Iowa have been postponed from September 15 to March 15; proposed by the Illinois Central and the Chicago & Alton railroads.

Rates on Ice to New Jersey Stations

In re Ice Rates to Long Branch and Other Stations in New Jersey. Opinion by the Commission:

The commission finds that the carriers have not justified proposed increases in carload rates on ice from points in New Jersey and Eastern Pennsylvania on the Lackawanna to points in New Jersey on the New York & Long Branch. It also finds that the carriers' carload rates on ice from Tobyhanna, Pa., to various points on the Seashore branch of the Central of New Jersey are unreasonable to the extent that they exceed \$1.32 a ton in box cars, and \$1.48 in ice cars. A fourth section application is denied to the extent that it seeks authority to continue rates on ice from points on the Lackawanna in New Jersey and Eastern Pennsylvania to Long Branch, N. J., and points south thereof on the New York & Long Branch lower than the rates concurrently in effect to intermediate points. (35 I. C. C., 73.)

Rates on Tanning Material

National Association of Tanners et al. v. Lehigh Valley et al. Opinion by the Commission:

Rates on mangrove bark, myrobalans and valonia from ports on the Atlantic seaboard to destinations in trunk line and central freight association territories are found to be unreasonable to the extent that they exceeded the sixth-class rates. (35 I. C. C., 175.)

Rates on Cottonseed Meal and Cake

Imperial Valley Oil & Cotton Company v. Southern Pacific et al. Opinion by the Commission:

The commission finds that the rates charged by defendants on cottonseed meal, cake and hulls from El Centro and Calexico, Cal., to El Paso, Tex., and on cottonseed meal and cake from the same points to Galveston, Tex., are unreasonable. Reasonable rates of 40 cents per 100 lb., minimum 40,000 lb., are prescribed for the future. (35 I. C. C., 215.)

The Pennsylvania's Steamer Lines on Chesapeake Bay

Opinion by Commissioner Clements:

Upon applications of the Pennsylvania Railroad and certain of its subsidiary companies, and of the Baltimore, Chesapeake & Atlantic and the Maryland, Delaware & Virginia for authority to continue the operation of steamers on the Chesapeake bay and rivers tributary thereto; and it appearing that the Maryland, Delaware & Virginia, which directly owns and operates some of the steamer lines involved, is controlled through stock ownership by the Baltimore, Chesapeake & Atlantic, which directly owns and operates the other steamer lines involved, and that the latter company is likewise controlled through stock

ownership by the Pennsylvania and its subsidiary companies, it is held that substantial competition does or may exist on the eastern but not the western shore of the Chesapeake bay between the rail lines of the petitioners and the steamer lines the subject of the applications; and that the steamer lines operating between Baltimore and Claiborne and Love Point, respectively, are necessary extensions of the rail lines of their directly owning carriers as to all other lines, the application is denied. (35 I. C. C., 692.)

The Tap Line Case

Opinion by Commissioner Harlan:

The Sibley, Lake Bisteneau & Southern was one of the parties to the original proceeding in the *Tap Line case*. In the commission's report on that proceeding, 23 I. C. C., 277, 594, it recognized the Sibley, Lake Bisteneau & Southern as a common carrier tap line, but found that it could not lawfully receive divisions from its connecting trunk lines on the product of the proprietary mill in excess of 1 cent per 100 lb. Upon rehearing the commission now holds that this finding should not be modified. (35 I. C. C., 485.)

Chattanooga Log Rates

Suspension Docket No. 256. Opinion by Chairman McChord:

Upon rehearing, it is held that rates and carload minimum weight for certain distances prescribed in the original report, 30 I. C. C. 36, should be modified. It is ordered that on or before September 15, the rates for the transportation of logs (except cedar), in carloads, to Chattanooga, Tenn., from points on the Alabama Great Southern, 71 to 90 miles, inclusive, and 181 to 250 miles, inclusive, distant from Chattanooga, shall not exceed the following, with a carload minimum of 40,000 lb.

Rates per 100 lbs. Cents.		Rates. per 100 lbs. Cents.	
75 miles and over	70 miles.. 4½	210 miles and over	200 miles.. 7½
80 miles and over	75 miles.. 5	220 miles and over	210 miles.. 7½
85 miles and over	80 miles.. 5	230 miles and over	220 miles.. 7½
90 miles and over	85 miles.. 5	240 miles and over	230 miles.. 8
190 miles and over	180 miles.. 7	250 miles and over	240 miles.. 8
200 miles and over	190 miles.. 7		(35 I. C. C. 163)

Coal and Coke Rates in the Southeast

Opinion by Commissioner Clark:

The commission finds that the carriers have justified proposed increased rates on bituminous coal from mines in Illinois, Kentucky, Tennessee and Alabama to the various Mississippi crossings, New Orleans, La.; Memphis, Tenn.; Greenville, Natchez and Gulfport, Miss.; Baton Rouge, La., and certain other points in Mississippi and Louisiana. The increases proposed are 15 cents a ton, and are allowed principally because the present rates are abnormally low and much below the average for like distances in the same territory.

The commission also finds that proposed increases from the Alabama mines to Vicksburg are not justified, but it is held that increases may be made in the rates to this point from the Illinois and Kentucky mines. Increases of but 5 cents are allowed from Illinois and Kentucky to Jackson, Milan and other junction points in Tennessee. These points will henceforth take the \$1.25 rate to Memphis. Certain increases are also allowed to Meridian and other Mississippi points.

The commission will also allow the carriers to make the rates on coke to points in the Mississippi valley 25 cents higher than the proposed rates on coal. In most cases the present rates on coal and coke are the same; to New Orleans the coke rate is 50 cents higher, and will henceforth be 35 cents higher. (35 I. C. C., 187.)

Rates to Lebanon, Ky.

Lebanon Commercial Club v. Louisville & Nashville et al., on rehearing. Opinion by Commissioner Clark:

In its original report in this case (25 I. C. C., 277) the commission found that the class rates from Louisville to Lebanon, Ky., were unreasonable, as applied as parts of through interstate rates, and reductions were ordered from 45 cents on first class to 28 cents, etc. The commission now believes from facts not before it at the former hearing that the rates prescribed were too low. It appears that the adjustment of rates in central Kentucky is the result of competitive conditions which the carriers have to a certain extent inherited or been unable to control, and those

rates cannot fairly be used as the only basis for comparison in determining whether or not rates immediately beyond that territory are reasonable. Rates to and from points just outside the territory must bear a proper relation to these rates, however. It is found that the rates from Louisville to Lebanon should not exceed 35 cents on first class, etc., and it is ordered that the rates in the opposite direction, which were not reduced, should be placed at the same standard.

Rates between Springfield, Ky., and Louisville are found discriminatory to the extent that they exceed the rates prescribed between Lebanon and Louisville. The rates between Lebanon and Springfield should not exceed the combinations on Louisville. The maintenance of rates between Cincinnati and Junction City, Ky., lower than the rates between Lebanon and Springfield and Cincinnati, are not found discriminatory against Lebanon or Springfield. (35 I. C. C., 204.)

Rail and Lake Rates Ordered

Port Huron & Duluth Steamship Company v. Pennsylvania Railroad et al. Opinion by Commissioner Hall:

Through routes and joint rates between points in trunk line territory and Duluth, Minn., and points west thereof, ordered to be established on the lines of defendants in connection with complainant's water line.

This proceeding demanded the establishment of through routes and joint rates which defendants had refused and neglected to voluntarily establish between points in trunk line territory on the one hand and Duluth, Minn., Superior, Wis., and points west thereof on the other, by way of the water line of the complainant steamship company from Port Huron, Mich., to Duluth and Superior. Complainant is an incorporated common carrier, entirely independent of railroad ownership or control, operating a line of freight and passenger steamers regularly between Port Huron and Duluth. The record shows that during each season it moves a considerable volume of general package merchandise and some bulk freight, the heavier movement being eastbound. During the summer it carries passengers and baggage. Its tariffs are and for several years have been on file with the commission. It operates three steamers of the approximate value of \$300,000 and aggregating 6,171 gross tons. At Port Huron its facilities for interchange of traffic consist of docks, warehouse and trackage yards, with ample space for any needed extension of these facilities. Its docks and warehouse there are reached by the rails of the Grand Trunk and during the season of navigation it is constantly engaged in receiving and delivering freight there from and to that carrier. The Grand Trunk filed an answer admitting the material averments of the complaint.

In connection with the Grand Trunk, its only outlet to the east, it has for some years maintained through routes and joint rates to and from Buffalo, N. Y., and all points in Eastern trunk line territory reached by the line of that carrier or by the lines of any of its connections, except the Pennsylvania. Negotiations have been had looking to a voluntary establishment of through routes, with joint rates equal to those concurrently in effect via the so-called standard lake lines, and have failed only because the parties were unable to agree upon divisions. The Pennsylvania has not absolutely refused to participate in through routes and joint rates on the basis of those in effect via other lake-line routes and states that it will not oppose, although it does not advocate their establishment. Its counsel states, further, that its difficulty in the matter of divisions has been with the Grand Trunk rather than with complainant. The commission orders through routes and joint rates established, the rates not to exceed the joint rates now in effect between the same points via other rail-and-lake and rail-lake-and-rail routes.

"We cannot in this proceeding prescribe the divisions of said rates. The parties will be required to establish the through routes and joint rates herein prescribed. They should endeavor to agree upon the divisions of such rates. If they cannot agree they may present the matter of divisions to the commission in a supplementary proceeding." (35 I. C. C., 475.)

Sample Baggage Defined; Articles May Be Sold

Jewelers' Protective Union et al v. Pennsylvania Railroad et al. Opinion by Commissioner Hall:

The defendants' present regulation defining sample baggage

is held unreasonable and the commission prescribes the definition given below. This proceeding was instituted by 15 national and section associations of wholesale jewelers against 69 railroads operating in all parts of the country. The plaintiffs charged lack of uniformity in the regulations and questioned the reasonableness of the excess baggage charges at 16½ per cent of the first-class passenger fares on baggage checked at owner's risk; and complained of the definition of sample baggage, particularly the restriction and limitation of such baggage to samples "not for sale or free distribution."

The first point is dismissed without consideration, as the carriers claim that they are endeavoring to establish uniform baggage rules, and it appears that much progress has already been made. As to the reasonableness of excess charges on baggage checked at owner's risk, the so-called Cummins amendment has replaced the Carmack amendment and it applies to baggage. The initial carrier is now made liable for the full actual loss or injury to baggage caused by it or by connecting carriers, and because of the changed conditions no action is taken.

It has been the custom of traveling salesmen for many years to sell or otherwise dispose of samples upon occasion. Complainants testify that, although this practice was known to the carriers, they did not object until issuance of the report by the commission on regulations restricting the dimensions of baggage. Witnesses for defendants deny that the practice was ever countenanced by the railroads and testify that every effort has been made to abolish it. Its persistence and the difficulty of properly policing the enforcement of any regulation designed to prevent it have their bearing upon the reasonableness of such regulations.

It is said to be impracticable to sell high-grade jewelry by sample, although the great majority of houses in other lines of business pursue this method, delivering the goods at some future date. The interveners emphasize the difficulty said to exist in selling candy or cigars by mere inspection of samples. Other lines of business, such as the dealing in millinery, hardware, crockery, blankets or drug sundries, are cited, in which it becomes necessary to make the best disposition possible of soiled, worn, deteriorated or out-of-date samples and replace them by fresh samples which better represent the stock. All of the instances cited illustrate the commercial need for elimination of restrictions as to "sale or free distribution."

No restriction exists as to sale or free distribution of birds, dogs, newspapers, steamer chairs, baby carriages, tool chests, peddlers' packs, paraphernalia for golf, baseball or cricket, adding machines, balloons and other articles which are carried in baggage service and charged excess baggage rates on the gross weight; but it is intimated in the brief for the Western defendants that they propose to apply the restrictive rule to such articles. Particular mention is made of peddlers' packs. It is said that the business of a peddler and that of a traveling salesman are the same in essence, but the peddler can sell articles checked as baggage, while the traveling salesman cannot. Cancellation of the unrestricted rule on these articles would not benefit complainants or interveners. The articles so carried occupy relatively little space in the baggage car, and if excluded therefrom, would tend to encumber passenger cars, with resulting inconvenience and annoyance to the traveling public.

It has been held in a long line of decisions with respect to freight that circumstances and conditions arising before receipt of a shipment by the carrier at point of origin, or after delivery of the shipment by the carrier at destination, cannot justify differences in rates or classification of property for transportation. But the act itself, in the amendment of 1910, recognizes a distinction between personal and sample baggage. That distinction seems to lie in the use to which the baggage is put, whether personal or commercial, and if so, use becomes the criterion by which, unlike freight, it should be classified. "Sample baggage" had a meaning well understood, although perhaps not well defined, at the time those words were incorporated in the statute. They must be construed in that meaning, and the evidence of use which is before us in this record does not exclude occasional sale or free distribution of the samples carried.

In the light of these decisions and considerations the commission finds that defendants' present regulations defining sample baggage as that "carried by commercial travelers * * *

and not for sale or free distribution" are unreasonable, and that a reasonable regulation defining sample baggage would be as follows:

"Sample baggage consists of baggage for the commercial, as distinguished from the personal, use of the passenger, and is restricted to catalogues, models and samples of goods, wares or merchandise in trunks or other suitable containers tendered by the passenger for checking as baggage to be transported on a passenger train, for use by him in making sales or other disposition of the goods, wares or merchandise represented thereby."

Defendants claimed that the removal of the restriction against the sale of sample baggage would tend to increase the volume of baggage and thus interfere with the safe and efficient operation of passenger trains; but this contention is rejected.

Commissioner Harlan took no part in the decision of this case. (36 I. C. C., 71.)

Rates on Live Stock

In re live stock rates from points in Colorado, South Dakota and other states to Omaha, Neb., and other points. Opinion by Commissioner McChord:

The carriers have proposed to increase their rates on cattle and sheep in carloads from points in New Mexico, Colorado, Utah, Oregon and Wyoming on or west of the Colorado common point line, and from points in Montana, North Dakota and South Dakota to markets on the Missouri and Mississippi rivers and to Chicago. Some increases are also proposed from points east of the Colorado common-point line.

The proposed increases average about 2 cents per 100 lb. on both cattle and sheep. From Montana, North Dakota, South Dakota and certain points in Wyoming the increase is 1 cent on cattle and 2 cents on sheep. The increased rates on sheep apply only to shipments in double-deck cars. There are a few points from which the increases differ from the above figures, but the differences are due to an effort by the carriers to bring about uniformity in the rates from all this general territory.

The commission holds that the proposed increases are not justified, thus adhering to its former decision in 1905 (11 I. C. C., 296, and 12 I. C. C., 1) and its decision in 1908 (13 I. C. C., 418). The commission agrees that the carrying of stock requires special effort and care, but it argues that conditions have not changed sufficiently to justify a modification of the former decisions.

The commission notes that the rates from South Dakota are on a higher plane than in any other part of the territory involved, and the proposed rates are higher than those found reasonable in *Investigation of Alleged Unreasonable Rates on Meat* (22 I. C. C., 160, 177). The present interstate rates are higher than the intrastate rates in the same territory, and it is urged that the proposed increases will only widen the spread between the two. In judging of the property of new schedules, the commission is charged with a broader duty than when simply passing upon the reasonableness of particular rates. The incongruity between the proposed interstate rates and the intrastate scale is a circumstance which goes vitally to the propriety of the rates under suspension. To dispose of this issue it is necessary to have before us the facts and circumstances surrounding the establishment of these intrastate rates. The record, however, in this respect is insufficient.

Commissioner Daniels dissents, noting that the increased rates in issue are, on the contrary, generally lower than intrastate rates in territory comparable with that here affected. (35 I. C. C., 684.)

Withdrawal of Regulations Covering Concentration and Storage of Dairy Products

Investigation and Suspension Docket No. 518. Opinion by Commissioner Daniels:

A proposed cancellation of rules providing for readjustment of aggregate charges on shipments of dairy products concentrated in transit in Western territory is found to be justified, and orders of suspension vacated; proposed cancellation of rules as to storage in transit not justified.

This proceeding has to do with traffic on certain lines which for many years have published special rules and regulations with regard to shipments of butter, eggs and poultry. These are divided into two general groups: (1) Rules providing for

the readjustment of aggregate charges on these products shipped in less than carload quantities from points of origin in Nebraska, Kansas, Oklahoma, Missouri and the northwestern corner of Arkansas, to concentration points, and thence in carload lots to the Mississippi river crossings and points east thereof, and to Pacific coast terminals; (2) rules providing that the through carload rate from point of origin to point of ultimate destination, plus a charge, usually \$5 per car, will be protected on carload shipments of these commodities stored in transit at intermediate points.

The respondent carriers filed tariffs designed to cancel these rules and regulations and to discontinue the practices thereunder, but protests were made by the Live Poultry & Dairy Shippers' Traffic Bureau and numerous other organizations.

Butter, eggs and poultry move from country stations to concentration points in small lots, averaging about 200 lb., and the less-than-carload rate is paid. At these concentration points, which are usually the larger towns, the shippers or concentrators maintain extensive plants for storing and subjecting these commodities to processes, such as the re-working, grading and re-packing of butter; the drying, desiccating, freezing, grading, candling and re-packing of eggs, and the feeding, dressing, grading, freezing and packing of poultry.

The products are shipped forward in carloads, and the carload rate from the concentration point to destination is applied, with a minimum weight of 20,000 lb. The shipper at concentration point thereupon files a claim with the carrier for a refund and there is a readjustment by which the carload rate from the point of origin of each less-than-carload shipment to destination is applied on each less-than-carload shipment in the car sent forward, with the addition of 5 cents per 100 lb. Only when the outbound carload moves within one year from the date of the inbound shipment will refund be made. Then, too, there is a minimum rate of 10 cents per 100 lb. prescribed on each inbound less-than-carload shipment and a minimum charge of 25 cents on each shipment. The actual weights of the inbound shipments as shown on paid expense bills are to be reduced by varying percentages stated in the tariff because of the reductions suffered in the treatment of the products at the concentration point. The shipper is required to keep a record of the transit and non-transit tonnage received at concentration points, and what is forwarded, and to make sworn yearly statements of the total tonnage on hand as compared with that represented by unexpired expense bills.

The carriers propose to discontinue this readjustment of the aggregate charge and this action will compel the application of the less-than-carload rate to points of concentration and the carload rate thence to destination, and while it advances no particular rate, it will result in an increase in the total transportation charges. The resulting charges are estimated by the respondents to be generally about 14 per cent in advance of the present charges and by the protestants from 30 to 35 per cent.

A special arrangement for the encouragement of the concentration of dairy products was first instituted about 1890 by the St. Louis & San Francisco along its lines in Kansas and Missouri. It was later established by the Missouri Pacific and Chicago, Rock Island & Pacific along their lines in these states and in Nebraska. The practice was established for the purpose of building up the industry. The method adopted, however, has not been without opposition. It appears that some of the carriers believing that the practice was wrong in principle established it on their lines only because they were forced to do so under stress of competition.

The average number of less-than-carload shipments to make up the carload moving from the concentration point is from 30 to 40, but frequently a car contains as many as 150 and each one of these small shipments requires the making out of a waybill, an expense bill and all of the other clerical work required by the ordinary less-than-carload shipment. The carload shipments from the concentration point, while loaded and unloaded by the shippers, are not only given all of the services incident to the usual carload shipment, but are made in refrigerator cars furnished by the carriers and given an expedited service. Loss and damage is heavy. In 1914 the Chicago & North Western paid upon eggs 9 per cent of the total gross revenue from the traffic; upon butter and cheese, 1.3 per cent, while the amount paid upon all carload freight was 0.8 per cent. Claims for readjustment require a great deal of detail work in handling;

the charges shown on each expense bill presented must be verified; care must be taken to see that the proper amount of tonnage has been surrendered and that the storage time permitted by the tariffs on that surrendered has not expired. In view of these facts respondents contend that there is no good reason why they should readjust the charges on two separate and distinct transactions on the basis of the carload rate from the point of origin of the less-than-carload shipment to the destination of the carload shipment.

On behalf of protestants it is claimed that the industry in question still needs the help of the readjustment practice, particularly in certain sections of the states where it now prevails and that for this reason it should not be withdrawn at this time. * * * The commission will not require the practice to be continued merely because of alleged commercial necessity. The local class rates in all the states, except Kansas, in which the readjustment practice in issue prevails have been reduced by legislative authority since the institution of the practice. These rates are presumed to reflect local conditions in the various states and so far as this case is concerned are applied on shipments which begin and end within those states. * * * The respondents have justified the proposed application of less-than-carload rates upon less-than-carload shipments and carload rates upon concentration carload lots from concentration points to destination.

The conclusions of the commission are without prejudice to the right of any party to contest the reasonableness of any rates affecting the commodities here involved by appropriate proceedings. Respondents have justified the proposed cancellation of the concentration practice.

The proposed cancellation of storage-in-transit rules is not approved, the carriers having failed to justify their proposal. (35 I. C. C., 469.)

STATE COMMISSIONS

The Public Service Commission of West Virginia has authorized all express companies to increase rates for the transportation of merchandise, following similar action by the federal commission.

The Pennsylvania Public Service Commission has adjourned until September 7. In the intervening time the commissioners will prepare opinions in a large number of cases. Before adjourning on August 14 the commission granted a certificate of public convenience to the City of Philadelphia, approving the plans for the Broad Street Subway and the Northeastern Elevated Railway, from Callowhill to Rhawn street, so far as covered by plans on file with the commission.

The Ohio Public Utilities Commission has appointed a committee of experts to investigate the coal rate disputes between the Hocking Valley and the Sunday Creek Coal Company. Beman Thomas, of the Stock and Bond Bureau of the commission, is in charge, and he will be assisted by C. W. Hillman, William J. Purdy, W. J. Warren and William Wyand. The attorney for the railroad objected to the personnel of the special examiners except Thomas, and it is said that an injunction may be asked for.

The Pennsylvania Public Service Commission has ordered the Philadelphia & Reading to instal, within 30 days, passenger train service on the Middle Creek branch between Swatara Junction and Newtown. The road contended that the branch was built as a mine lateral, and not for the purpose of carrying passengers and that, therefore, the commission was without authority to make any order. The decision holds that though the branch might have been built for the purpose of carrying coal, the act of Assembly creating the branch railroad placed no such limitation upon it and that therefore it may lawfully carry passengers. The order further holds that it is not an answer to a demand for passenger service to show that the particular train would be operated at a loss.

PERSONNEL OF COMMISSIONS

William D. B. Aincy, a former congressman, has been appointed chairman of the Pennsylvania Public Service Commission. He has been acting chairman since early in June when the present members of the commission were sworn in. Mr. Aincy is a lawyer.

In accordance with the provisions of the recently enacted structural engineers' license law of Illinois, E. N. Layfield, acting secretary of the Western Society of Engineers, Chicago, has been appointed president of the State Board of Examiners of Structural Engineers; John T. Hanley, Chicago, secretary, and Prof. I. O. Baker, University of Illinois, Urbana; John W. Musham, secretary Condron Co., Chicago, and C. C. Stowell, civil engineer, Rockford, Ill., members.

COURT NEWS

Tariff—Application to Switching

The Minnesota Supreme Court holds that the state statute requiring railroad tariffs for transportation to be based upon distance applies to movement of cars or commodities between stations and not to switching or like movements within a shipping point, such as a village or city.—*Washed Sand & G. Co. v. Great Northern (Minn.)*, 153 N. W. 610.

Failure to Fence—Damage to Crops

The Oklahoma Supreme Court holds that a railroad is not required to fence its right of way to protect landowners whose land is immediately adjacent to the right of way from the trespass of cattle on such adjacent land over the right of way. The object of the fencing statute is only to prevent animals from going on the right of way. If additional liability had been intended the legislature would have so provided.—*Missouri, O. & G. v. Brown (Okla.)*, 148 Pac. 1040.

Carrier's Risk and Shipper's Risk—Shipper's Option

A carrier had published a tariff of interstate rates on shipments of live stock, containing two rates, one at shipper's risk and the other at carrier's risk. A shipper demanded the rate at carrier's risk. The agent refused him the option and forced upon him a bill without stamping on it "At carrier's risk." The Texas Court of Civil Appeals holds that the company was liable in damages, since by the exercise of the shipper's option the contract became one at the carrier's risk regardless of the terms of the bill of lading, and the carrier could have collected the higher rate at destination.—*Chicago, R. I. & G. (Tex.)*, 176 S. W. 778.

Assumption of Risk

A fireman, pushing back a crane after taking water, stepped on a bolt 6 or 8 in. long and thereby sustained injuries. There were also on the tank a piece of rubber hose, an iron bar, about 2 in. of cinders, and two lumps of coal which had fallen over the lattice work supporting the coal. The engine had no tool box, and it was shown to be customary when engines carry no tool box to place on this platform about the manhole the three articles mentioned. It was held by the Arkansas Supreme Court that the risk of stepping on the bolt was one of those incident to the fireman's employment and was assumed by him.—*Kansas City Southern v. Livesay (Ark.)*, 177 S. W. 875.

Proximate Cause of Injury—Rescuing Property

A section foreman, while with his crew on a hand car, saw a train approaching behind him when it was at such a distance that he had time to get out of its way. When the train was within 200 or 300 feet he thought he had time to remove the car, and would have had but for the fall of one of his men, delaying the removal. He was injured and in an action against the railroad the Montana Supreme Court held that the failure to give a warning signal was not the proximate cause of his injury, and he could not recover. While he was not guilty of contributory negligence in his attempt to save the railroad's property, it would be necessary to his recovery that he show precedent negligence toward himself after the attempt was begun.—*Nelson v. Northern Pacific (Mont.)*, 148 Pac. 388.

State Regulation of Relief Associations

The Indiana Supreme Court holds that the Indiana statute providing that no railroad, domestic or foreign, operating in the state, may establish or maintain any relief association, the rules of which shall require any employee becoming a member thereof to enter into any contract surrendering or waiving any

right to damage against the railroad for personal injury or death, or agree to surrender or waive any right whatever, in case he asserts such claim for damages, and declaring any such agreement void, is within the scope of the police power of the state; is not invalid as an interference with interstate commerce (in the absence of any congressional action), and is not unconstitutional class legislation because applicable to railroads alone.—*B. & O. S. W. (Ind.)*, 109 N. E., 194.

Duty as to Sectionmen at Work

In an action for the death of a section foreman at a crossing which was at the time enveloped in steam and smoke, the Kansas Supreme Court holds that railroad companies in the operation of their roads may rightfully assume that their sectionmen while at work on the track will look out for the approach and passage of trains at all times, and ordinarily such companies owe to their sectionmen no duty to warn them of the approach of trains save when such employees are found to be in a place of danger and it becomes apparent that they will not or cannot protect themselves. Crossing signals are not intended or required for the benefit of sectionmen at work, and the failure to give such signals is not negligence as to such employees. This rule is not changed by the fact that a preceding train going in the opposite direction has left the other track enveloped in steam and smoke. This condition requires added vigilance on the part of the employees to protect themselves.—*Land v. St. Louis & S. F. (Kan.)*, 148 Pac. 612.

Assumption of Risk

A railroad employee lost his life by falling from a track which hung suspended over a washout for about 90 feet, while assisting in preparations for its repair. In an action for his death the jury returned a verdict for the plaintiff, but in reply to a question requiring them to state the particular negligence of the employer that caused the death, they answered that it was the failure to give the deceased proper instructions. The only neglect pleaded in this regard was the omission to instruct the deceased how to walk on the ties—to step on them close to the rail. Specific findings were made that the foreman, after examining the bridge, said in the presence of the deceased that the ties were unsafe to walk on; that he warned the workmen to plank the ties; that he directed them to do this by pushing the planks ahead of them on the rail, then turning them over on the ties, one on each side of the rail. It was held by the Kansas Supreme Court that these findings required a judgment for the defendant.—*Spinden v. Atch., T. & S. F. (Kan.)*, 148 Pac. 747.

When a Person Becomes a Passenger

In an action for injuries caused by being allowed to sit in a cold station the question arose as to when the plaintiff became a passenger. Intending to go to Kilkenny, Minn., from Union, Iowa, he bought a ticket to Mason City and arrived there about 10:30 p.m. He then tried to buy a ticket to Kilkenny. The ticket agent told him that he was busy and could not wait on him then; that the station would be open all night; that the plaintiff's train was due to leave at 3:35 a.m.; and that he could buy his ticket at any time before train time. He left the station, returned about midnight, and remained in the waiting room until about 3 o'clock, when he bought a ticket to Kilkenny. The Minnesota court held that as he was not a through passenger from Union to Kilkenny recovery could only be had for injuries received after he bought his ticket at Mason City. In the language of the court in the prior case of *Barnett v. M. & St. L.*, 123 Minn. 153: "A person is not a passenger all night because he intends to take a train the next morning, even though he asks to buy a ticket the night before, and even though he came the evening before from another station on the same road for the purpose of taking passage on that train."—*Barnett v. M. & St. L. (Minn.)*, 153 N. W. 600.

Federal Employers' Liability Act—"Engaged in Interstate Commerce"

The Illinois Supreme Court holds that a machinist who was sent by his superior officer to repair the whistle rod on an engine engaged in switching and handling interstate commerce, and who while on his way stepped in front of another engine engaged in switching all classes of freight, interstate as well as intrastate, was "engaged in interstate commerce" within the

federal employers' liability act. It also holds that the Illinois workmen's compensation act does not apply to a railroad employee injured while engaged in interstate commerce.—*Staly v. Illinois Central (Ill.)*, 109 N. E. 342.

A youth of 17 years was employed by a railroad engaged in interstate commerce, to fire an engine preparatory to its being attached to a train scheduled to run from Wechawken, N. J., to Ravenna, N. Y., and he assisted in operating the engine in the yard, for the purpose of taking on a barrel of oil to be carried on the engine to Ravenna. It was held by the New Jersey Court of Errors and Appeals that he was engaged in interstate commerce.—*Tonsellito v. New York Central (N. J.)*, 94 Atl. 804.

The Kentucky Court of Appeals holds that a fireman at work on a switching engine attached to a car destined to a point within the state, and going on to a yard track to remove some cars thereon, so that an interstate car could be reached and placed on another track in a train to proceed to an interstate destination, was not engaged in interstate commerce.—*L. & N. v. Parker's Admr. (Ky.)*, 177 S. W. 465.

Unloading for Rest, Water and Feed—Some Decisions Under the 1906 Act

The Federal District Court, E. D. Pennsylvania has handed down the following decisions under the rest, water and feed act:

A railroad placed cars of live stock in unloading positions at the consignee's private unloading chute, and notified the consignee thereof, nearly two hours before the expiration of the time limit prescribed by the law; but the stock was not unloaded until nearly three hours overtime. The carrier had no reason for believing the animals would not be promptly unloaded, and it was held that his responsibility as such for the shipment terminated within the time limit.—*U. S. v. Reading*, 223 Fed. 206.

A railroad delivered a carload of hogs on the consignee's private track opposite a runway for unloading, and notified the consignee to unload within the legal time limit. The hogs, however, were not unloaded until about six hours after the expiration of the time limit, because the consignee's place of business was closed at the time, and because stormy weather rendered unloading impracticable. The railroad had notice of the conditions prevailing at the place of delivery. It was held that the railroad was not subject to the penalty, though the act it committed was knowingly done. It was not guilty of willfully confining the animals in cars beyond the time limit, for the word "willfully" carries with it the thought of an intentional ignoring of the law or of indifference to its provisions.—*U. S. v. Reading*, 223 Fed., 207.

A contract called for the delivery of live stock at the consignee's private siding, but custom required the railroad to place the cars at a point opposite a runway provided for unloading. The railroad did not place the cars at this point within the time, though they reached the siding within the time limit. Nothing prevented the carrier from unloading the stock, and he was held liable to the penalty, for the delivery of the stock was not complete until each car was placed opposite the runway for unloading.—*U. S. v. Reading*, 223 Fed., 202.

In another case the cars were placed on the consignee's siding for delivery and notice given, but consignee refused to unload because his place of business was closed and because of the cold weather. The railroad had provided proper unloading pens, but they were not within available distance. It confined the animals in the cars beyond the time limit. Hauling the cars to the railroad's pens would not have released the animals sooner than was done. The railroad knew of the conditions of the consignee's siding and had refused to erect a shed there. The railroad was held not liable for a penalty. The act did not impose a duty to provide shelter pens at every place of delivery of carload shipments of animals. The railroad did not confine the animals beyond the time limit in cars while in transit, and there was no willful failure on its part to comply with the act.—*U. S. v. Reading*, 223 Fed., 211.

The same court also holds that a railroad confining animals in cars beyond the time limited through a clerical error of the receiving clerk failing to note the loading time at initial point and to mark the shipment for unloading at a point for unloading for rest, water and feed, is not subject to the penalty, because the railroad's act was not knowingly and willfully committed.—*U. S. v. Reading*, 223 Fed., 213.

Railway Officers

A Robertson, vice-president of the Missouri Pacific-Iron Mountain System, has been appointed chief operating officer for the receivers, with headquarters at St. Louis, Mo.; J. M. Johnson, vice-president, has been appointed chief traffic officer, with headquarters at Chicago; J. G. Drew, vice-president, has been appointed chief accounting officer, with headquarters at St. Louis, Mo.; F. J. Shepard, vice-president, has been appointed assistant to receiver, with headquarters at New York; H. L. Utter, secretary and treasurer, has been appointed treasurer, with office at New York, and F. M. Hickman remains local treasurer, with headquarters at St. Louis.

Operating

H. J. Simmons, since June, 1905, general manager of the El Paso & Southwestern System at El Paso, Tex., has resigned, and G. F. Hawks, general superintendent at El Paso, has been appointed his successor to take effect September 1.

J. T. Ransom, superintendent of the Pullman Company at Philadelphia, has been appointed general superintendent, with headquarters at Chicago, and O. P. Powell, assistant to vice-president, has been appointed assistant general superintendent, to succeed F. M. Bostwick. J. A. Rittenhouse, district superintendent at the Pennsylvania Railroad Terminal, New York City, succeeds Mr. Ransom as superintendent at Philadelphia. F. E. Cook, superintendent at St. Louis, Mo., has been transferred to the Grand Central Terminal at New York, N. Y., to succeed A. J. Grant; W. H. Waite, district superintendent at the Union Depot, Chicago, succeeds Mr. Rittenhouse at the Pennsylvania Terminal, New York; F. A. Cooke, district superintendent at Seattle, Wash., has been transferred to Chicago to succeed Mr. Waite; T. C. Olney, district superintendent at Chattanooga, Tenn., has been transferred to New Orleans, succeeding H. J. Clark, promoted. H. M. Allen has been appointed district superintendent at Seattle, Wash., to succeed Mr. Cooke; J. F. Green has been appointed district superintendent at Chattanooga, Tenn., succeeding Mr. Olney; F. W. Millspaugh has been appointed agent at Nashville, Tenn.

Engineering and Rolling Stock

A. M. Hilborn has been appointed general car foreman of the Illinois Central with office at Memphis, Tenn., succeeding E. A. Nix.

J. A. MacRae, whose appointment as mechanical engineer of the Louisville & Nashville, with headquarters at Louisville, Ky., has already been announced in these columns, was educated at the University of Illinois, where he took a course in mechanical engineering, graduating in 1896. The following year he began railway work as a draftsman in the office of the mechanical engineer of the Chicago & Northwestern, remaining with that company until 1899, when he entered the service of the New York Central & Hudson River. There, until 1904, he was engaged in special work and as draftsman at Albany, and at New York City. From 1904 to 1906 he was mechanical engineer of the Boston & Albany, at Boston. Then until January, 1915, he was mechanical engineer of the Michigan Central at Detroit, Mich., and now becomes mechanical engineer of the Louisville & Nashville, with headquarters at Louisville, Ky., as above noted.



J. A. MacRae

A. J. Himes, valuation engineer of the New York, Chicago & St. Louis, has been appointed engineer of grade-crossing elimination, with headquarters at Cleveland, Ohio.

OBITUARY

J. W. Eber until recently general manager of the Toronto, Hamilton & Buffalo, died on August 18, at Hamilton, Ont.

Patrick A. Gorman, formerly general manager of the Waco & Northwestern, died at Waco, Tex., on August 15th.

E. B. Pleasants, chief engineer of the Atlantic Coast Line, with headquarters at Wilmington, N. C., died on August 22, at Washington, D. C., at the age of 65 years.

T. S. Moise, general manager of the Central of Georgia, with headquarters at Savannah, Ga., died on August 17, at Temagami, Ont. He was born on June 13, 1862, at New Orleans, La., and



T. S. Moise

began railway work in 1880, serving in various clerical positions in agency work and as conductor and yardmaster at Montgomery, Ala., and Macon, Ga., until February, 1890, when he became trainmaster of the Savannah & Western division of the Central Railroad & Banking Company of Georgia, at Columbus, Ga. He was later transferred in the same capacity to the Southwestern division at Macon, Ga., and then was consecutively superintendent of the Savannah & Atlantic division of the same road at Savannah, Ga.; superintendent of the South Carolina division at Au-

gusta, and from February, 1893, to September, 1898, was superintendent of the Savannah & Western division at Columbus, Ga. From September, 1898, to December, 1903, he was superintendent of the Savannah division at Savannah; then to February, 1904, was general superintendent of transportation and later served as general superintendent until January, 1905, when he was appointed general manager. His entire service had been with the Central Railroad & Banking Company of Georgia and its successor, the Central of Georgia Railway.

THE BAGDAD RAILWAY.—The Bagdad Railway, if it is completed according to present plans, will extend from Konieh, in the province of Konieh in Asia Minor, southeast of Constantinople, through Aleppo, Mesopotamia, and Bagdad to Busra near the mouth of the Euphrates and Tigris rivers, a total distance of something like 1,314 miles. At the present time the railway is in disconnected sections. There have been about 175 miles of line constructed to the west of the Cilician Taurus, about 105 miles (including a branch line about 36 miles long) in the plain from Adana, about 158 miles between the Amanus mountains and the Euphrates and 79 miles in the neighborhood of Bagdad. In addition to this there is a small branch line in the Adana plain, from Adana to Mersina, 40 miles long, which the Bagdad company has acquired, and which until the opening of the port of Alexandretta for the Asia Minor portions of the Bagdad railway, represents the only access to the sea. This makes an aggregate of 556 miles of the Bagdad Railway so far opened for traffic. In spite of the war, or as it is asserted in some quarters, owing to military considerations connected with the war, the work is being pushed with no small amount of energy. Recently the most important tunnel on the Bagdad Railway, the Bilemedik tunnel, has been pierced and is approaching completion. The sections upon which work is most active are in the Cilician Taurus and the Amanus mountains, which are associated with the military advantages that will be obtained when there is a direct railway connection from the Bosphorus to the Egyptian frontier. The work also comprises more easterly portions which cannot be deemed to be of any direct military moment.—*From an article in Engineering, London.*

Equipment and Supplies

LOCOMOTIVE BUILDING

THE CHICAGO, BURLINGTON & QUINCY has ordered one 18 in. by 26 in. 12-ft. cut scoop wheel rotary snow plow from the American Locomotive Company.

THE COPPER RIVER & NORTHWESTERN has ordered 2 locomotives from the American Locomotive Company.

CAR BUILDING

THE BUTTE, ANACONDA & PACIFIC is inquiring for 100 50-ton ore cars.

WELLS, FARGO & Co. has ordered 35 refrigerator cars from the Pullman Company.

THE CUBA COMPANY is in the market for from 500 to 600 sugar, box and flat cars.

THE CHICAGO & NORTH WESTERN has ordered 50 caboose cars from the American Car & Foundry Company.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA has ordered 100 refrigerator cars from the Haskell & Barker Car Company.

THE ATLANTIC COAST LINE has ordered 750 ventilated box cars from the Mount Vernon Car Manufacturing Company.

THE ATCHISON, TOPEKA & SANTE FE is reported to be inquiring for 500 stock cars, and has ordered 50 ore and concentrate cars from a Chicago builder. This item has not been confirmed.

IRON AND STEEL

THE GULF, FLORIDA & ALABAMA has ordered 6,000 tons of 80-lb. rails from H. F. Wardwell, Chicago.

THE CHESAPEAKE & OHIO has ordered 6,000 tons of rails from the Illinois Steel Company, and 500 tons each from the Cambria Steel Company and the Pennsylvania Steel Company, also 600 tons of structural steel from the Virginia Bridge & Iron Company and the Mount Vernon Bridge Company.

MACHINERY AND TOOLS

THE DELAWARE, LACKAWANNA & WESTERN is in the market for a 42-inch coach wheel lathe and for three or four smaller machine tools.

RAILWAY EXTENSION IN ECUADOR.—Just before the war broke out, a German firm secured a contract from the Ecuadorian Government to build a railway line from Huigra to Cuenca. If the undertaking can be proceeded with—and it is doubtful whether without the active co-operation of United States firms this can be the case—it will mean a great deal for the Guayaquil & Quito Railway, both during and after construction. The whole of the requisite building material must pass over the company's lines, and subsequent traffic must be shared with the new system in generous proportions. Unfortunately, the lack of funds has prevented the existing railway company from maintaining the track in a proper state of repair, with the consequence that breakdowns, and even more serious accidents, are of frequent occurrence. The line, which is 288 miles in length, is, from the engineering point of view, one of the most remarkable in the world; it connects Quito, the capital of the republic, with Guayaquil, the only important port in the country. From the day of its opening in June, 1908, the line has been worked at a heavy loss, not sufficient revenue being received even to pay the interest upon the bonds. It is believed that this constitutes a record in railway working in any part of the world.—*The Engineer, London.*

PRODUCTION OF PIG-IRON DURING WAR IN GERMANY.—The production of pig iron during the war has for each month amounted to the following percentage of the normal peace production: , August 1914, 37.84 per cent; September, 37.42 per cent; October, 47.08 per cent; November, 50.90 per cent; December, 55.11 per cent; January, 56.39 per cent; February, 51.85 per cent; March, 60.54 per cent and April, 60.55 per cent.—*Engineering, London.*

Supply Trade News

G. F. Riddell, superintendent of the Chicago Heights Works of the Inland Steel Company, died of heart failure at his home in Chicago on August 12.

The Keuffel & Esser Company, New York, has been awarded three grand prizes at the Panama-Pacific International Exposition at San Francisco for its exhibit of drawing instruments and slide rules; surveying instruments, and telescopic sights and periscopes, respectively.

The Mesta Machine Company, Pittsburgh, Pa., recently shipped a 1,500-ton quick-acting steam-hydraulic forging press of its standard four-column type to the Pressed Steel Car Co. The valves on this press are so arranged as to permit the use of a single controlling lever and to cause the press to stop automatically at any point the operator desires.

Robert M. Smith, assistant mechanical engineer of the Acme Supply Company, Chicago, has been appointed mechanical engineer. Mr. Smith was formerly chief car draftsman for the Illinois Central and went to the Acme Supply Company last January as inspector. In March he was appointed assistant mechanical engineer, and on August 1 mechanical engineer.

The Chicago & Alton has closed a contract with the Hupp Automatic Mail Exchange Company, Chicago, for the installation of automatic mail exchange apparatus at all of its main-line stations between Chicago and St. Louis which are not regular stops for through passenger trains. This contract was awarded after exhaustive tests extending over a period of six months. This device was described in the *Railway Age Gazette* of November 27, 1914.

The Hoeschen Manufacturing Company, Omaha, Neb., maker of highway crossing alarms, has recently been reorganized and has moved its factory and office into larger quarters with the Paxton & Vierling Iron Works, at Seventeenth street and Union Pacific tracks. This change has greatly increased the capacity of the factory and will facilitate the handling of future orders. F. K. Davis, until recently office engineer in the signal department of the Grand Trunk at Montreal, has been appointed general manager, with headquarters at Omaha.

Bertram Smith, who has been in the storage battery business for the past 15 years, has been appointed manager of the Detroit office of the Edison Storage Battery Company, Orange, N. J. About a year and a half ago Mr. Smith became assistant manager of the Edison Storage Battery Supply Company of San Francisco, Cal., the distributor for the Edison Nickel-Iron-Alkaline Battery on the Pacific Coast. Directly previous to his connection with the Edison company he was manager of the battery department in the Chicago branch of the United States Light & Heating Co. He was formerly secretary and treasurer of the National Battery Company of Buffalo, until its consolidation with the United States Light & Heating Co.

Edward A. Everett, formerly signal engineer of the Michigan Central, has opened an office at 50 Church street, New York, for the sale of railway supplies and signal material. He represents the Hobart-Allfree Company, Chicago, derailleurs and car replacers; E. J. Clark, Philadelphia, Pa., T. C. Cypress Trunking and Capping; the National Concrete Machinery Company, Madison, Wis., concrete fence post machinery and supplies; the Detroit Twist Drill Company, Detroit, Mich., high-speed bonding drills; the J. Frederick Schroeder Air Felt Company, Newark, N. J., high-grade air felt used in refrigerator car construction, steam pipe covering and as a cushion under relays and electrical apparatus; the Cincinnati Electrical Tool Company, Cincinnati, Ohio, portable electric drills, grinders and reamers; the Keller Pneumatic Tool Company, pneumatic drills, hammers, riveters and chippers; the Reliable Electric Company, Chicago, signal, telephone and telegraph specialties. Mr. Everett also has charge of the sales of the electric release train annunciator, which is one of his patents and which has been sold for several years by the Railroad Supply Company, Chicago. He also has a line of copper clad and bond wires and high strength non-corrosive bond wire.

Railway Construction

ATLANTA & ST. ANDREWS BAY.—This company has under consideration the question of building an extension, it is said, from Dothan, Ala., north via Eufaula. The company now operates a line from Dothan south to Panama City, Fla., 82 miles.

BELLINGHAM, MOUNT BAKER & SPOKANE.—It is reported that work on 288 miles of track for this company will be started within 90 days. This line is to form part of a through line to Port Nelson on Hudson Bay. C. E. Wingate, chief engineer of surveys and construction, Bellingham, Wash.

BALTIMORE (MD.) ROADS.—A plan for a municipality-owned electric belt railroad connecting with the Pennsylvania; Baltimore & Ohio; Western Maryland and Maryland & Pennsylvania railroads, with provision for new tunnels through the city and a union station at the Fallsway and Biddle street, was sent to the City Planning Commission recently by Mayor Preston. William H. Maltbie and Daniel B. Banks are interested in the project.

CHARLESTON SOUTHERN.—Application is to be made in South Carolina on September 17 for a charter to build from the Carolina, Atlantic & Western, in Charleston, S. C., southwest through the counties of Charleston, Colleton, Beaufort and Jasper to a point on the north bank of the Savannah river, thence across the Savannah river to a connection with the Seaboard Air Line on Hutchinson Island in the county of Chatham, Georgia. The incorporators include George E. Dargan, 112½ Cashua street, Darlington, S. C.; Bright Williamson and James D. Evans.

CLEVELAND & OHIO CENTRAL ELECTRIC.—Most of the right-of-way, also terminal rights, have been secured, and the contract to build and equip the first section of 55 miles has been let to the Lathrop-Shea interests; J. J. Shea, Buffalo, N. Y., is president of the three construction companies involved. The contract calls for the completion of the work in 1916. The amended route extends from Cleveland, Ohio, south to Wadsworth, thence via Rittman and Smithville, to Worcester, which will be the southern terminus of the first division. The line is to be extended south to Columbus. (August 20, p. 368.)

LOUISVILLE & NASHVILLE.—The branch of the Louisville & Nashville, which now extends from Pineville, Ky., to Benham, is to be extended, it is said, to a connection with the line in operation to Middlesborough and to Norton, Va.

WILLIAMSPORT, NEESE & MARTINSBURG.—Construction work is reported under way on a section of this line, and the work is to be continued as far as rights of way have been obtained towards Martinsburg. The plans call for a 15-mile line between the Potomac river and Martinsburg. John Carmichael, president, Hagerstown, Md. (April 9, p. 811.)

RAILWAY STRUCTURES

BALTIMORE, MD.—The Pennsylvania Railroad expects to ask for bids soon for building a new pier at Canton, Baltimore. (June 25, p. 1498.)

CHICAGO, ILL.—The new freight house and warehouse of the Pennsylvania lines will be a five-story building, 745 feet long and 420 feet wide. It will have a pile and concrete foundation, steel frame, concrete fireproofing and brick curtain walls as announced previously. The foundation contract has been awarded to Blome-Sinek Company, Chicago, and the structural steel contract to Thompson-Starrett Company, Chicago. The general contract will not be let for several months. Foundation work is now in progress.

GRAND FORKS, B. C.—Construction work was started recently by the Great Northern, it is said, on a new bridge over North Fork canyon on the railway spur into Granby smelter. The new bridge, which is to be 692 ft. long, with stone and concrete abutments, will cost \$65,000, and is to be built to replace the present structure. Until the new bridge is completed the Great Northern will use the spur and bridge of the Canadian Pacific into the smelter. About 2,000 ft. of track will be laid to connect the two lines.

Railway Financial News

BOSTON & MAINE.—In a notice issued by President Hustis urging holders of the notes due September 2 to notify the Old Colony Trust Company, Boston, as to whether they will extend their notes or extend part of them, and receive in exchange Maine Railways notes, President Hustis says: "During the fiscal year ending June 30, 1915, by strict economy, and with the partial benefit of increased passenger and freight rates recently granted, the road was able, notwithstanding a decrease in operating revenue of \$1,489,236, to come within about \$334,000 of meeting its fixed charges, as against a deficit of \$2,044,742 for the previous year. While this improvement does not remove the necessity of reorganization, it strengthens our belief that if a consolidation with the leased lines can be effected on equitable terms, a financially strong corporation will result which will be to the greatest advantage of all."

CHICAGO, ROCK ISLAND & PACIFIC.—The time for the deposit of the 5 per cent debentures with the committee, of which Seward Prosser is chairman, has been extended to October 15.

CHICAGO & WESTERN INDIANA.—J. P. Morgan & Co., the First National Bank and the National City Bank, all of New York, have bought from the Chicago & Western Indiana and are offering to the public \$12,935,000 two-year 5 per cent collateral notes of September 1, 1915-1917. The offering price to the public is 99, yielding about 5½ per cent on the investment. The notes are secured by the deposit of \$17,247,000 Chicago & Western Indiana first and refunding mortgage 5 per cent bonds, which are part of the \$18,497,000 bonds outstanding under the first and refunding mortgage. This mortgage is an absolutely direct and first lien on the company's clearing yard, which includes approximately 18,010 acres of land and which yard is used by the following companies: Pennsylvania Company, Atchison, Topeka & Santa Fe; Illinois Central; Chicago, Burlington & Quincy; Chicago, Rock Island & Pacific; Chesapeake & Ohio; Minneapolis, St. Paul & Sault Ste. Marie; Chicago & Eastern Illinois; Chicago, Indianapolis & Louisville; Erie; Grand Trunk Western; Wabash. The mortgage is also a junior lien on the remainder of the company's property, which includes a passenger station in Chicago, used by the last five named companies and by the Atchison, Topeka & Santa Fe.

MINNEAPOLIS & ST. LOUIS.—This company has completed the purchase of its subsidiary company, the Des Moines & Fort Dodge.

NEW ORLEANS, MOBILE & CHICAGO.—This company was recently sold under foreclosure and was bought in by C. H. Murphey, representing, it is said, the reorganization committee, of which J. W. Platten, New York, is chairman.

MILITARY TRAFFIC ON THE P. L. M. RAILWAY OF FRANCE.—When the mobilization of the French Army was ordered, the Paris, Lyons & Mediterranean was not taken unawares, for, acting on the advice of the minister of war, steps had previously been taken to put the system in a condition suitable for handling heavy military traffic. On the night between August 2 and 3, the ordinary service was entirely suspended and more than 3,000 special military trains were provided in four days. This was the mobilization proper, but concentration went on during the whole month, and required another 4,000 trains up to the thirtieth day of mobilization. After the mobilization and concentration of the army were finished, there began what may be called the third stage of military transportation, embracing the victualling of the troops, the supply of stores and depots, the carriage of supplementary troops, the conveyance of the wounded, etc., and in one period of five weeks 1,600 trains were run for these and similar purposes. The P. L. M. Company already owned two complete hospital trains, but it was necessary to improvise very many more, and there are actually about 1,600 cars now engaged in the transportation of the wounded between the front and the hospitals, of which 670 are passenger coaches.—*Railway Gazette, London.*

ANNUAL REPORT

CANADIAN PACIFIC RAILWAY COMPANY—THIRTY-FOURTH ANNUAL REPORT

To the Shareholders:

The accounts of the Company for the year ended June 30th, 1915, show the following results:—

Gross Earnings	\$98,865,209.78
Working Expenses	65,290,582.49
Net Earnings	\$33,574,627.29
Deduct Fixed Charges.....	10,446,509.83
Surplus	\$23,128,117.46
Contribution to Pension Fund.....	125,000.00
	\$23,003,117.46
Deduct Net Earnings of Pacific Coast Steamships, Commercial Telegraph, and News Department, transferred to Special Income Account	1,494,151.49
	\$21,508,965.97

From this there has been charged a half yearly dividend on Preference Stock of 2 per cent., paid April 1st, 1915.....	\$1,605,412.80
And three quarterly dividends on Ordinary Stock of 1¼ per cent. each, paid January 2nd, 1915, April 1st, 1915, and June 30th, 1915	13,650,000.00
	15,255,412.80
	\$ 6,253,553.17

From this there has been declared a second half yearly dividend on Preference Stock, payable October 1st, 1915.....	\$1,613,638.42
And a fourth quarterly dividend on Ordinary Stock of 1¼ per cent., payable October 1st, 1915	4,550,000.00
	6,163,638.42

Leaving net surplus for the year..... \$ 89,914.75
In addition to the above dividends on Ordinary Stock, three per cent. was paid from Special Income.

THE FOLLOWING ARE THE DETAILS OF SPECIAL INCOME FOR YEAR ENDED JUNE 30TH, 1915.

Balance at June 30th, 1914.....	\$ 5,046,812.46
Less Dividend paid October 1st, 1914....	1,950,000.00
	\$3,096,812.46
Interest on Proceeds Land Sales.....	64,587.54
Interest on Deposits and Loans.....	1,466,096.67
Interest from Minneapolis, St. Paul & S. S. Marie Ry. Bonds.....	159,720.00
Interest from Mineral Range Ry. Bonds.....	50,160.00
Interest from Toronto, Hamilton & Buffalo Ry. Bonds.....	10,840.00
Interest from Montreal & Atlantic Ry. Bonds and other Securities	107,902.09
Interest from Berlin, Waterloo, Wellesley & Lake Huron Ry. Bonds	17,040.00
Interest from St. John Bridge & Railway Extension Co. Bonds	6,200.00
Interest from Esquimalt & Nanaimo Ry. Bonds.....	193,280.00
Interest from Dominion Atlantic Ry. Extension Debenture Stock	56,940.00
Interest from Dominion Atlantic Ry. 2nd Debenture Stock..	36,986.67
Interest from Hull Electric Railway.....	75,000.00
Dividend on Esquimalt & Nanaimo Ry. Stock.....	125,000.00
Dividend on St. John Bridge & Railway Extension Co. Stock	70,000.00
Dividends on Minneapolis, St. Paul & S. S. Marie Ry. Common Stock	890,645.00
Dividends on Minneapolis, St. Paul & S. S. Marie Ry. Preferred Stock	445,326.00
Dividends on West Kootenay Power & Light Co. Common Stock	55,000.00
Dividends on West Kootenay Power & Light Co. Common Preferred Stock	3,850.00
Dividends on Consolidated Mining & Smelting Co. Stock..	209,520.00
Dividend on Berlin, Waterloo, Wellesley & Lake Huron Ry. Stock	12,500.00
Earnings from Ocean Steamships and Hotels.....	4,370,280.41
Revenue from Company's Interest in Coal Mine Properties..	544,294.26
Extraneous Mail Earnings.....	364,733.61
Net Earnings of Pacific Coast Steamships, Commercial Telegraph, News Department.....	1,494,151.49
Received for space rented in Office Buildings.....	139,277.95
	\$14,066,144.15

Less:—Payments to Shareholders in dividends:
January 2nd, 1915, April 1st, 1915, and June 30, 1915

\$8 216,144.15

From this a dividend has been declared payable October 1st, 1915

1,950,000.00

2. The working expenses for the year amounted to 66.04 per cent. of the gross earnings, and the net earnings to 33.96 per cent., as compared with 67.32 and 32.68 per cent., respectively, in 1914.

3. Four per cent. Consolidated Debenture Stock to the amount of £611,797 was created and sold, and the proceeds were applied to the acquisition of the securities of other railway companies whose lines constitute a portion of your system, the interest on which had, with your sanction, been guaranteed by your Company.

4. Four per cent. Preference Stock to the amount of £504,914 was created and sold for the purpose of meeting capital expenditures that had previously been sanctioned by you.

5. During the year 231,297 acres of agricultural land were sold for \$3,742,115.00, being an average of \$16.17 per acre. Included in this area there were 6,550 acres of irrigated land which brought \$55.22 per acre, so that the average price of the balance was \$15.04 per acre.

6. All of the Company's outstanding First Mortgage 5% Bonds, amounting at the end of the last fiscal year to £2,638,900, were satisfied and retired at or before their maturity, July 1st, excepting a few that had not been presented for redemption. An amount sufficient to take up these Bonds, as they come in, has been deposited with your bankers, and the Trustees have been asked to certify the satisfaction of the debt and to have the mortgage securing them formally cancelled. Outstanding Bonds, to the amount of

£233,200, of the Shuswap and Okanagan Railway Company, whose line is leased to your Company for 999 years, were also acquired during the year, and have been deposited with your Treasury securities.

7. As you were informed at a previous meeting, your Directors have had under consideration for some time the desirability of transferring to a Steamship Company your steamships engaged in traffic on the Atlantic and Pacific Oceans, so as to more effectually separate your railway and steamship finances and operations. To that end, a Company has been organized under the laws of Great Britain, known as "The Canadian Pacific Ocean Services, Limited," with an authorized capital of £2,000,000 sterling, having for its purpose, amongst other things, the acquisition and operation of ocean steamships and the interchange of traffic with your railway lines and others. The requisite extension of your Company's charter powers has been secured to enable it to hold stock and securities of the Canadian Pacific Ocean Services, Limited, and to guarantee payment of the principal and interest of such securities as may be issued with your consent. It is proposed that the Canadian Pacific Ocean Services, Limited, shall purchase and take over your interest in all of the steamships and their appurtenances engaged in ocean traffic, as well as those of the Allan Line Steamship Company which has been under your control for some time. A moderate estimate of the value of the steamship property involved in the transaction, after making due allowance for depreciation, is \$23,500,000. Your Directors recommend that as a consideration for the steamships and their appurtenances to be sold and delivered by your Company, and for the Capital Stock of the Allan Line Steamship Company, carrying with it all that Company's steamship and other properties, you accept as fully paid the Capital Stock of the Canadian Pacific Ocean Services, Limited, namely, £1,962,910, being all excepting the shares necessary to qualify the Directors of the Steamship Company, and in addition, 5% First Debentures or Debenture Stock of the Canadian Pacific Ocean Services, Limited, to the amount of £2,865,860 sterling. The transaction has been completed on this basis, subject to your approval at this Meeting.

8. Six of the Company's older class steamships, namely, the "Montrose," "Mount Royal," "Montezuma," "Montcalm," "Tyrolia" and "Ruthenia," were taken by the Imperial Government in November last, at a price that has not yet been fixed by the Admiralty, and the steamship "Empress of India," after twenty-five years service on the Pacific Ocean, was sold for £85,000 and converted into a hospital ship. Two large modern steamships that were under construction at Belfast were purchased by the Company at a cost of about £700,000, for delivery in July and October of this year. Pressure of other work, however, delayed their completion, and it will be probably some months before they are ready for service.

9. The appropriations made by your Directors for expenditures on capital account during the calendar year were comparatively small, aggregating only \$3,546,600. In this amount are included the estimated expenditure on Roger's Pass Tunnel in the Selkirk Mountains, \$1,350,000; Passenger and Freight Terminals at Quebec, \$300,000; and Passenger Station with approaches, at North Toronto, \$400,000. The balance of the amount is made up of works of minor importance on all sections of the Railway.

10. The Victoria Rolling Stock and Realty Company's equipment securities, to which reference was made in the last Annual Report, were disposed of during the year at a price sufficient to repay the amount advanced by the Company.

11. Uncontrollable conditions caused an abnormal decline in the gross revenue of your railway lines for the year, and, although the working expenses were very substantially reduced, the net earnings were \$8,551,300 less than in the previous year, leaving a margin barely sufficient to meet the customary distribution to shareholders. Against this your Special Income, from which a portion of the dividend is paid, was \$2,381,461 greater this year than last.

Your Directors were of the opinion that in the circumstances there was no good reason for making any change in the rate of dividend, and acted accordingly.

12. Vice-President McNicoll, after more than 40 years' continuous connection with the Company and one of its acquired lines, was compelled by failing health to relinquish the arduous duties of his office, and he, therefore, resigned in December last. The resignation was accepted after the Directors had expressed in a most pronounced way their high appreciation of Mr. McNicoll's services to the Company, and their personal esteem and regard for him. Mr. George Bury, Vice-President in charge of the Company's Western Lines, was promoted to fill the vacancy caused by Mr. McNicoll's retirement, and he was also elected a member of the Board of Directors.

13. The under-mentioned Directors will retire from office at the approaching Annual Meeting. They are eligible for re-election:—

SIR WILLIAM C. VAN HORNE, K.C.M.G.,
MR. RICHARD B. ANGUS,
SIR EDMUND R. OSLER, M.P.,
SIR HERBERT S. HOLT,

For the Directors,
T. G. SHAUGHNESSY,
President.

MONTREAL, August 9th, 1915.

SCHEDULE "C"

DETAILS OF EXPENDITURE ON ADDITIONS AND IMPROVEMENTS FROM JULY 1ST, 1914, TO JUNE 30TH, 1915.

EASTERN LINES:

Additional Sidings, Buildings, Stations and Yards	\$ 97,928.65
Permanent Bridges and Improvements of Line	431,088.27
Double Tracking.....	584,983.94
Right of Way.....	5,432.67
	\$1,119,433.53
MONTREAL TERMINALS.....	220,360.27
Windsor St. Station Extension.....	51,939.90
Double Track Bridge over St. Lawrence River	5,468.44
Drawbridge over Lachine Canal.....	116,618.63

WESTERN LINES:

Additional Sidings, Buildings, Stations and Yards	\$231,950.67
Permanent Bridges and Improvements of Line	397,016.62
Fort William Terminals, including Coaling Plant	45,506.68
East Winnipeg Yard.....	124,858.37

Winnipeg New Elevator.....	209,764.00	
Winnipeg Station and Hotel.....	1,047,453.35	
Winnipeg Terminals.....	6,204.93	
Calgary Hotel.....	157,849.09	
Vancouver Terminals.....	451,169.96	
Double Tracking.....	2,720,206.71	
Right of Way.....	5,032.02	
		5,397,012.40
Additions to Office Buildings and Hotels....	2,091,960.49	
Rented and Temporary Sidings.....	39,871.19	
Telegraph Extensions and Additions.....	47,682.02	
		\$9,090,346.87
		=====

SCHEDULE "D"

DETAILS OF EXPENDITURE ON LEASED AND ACQUIRED LINES,
FROM JULY 1ST, 1914, TO JUNE 30TH, 1915.

NEW BRUNSWICK RAILWAY:		
Additional Sidings, Buildings, Stations and Yards	\$ 20,270.13	
Permanent Bridges and Improvements of Line	109,902.58	
St. John Terminals.....	55,402.69	
		\$ 185,575.40
ATLANTIC & NORTH WESTERN RAILWAY:		
Additional Sidings, Buildings, Stations and Yards	35,067.11	
Permanent Bridges and Improvements of Line	25,936.57	
Right of Way.....	1,562.00	62,565.68
MONTREAL & OTTAWA RAILWAY:		
Additional Sidings, Buildings, Stations and Yards	1,996.49	
Permanent Bridges and Improvements of Line	Cr. 13,101.93	
Right of Way.....	3,134.27	Cr. 7,971.17
MONTREAL & WESTERN RAILWAY:		
Additional Sidings, Buildings, Stations and Yards	1,272.51	
Permanent Bridges and Improvements of Line	35,359.54	
Account Purchase of Road.....	14,462.28	51,094.33
ONTARIO & QUEBEC RAILWAY:		
Additional Sidings, Buildings, Stations and Yards	170,939.60	
Permanent Bridges and Improvements of Line	260,886.48	
Double Tracking.....	195,686.19	
Toronto Terminals.....	421,778.76	
Right of Way.....	795.40	1,050,086.43
MANITOBA & NORTH WESTERN RAILWAY:		
Additional Sidings, Buildings, Stations and Yards	3,488.63	
Permanent Bridges and Improvements of Lines	9,680.33	
Right of Way.....	451.74	13,620.70
MANITOBA SOUTH WESTERN COLONIZATION RAILWAY:		
Additional Sidings, Buildings, Stations and Yards	148.61	
Permanent Bridges and Improvements of Line	24,186.43	24,335.04
CALGARY & EDMONTON RAILWAY:		
Additional Sidings, Buildings, Stations and Yards	5,689.20	
Permanent Bridges and Improvements of Line	7,182.88	
Right of Way.....	919.86	13,791.94
COLUMBIA & WESTERN RAILWAY:		
Additional Sidings, Buildings, Stations and Yards	Cr. 1,191.49	
Permanent Bridges and Improvements of Line	97,502.68	
Right of Way.....	818.00	97,129.19
NEW BRUNSWICK SOUTHERN RAILWAY:		
CAP DE LA MADELEINE RAILWAY.....	12,484.67	
ST. MAURICE VALLEY RAILWAY.....	173.00	
JOLIETTE & BRANDON RAILWAY.....	2,443.87	
OTTAWA, NORTHERN & WESTERN RAILWAY.....	22.49	
LINDSAY, BOBCAYGEON & PONTYPOOL RAILWAY.....	16,094.91	
GEORGIAN BAY & SEABOARD RAILWAY.....	1,340.45	
GUELPH & GODERICH RAILWAY.....	46,640.20	
TILLSONBURG, LAKE ERIE & PACIFIC RAILWAY.....	24,462.16	
WALKERTON & LUCKNOW RAILWAY.....	1,811.33	
GREAT NORTH WEST CENTRAL RAILWAY.....	22,423.20	
COLUMBIA & KOOTENAY RAILWAY.....	175.50	
NICOLA, KAMLOOPS & SIMILKAMEEN RAILWAY.....	7,197.63	
KASLO & SLOCAN RAILWAY.....	616.14	
	Cr. 30,569.74	
		\$1,595,543.35
		=====

RECEIPTS AND EXPENDITURES,
YEAR ENDED JUNE 30TH, 1915.

Cash in hand, June 30th, 1914.....	\$36,777,725.02	
RECEIPTS:		
Surplus Revenue as per statement.....	\$21,508,965.97	
Special Income as per statement.....	10,969,331.69	
		32,478,297.66
LAND DEPARTMENT:		
Lands and Townsites:		
Net proceeds of sales.....	3,310,535.69	
Less Irrigation Expenditures.....	982,450.72	
		2,328,084.97

Deferred Payments on previous years' sales	2,726,890.21	
		5,054,975.18
Less amount remaining in Deferred Payments on year's sales.....	4,680,425.02	
		374,550.16
FOUR PER CENT. PREFERENCE STOCK:		
Amount realized from issue £504,914.....		2,182,763.46
CONSOLIDATED DEBENTURE STOCK:		
Amount realized from issue £611,797.....		2,781,731.36
VICTORIA ROLLING STOCK & REALTY COMPANY, LIMITED, BONDS		13,630,000.00
		\$88,225,067.66

DEDUCT:

Agents and Conductors' Balances	\$2,775,683.51	
Net Traffic Balances.....	502,500.43	
Miscellaneous Accounts Receivable	8,870,601.74	
		12,148,785.68
Advances to Lines and Steamships under Construction	42,472,295.22	
Advances and Investments.....	10,457,984.79	
		65,079,065.69
Amount at June 30th, 1914.....	62,169,167.78	
		2,909,897.91
		\$85,315,169.75
		=====

EXPENDITURES:

Dividends on Preference Stock:		
2 per cent. paid October 1st, 1914.....	\$1,564,493.46	
2 per cent. paid April 1st, 1915.....	1,605,412.80	
		\$3,169,906.26
Dividends on Ordinary Stock:		
2½ per cent. paid October 1st, 1914.....	6,500,000.00	
2½ per cent. paid January 2nd, 1915.....	6,500,000.00	
2½ per cent. paid April 1st, 1915.....	6,500,000.00	
2½ per cent. paid June 30th, 1915.....	6,500,000.00	
		26,000,000.00
Construction of branch lines.....		695,359.07
Additions and Improvements, main line and branches, Schedule "C"		9,090,346.87
Additions and Improvements, leased and acquired lines, Schedule "D"		1,595,543.35
Rolling Stock Equipment.....		338,667.94
Shops and Machinery.....		54,182.88
Ocean, Lake, and River Steamers:		
Completion of River Steamers and Barges.....	37,432.98	
Purchase of Steamship "Medora".....	435,566.91	
		472,999.89
Less amount paid from Steamship Replacement	435,566.91	
		37,432.98
1st Mortgage 5% Bonds redeemed £2,074,000 at par		10,093,466.67
Deposited with Trustee of Special Investment Fund		3,782,191.88
SECURITIES ACQUIRED:		
Campbellford, Lake Ontario & Western Ry. 1st Mortgage Bonds.....	2,630,000.00	
Shuswap & Okanagan Ry. 1st Mortgage Bonds	1,138,699.00	
Alberta Ry. Irrigation Co. Stock.....	7,300.73	
Public Markets Limited Stock.....	5,000.00	
Shuswap & Okanagan Ry. Stock.....	486.67	
Toronto, Hamilton & Buffalo Ry. Stock.....	3,400.00	
		3,784,886.40
Payment of Equipment Obligations.....		1,570,000.00
		60,211,984.30
Deduct Decrease in Material and Supplies on hand.....		1,956,630.04
		\$58,255,354.26
		=====

ADD DECREASE IN LIABILITIES:

Current Liabilities	12,552,309.69	
Interest on Funded Debt.....	830,614.11	
Reserves and Appropriations.....	10,852,465.52	
		24,235,389.32
Amount at June 30th, 1914.....	34,239,935.18	
		10,004,545.86
		68,259,900.12
Cash on hand.....		17,055,269.63
		\$85,315,169.75
		=====

STATEMENT OF EARNINGS FOR THE YEAR ENDED
JUNE 30TH, 1915.

From Passengers.....	\$24,044,282.83
" Freight.....	60,737,737.25
" Mails.....	1,380,333.56
" Sleeping Cars, Express, Telegraph and Miscellaneous	12,693,856.14
Total.....	\$98,865,209.78

STATEMENT OF WORKING EXPENSES FOR THE YEAR ENDED
JUNE 30TH, 1915.

Transportation Expenses	\$32,083,169.65
Maintenance of Way and Structures.....	11,400,533.89
Maintenance of Equipment.....	11,307,965.04
Traffic Expenses	2,990,163.97
Parlor and Sleeping Car Expenses.....	1,111,253.29
Expenses of Lake and River Steamers	1,051,781.69
General Expenses	3,963,202.80
Commercial Telegraph	1,382,507.16
Total.....	\$65,290,582.49

TRAIN TRAFFIC STATISTICS—FOR TWELVE MONTHS ENDED
JUNE 30TH, 1915 AND 1914.
EARNINGS OF LAKE AND RIVER STEAMERS NOT INCLUDED IN THIS STATEMENT.

	Year ended June 30th, 1915.	Year ended June 30th, 1914.	Increase Decrease. Amount or number.	Per Cent.
TRAIN MILEAGE.				
Passenger trains.....	17,977,033	21,523,630	—3,546,597	—16.48
Freight trains.....	16,896,368	24,164,242	—7,267,874	—30.08
Mixed trains.....	1,939,478	1,890,364	49,114	2.60
Total trains.....	36,812,879	47,578,236	—10,765,357	—22.63
CAR MILEAGE.				
PASSENGER.				
Coaches and P. D. and S. cars	87,283,067	106,852,513	—19,569,446	—18.31
Combination cars	2,829,455	2,904,782	—75,327	—2.59
Baggage, Mail and Ex- press cars	40,691,990	47,355,009	—6,663,019	—14.07
Total Passenger cars	130,804,512	157,112,304	—26,307,792	—16.74
FREIGHT.				
Loaded	404,249,594	526,194,125	—121,944,531	—23.17
Empty	144,408,527	169,768,349	—25,359,822	—14.94
Caboose	18,476,337	26,196,664	—7,720,327	—29.47
Total Freight cars..	567,134,458	722,159,138	—155,024,680	—21.47
Passenger cars per Traffic Train Mile.....	6.57	6.71	—0.14	—2.09
Freight cars per Traf- fic Train Mile.....	30.11	27.72	2.39	8.62
PASSENGER TRAFFIC.				
Passengers carried (earning revenue).....	13,086,064	15,449,849	—2,363,785	—15.30
Passengers carried (earning revenue) one mile	1,155,371,348	1,570,758,210	—415,386,862	—26.44
Passengers carried (earning revenue) one mile per mile of road	93,413	132,825	—39,412	—29.67
Average journey per passenger	88.29	101.67	—13.38	—13.16
Average amount re- ceived per passen- ger	1.81	2.06	—0.25	—12.14
Average amount re- ceived per passenger mile	2.05	2.03	.02	.99
Average number of pas- sengers per train mile	58.01	67.09	—9.08	—13.53

Average number of pas- sengers per car mile.....	12.82	14.31	—1.49	—10.41
Revenue from passen- gers per passenger car mile	26.32	29.05	—2.73	—9.40
Total passenger train earnings per train mile	1.53	1.69	—0.16	—9.47
Total passenger train earnings per train mile of road.....\$	2,468.87	3,345.11	—876.24	—26.19
FREIGHT TRAFFIC.				
Tons of revenue freight carried one mile....	7,734,433,065	10,601,426,321	—2,866,993,256	—27.04
Tons non-rev. freight carried one mile....	985,500,816	1,497,306,046	—511,805,230	—34.18
Total tons (all classes) freight carried one mile	8,719,933,881	12,098,732,367	—3,378,798,486	—27.93
Tons of revenue freight carried one mile per mile of road.....	625,338	896,470	—271,132	—30.24
Tons of non-rev. freight carried one mile per mile of road.....	79,679	126,614	—46,935	—37.07
Total tons (all classes) freight carried one mile per mile of road	705,017	1,023,084	—318,067	—31.09
Average amount re- ceived per ton per mile of revenue freight cts.	0.773	0.753	0.020	2.66
Average No. of tons of revenue freight per train mile.....	410.62	406.89	3.73	.92
Average No. of tons of non-rev. freight per train mile.....	52.32	57.47	—5.15	—8.96
Average No. of tons of (all classes) freight per train mile.....	462.94	464.36	—1.42	—0.31
Average No. of tons of revenue freight per loaded car mile.....	19.13	20.15	—1.02	—5.06
Average No. of tons of non-rev. freight per loaded car mile.....	2.44	2.84	—0.40	—14.08
Average No. of tons of (all classes) freight per loaded car mile.	21.57	22.99	—1.42	—6.18
Freight train earnings per loaded car mile	14.79	15.17	—0.38	—2.50
Freight train earnings per train mile.....\$	3.17	3.06	.11	3.59
Freight train earnings per mile of road...\$	4,832.53	6,749.41	—1,916.88	—28.40

GENERAL BALANCE SHEET, JUNE 30th, 1915

ASSETS		LIABILITIES	
PROPERTY INVESTMENT:		CAPITAL STOCK:	
Railway	\$349,989,662.34	Ordinary Stock	\$260,000,000.00
Rolling Stock Equipment.....	153,595,062.73	Four Per Cent. Preference Stock.....	80,681,921.12
Ocean, Lake and River Steamers.....	24,208,595.28		\$340,681,921.12
	\$527,793,320.35	FOUR PER CENT. CONSOLIDATED DEBENTURE STOCK	176,284,882.10
ACQUIRED SECURITIES (COST):		MORTGAGE BONDS:	
Schedule "A"	111,652,627.03	Canadian Pacific Ry. 1st Mortgage 5 per cent.	2,749,180.00
ADVANCES TO LINES AND STEAMSHIPS UNDER CONSTRUCTION	42,472,295.22	Algoma Branch 1st Mortgage 5 per cent.	3,650,000.00
			6,399,180.00
ADVANCES AND INVESTMENTS.....	10,457,984.79	NOTE CERTIFICATES 6 PER CENT.....	52,000,000.00
DEFERRED PAYMENTS ON LANDS AND TOWN-SITES SALES, No. 2.....	7,431,543.04	PREMIUM ON ORDINARY CAPITAL STOCK SOLD	45,000,000.00
*SPECIAL INVESTMENT FUND:		CURRENT:	
Deferred Payments on Lands and Town-sites.	41,328,916.47	Audited Vouchers.....	4,054,309.08
Government Securities.....	10,088,734.86	Pay Rolls	3,647,354.54
Deposited with Trustee	4,452,417.41	Miscellaneous Accounts Payable.....	4,850,646.07
	55,870,068.74		12,552,309.69
WORKING ASSETS:		ACCRUED:	
Material and Supplies on Hand.....	\$15,729,605.49	Coupons due July 1st, 1915, and including	
Agents' and Conductors' Balances.....	2,775,683.51	Coupons overdue not presented.....	648,094.03
Net Traffic Balances.....	502,500.43	Rentals of Leased Lines.....	182,520.08
Miscellaneous Accounts Receivable.....	8,870,601.74		830,614.11
Cash in Hand.....	17,055,269.63		12,780,000.00
	44,933,660.80	EQUIPMENT OBLIGATIONS	
OTHER ASSETS:		RESERVES AND APPROPRIATIONS:	
Schedule "B"	131,241,869.49	Equipment Replacement	1,200,082.16
		Steamship Replacement.....	7,492,891.98
		Reserve Fund for Contingencies.....	2,159,491.38
			10,852,465.52
		NET PROCEEDS LANDS AND TOWNSITES.....	65,979,356.16
		SURPLUS REVENUE FROM OPERATION.....	83,019,483.06
		SURPLUS IN OTHER ASSETS.....	125,473,157.70
			\$931,853,369.46
			=====
			I. G. OGDEN, Vice-President.

AUDITORS' CERTIFICATE.

We have examined the Books and Records of the Canadian Pacific Railway Co., for the fiscal year ending June 30, 1915, and having compared the annexed Balance Sheet and Income Account therewith, we certify that, in our opinion, the Balance Sheet is properly drawn up so as to show the

true financial position of the Company at that date, and that the relative Income Account for the year is correct.

PRICE, WATERHOUSE & CO.,
Montreal, August 6th, 1915. Chartered Accountants (England)

*Security for issue of Note Certificates, \$52,000,000.

Railway Age Gazette

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LONDON: Queen Anne's Chambers, Westminster.

E. A. SIMMONS, *President*.
L. B. SHERMAN, *Vice-President*. HENRY LEE, *Sec'y & Treas.*
The address of the company is the address of the officers.

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ROY V. WRIGHT, *Managing Editor*.

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THE RAILWAY AGE GAZETTE and all other Simmons-Boardman publications are members of the Audit Bureau of Circulations.

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SEPTEMBER 3, 1915.

No. 10

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Not long ago the Central of Georgia revised the form which it uses to send out monthly statements of earnings and expenses.

Railroads and the Local Public

In addition to the usual columns of figures showing the month's earnings and accumulated earnings for the fiscal year to date, with comparisons for the previous year, this form contains a statement showing the percentage of total operating expenses which were distributed on payrolls to approximately so many persons, "substantially all of whom reside on the company's lines," and also a statement of the amount spent for materials and supplies, "the cost of which includes large payments for labor expended

on them before they were consumed." Fairfax Harrison, shortly after returning to the Southern Railway as its president, pointed out in an address to business men of the South how large a proportion of all of the money collected by the Southern Railway from the southern people is almost immediately distributed again in the same territory. Ordinarily the monthly earnings statements of railway companies are of primary interest to investors and to bankers; but the Central of Georgia's new form of statement suggests a way in which they can be made of interest to local newspaper editors and of value in promoting a better understanding between the railroads and their patrons. The fact that of the hard-earned dollars which a farmer pays on a freight bill or through the ticket agent's window little more goes out of the county than of the dollars he pays to his hands cannot be reiterated too often.

A committee of the Association of American Railway Accounting Officers has been making inquiries as to the attitude of the railroads in regard to the desirability of changing the fiscal year, insofar as reports to the Interstate Commerce Commission and to state commissions are concerned, from June 30 to December 31. The com-

mittee made inquiry of 200 roads, with an aggregate of 271,857 miles of railroad. Of these, 130 roads, operating 212,542 miles, or 78 per cent of the total mileage of which inquiry was made, voted in favor of changing the period for making reports from June 30 to December 31; 32 roads, with a mileage equal to 5 per cent of the total, did not vote, and 38 roads, with a mileage equal to 17 per cent of the total, voted against the change. The *Railway Age Gazette* has for some time past advocated a change in the fiscal year both for reports to the Interstate Commerce Commission and state commissions, and for reports to stockholders. One of the most important reasons why this change should be made is that there will then no longer be the same temptation that there is now to delay maintenance work in May and June so as to keep the expense of it out of the fiscal year about to close. Presumably the roads operating 17 per cent of the mileage from which inquiry was made either desire to have this opportunity to make a showing by delaying maintenance work left open to them or do not think that the advantages to be gained are equal to the cost and trouble of making the change. This appears to be a shortsighted or a rather selfish point of view. Even if a particular company is so prosperous as to never feel the temptation to delay maintenance in May and June, it ought to be willing to put its accounting department to the comparatively small expense and temporary trouble to make the system uniform and to carry out a reform which is for the good of the great majority of companies.

The Pennsylvania Railroad, in its last publicity pamphlet, noticed on another page, tells one of the most striking facts that have come

A Remarkable Gang of Freight Handlers

to light in connection with the railroad service for many a day, the operation of the Pittsburgh freight transfer station, with a force of 318 laborers, for 23 months, with practically no change in personnel; only one new man being taken on in all that time. George F. Wagner took charge of the station 30 months ago, and it is his personal efforts—or genius—to which this result is to be credited. Any railroad man acquainted with freight-house work will readily accept the statement in the pamphlet that it "would be most difficult to duplicate" this record of efficiency and of physical and moral character of the individual men. The story, as printed, is all too short, and the railroad world will be eager to learn about the "other diversions" that have made this work so attractive. And who shall say that the music is not one of the main elements in this remarkable "uplift"? As everybody knows, the unique social successes that have been recorded at the Isthmus of Panama during the last ten years have been due largely to the

wise management of recreation. Paternalism in the management of large enterprises has its occasional virtues, in spite of its dangerous nature. Railroad men will recall that one of the best records ever made in railroad building was that made by the paternal—the despotic—Russian government, beyond the Caspian sea, 25 years ago. Music, by well-trained bands, was a permanent feature of the off-duty life of the workmen there, and the morale of the forces was notable. This paternalism at Pittsburgh evidently is of a kind that anybody can safely copy; anybody, that is, who, like Mr. Wagner, “believes in” welfare work. A “belief” in the mind of a strong leader, is essential in any important work.

ELECTRO-MECHANICAL INTERLOCKING

THIS term, as used by signal engineers, means an interlocking plant where the switches are moved manually—by means of the ordinary “mechanical” machine, with its long levers and its rod connections along the ground—while the signals are worked by electric motors, a motor at each signal, controlled from the cabin, as in a power apparatus. With electric motors the signalman has to put forth no more physical effort than he does to turn a doorknob; and a succession of operations can be performed almost as fast as the mind can decide on them. The description of the interlocking at Trenton, N. J., printed on another page, will attract the attention of many readers not particularly interested in signal engineers’ technicalities, and it has seemed desirable, therefore, to explain this somewhat arbitrary use of terms. This combination of man-power and electric-energy is now so common in the signaling field—there being over 40 plants on the Pennsylvania alone—that the subject should be of general interest, and a brief comparison between this and the older arrangements will be found profitable. In passing, the reader should be cautioned concerning another arbitrary use of terms—a misnomer, in fact; the universal use of “lever” for the handle by which a signalman causes the movement of a switch or signal. In power interlocking the “lever” may be a sliding bar, to open or close an electric circuit, or a little crank to turn a spindle on its axis; but it is a “lever” all the same, so strong is the force of habit.

Electro-mechanical interlocking, when compared with mechanical interlocking which has no electrical features, presents a complexity of electrical devices and circuits, and involves increases in the cost of installation, of maintenance and of operation; and it is justified only by the increased safety and facility of operation that is obtained. That the improvement is believed to be justified is evident from the extensive use already noted. The 44 plants on the Pennsylvania have been put in use during the last six years; some of them new and some reconstructed plants. And there are numerous similar plants on other roads. The electro-mechanical plant, like the purely mechanical, is subject to the limitation of the distance at which switches can be operated, but the speed of operation is somewhat greater because of the smaller size of the machine and the smaller number of heavily loaded levers to be thrown for a given movement. In the nature of things, electro-mechanical cannot displace complete power interlocking to any great extent. The latter has its own field, where either some of the switches are too far from the machine for manual operation or the number of train movements is so great that ease and quickness of operation are essential.

Electro-mechanical interlocking is simply the result of the gradual addition of electrical devices to mechanical interlocking plants and the substitution of electrical for mechanical operation or control of certain parts of such plants. Probably the first step was electric locking, in the nature of approach locking or approach and route locking to prevent the movement of switches and derails when trains for which the signals had been cleared were approaching and passing through the plant. Next came power-operated distant signals, installed because it was practically impossible to move signal arms by either rods or wires at the long distances required to admit the fastest trains being stopped between the distant and home signals. As a third step, home signals were made semi-automatic when the plant was

within the territory of an automatic block system. At first the “electric slot” in the mechanical connections on the signal post, was used for this purpose. But, particularly where the home signals were made three-position and controlled by automatic signals in advance, power mechanisms were also used. It was then that some of the levers in the machine in the cabin ceased to be “mechanical” levers and began to control electric circuits only—a function for which the smaller levers, used in power-interlocking machines, were better adapted. The electric locking of individual switch levers, or facing-point-lock levers—section locking—followed, and finally electric locking, or control, designed to prevent the clearing of the signal for any given route, unless the actual position of the rails of each switch in that route corresponded with that of the lever for that switch.

Now a mechanical plant to which some or all of these electrical features had been added, might, perhaps, properly be called an electro-mechanical plant. But the final development was the electro-mechanical machine, combining mechanical levers for operation of the switches (and for facing point locks, where these are used) with small levers, of the type used in power-interlocking machines, for the operation of the signals and, in many cases, for control of the mechanical levers. In practice a plant is not usually called an electro-mechanical interlocking unless it has an electro-mechanical machine and all, or nearly all, of the electrical features mentioned.

The electro-mechanical machine, for a given plant, has the advantage over a mechanical machine equipped with electrical devices on the mechanical levers, that it can be more readily and rapidly operated on account of its smaller size; and, in the opinion of some signal engineers, the electrical parts of the machine are better suited to their purposes and more reliable. At the same time a saving in first cost is sometimes possible because the machine occupies much less floor space, and a smaller cabin can therefore be built.

From this brief outline it will be seen that this elaboration of what was at first a simple process—the insuring that a signal lever should not be moved to “clear” until its corresponding switch lever was surely set right—has been a logical and, we may say, an inevitable process. At each point where the original interlocking mechanism of 1860-1875 fell short of affording everything that the operating officer could demand, the signal engineer was called upon to provide something new; and he has responded with notable promptness and efficiency. He has perfected his interlocking with marked resourcefulness and economy. And here, as in so many other questions of the railroad plant and its maintenance, economy is the final test. Not that “safety first” is neglected; not by any means. Indeed, in the signal engineer’s office safety first goes without saying.

ARE OUR GOVERNMENTS PERFECT?

IN the *Railway Age Gazette* for August 13, there was published an editorial entitled “Our Inefficient Governments.” We pointed out therein that government regulation of business usually is inefficient and fails of its purpose. The Eastland disaster, occurring in spite of government inspection of steamships, was cited as an illustration. Our esteemed contemporary, the *Topeka Capital*, says that the *Railway Age Gazette* “therefore concludes as a logical proposition that the government should quit attempting to regulate business.” We beg to say to the esteemed *Capital* that its statement regarding our conclusion is not true. The conclusion which we drew was, we thought, as clearly stated as the English language would permit. It was not that government regulation should be abolished, but that there ought to be a movement to make our governments more efficient so that regulation would be more intelligent, and in consequence would secure the results which it aims at.

The concluding sentences of the editorial in this paper, to which the *Capital* refers, were as follows: “When shall we have an honest, energetic and widespread movement for making our governments competent to perform the functions they

already have? Raising them to this plane of efficiency is absolutely prerequisite to raising them to the still higher plane of efficiency where they will be fit to perform large and important additional functions. The advocates as well as the opponents of further increases of government functions ought to be able to unite in such a movement; for by far the strongest argument at present against further increases of government functions is the almost imbecile inefficiency which most of our governments display in most of the things that they now undertake."

This is not, as the Topeka Capital strangely asserts, "an argument for anarchy." It is not an argument for no government but for better government. Does not the Capital agree with us that we need better management of our governments, as well as of our railways? Or does the fact that the editor of the Capital is also the governor of Kansas make all governments entirely satisfactory to it?

THE RAILWAYS MUST MAKE THEIR OWN FIGHT

THE worst part of government regulation of railways in this country is the regulating done by the states. There is, and doubtless always will be, a good deal of complaint and criticism regarding federal legislation and the way the Interstate Commerce Commission performs its duties. But the regulating done by the federal government is in intelligence and fairness as far above that done by the states as the heavens are above the earth.

There have been some state commissions whose performance of their functions has been on a high plane. This formerly was notably true of the Railroad Commission of Massachusetts. It has been and is still true of the Railroad Commission of Wisconsin. The Wisconsin commission is strict to severity in controlling the concerns subject to its authority, but its expertness and justness command confidence and respect. The same used to be true of the Public Service Commission of the Second district of New York. But most state regulation, whether by legislatures or commissions, is as inexpert as it is unfair. Besides, as to most matters, there is no consistency between the policies of the various states, except that most of them squeeze the roads as hard as the constitution and the courts will let them. Finally, regulation by the federal government and by the various states involves much duplication and therefore much waste of energy and money on the part of both the railways and the governments.

State regulation ought to be either eliminated or brought into harmony with and subjection to federal regulation. In the Shreveport case the Interstate Commerce Commission found that there was unfair discrimination between the state rates from jobbing points in Texas to consuming points in east Texas and the interstate rates from Shreveport, La., to the same consuming points, and held that the railways must correct this by raising the state rates or reducing the interstate rates. The commission made clear that the discrimination resulted chiefly from the fact that the state rates were unreasonably low. Subsequently, when the eastern railways raised their interstate passenger fares to 2½ cents a mile, while leaving many state rates at 2 cents, the commission let the higher interstate rates go into effect. These and other developments seemed to indicate not only that the commission looked with disfavor on unremunerative state rates fixed by public authority, but that it might even take the aggressive in attacking them.

The decision in the Western freight rate case seems to show that the commission is not disposed to adopt any such policy. It refused advances in interstate livestock rates, not because they were unreasonable, but because there were corresponding state rates that were lower. Instead of state regulation being compelled by the federal government to conform to interstate regulation, or instead of interstate regulation being carried on regardless of state regulation, state regulation was allowed to exert a controlling influence on interstate regulation.

The *Railway Age Gazette* has criticized the attitude assumed by the commission in this instance as inconsistent and lacking

courage. But there is something to be said on the other side. The railways themselves show inconsistency and want of courage when they ask the commission to allow advances in interstate rates, and at the same time fail vigorously to attack state rates which are lower. It is primarily the business of the railways, and not that of the Interstate Commerce Commission, to attack unremunerative state rates. Furthermore, in the long run, it will probably be better that the railways rather than the Interstate Commerce Commission take the initiative in this matter. If the commission goes on letting the roads make interstate rates higher than the corresponding state rates it may become the object of attacks for permitting unfair discrimination against interstate traffic. If it should take the initiative in an attempt to force up the state to the level of the interstate rates it probably would be accused of going out of its way to aid the railways and to attack state regulation. Many persons might suspect and allege that it did this mainly to increase its own power. It seems not improbable that if it should show much aggressiveness in attacking state regulation it might so array the state commissions, state politicians and advocates of state's rights against it as to do harm to federal regulation.

It would seem that in the long run the best and most certain way to get the legislation, or the action by the commission and the federal courts, essential to securing the needed limitation or abolition of state regulation would be for the railways to take the initiative in bringing squarely before the commission and the courts, and if necessary also before Congress, the situation created by unjust state regulation in such a manner as practically to force the federal authorities to assert and exercise their paramount power. This may be done in various ways. For example, there are many state passenger fares which are lower than corresponding interstate passenger fares. There are also some state freight rates that are lower than the corresponding interstate rates. Why should not the railways advance some of these state rates fixed by public authority to the same basis as the corresponding interstate rates, and then when the states proceed against them appeal to the Interstate Commerce Commission for protection on the ground that the states are trying to compel an unjust discrimination against interstate commerce? If the commission should hold that the advanced state rates were reasonable the federal courts, it would seem, could be relied on to uphold the railways in persisting in charging them.

There is no question that in almost every instance where a state rate is being charged which is lower than a corresponding interstate rate an unjust discrimination is being worked against interstate commerce. This is a condition which ought not to be allowed to continue. It is wrong in itself and causes unnecessary and unfair losses to the railways. It would appear that the Interstate Commerce Commission does not intend to take the initiative in attacking this condition. Therefore, it is for the railways to open the attack, and the sooner and the more vigorously they begin it the earlier and the more satisfactorily the problem of regulation will be advanced toward a solution.

NEW BOOKS

Purchasing. By C. S. Rindsfoos, C.E. Bound in cloth; 165 pages; size, 6 in. by 9 in. Published by McGraw-Hill Book Company, Inc., 239 West 39th Street, New York. Price, \$2.

This book might well be called a psychological study of the art of purchasing. While it does deal to some extent with the department organization of the purchasing office, its main emphasis is placed rather on the elemental things for which the department is created. This is best explained by a citation of the following chapter heads: How to Obtain the Right Article; How to Obtain the Lowest Price; How to Obtain Prompt Delivery; How to Obtain Favorable Terms, and Strategy. The chapter on some of the Legal Aspects of Purchasing, written by William W. Taylor, is especially valuable, dealing as it does with the contract, the passing of title, etc. Nearly 60 pages of the book are devoted to specimen forms and contracts, thereby making the volume a useful reference book.

Letters to the Editor

THE UNNOTICED UNORGANIZED EMPLOYEES

REDSTACK, Ark.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The trenchant discussion of "The Rising Wage Differential and Its Cure," signed "Division Engineer," in your issue of June 18, contains many suggestive points for every member of the non-organized class of railway employees, to which class I belong.

During a varied experience of ten years handling a train sheet or a chief dispatcher's desk I have never belonged to any protective organization; but there have been many times when I have wondered if I should not be justified in joining six or eight of them if they were available. Everybody in the operating department, outside of the brotherhoods, should think seriously on this subject. The solution proposed would certainly appeal to all non-organized employees. The matter, however, is beyond the province of division officers, and my impression of general managers is that they do not usually consider such radical measures; yet I sincerely hope that some of them may give thought to the letter written by Mr. Division Engineer.

The management of a railroad should see that some supervision is made of the treatment accorded all classes of employees, and that non-organized employees should be accorded protection and treatment that would tend to promote their loyalty, rather than alienate them; or, in other words, induce them to shun, rather than seek, protective organization. Instead of having so many inspectors, minor officers, etc., to see that a man toes the mark all the time, endow at least one officer with authority to see that they are given proper credit for the good that they achieve, and are not criticized too severely for the errors that human beings are bound to make now and then.

For an example: A train dispatcher is subject to all the whims and erratic criticisms of not only all the minor officers, but also of their chief clerks. An unjust criticism cannot be designated as such without a man imperiling his means of making a living. Too often a man is hounded for a week over some matter that does not amount to a hill of beans, simply because he overlooked some unimportant paragraph in a bulletin book containing 795 pages of instructions; instructions which he is told he must know by heart. I know of a case where a section foreman—who happened to be the general manager's brother-in-law and was promoted to train master because of his remarkable ability—discharged a train dispatcher for sawing a passenger train at a non-telegraph station, regardless of the fact that the saw was directly caused by a drawbar failure.

In such cases, for an employee whose interests are bound solely to the company which he serves, there is no redress. Such things are altogether too common in various division headquarters to need much citing of individual instances. If some self-respecting general manager, who also had some respect for his railroad, would step into some of the offices where I have had the honor of serving, and look over some of the data by which the dispatching force were governed, he would no doubt call the janitor to dump it all into a bushel basket and make a bonfire of it; and tell the boys to start over.

Several years ago my employers were threatened with labor difficulties, and the superintendent called each dispatcher into the office and impressed upon him the fact that he was considered an officer of the company, and as such would be expected to submerge all his personal interests and give his undivided support and service to the company during the trouble. I am proud to say that every one of us responded nobly to the occasion, although it was exactly what I would have done without any preliminary coaching or reference to my being a member of the official staff. But, a short time later when I requested some courtesies in the way of transportation, I was informed that such

were not granted to employees less than three years in service, which was about six months more than I could claim. This was an arbitrary ruling applying to all employees regardless of whether the employee's allegiance was divided between the company and some other institution or not.

I pondered deeply the question whether I was an "official" or not, and if so, what an official consisted of, and came to the conclusion that if I was an official, an official in such cases consisted of at least two-thirds jackass for ever thinking that to dub a dispatcher an "official" carried any distinction except when it served the company's interests.

The rooms provided for the dispatching force in some instances are not fit for the habitation of swine; their working equipment is dilapidated and consists of pieces discarded by other departments patched together; and their sanitary conveniences—if there are any—are of inferior grade and inconveniently located. Great improvements could be made in this respect on almost any railroad, but if the dispatchers were to formulate a petition on the matter, it would be considered rank insubordination.

Let some railway company, as an experiment, create a new office. Select a responsible man with a keen eye and reliable judgment in such matters. Give him some such title as "inspector of methods," a fair salary, and instructions to canvass the system and take up for correction all cases that he may find of unjust criticisms or discipline, criticism or discipline rendered in such a way that it humiliates, insults and angers a man; unfavorable physical working conditions; shirking of responsibility and shifting of responsibility to subordinate shoulders by those who are designated to assume, and expected by the management to assume, that responsibility; and general injustice and arbitrary treatment accorded men who must either submit or resign. He would find enough of it to keep him busy for 365 days in the year.

There are many other ways in which railway companies can serve their own interests by devoting a little thought to the welfare of those employees who do not belong to fraternal orders. I hope to live long enough to see some of them put into operation. If I do not, I know that I shall live—if the life insurance companies guess correctly as to my prospects—to see a great many more men driven into organization in self defense.

HOMER PIGEON.

HANDLING OF CLAIMS FOR PERISHABLE FREIGHT

CHICAGO.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The purpose of this letter is, first, to protest again a practice which is throwing unnecessary expense upon all lines handling perishable freight; and, secondly, to further protest against a growing disposition on the part of the arbitration committees of the Freight Claim Association to settle cases otherwise than in accordance with the rules of the association, and contrary to provisions of the tariffs under which the goods move.

During the last few years several loss and damage claims filed against one commodity, viz., peaches in carloads, have been reviewed. The shipments were handled under stated refrigeration charges and the investigations as a rule developed that the cars failed to maintain schedule; that periods of over 24 hours' duration between re-icing operations were permitted to elapse, and that the condition of the lading on arrival at destination indicated through handling in transit. *There is no published rule to the effect that perishable freight must or should be re-iced every 24 hours.* In fact, the use of such a rule is condemned by transportation authorities.

It has been the practice of many freight claim agents to apportion claims of that description entirely on the refrigeration record, adjudging each road guilty of negligence which had permitted over 24 hours to expire between re-icings, although the freight was in possession of such road during only part of such 24 hours. Freight Claim Association arbitration committees are disposing of appeal cases in the same manner.

Practically all cars of fruit disposed of in Chicago have, at some time between the start of loading and completion of unloading, exceeded the 24-hour limit.

Indications are that bills of lading are made out by railroad agents and re-icing instructions inserted in accordance with some well-defined plan. This is wrong, as the shipper should tender the bill of lading complete for the railroad agent's signature, and, when stated refrigeration charges apply, without icing instructions.

Shipments arrive at destination in bad condition, checking, say, "over-ripe, rotten and mashed," and are taken in charge by consignees, who must pay for all ice furnished at destination and, therefore, have undertaken to regulate the time of icing and amounts supplied. It does not seem reasonable to say that failure to re-ice a car of "over-ripe, rotten and mashed" peaches every 24 hours after arrival at destination, regardless of all other conditions and circumstances, constitutes negligence.

Here is a case in point: A car arrived at destination with ice-boxes three-fourths full and unloading was completed in about 48 hours. It was handled under a tariff which carries the following rules:

Carriers' obligation to re-ice shipments moving under refrigeration charges ceases on arrival of cars at destination," etc.

"Upon arrival at destination of carload perishable freight under refrigeration if shipment is not unloaded immediately carriers will see that cars are properly iced and will examine tanks daily, filling to full capacity whenever tanks get below half full."

Nevertheless the terminal road was penalized for exceeding the unwritten and unauthorized 24-hour limit at destination. (Arb. claim A 3345 Appeal Claim No. 566.)

Following is an example of the extremes to which some freight claim agents are going:

A car was loaded at a point on a Western road and bill of lading issued to Pittsburgh, Pa. The initial line erroneously waybilled it to Philadelphia, Pa. In the actual movement it passed through Pittsburgh on schedule. The consignee was not located until three days after the car passed the correct destination and it was then in Philadelphia. In the meantime there was a heavy run of peaches. The markets at both Pittsburgh and Philadelphia became glutted, prices fell and the consignee refused to furnish disposition. On account of the large supply, peaches were being diverted away from the Philadelphia market. This carload was sold by the carrier to the best advantage, but at a loss. No complaint was made on account of their condition. In fact, the record showed the peaches were in good condition. It is clear that the loss was the result of excessive delay caused by the car going astray. The road responsible for the improper billing insisted on a complete investigation of the handling. It was developed that one period of 27 hours had elapsed in transit between re-icings. The 24-hour limit was then introduced and the road responsible for failure to re-ice within the limit was requested to assume 50 per cent of the claim, although damage to the shipment was not claimed.

Tariffs of recent issue provide that where shippers are not satisfied with the standard rule, *i. e.*, "re-ice to capacity at all regular icing stations," they must specify the points where ice is to be furnished and the amounts to be used. Such notations as "Re-ice every 24 hours," "Re-ice when necessary," "Keep fully iced," etc., have been defined by competent authorities as indefinite and unreasonable and their use prohibited by tariff publication. The propriety of the carriers' position in refusing to accept perishable freight with such notations in bills of lading was approved by the Interstate Commerce Commission in a decision rendered last winter (I. C. C. case 6097, *Providence Fruit & Produce Exchange v. New York Central & Hudson River Railroad*). While this decision is in connection with ice furnished on a rate per ton basis, still it would apply with equal force anywhere that the shipper had a voice in regulating the refrigeration. Carriers should consistently use the same rules they insist on shippers using, *viz.*, standard rules. In view of the fact that carriers may refuse to accept notations described above from shippers on account of their unreasonableness, the

same principle should apply when offered by one carrier to another.

Tariffs which publish stated refrigeration charges usually publish certain rules in connection therewith. In the past they have stated in effect that the acceptance of re-icing instructions from shippers was optional with the carriers and even when shippers did furnish instructions they were disregarded. The refrigeration tariffs now carry specific instructions to all agents not to accept re-icing instructions from shippers.

Agents of terminal roads comply literally with re-icing instructions published in tariffs in connection with refrigeration rates, and the roads are then adjudged guilty of negligence and penalized accordingly. This is brought about by the arbitration committees of the Freight Claim Association reading the before-mentioned unauthorized 24-hour re-icing limit into the rules.

As between penalizing the initial lines for accepting or using instructions such as are prohibited by tariffs, and distributing liability amongst connecting carriers for failure to comply with such instructions, the former would seem to be more reasonable.

The establishing of a 24-hour limit has broadened the field for the "rate sharks" of the country, and even now consignees are requesting carriers to show the exact hour and date of icing in freight bills as well as the names of stations at which cars are re-iced.

It would seem that there can be no excuse for railroads deliberately violating their tariff provisions on the one hand or, on the other, for the committees of the Freight Claim Association to base decisions upon their own precedents instead of upon the tariffs and rules.

JOHN F. BOYLAN.

OFFICERS MUST BE TRAINED IN THE SCHOOL OF EXPERIENCE

KANSAS CITY.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The address of Mr. Basford before a meeting of Burlington officers, published in your issue of July 23, and the supplementary article by Mr. Wright in the following issue, most forcibly portray the fundamental importance of the matter of organization in building up the personnel of the railway service, and make some splendid suggestions that should be very carefully considered by the executives and managers of all railroads. This most important work of conservation of men for posterity has been and is neglected by most railroads; evidently for the same reason that it has been neglected by other corporations, and even our government: *i. e.*, the mad rush for quick returns; the drawing on the bank of futurity; in short, selfishness. On some roads the trouble is due to stock jobbing by the financiers which often has resulted in too frequent changes in management.

Mr. Basford has done a good thing to show up the mistake of putting college or technical men too freely into official positions. The practice, I believe, is still in vogue on some roads. With very rare exceptions the college man has no ballast whatever. Not only is he without experience, he neglects to learn from the experience which is available all around him. Too often he assumes an attitude of superiority that freezes the very sources of confidence, and promotes distrust and suspicion on the part of the rank and file.

Empiricism, in its better sense—true study of experience—has been one of the foundation rocks of every eminently successful career, and the sooner railroad managements realize the fact the better. No man is qualified to be put in charge of men who has not served in the ranks himself.

And even the men who have fairly won their way will at times discriminate in the promotion of men, so there must be a central governing head or body which must make it its business to know that justice is done.

Mr. Basford said a timely word about clerks: "Clerks are a neglected crowd of competent and incompetent men; usually in blind-alley jobs with no training and no outlook." "Blind

alley" here is the right word. The clerk is so busy and so closely confined in his dark alley that he has no acquaintance with officers and is therefore left out of consideration; and even when he makes himself known he is likely to be pushed aside on the pretext that unfortunately he lacks outside experience, etc. My opinion is that officers who got their start as clerks have proved on the whole to be more thorough going and systematic than the man whose experience has been mostly in outdoor jobs.

Is it not possible that the managements have kept so busy for the past few years in dealing with the brotherhoods that their loyal body of clerical men have in consequence been largely overlooked? Is it not also a fact that the outside man who fortunately rubs up against the officers occasionally, is frequently promoted to official position simply through fancy or on account of his coming to notice on account of some one act? Men are promoted without being subjected to a real character or efficiency test. This is wrong.

Some such scheme as Mr. Basford suggests ought to be put in practice. It would help to liberate these loyal clerks, and put a check on nepotism as well as favoritism. As Burke remarked of our forefathers—the rebels of 1776—"Treat men as though they are what you want them to be and they will rise to it; and in no other way." When managements rise to this high plane there will be no need for the numerous committees, "safety first" or otherwise. Intelligent, sincere, loyal men are always safe men, and such men can be evolved only in the way that Mr. Basford points out.

OUTSIDE MAN.

COMMENDING GOOD SERVICE *versus* CONDEMNING BAD

NEW YORK CITY.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I noticed in your issue of August 20, page 361, an account of a "roll of honor" which is kept on the Conemaugh division of the Pennsylvania Railroad, wherein every employee in the train service who has made a perfect record—that is, freedom from suspensions or reprimands—for a year, has the fact made known to other employees by having his name printed on a bulletin.

Undoubtedly every active railroad man will look upon this as a good move. Publishing only the bad and unpleasant things, even when no names are mentioned, does not in all respects satisfy the demands of justice and equity. It is depressing to be constantly reading lessons and trying to absorb the admonitions contained in the lessons. On the other hand it is difficult to formulate and classify the good things that a superintendent feels disposed to say to the employees and so the whole situation remains in a sense unsettled. This attempt to cure the difficulty by means of the honor roll is therefore of general interest. If there must be publicity, it will be a good thing to try, for a time at least, the idea of publishing the good rather than the bad.

But publicity is not the only means of straightening out our discipline. There is a superintendent of a large division, of a large railroad, not a thousand miles from New York, who carries out the same idea as that embodied in Mr. Keiser's honor roll; but without having a roll. He writes an individual letter to each employee who is worthy of commendation. The commendatory statement is not rolled up, neither is it unrolled. It is folded, and put into an envelope. And when the recipient of such a letter unfolds it you can rest assured that he sits up and takes notice. He is not reading a tedious list of names. He has in his hand a statement that is of particular interest to him, himself. When he gets home he shows it to his wife, inside of ten seconds. If there is need of diplomacy—feminine or other—in getting the fact of the receipt of the letter properly circulated among the neighbors he does not need to hunt far for the necessary assistance in that direction.

I give you two or three samples of letters of this kind, slightly disguised:

John Smith, Brakeman,
Dear Sir:

In making a personal examination of your record I find that during the last twelve months no disciplinary action, of any kind, has been taken in connection with your service; no suspension and not even a reprimand. It is a pleasure to note this satisfactory service and I trust that you will succeed in making an equally creditable record during the current year.

Yours truly, ———.

Peter Jones, Engineman,
Dear Sir:

In making a personal examination of your record, I find that no suspensions, reprimands or other disciplinary action have been recorded against your name since January 1, 1913. This satisfactory service for a period of more than two years is evidence of good work on your part, and I shall hope to be able to record, next January, the fact that you have extended the two-year record to three years.

Yours truly, ———.

Benjamin Baker, Conductor,
Dear Sir:

In looking over your record recently I find that no unfavorable disciplinary action has been taken in connection with your service as conductor since January 1, 1912. This satisfactory record for a period of three years may justly be taken as evidence of excellent service; and such excellence is appreciated by the management.

Yours truly, ———.

It will be observed that the style of the letters differs somewhat in proportion to the length of the uneventful record. But, whatever the style, the notable thing is that the superintendent himself does look into the individual records. I think I am safe in saying that results, in the way of a reduction in the number of cases of discipline, are as satisfactory as those reported in your article of August 20, or as reported by other roads which have received mention in your columns now and then as making great advance in the matter stated, but I will not venture to enlarge on this feature of the matter, for the slackening in the volume of freight traffic on most of the roads of the country in recent years makes all comparisons somewhat deceptive. As you have remarked in some of your editorials, the weeding out of the less competent and less cautious men which follows a diminution of freight traffic often results, automatically, in a marked improvement in the service.

C. C.

CONDITIONS THAT NEED CORRECTING

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

When riding in some of the suburban trains on even our leading railroads, one cannot but wonder at times whether the passenger department does not spend its entire time looking after the interests of the traveling public on only the high-class through trains. On one of the most important suburban trains on a large system operating into New York City, the train crew very frequently permits smoking in day coaches other than the smoking cars, and cases are not infrequent where ladies entering the train have to spread newspapers on the floor between the seats where smokers have been spitting and throwing cigar ends, while window sills are at times covered with ashes knocked from cigars. It is another common occurrence on this train for the trainmen to omit the calling of important stations in some of the cars and for passengers to have to open vestibule doors and raise the trap doors because of no trainman being in attendance at that end of the car. Conditions of this kind are a disgrace to any railroad and it is scarcely believable that the officers in charge are aware of their existence.

E. M.

Electro-Mechanical Interlocking at Trenton

Electric Power for Signals, Manual for Switches; No Plunger Locks, No Detector Bars; Novel Locking

By W. M. POST

Supervisor of Signals, Pennsylvania Railroad, Jersey City, N. J.

On account of a change in the arrangement of the tracks of the Pennsylvania at Trenton, N. J., during 1913, the wornout mechanical interlocking of 66 working levers was replaced by an electro-mechanical interlocking, U. S. & S., style P, of 22 working mechanical levers and 28 working electric levers. In considering the type of interlocking to be adopted, it was found that both the installation cost and the maintenance of an electro-mechanical plant would be somewhat less than for other types. The compactness of an electro-mechanical, as compared with a mechanical machine, as shown graphically in Fig. 2, was con-

parture from general practice for mechanically operated switches has been found safe and practicable on account of the use of the "indicating lock lever" in connection with the mechanical switch lever. As the function of the indicating lock lever may not be generally understood, its operation is described somewhat in detail with reference to Fig. 4.

The indicating lock lever, when normal, locks the mechanical lever normal at A; when the indicating lock lever is on center, the mechanical lever can be moved and the crossover operated; when the mechanical lever is reversed, the indicating lock lever can be moved from center to reverse position, locking the mechanical lever reversed at A, provided the crossover switches



Fig. 1—Pennsylvania Interlocking at Trenton, N. J.—Looking East

sidered in connection with its operation, and the space saved in the interlocking station. The factor of safety of an electro-mechanical interlocking resulting from the actual mechanical connection between a switch and the lever operating it, and the electrical safeguards which are essential in a power interlocking, applied through the electric levers, was also considered.

The machine is shown in Fig. 3. Indication lights are located below the electric levers to show which track circuits are occu-

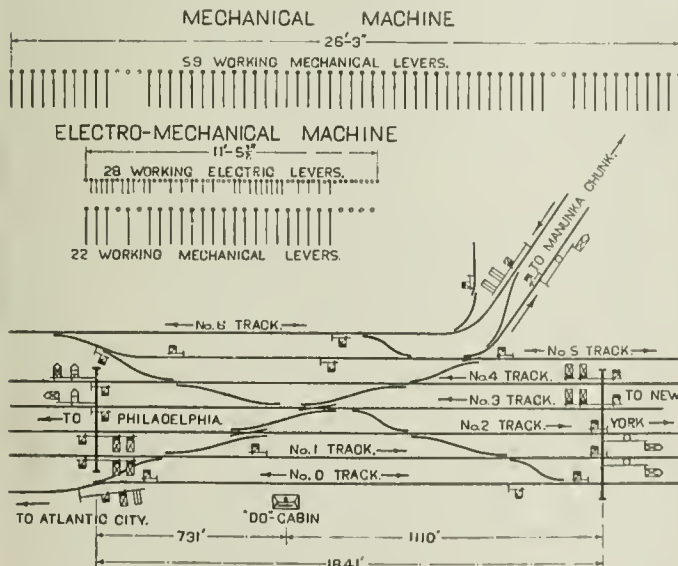


Fig. 2—Trenton Interlocking; Comparison of Old and New Machine

ried. A diagram showing the track layout is mounted directly over the machine, and clockwork slow releases are placed at each end of the machine. Mercury slow releases are connected to levers controlling dwarf signals located close to switches.

The switches are operated through switch and lock movements, eliminating the plunger facing point locks, detector bars, their pipe connections and levers. This somewhat radical de-

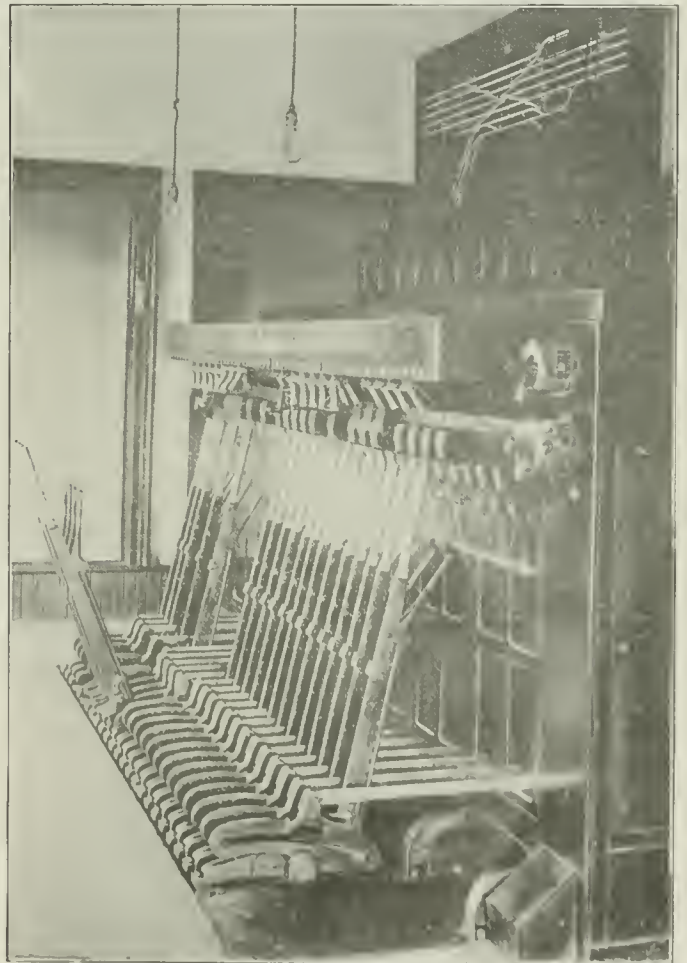


Fig. 3—Electro-Mechanical Interlocking Machine

have responded to the movement of the mechanical lever, are locked, and the indication is received. If the indication is not received, the indication lock lever cannot be moved from its center position, and as this lever actuates the mechanical locking and unlocks signal levers only when its stroke is completed, all signal levers are mechanically locked normal and a proceed signal cannot be given. The detector lock prevents the indication lock lever from being moved from either the normal or reverse positions when the track circuits controlling the crossover are occupied, which, in turn, prevents the mechanical switch lever from being moved because it is locked at A.

It will be noted that all vital parts of the machine, namely, mechanical locking, spring combination, indication and detector locks, are actuated by the small levers, resulting in a minimum amount of wear and strain on these parts. The mechanical lever and the pipe connections are merely to transmit the power applied by the leverman to the switch. A counterweight, W, is applied to the tail levers of the mechanical levers to assist in moving the lever to the normal position. As a leverman can apply more power to move a lever to the reverse position than to the normal, it was found that the addition of the weight evened up the effort on the part of the leverman. It was also found that a switch moves easier during the first part of the lever stroke, and the momentum gathered by the weight while moving the lever about half-way helps to carry the switch to

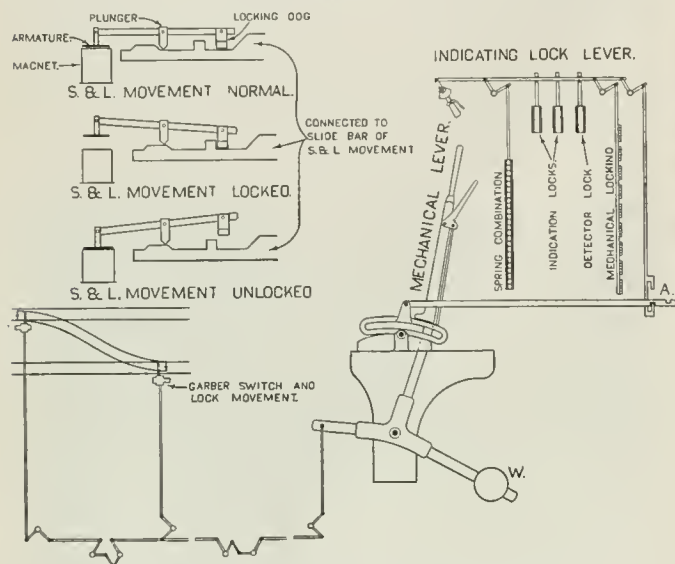


Fig. 4.—Connections of Levers and Switch Movement

the completion of the movement and lock it. In other words, the addition of the weight smooths out the lever movement in both directions. The furthest crossover at the east end of the plant, between Nos. 1 and 0 tracks, is 1,040 ft. from the machine. It is operated with one mechanical lever and is easily thrown.

The Garber switch-and-lock movement, which was designed for electro-mechanical interlocking, was used for each switch and movable-point frog. The pipe connection to this switch-and-lock movement is in the direction of the movement of the switch, and is operated by a direct thrust or pull on the operating rod of the switch, instead of through an escapement crank or a motion plate. This reduces to a minimum the power re-

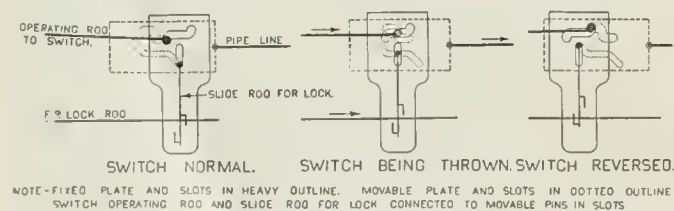


Fig. 5.—Garber Switch and Lock Movement

quired to operate the switch. A diagram showing the mechanical movements for unlocking, throwing and locking the switch, is shown in Fig. 5. A view of this switch-and-lock movement is shown in Fig. 6.

In mechanical and electro-mechanical interlockings, it is possible, although the probability is very remote, that something dragging from a passing train may catch the cross pipe lines and pull a switch open. On account of pipe lines crossing so many tracks at this point, it was thought best to lock electrically the facing point switches which might be pulled open when in the normal position. An electric lock for switch-and-lock movements has been designed to accomplish this. The magnet is de-energized when the indicating lock lever is normal or re-

versed, and should the pipe line be pulled by something dragging, the first movement of the slide rod would lift the armature and the locking dog would engage the projection on the slide rod, thereby locking the switch movement against further movement. If the indicating lock lever is on center, as is the case when the switch is to be thrown, the magnet is energized, and the first movement of the slide rod would lift the locking dog, allowing the switch to be moved in the usual way.

This electric lock is very rugged. Several tests proved that the pipe line would break should it be caught, and the electric lock still hold and prevent the switch from being pulled open. The same tests were applied on a switch equipped with the usual mechanical connections to see if the plunger lock and lock rod would hold the switch closed if the operating pipe line was



Fig. 6.—Garber Switch and Lock Movement

caught and pulled. The results showed that the front and lock rods bend and the switch can then be pulled open. These locks are only placed on switches where a track intervenes between the switch and the pipe line, and which face the normal direction of traffic. Fig. 4 shows the mechanical movements of this lock.

The electric current is obtained from the 3,300-volt, 60-cycle, underground signal feeders which supply the signal system between Trenton and Holmesburg Junction, about 20 miles. The generators for this system are situated in the pumping station at Bristol, 10 miles from Trenton. Suitable transformers are placed through the interlockings to furnish current for the track circuits and lights. A 14-volt storage battery of 150 ampere hours capacity, charged through a mercury-arc rectifier, furnishes direct current for the signals and indicators.

There are, on an average, 1,350 signal and 1,900 switch movements at this plant each day. The results of two years of service show this type of interlocking to be entirely practicable at a busy point. There are now 44 such plants in service on the Pennsylvania Railroad.

LEHIGH VALLEY'S NEW YORK ORE DOCK

The Lehigh Valley is building at Constable Hook, Bayonne, on New York bay, 5 miles south of the Battery, a long pier which will be the northern terminus of a line of ore-carrying steamships, to be used by the Bethlehem Steel Company to bring iron ore from Chile by way of the Panama Canal. Ore will be brought also from Cuba.

The new pier will be 1,000 ft. long and 67 ft. wide, and there will be a basin 200 ft. wide. A channel which will insure 35 ft. of water at low tide will be dredged. The pier will have four railroad tracks running its whole length, and will be equipped with modern unloading machines, two of them, which can work on one vessel at the same time, each with a maximum capacity of 500 tons an hour, or both together, 300 cars of ore a day.

The site of the new pier adjoins the plant of the Standard Oil Company. Plans of the Bethlehem Steel Company contemplate an annual importation of 750,000 tons of ore from its beds in Chile (Coquimbo). The Chilean deposits of iron ore, grading very high, are said to be the largest known in the world.

The foundation of the pier includes a section of cribbing work 710 ft. long and 46 ft. wide.

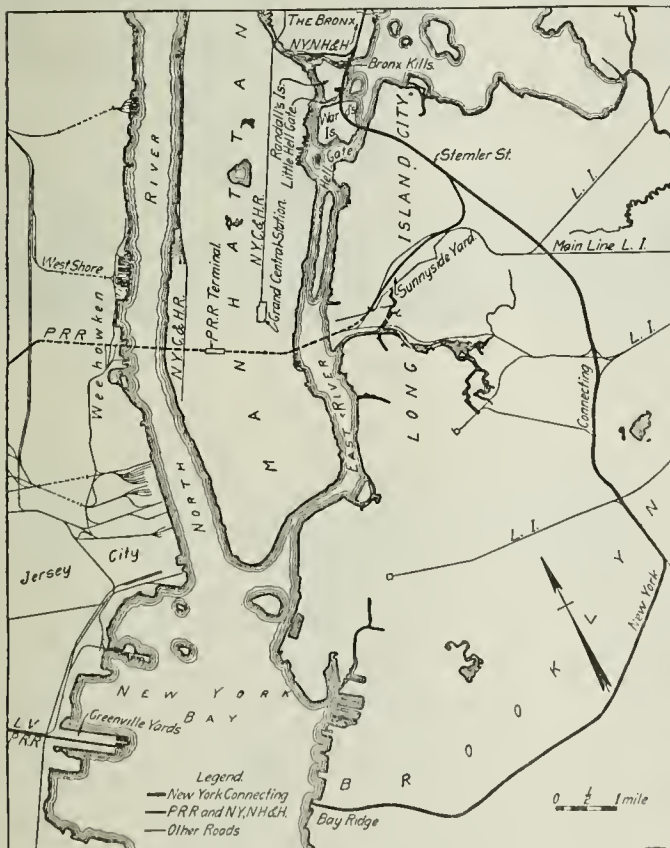
Construction of the New York Connecting Railroad

Material Progress Is Being Made on the Ten-Mile Line Which Will Connect the Pennsylvania and New Haven

Encouraging progress is being made on the East River Bridge division of the New York Connecting Railroad. All masonry work has been completed except the top portions of the abutments of the 1,000-ft. Hell Gate arch and the neat work of several viaduct piers on either side of the latter, which would interfere with the erection of the arch and which cannot be built until after it is completed. The erection of the four inverted bow-string trusses of the Little Hell Gate bridge and of the Hell Gate arch bridge is now in progress, all other portions of the steel work of the three and one-half miles comprising this section being now in place except the girders of the Ward's Island and Long Island viaducts, most of which are in temporary use in the back stays for the erection of the 1,000-ft. arch.

From the standpoint of the magnitude of the expenditure, together with the formidable character of the engineering prob-

lem and under the Hudson river through the Pennsylvania tunnel to connect directly with the main line for the West. A double-track freight line will leave the passenger line at Stemler street, Long Island City, the southern end of the East River Bridge division, and will continue east and south to a connection with the old Manhattan Beach road of the Long Island system near Fresh Pond Junction. The freight line then continues over the Long Island branch to Bay Ridge, directly opposite the Greenville (N. J.) freight yards of the Pennsylvania,



Map of New York and Vicinity, Showing Location of the New York Connecting Railroad

lems involved in the accomplishing of a definite strategic purpose, this project compares favorably with the entrance of the Pennsylvania on Manhattan island. An account of this undertaking, together with a record of the earlier progress on the various structures, was given in the *Railway Age Gazette* on November 13, 1914.

The four-track line of the New York Connecting Railroad leaves the New Haven's Harlem River branch at One Hundred and Forty-second street, in the Bronx, crosses Bronx Kills to Randall's Island, then crosses Little Hell Gate to Ward's Island, then turns sharply to the left across Hell Gate to Long Island on an arch bridge having the longest span in the world. A connection is made in Long Island City with the Pennsylvania system, through the Sunnyside yard. Passenger trains will use this connection, passing under the East river to Manhattan



Skew Crossing of New York Connecting Tracks Over New Haven Tracks in the Bronx

with which there is connection by means of ferries. A contract for the construction of the new work on the freight line has recently been let to the Wilson & English Construction Company, New York, and to P. McManus, Inc., Philadelphia.

THE BRONX AND RANDALL'S ISLAND VIADUCTS

The four New York Connecting tracks join the four New Haven tracks at One Hundred and Forty-second street in the Bronx, the New Haven tracks being spread to allow two new



West Abutment of Hell Gate Arch, Showing Stayback Structure

tracks to be located in the middle. The other two new tracks are constructed on the east side of the old line, all four tracks being laid on an earth fill between retaining walls as far south as One Hundred and Thirty-eighth street. From that point to One Hundred and Thirty-second street, where the difference in elevation between the new and the old tracks is too great to allow

the use of the retaining walls and earth embankment, rectangular concrete piers are used under each of the two double-track portions of the line, which carry 64-ft.-deck girder spans.

The girders are provided with ballast floors, I-beams spanning transversely across the girders and imbedded in concrete, forming the support for the ballast. The top flanges of the girders are equipped with what are known as dam angles, one being riveted to each edge to form a channel-shaped trough for the

very flat skew. The manner of handling this problem is shown in the accompanying photograph. No change from the standard construction is made for the two east connecting tracks, nor is the span length of the girders for the two west tracks modified. The girders are supported at their ends by heavy double-webbed cross girders, in turn supported on the east by the piers for the east tracks and on the west by heavy section columns placed between the two east and the two west New Haven tracks. The



Hell Gate Arch, East Abutment and Backstay. First Set of Ties in Position

reception of the concrete. The I-beams of the floor are supported over these channels on small cast-iron blocks, while clip angles riveted to the beams and to the dam angles secure the beams rigidly in position. Every third beam projects beyond the edge of the concrete imbedment to support plank walks between and outside the tracks, the outside walks being protected by iron pipe railings.

girders in the lower foreground carry the New Haven tracks over One Hundred and Thirty-third street. The vertical cross bracing on the right is not a truss, but serves as longitudinal sway bracing to take the traction forces from the tracks overhead. A rocker column is shown in the distance.

In the Bronx, south of the skew crossing, and on Randall's Island, the viaduct girders are carried on piers consisting of two



Progress on the Erection of the Hell Gate Arch. Second Set of Ties in Position on the East Side

Between One Hundred and Thirty-second and One Hundred and Thirty-third streets the New Haven tracks curve to the right to follow westward along the north shore of Bronx Kill. In consequence it is necessary for the two inside connecting tracks to cross over the two easterly New Haven tracks on a

heavy shafts or columns connected by an arched diaphragm or girder. The piers vary from 50 to 90 ft. in height. On Randall's Island the girders are from 80 to 87 ft. in length, the details corresponding very closely to those in the Bronx Viaduct. The girders for the two center tracks were erected first, and with

erected by means of a stiff-leg derrick set on a platform with long legs in the rear to permit it to stand on and advance up the inclined plane of the backstay as the erection progressed. When the work had advanced to the stage shown in the photograph of the west abutment, the erection traveler was set up on the first tie of the back stay directly over the top of the abutment in the position shown. It was then ready to proceed immediately with the erection of the arch. The general method followed is shown in the photograph of the east abutment. The



Debevoise Avenue Arch, Long Island Eastern Viaduct

erection had just been completed to the sixth panel point, one short of the point for attaching the second set of ties. The first set of ties is shown in position over the front face of the abutment, temporary I-beams being used to make the connection between the backstays and the ends of the top chords of the arch. With the traveler off the arch the other derrick can proceed with the completion of the top of the backstay to make ready for the second tie. In a third photograph, showing later progress on both cantilevers, the second ties are seen in position on the east side.

The traveler consists of a stiff-leg derrick on a platform sup-

ported on a tower carried on fur-wheel carriages rolling on tracks laid on the top chord. The rear of the traveler is raised or lowered to keep the platform level with the varying inclination of the top chord by means of pin holes set at various elevations in the rear legs.

the section. The crown joint will be left unriveted to serve as a hinge until all the dead load has been applied, after which the splices will be completed to make a two-hinged arch for live loading. It has been necessary to provide considerable allowance for deformation for the structure during erection. The length of all arch members has been corrected for dead load stress, while the tower of the backstay is tilted backward so that the elongation of the long tension members will bring it to a vertical position when the full load is applied. Frequent observations are taken for the deflection of the panel points of the arch ring, and as these are inaccessible to direct measurement or leveling it is necessary to determine their absolute position by triangulation from base lines at the foot of each abutment, perpendicular to the axis of the bridge.

A photograph shows the erection of the first section of the north pedestal for the west abutment. This weighs 117 tons and is composed of six separately-cast sections bolted together. The complete pedestal consists of three tiers, weighing in all 275 tons. The upper face of the top tier forms a seat for the cast shoe on the end of the bottom chord, the shoe having a slightly curved bearing face to form a hinged joint. As the great weight of this pedestal is carried on the steep slope of the skewback it must be supported by tie-bars projecting from the abutment until the full arch thrust is obtained. These tie-bars connect by means of pins to ears projecting from the rear of the top section of the pedestal and will be cut off after the arch has been fully erected. The maximum bearing of the pedestal on the skewback, which is of granite masonry, is 800 lb. per sq. in. Material is delivered to the site on car floats and is unloaded by a derrick to cars standing on temporary tracks.

THE EASTERN VIADUCT

East of the Long Island viaduct, which extends for 2,868 ft. east of the Hell Gate bridge, there is a structure 3,480 ft. long known as the Eastern viaduct. This consists of an embankment between vertical retaining walls, interrupted at the intervening streets by concrete arches and steel bridges and embodies a number of special features. The tracks are from 35 to 60 ft. above the street level, and, although this is a formidable height for retaining walls, they were adopted in place of open-viaduct construction because certain features embodied in the design resulted in a more economical structure than it was possible to obtain with other designs. The walls are 3 ft. thick at the top with a face batter of 1 in 40, the back being vertical. They are



Potter Avenue Crossing, Long Island Eastern Viaduct

ported on a tower carried on fur-wheel carriages rolling on tracks laid on the top chord. The rear of the traveler is raised or lowered to keep the platform level with the varying inclination of the top chord by means of pin holes set at various elevations in the rear legs.

The arch will be erected as a three-hinged structure. The ends of all bottom chord sections are milled to give bearing on the middle third of the section only, the complete joint being made by splices riveted to from 60 to 80 per cent of the strength of

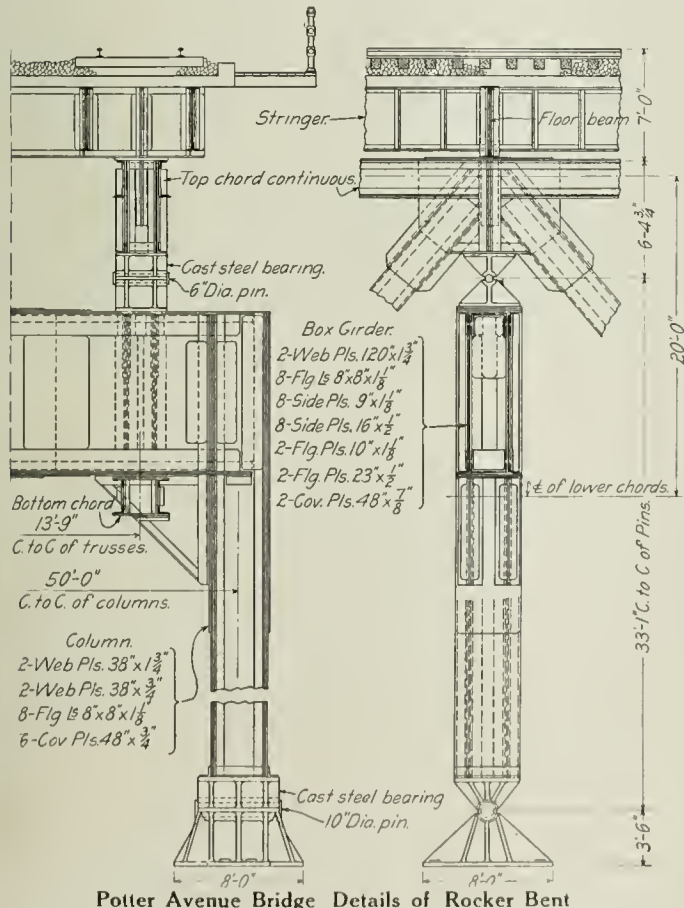
tied together through the fill, giving a form of construction similar to the reinforced concrete U-abutments frequently used by some railroads. However, as the walls are 57½ ft. apart the concrete protection for the tie rods, as ordinarily placed in the form of cross walls, would have added a large volume of concrete, which would require heavy reinforcement for flexure on account of the heavy superimposed four-track load and the wide span. This has been avoided by the use of a special form of construction made possible by careful preparation of the filling

which insures almost absolute security against settlement and has also permitted a large reduction in the assumed lateral earth pressure in design.

The transverse ties consist of $2\frac{1}{4}$ -in. diameter steel rods spaced 10 ft. centers, both vertically and horizontally and anchored at each end to horizontal and vertical 8-in. $16\frac{1}{4}$ -lb. channels through their intersection. The channels are imbedded in the walls 6 in. from the exterior faces. The walls are reinforced in addition by 1 in. square horizontal rods, spaced 1 ft., center to center vertically between the horizontal channels. The tie rods are protected by a covering of concrete 10 in. square, except that every 70 ft. along the viaduct one vertical tier of the rods is enclosed in a solid transverse wall, which serves as a diaphragm to give the structure the desired transverse stiffness and divide it into convenient units for filling.

The filling is a natural mixture of sand and clay obtained from a shovel cut in the Sunnyside yard of the Pennsylvania, three and one-half miles distant, a material which stood practically vertical in the cut. It was concluded that if this material could be placed in the fill as compactly as it was found in its natural state there would be ample insurance against settlement, and if proper precautions were taken to provide drainage a material reduction in the assumed lateral earth pressure for the design of the walls would be justified.

The fill was placed in layers 1 ft. thick, with a crown of 1 ft.



surface or established grade. These consisted of rubble stones piled up loosely to give a 2-ft. by 3-ft. cross section and carried to the top of the walls. The concrete protection for the tie rods was placed as the filling was brought up to the level of the rods. The fill was delivered in trains consisting of eleven 3.8-yd. capacity dump cars handled by a dinky engine. These were moved over the structure on trestle work supported by transverse timber trusses, the bottom members of which extended only 20 ft. below the top of the wall, thus avoiding the burial of any appreciable amount of timber work in the fill.

The viaduct is pierced by a number of concrete subways spanning the entire width of the street with simple concrete arches, all of which are on a skew and semi-circular in section, except the ones over Debevoise avenue and Stemler street, which are flat arches. The arches in all cases are reinforced concrete rings supported on abutments consisting, except in the case of Debevoise avenue and Stemler street, of thin-faced walls braced by deep counterforts. The viaduct structure, including the arches, is built monolithic without expansion joints, sufficient steel having been provided in the side walls to take care of temperature changes.

In addition to the seven arch subways there are three steel-deck truss structures crossing one or more streets on sharp skews, where the arches would have been impracticable. The line crosses Potter avenue, a street 80 ft. wide, at an angle of about 20 deg., resulting in a structure consisting of three 135-ft. spans, the intermediate support being provided by two rocker bents of two columns each, each having one column in the center of the street, the other column in each case standing outside of the street line on opposite sides. The superstructure consists of a Warren riveted truss having a top chord continuous over the top of the bents from end to end of the bridge, with an expansion joint at one abutment only. For this reason the bents act as rockers, the truss load being applied on top of the cross girders through heavy cast-steel pin bearings, while the columns are supported at their bases on cast pedestals equipped with 10-in. pins. The bents are of very heavy construction, consisting of heavy box-section columns made up of built-up I-beams connected by cover plates on both sides. The box girders which carry the load of the four trusses to the two columns are 10 ft. deep, with heavy double diaphragms at each truss concentration. Fillet brackets, 7 ft. on a side, stiffen the connections of the girders to the columns.

The floor system consists of floor beams and stringers resting on the tops of the top chords. The stringers have their top flanges level with the tops of the floor beams to facilitate the use of a solid concrete floor designed for ballast track construction. A plank sidewalk, protected by a pipe hand railing, is provided on either side of the four tracks.

A two-span deck truss structure has been provided at Frankfort and Steinway streets, and a four-span deck structure between Albert street and Flushing avenue. These are similar in design to the structure at Potter avenue, except that the intermediate supports are masonry piers to which the load is applied from the bottom instead of the top chord. Consequently, the bottom chords are continuous from end to end of the structure, instead of the top chords.

The American Bridge Company has the contract for fabricating and erecting the arch bridge and the Long Island and Ward's Island viaducts. The McClintic Marshall Construction Company furnished and erected the other viaducts and the Bronx Kills bridge, and is now erecting the Little Hell Gate bridge. All the work on the East River division is under the direction of Gustav Lindenthal, chief engineer; O. H. Ammann, assistant chief engineer, and H. W. Hudson, construction engineer, New York Connecting Railroad.

VALUATION OF RAILROADS IN WYOMING.—The Wyoming State Board of Equalization has fixed the total assessed valuation of all railroads in the state for 1915 at \$55,120,350, an increase over the valuation of last year of \$3,235,110

in the width between the walls and was rammed in place by Ingersoll-Rand foundry tampers. In general the tamping was conducted by shifting the tools one-half the width of the hammer face with each blow, so that an equivalent of two blows on each square inch of the area was obtained. The result was a surface that would scarcely take an impression from a boot heel and the filling was made so compact that the volume measurements in place agreed to within less than 1 per cent with the measurements in the cut. Simultaneous with the placing of the fill, drainage chimneys were built along each wall over weep holes piercing the walls every 10 ft. at the level of the natural ground

RULES FOR INSPECTION OF LOCOMOTIVES
AND TENDERS

As noted in the *Railway Age Gazette* of August 20, page 357, a conference of representatives of the railways, of the Bureau of Locomotive Boiler Inspection and of organized labor was held August 23 to discuss the rules and instructions for the inspection and testing of steam locomotives and tenders submitted by the Bureau of Locomotive Boiler Inspection. Sixty-one rules were considered and all but rules 18, 29 and 31 were finally so drafted that they were accepted by the representatives of the railways subject to the final approval of the railways themselves. All of the rules are published in Bulletin 70, recently issued by the Special Committee on Relations of Railway Operation to Legislation. These rules will be presented to the Interstate Commerce Commission by the Bureau of Locomotive Boiler Inspection for acceptance. The railways will probably present substitute rules for rules 18, 29 and 31. The following is a list of the more important rules, those printed in italics being the rules not accepted by the representatives of the railways:

Rule 1.—The railroad company will be held responsible for the general design, construction and maintenance of locomotives and tenders under its control.

Rule 2.—The mechanical officer in charge, at each point where repairs are made, will be held responsible for the inspection and repair of all parts of locomotives and tenders under his jurisdiction. He must know that inspections are made as required, and that the defects are properly repaired before the locomotive is returned to service.

Rule 4.—Each locomotive and tender shall be inspected after each trip, or day's work, and the defects found reported on an approved form to the proper representative of the company. The form is shown herewith:

Locomotive	Number
	Initials
..... Railroad.	

DAILY LOCOMOTIVE INSPECTION AND REPAIR REPORT.

Instructions.—Each locomotive and tender must be inspected after each trip or day's work and report made on this form whether needing repairs or not. Proper explanation must be made hereon for failure to repair any defects reported, and the form approved by foreman before the locomotive is returned to service.

Inspected at.....time	m.
Date.....	191
Repairs needed:	
.....	
.....	
.....	
.....	
.....	
.....	
.....	

Condition of injectors?.....	Water glass?.....
Condition of gauge cocks?.....	Brakes?.....
Condition of piston rod and valve stem packing?.....	
Safety valve lifts at.....lbs.	Seals at.....lbs.
Main reservoir pressure.....lbs.	Brake pipe pressure.....lbs.

Signature
Occupation

The above work has been performed, except as noted, and the report is approved.
..... Foreman.

Note.—Additional items may be added to this form if desired.

Rule 5.—* * * * Locomotives built subsequent to January 1, 1916, shall have the ash pans supported from mud rings or frames. Locomotives built prior to January 1, 1916, which do not have the ash pans supported from mud rings or frames shall be changed when the locomotive receives new firebox. * * * * No part of ash pan shall be less than 2½ in. above the rail.

BRAKE AND SIGNAL EQUIPMENT

Rule 7.—The compressor or compressors shall be tested for

capacity by orifice test as often as conditions may require, but not less frequently than once each three months. The diameter of orifice, speed of compressor and the air pressure to be maintained for compressors in common use are given in the following table:

Maker.	Size compressor	Strokes per minute	Dia. of orifice (inches)	Air pressure maintained
Westinghouse ...	9½	70 complete	9/64	To within 5 lb. of 1 lb. adjustment of the low-pressure governor.
Do.....	11	70 complete	11/64	
Do.....	8½ C.C.	70 complete	9/64 & 11/64	
New York.....	2a	100 single	3/16	61 lb.
Do.....	6a	100 single	7/32	62 lb.
Do.....	5b	100 single	5/16	50 lb.

Rule 8.—Every main reservoir before being put into service and at least once each 12 months thereafter shall be subjected to hydrostatic pressure not less than 25 per cent above the maximum allowed air pressure. The entire surface of the reservoir shall be hammer tested each time the locomotive is shopped for general repairs, but not less frequently than once each 18 months.

Rule 10.—Distributing or control valves, reducing valves, triple valves, straight-air-double-check valves, dirt collectors and brake cylinders shall be cleaned and brake cylinders lubricated as often as the conditions require to maintain them in a safe and suitable condition for service, but not less frequently than once each six months.

Rule 12.—The minimum piston travel shall be sufficient to provide proper brake shoe clearance when the brakes are released. The maximum piston travel when locomotive is standing shall be as follows:

Cam type of driving-wheel brake	3½ in.
Other forms of driving-wheel brake	6 in.
Engine truck brake	8 in.
Tender brake	8 in.

Rule 14.—Main reservoir leakage shall not exceed an average of 3 lb. per minute in a test of 3 minutes duration. Brake pipe leakage shall not exceed 5 lb. per minute. Brake cylinder leakage shall not exceed 5 lb. per minute per cylinder from an initial cylinder pressure of 50 lb.

Rule 15.—The train signal system, when used, shall be tested and known to be in safe and suitable condition for service before each trip.

CABS, WARNING SIGNALS, AND SANDERS

Rule 16.—* * * * Road locomotives used in regions where snowstorms are generally encountered shall be provided with what is known as a "clear-vision" window, which is a window hinged at the top and placed in the glass in each front cab door or window. These windows shall not be less than 5 in. high, located as nearly as possible in line of the enginemen's vision, and so constructed that they may be easily opened or closed.
* * * *

Rule 18.—Each locomotive shall be provided with a bell, so arranged and equipped that it may be operated from the engineer's cab by hand and by power. (*Rule 18 objected to by the Committee representing the Carriers.*)

DRAW GEAR AND DRAFT GEAR

Rule 22.—The draw gear between the locomotive and tender, together with the pins and fastenings, shall be maintained in safe and suitable condition for service. The pins and drawbar shall be removed and carefully examined for defects not less frequently than once each three months. Suitable means for securing the drawbar pins in place shall be provided. Inverted drawbar pins shall be held in place by plate or stirrup. * * * * Lost motion between locomotives and tenders not equipped with spring buffers shall be kept to a minimum, and shall not exceed ½ in. * * * *

DRIVING GEAR

Rule 25.—Crossheads shall be maintained in a safe and suitable condition for service, with not more than ¼ in. vertical and 5/16 in. lateral play between crossheads and guides.

Rule 28.—* * * * Autogenous welding of broken or

cracked main and side rods not permitted. Bearings and bushings shall so fit the rods as to be in a safe and suitable condition for service, and means be provided to prevent bushings turning in rod. Straps shall fit and be securely bolted to rods. The total amount of side motion of rods on crank pins shall not exceed $\frac{1}{4}$ in. On locomotives used in road service the bore of the main rod bearings shall not exceed pin diameters more than $\frac{3}{32}$ in. at front end, or $\frac{3}{32}$ in. for back end. The total lost motion at both ends shall not exceed $\frac{5}{32}$ in. The bore of side rod bearing on main pin shall not exceed pin diameter more than $\frac{3}{16}$ in. * * * *

LIGHTS

Rule 29.—Each locomotive used in road service between sunset and sunrise shall have a headlight which will enable persons with normal vision in the cab of the locomotive, under normal weather conditions, to see a dark object the size of a man for a distance of 1,000 feet or more ahead of the locomotive; and such headlights must be maintained in good condition. Locomotives used in road service, which are regularly required to run backward for any portion of their trip, except to pick up a detached portion of their train, or in making terminal improvements, shall have on the rear a head-light which will meet the foregoing requirements. Nothing in the foregoing rules shall prevent the use of a device whereby the light may be diminished in yards and at stations to an extent that will enable the person or persons operating the locomotive to see a dark object the size of a man for 300 feet or more ahead of the locomotive under the same conditions as set forth above. When two or more locomotives are used in the same train, the leading locomotive only, will be required to display a head-light. (Rule 29 was objected to by the committee representing the carriers.)

Rule 31.—Each locomotive used in yard service between sunset and sunrise shall have two headlights, one located on the front of the locomotive and one on the rear, each of which will enable persons with normal vision, in the cab of the locomotive, under normal weather conditions, to see a dark object the size of a man for a distance of 300 ft. or more; and such headlights must be maintained in good condition. (Rule 31 was objected to by the committee representing the carriers.)

RUNNING GEAR

Rule 33.—Driving, trailing and engine truck axles with any of the following defects shall not be continued in service: Bent axles; cut journals that cannot be made to run cool without turning; seamy journals in steel axles; transverse seams in iron axles, or any seams in iron axles causing axles to run hot; or unsafe on account of usage, accident or derailment; main driving, trailing truck or engine truck axles more than one-half inch under original diameter; other driving axle more than three-fourth inch under original diameter.

Rule 34.—Diameter of tender truck axle journals shall be governed by axle loads. The minimum diameter of journals for various axle loads shall be as follows:

	Axle load. Minimum diameter of journals.
50,000 lb.	$5\frac{1}{2}$ in.
38,000 lb.	5 in.
31,000 lb.	$4\frac{1}{2}$ in.
22,000 lb.	$3\frac{3}{4}$ in.
15,000 lb.	$3\frac{1}{4}$ in.

Rule 35.—Tender truck axles with any of the following defects shall not be continued in service: Bent axle; cut journals that cannot be made to run cool without turning; seamy journals in steel axles or transverse seams in journals of iron axles, or unsafe on account of usage, accident or derailment; collars broken or worn to one-fourth inch or less in thickness; fillet in back shoulder worn out.

Rule 36.—Crank pins shall be securely applied. Shimming or prick punching crank pins will not be allowed. All crank pins allowed after January 1, 1916, shall have the date applied and kind of material used legibly stamped on end of pin. Crank pin collars and collar bolts shall be maintained in a safe and suitable condition for service.

Rule 37.—Driving boxes shall be maintained in a safe and suitable condition for service. Broken and loose bearings shall be renewed; not more than one shim may be used between box and bearing.

Rule 40.—The total lateral motion or play between the hubs of the wheels and the boxes on any pair of wheels shall not exceed the following limits:

For engine truck wheels (trucks with swing centers).....	1 in.
For engine truck wheels (trucks with rigid centers).....	$1\frac{1}{2}$ in.
For trailing truck wheels.....	1 in.
For driving wheels (more than one pair).....	$\frac{3}{4}$ in.

These limits may be increased on locomotive operating on track where the curvature exceeds 20 deg. when it can be shown that conditions require additional lateral motion. The lateral motion shall in all cases be kept within such limits that the driving wheels, rods or crank pins will not interfere with other parts of the locomotive.

Rule 42.—Springs and equalizers shall be arranged to insure the proper distribution of weight to the various wheels of the locomotive; maintained approximately level, and in a safe and suitable condition for service. Springs or spring rigging with any of the following defects shall be renewed or properly repaired: One long leaf or two or more shorter leaves broken; springs with leaves working in band; broken coil springs; broken driving box saddle, equalizer, hanger, bolt or pin.

Rule 43.—The minimum height of flange for driving and trailing wheel tires for locomotives used in road service, measured from tread, shall be 1 in. except for locomotives originally constructed for plain tires when the minimum height of flange on one pair of wheels may be $\frac{7}{8}$ in. The maximum taper for tread of tires from throat of flange to outside of tire for driving and trailing wheels for locomotives used in road service shall be $\frac{1}{4}$ in. and for locomotives used in switching service $\frac{5}{16}$ in. The minimum width of tires for driving and trailing wheels of standard gage locomotives shall be $5\frac{1}{2}$ in. for flanged tires and 6 in. for plain tires When all tires are turned or new tires applied to driving and trailing wheels of locomotives, the diameter of the wheels on the same axle or in the same driving-wheel base shall not vary more than $\frac{3}{32}$ in. When a single tire is applied the diameter must not vary more than $\frac{3}{32}$ in. from that of the opposite wheel on the same axle. When a single pair of tires is applied the diameter must be within $\frac{3}{32}$ in. of the average diameter of the wheels in the driving-wheel base to which they are applied. Driving and trailing wheel tires with any of the following defects shall not be continued in service: Slid flat spot $2\frac{1}{2}$ in. or more in length; flange $15/16$ in. or less in thickness, gaged at a point $\frac{3}{8}$ in. above the tread, or having flat vertical surface 1 in. or more from tread; tread worn hollow $5/16$ in. on locomotives used in road service or $\frac{3}{8}$ in. on locomotives used in switching service; flange more than $1\frac{1}{2}$ in. from tread to top of flange.

Rule 46.—Wheels shall be securely pressed on axles. Prick punching or shimming the wheel fit will not be permitted. The diameter of wheels on the same axle shall not vary more than $\frac{3}{32}$ in. Wheels used on standard gage track will be out of gage if the inside gage of flanges, measured on base line, is less than 53 in. or more than $53\frac{3}{8}$ in. The distance back to back of flanges of wheels mounted on the same axle shall not vary more than $\frac{1}{4}$ in.

Rule 47.—Cast-iron or cast-steel wheels with any of the following defects shall not be continued in service:

Slid Flat.—When the flat spot is $2\frac{1}{2}$ in. or over in length, or if there are two or more adjoining spots each 2 in. or over in length.

Broken or Chipped Flange.—If the chip exceeds $1\frac{1}{2}$ in. in length and $\frac{1}{2}$ in. in width.

Broken Rim.—If the tread, measured from the flange at a point $\frac{5}{8}$ in. above the tread, is less than $3\frac{3}{4}$ in. in width.

Shelled Out.—Wheels with defective treads on account of cracks or shelled out spots $2\frac{1}{2}$ in. or over, or so numerous as to endanger the safety of the wheel.

Brake Burn.—Wheels having defective treads on account of cracks or shelling out due to heating.

Seams.—Seams $\frac{1}{2}$ in. long or over, at a distance of $\frac{1}{2}$ in. or less from the throat of the flange, or seams 3 in. or more in length, if such seams are within the limits of $3\frac{3}{4}$ in. from the flange, measured at a point $\frac{3}{8}$ in. from the tread.

Worn Flanges.—Wheels on axles with journals 5 in. by 9 in. or over, with flanges having flat, vertical surfaces extending $\frac{7}{8}$ in. or more from the tread, or flanges 1 in. thick or less gaged at a point $\frac{3}{8}$ in. above tread. Wheels on axles with journals less than 5 in. by 9 in. with flanges having flat, vertical surfaces extending 1 in. or more from the tread, or flanges $15/16$ in. thick or less, gaged at a point $\frac{3}{8}$ in. above the tread.

Tread Worn Hollow.—If the tread is worn sufficiently hollow to render the flange or rim liable to breakage.

Burst.—If the wheel is cracked from the wheel fit outward. Cracked tread, cracked plate or one or more cracked brackets. Wheels out of gage.

Wheels loose on axle.

Rule 48.—Forged-steel or steel-tired wheels with any of the following defects shall not be continued in service:

Loose wheels, loose, broken or defective retaining rings or tires, broken or cracked hubs, plates, spokes or bolts.

Slid flat spot $2\frac{1}{2}$ in. or longer, or if there are two or more adjoining spots each 2 in. or longer.

Broken flange.

Defective tread on account of cracks or shelled out spots $2\frac{1}{2}$ in. or longer, or so numerous as to endanger the safety of the wheel.

Flange worn to $15/16$ in. or less in thickness, gaged at a point $\frac{3}{8}$ in. above the tread, or having flat vertical surface 1 in. or more from tread; tread worn $5/16$ in.; flange more than $1\frac{1}{2}$ in. from tread to top of flange. * * * *

Wheels out of gage.

Rule 51.—Driving and trailing wheels with any of the following defects shall not be continued in service:

Driving or trailing wheel centers with three adjacent spokes, or 25 per cent. of the spokes in wheel broken.

Loose wheels, loose, broken or defective tires or tire fastenings, broken or cracked hubs or wheels out of gage.

TENDERS

Rule 52.— * * * * The difference in height between the deck on the tender and the cab floor or deck on the locomotive shall not exceed $1\frac{1}{2}$ in. The maximum width of the gangway between locomotive and tender while standing on straight track shall be 16 in.

Rule 53.— * * * * Not less frequently than once each month the interior of the tank shall be inspected and cleaned if necessary. * * * *

Rule 55.—Tender truck center plates shall be securely fastened, maintained in a safe and suitable condition for service, and provided with a center pin properly secured. Where shims are used between truck center plates the male center plate must extend into the female center plate not less than $\frac{3}{4}$ in. Truck bolsters shall be maintained approximately level. * * * * Friction side bearings shall not be run in contact. The maximum clearance of side bearings on rear truck shall be $\frac{3}{8}$ in. and if used on front truck $\frac{3}{4}$ in., when the spread of side bearings is 50 in. When the spread of the side bearings is increased the maximum clearance may be increased in proportion.

FILING REPORTS

Rule 58.—Not less than once each month and within 10 days after inspection a report of inspection, Form No. —, shall be filed with the United States inspector for each locomotive used by a railroad company, and a copy shall be filed in the office of the chief mechanical officer having charge of the locomotive.

Rule 59.—A copy of the monthly inspection report, Form No. —, or annual inspection report, Form No. —, properly filled out, shall be placed under glass in a conspicuous place in the cab of the locomotive before it is put into service.

Rule 60.—Not less than once each year and within 10 days

after required tests have been completed a report of such tests, showing general condition of the locomotive, shall be submitted on Form No. —, and filed with the United States inspector, and a copy shall be filed in the office of the chief mechanical officer having charge of the locomotive. The monthly report will not be required for the month in which this report is filed.

ACCIDENT REPORTS

Rule 61.—In the case of an accident resulting from failure, from any cause, of a locomotive or tender or any appurtenances thereof, resulting in serious injury or death to one or more persons, the carrier owning or operating such locomotive shall immediately transmit by wire to the chief inspector, at his office in Washington, D. C., a report of such accident, stating the nature of the accident, the place at which it occurred, as well as where the locomotive may be inspected, which wire shall be immediately confirmed by mail, giving a full detailed report of such accident, stating, so far as may be known, the causes, and giving a complete list of the killed or injured.

GREAT ACHIEVEMENTS OF GERMAN STATE RAILROAD LINES

BY FREDERIC WILLIAM WILE
Author of "Men Around the Kaiser"

The war has been called, at various times, the "trench war," the "motor war" and the "shells war." But, as far as Germany and the German armies are concerned, it is a "railroad war," pure and simple. The amazing ability of the Kaiser's staff and field marshals to fling not only regiments, brigades and divisions, but entire army corps and even whole armies, from East to West and back again from West to East, as emergency requires, is due exclusively to the marvelous system of state-owned railroad lines which honeycomb the fatherland from end to end in all directions. When the history of the war is written the achievements of German railroad men will deserve to be inscribed in letters of red, for the triumphs of the Teuton legions in both the western and eastern theatres of war stand to their credit no less than to the credit of the engineers who built the deadly 42-centimeter howitzer or the strategists of Berlin, who have so skilfully directed the activities of the mighty German war machine.

When regiments which were fighting in Flanders, April 1, are next heard of in Southern Galicia, April 15, or when Germans who were resisting the onslaughts of Joffre's Frenchmen around Arras late in June, pounded at Warsaw on the 4th of July, it means that the lines of communication at the command of the German military authorities have approached something resembling mechanical perfection. We of the United States can perhaps somewhat visualize the problems the German railroad authorities are solving every day if we conjure up the vision of our own country resisting invasion, let us suppose, simultaneously in the Southwest—Texas—and in the Northeast—Maine. The distances with which the German railroad staff must deal are not, of course, as magnificent as those which separate Bangor from Galveston—all Germany is not as large in area as Texas alone—but Germany has expanded, temporarily at least, since last August, for she now occupies five-sixths of Belgium, 25,000 sq. miles of France and 30,000 sq. miles of Russia.* Her railroad system today contemplates an area, one of whose farthestmost eastern points is Libau on the Baltic coast of Russia, and which stretches to the west to the Belgian coast of the Channel, and internally to within 50 or 60 miles of Paris.

Put in American terms, the Kaiser's railroad strategists have to concern themselves with an area which embraces, roughly, the states of Ohio, Michigan, Indiana, Illinois, Iowa, Kentucky, Missouri, Wisconsin and Tennessee. I am sure that many an American traffic manager will acknowledge that the job of switching a couple of million armed men, with full artillery

*This article was written in London on July 3.

equipment, back and forth, incessantly, week in and week out, through territory of such ramifications, represents as big a piece of "railroading" as was ever tackled. I heard H. W. Thornton, the gifted and popular American general manager of England's Great Eastern Railway, tell an after-dinner audience not long ago that American traffic managers think they are handling "some traffic" when they successfully deal with a national convention, an Epworth League conclave or a G. A. R. encampment.

I present herewith the official narrative of "The Railway War," as prepared for publication in Germany by the great general staff. It is necessarily somewhat stilted in form, in the English translation, but complete idiomatic rendering of the facts in our own language is almost impossible:

"THE RAILWAY WAR"

"In order to obtain a survey of the preparations for the 'Railway War' one must remember the conditions in Germany during the critical days at the beginning of August, 1914. It was the holiday and tourist season. The large manœuvring grounds in every military district were filled with troops. The freight traffic was normal. Everybody believed till the last moment that peace would be maintained; moreover, war preparations could not, for political reasons, be carried out by the railways.

"War was declared on August 2. Everybody who was away hastened to the railway to reach home before the movement of the military transport began. Relatives visited their sons and brothers to take leave of them before they left for the front. The troops taking part in the manœuvres were sent back to their garrisons as quickly as possible. The mobilization of our armies had to take place partly in the western industrial district. Thousands of long military trains had to be despatched there. By this time the railways had to be cleared of the large number of loaded and unloaded freight cars in order that there might be no hitch in the forward movement.

"At the same time other transport movements began throughout the entire fatherland. Long trains of empty cars and lines of locomotives coupled together were sent to those places where, after careful consideration, cars and engines were greatly needed at the beginning. It is easy for anyone to understand the reason for all this railway traffic. First of all, there was the transport of millions of reservists and 'landwehr' men to their respective posts; then followed the transport of provisions and material for the troops and the armaments for the fortresses. In the districts of Germany which provided the horses, trains ran at specified times in every direction where the full complement of horses was needed as against the number under normal conditions in time of peace. Long trains filled with meat proceeded to the army preserving factories from the districts providing cattle. Finally, from the very beginning of the war there was a constant flow of coal trains from the collieries to the naval ports.

"A very few hours after mobilization there was the first great rush of troop trains. These were filled with men bound for the frontiers in order to guard them against enemy invasion. From day to day this traffic grew until our armies stood at the frontiers and numerous depots behind the first line of troops were filled with provisions, ammunitions, etc. This was, indeed, a great traffic in Germany! The movement of transports was carried out without a hitch. How easily might a very serious accident have happened at any one place on our vast railway system, through human neglect or by criminal hand, which would have seriously delayed the arrival of troops at the frontier! The railway authorities had, therefore, in their primary preparations to take into consideration our geographical position and see where the most vulnerable positions lay. In time of peace trial trains were run to these various positions, so that if war broke out there should be no hitch in the transport of troops. Preparations were made, therefore, for all eventualities.

"The organization of the military railways has already proved

successful during the present war. When the commander of a force on the march receives news of the enemy's whereabouts and has to proceed elsewhere, trains are in instant readiness to take him to the scene of operations. The ability of the officers and employees organizing the transport of troops by rail materially contributed to our great successes on the eastern and western frontiers, but their greatest reward was reaped in the latest victories in Galicia.

"The essential condition for the prompt transport and mobility of troops by rail is to have at one's disposal a well-developed railway system. When the mobilization of our armies to the frontiers was complete and the forward march had begun, the chief of the railway section, as 'Chief of the Military Railway Organization,' and his staff proceeded to the field with His Majesty, the Kaiser. From the day of mobilization the relations of the so-called 'military railway authorities' with the German railway administration proper were completely changed. Numerous railways in Germany have since then been amalgamated with the 'war section,' that is to say, the various individual railway administrations are now subject to the orders of the 'Chief of the Military Railway Organization, in respect to everything relating to the running of trains. This chief issues to the railway commando ('working notices') for regulating the war traffic. He has also at his disposal for this work the machinery of the railway section of the great general staff in Berlin.

"To the German railway system were soon added the railway districts in conquered territory. Our troops penetrated very quickly far into the enemy's country, yet, on practically all battlefields the enemy still found time to blow up most of the large bridges and numerous tunnels before retreating. Our railway tracks had, of course, to follow very closely behind the advancing armies, so as not to impede their forward march. This required the prompt repairing and putting into working order the enemy's dismantled railways. To this end, when mobilization took place, two military railway administrations were forthwith formed to organize railway traffic in the conquered districts exactly similar to railway administrations in the fatherland itself.

"One of these two administrations waited at Aix La Chapelle (Germany) for the time when it could proceed to Belgium. The officers of the railway regiments accompanying the first line of troops immediately reported all damage done to lines and buildings entirely deserted by the enemy right into the districts of Hasselt, Louvain, Namur and Marloie. Apart from numerous minor damages, such as tornup rails, overturned engines, etc., thirteen bridges were found blown up, while a tunnel was blocked with several engines which had been made to telescope one another at full steam. Telegraph and telephone wires had been destroyed and all instruments in the stations were rendered unserviceable. Moreover, the railway roadbeds in Belgium in most cases were in a sadly neglected state and the rails were bad. Very often the sleepers broke under the weight of our engines.

"Here our regular railways troops had to commence work. They labored with almost superhuman effort so as to facilitate the bringing up of provisions and ammunition for the advancing armies. Very often long troop trains in close succession had to be brought over these lines, after one line had been cleared, and the working of the stations was taken over by railway officers with a few men. For instance, never before had a German engine been west of Liege until the first train filled with German troops going to reinforce their comrades fighting hard around Brussels ran into the station and had to proceed to Louvain. The lines between Liege and Louvain were repaired one at a time. Staff, there was none. The telegraph and telephone communications between the stations had not yet been restored. Nevertheless, train after train proceeded to Louvain and the empty trains returned the same way. Although the trains were fired on from the houses by the infuriated population and continual cowardly attacks were made, the troops were brought up in time against the enemy and could still participate in the deciding victory. The repairing and putting in order of the railways

proceeded little by little. On September 1 the military railway administration arrived in Brussels and proceeded to Lille toward the end of October. The last-named administration was taken over by newly-formed railway commandos in Liege and Brussels.

"To the south of Military Railway Administration No. 1, Military Railway Administration No. 2 was set up on August 20 in Ulfingen; on August 25 at Libramont and on September 4 at Sedan.

"A newly-formed railway commando followed in Luxembourg. The district covered by these various railway administrations was in time so extensive that a third was pushed forward between them, controlled from Charleroi. In the East, presently, a railway commando was set up in Lodz for the conquered districts of Russian Poland.

"All these authorities are organized by the military administration. The railway traffic is essentially of a military nature and is carried on in the districts close behind the front by railway troops; and, farther in the rear, by ordinary individuals transferred from the German railway administrations.

"The constructional operations of the railway troops consisted during the first months of the war chiefly in restoring damaged railway buildings so as to provide as quickly as possible complete railway communications for the army. New lines were laid where the military authorities needed them most or where our railways had no extensions in the conquered territory. Owing to the unfavorable country and the bad conditions of the roads after such a wet winter, we were obliged to construct a railway system comprising innumerable small 'field railways' so as to bring up ammunition and provisions to the particular place where our troops were located.

"In the place of emergency bridges we had to build later bridges of a permanent character so as to give greater security to the ever-increasing traffic. These operations at the seat of war were carried out by the railway troops and farther back by private German firms.

"During the course of the war up to the present 104 large bridges have been built, 8 tunnels restored and 14 lines opened to traffic. Owing to increased number of lines over 160 stations have been enlarged for the purpose of loading and unloading; also numerous crossover points have been built.

"The following table will give an idea of the development of this military traffic in the enemy country conquered by us with the exception of the Russian lines bordering on East and West Prussia, east of the Vistula:

TRAFFIC IN THE CONQUERED RAILWAY TERRITORIES (BELGIUM AND FRANCE)
FOR THE MONTH OF APRIL, 1915
(In round figures)

1. Distance in Kilometers at the end of the Month:	Single line	Double line	Total
A. Used by military.....	3,000	4,100	7,100
B. Leased	450	150	600
C. Not in use.....	550	20	570
D. Not restored.....	90	29	110
E. Under construction.....	400	15	415
Total	4,490	4,305	8,795
2. Traffic Management:			
A. Traffic officials.....			75
B. Engineers			25
C. Workshop officials.....			10
D. Stations occupied.....			1,200
E. Workshops			70
F. Gasworks			55
G. Power stations.....			350
3. Benevolent Institutions:			
A. Isolation hospitals.....			20
B. Bath establishments.....			130
C. Hospitals			35
D. Red Cross establishments.....			30
E. Dormitories for railway staff.....			135
F. Convalescent homes.....			5

"In considering the above table one must remember that only eight months have elapsed since the railways were taken over under the conditions described previously and the public passenger and freight traffic is still in its infancy. The railways can now, no doubt, respond more efficiently to the demands of public traffic."

WELFARE WORK ON THE PENNSYLVANIA

The Pennsylvania Railroad has issued a pamphlet containing a half-tone reproduction of a photograph of a group of about a hundred of the workmen at its Pittsburgh (Pa.) freight transfer station, all in their hot-weather working clothes; and in connection with the picture the statement is made that the whole force has been kept together, unchanged, for almost two years. The statement explains, further:

"The whole force of laborers numbers 318. Two and one-half years ago the transfer came under the management of George F. Wagner, as agent. Mr. Wagner believed in welfare work. Through his efforts a locker was provided for each man. A large number of wash basins and about 40 shower baths were installed. At the noon hour Victrola music is furnished. Other diversions are provided, and in many ways work at the transfer has been made attractive. The result is that in the last 23 months only one new man has been employed, and he was taken on as an addition to the force because he was a good worker and his services were needed. A working force has been built up at the Pittsburgh transfer that in point of efficiency and the physical and moral character of the individual men would be most difficult to duplicate."

The leaflet which gives this information concerning welfare work at Pittsburgh is itself an instrument in "welfare work"; it contains notes commending a number of employees for fidelity to their duty. Mention is made of another Wagner, track foreman on the Philadelphia division, now 61 years old, who when an unusually heavy rain and electric storm occurred recently in the night, went out, as his custom was, to take a walk over his section; he came across a washout, which very likely would have wrecked a freight train, which soon came along, had he not been there to display his red light.

Another item mentions locomotive engineman O. G. Bloom of the Sunbury division, who, when taking an excursion home one night recently, was delayed by the breakage of some parts of his engine, and who was so skillful and speedy in making temporary repairs, so as to get the excursionists to the end of his run in time to make desired connections, that he aroused great admiration among the passengers; so much so that a committee was appointed and a purse of \$76 was raised, and the next day was given to Mr. Bloom. He accepted it with great reluctance.

Another article, accompanied by a portrait, tells how Harry E. Duey, a brakeman on the Tyrone division, on July 13, last, riding on the fireman's seat of the locomotive of his freight train, descending a steep grade, suddenly saw a four-year-old boy sitting on the track, only about 200 ft. ahead of the train. Instantly dashing out of the cab and along the running board, Duey reached the pilot in time to lift the boy clear of the wheels and save his life. Some freight cars on a side track had hidden the boy from the view both of the brakeman and the engineman until they were close to him; and then there was not time to stop. Duey is 27 years old and son of a former employee; active in the Young Men's Christian Association and in athletics.

THE RUSSIAN IRON INDUSTRY.—The production of pig-iron in Russia in the six years ended with 1914 inclusive was:—1914, 5,207,000 tons; 1913, 4,756,000 tons; 1912, 4,111,000 tons; 1911, 3,630,000 tons; 1910, 2,999,000 tons, and 1909, 2,821,000 tons. Half-finished products were turned out during the six years as follows:—1914, 4,594,000 tons; 1913, 5,110,000 tons; 1912, 4,433,000 tons; 1911, 3,885,000 tons; 1910, 3,482,000 tons and 1909, 3,079,000 tons. The output of finished products was: 1914, 4,617,000 tons; 1913, 4,224,000 tons; 1912, 3,676,000 tons; 1911, 3,272,000 tons; 1910, 2,965,000 tons, and 1909, 2,628,000 tons. These figures illustrate the decided progress which Russian metallurgical industry has been making of late years.—*Engineering, London.*

Humidity-Control Process for the Drying of Lumber

Norfolk & Western Dry Kiln at Roanoke, Va., Embodies
Features Developed in Recent Government Investigations

By W. H. LEWIS

Superintendent Motive Power, Norfolk & Western, Roanoke, Va.

There has been recently put in operation at the Roanoke shops of the Norfolk & Western a dry kiln embodying features worked out in recent government investigations into the principles of the kiln drying of lumber. The kiln represents the direct results of the experiments of the United States forest products laboratory at Madison, Wis., the staff of this laboratory acting with the mechanical department of the Norfolk & Western in designing the kiln and its equipment.

The general principles of drying are based on what is known as the humidity-control system. It was found by the forest products laboratory that the maximum rate at which moisture should be removed from the surface of lumber at any temperature is not greater than that at which it will be drawn through the fibres of the wood to the surface. The only practical way of controlling such evaporative speed is by controlling the

lumber. The heated air rises and passes through the stacked lumber to the top of the kiln. Along the top of the air legs are spray nozzles which by means of a fine mist of spray chill the air at the top of the kiln, causing it to drop by gravity down the air legs to the bottom of the kiln, where it again comes in contact with the heated steam pipes, thus performing continuous cycles. As the heated air passes through the stacks of lumber the moisture from the lumber is taken up by the air and when this air is chilled at the top of the air legs the excess moisture is precipitated and mingles with the water from the spray nozzles.

Thermostats are provided for regulating the amount of steam to the steam pipes, by which means the temperature of the drying chamber is controlled, and further means are provided for controlling the temperature of the spray water, by which means the



Front View of Norfolk & Western Dry Kiln

humidity of the current of air passing over and through the lumber; hence the term "humidity-control," as applied to this kiln.

The kiln is unique in that it has no stack and no regular air inlets or outlets. The same heated air is used over and over and the moisture is removed from the air by means of a spray of water which lowers the temperature of the air and causes precipitation of the moisture, the same as natural precipitation of rain in external air; thus the only discharge from the kiln is a small stream of water.

The kiln consists generally of a drying chamber with air legs or spray chambers at either side and with a heating chamber immediately under the drying chamber. The air passes over a bank of steam pipes which are located just under the loads of

temperature and humidity of the air before it reaches the steam pipes are controlled. The spray water is circulated by means of a suitable pump, so that this water is used over and over, an overflow being provided so that excess water will drain off to the sewer.

The kiln is susceptible of very delicate control, and by controlling the humidity of the drying air the speed of drying may be regulated to a nicety. By this means the most rapid consistent rate of drying may be attained without danger of injuring the lumber.

In connection with this kiln there has been provided a dry lumber storage building so that the kiln itself may be of smaller dimensions and kept in continuous use. The kiln is built at one end of the storage building and a transfer car runs on a suitable

track along the front of the buildings. The lumber or kiln cars run into either the kiln or the storage building from the transfer car. The location is convenient to the planing mill.

Lengthwise piling of the lumber is used in the kiln, and the kiln cars are of steel and not of the customary knockdown type. A peculiar method of piling the lumber on the car is used, as shown in the illustrations. A tapered central channel is formed for the upward passage of the air, and the strips between the layers of lumber from slightly upward inclined air passages. By this means the current of air passes uniformly through the entire stack of lumber, and uniformity of drying throughout the pile is obtained. The clearance dimensions of the drying chamber of the kiln are as follows: Length, 50 ft. 10 in.; width, 17 ft. 3 in.; height, 10 ft. 2 in.

The kiln holds six kiln cars of lumber, the capacity being



Interior of Humidity Controlled Dry Kiln

approximately 27,000 board feet of 1-in. material. It is supplied with approximately 3,300 sq. ft. of heating surface. The building is of brick laid in cement mortar; the foundations and pipe chamber are of concrete, while the roof is of cinder concrete.

This kiln has been in successful operation drying all kinds of lumber for some time and fully meets the expectations of the designers. A number of patents on the principles involved have been issued to Harry D. Tiemann, of the Forest Products Laboratory, all of which have been dedicated to the public.

REPORT OF COMMISSION ON INDUSTRIAL RELATIONS

The United States Commission on Industrial Relations has given out a report of Basil M. Manly, its director of research and investigation, containing findings of fact and recommendations of the staff with reference to conditions of employment in public utilities, including the Pullman Company and the railroads. It is suggested that the commission recommend the extension of the Newlands act to cover not only all classes of railroad employees, but all employees of public service corporations engaged in interstate commerce, that the functions of the Board of Mediation and Conciliation be extended to provide for the creation of boards of investigation and that the board should be

authorized by Congress to create an advisory council composed of equal numbers of employers and employees for the purpose of creating a panel of names from which impartial arbitrators may be chosen.

The report says that "conductors and porters are employed by the Pullman Company under conditions which seem to require radical readjustment and are admitted by officials of the company to be underpaid;" that the salary of the porters is such that they are obliged to secure tips from the public in order to live, and that the Pullman Company is the direct beneficiary of the tips to the extent of the difference between a fair wage and that which is now paid; that the hours of service are extremely long and that the employees of the company are subject to many other abuses, among which are mentioned, "the arbitrary deductions in their salaries for such time as they may not be needed for the actual service of the company, although required to report at the office each morning; the requirement that porters shall furnish blacking, although they are not permitted to charge passengers for the service of shoe cleaning; the system of arbitrary penalties for the infraction of multitudinous rules."

Criticism is made of the company's bonus system, by which employees who have a clean record for the year receive an extra month's salary, on the ground that this penalizes with extra severity any infraction of rules which occurs during the latter half of the year and puts into the hands of officials and inspectors a means of discrimination. It is stated that the effect of the tipping system is not only to degrade those who are obliged to accept tips, but to promote discrimination in the service to the public; that the employees of the company are unable to improve their condition through organization, as employees known to be members of labor unions are discharged; that the company is "tremendously over-capitalized," and that on the basis of cash actually paid in, the annual dividends of the company are not less than 29 per cent.

It is suggested that the commission recommend: the enactment by Congress of a statute prohibiting the tipping of any employee of a public service corporation engaged in interstate commerce, and providing a proper fine for both the giver and the recipient of the tip; the amendment of the existing law regulating the hours of service of train employees to include the employees engaged in the Pullman service; the extension of the Newlands act to cover the Pullman Company.

With reference to railroads, it is suggested that the commission recommend:

Thorough investigation by the public health service of railroad construction camps as well as other labor camps, and the preparation of definite plans for such camps and a standard code of sanitary regulations.

The enactment by Congress of a statute expressly prohibiting corporations engaged in interstate commerce from inducing or compelling their employees to sign releases of liability for accidents.

Congress should enact a statute prohibiting interstate employers from requiring their employees to contribute to benefit funds, and providing for the participation of employees engaged in interstate commerce in the management of all benefit funds and other funds to which they contribute.

The regulation by federal statute of the employment of police on interstate railroads. The statute should not only provide for the organization, personnel and powers of such police, but should definitely provide that during labor disputes such police should be subject to the proper civil authorities and paid out of the public treasury. The statute should also provide that such corporations should be permitted to have firearms only under license, requiring that a definite record be maintained showing the character of each firearm and to whom it is issued.

The assumption by the states of full responsibility and definite provision not only for protecting the property of railroads, but for preventing trespass upon their property.

The report is signed only by Commissioners Frank P. Walsh, John D. Lennon, James O'Connell and A. B. Garretson.

The Qualifications of a Terminal Superintendent

An Analysis of the Essential Elements Necessary to Secure Maximum Results from His Organization

By S. W. ROBERTS

General Superintendent of Passenger Transportation, Pennsylvania Lines,
Pittsburgh, Pa.

To accept as correct the theory expressed by the adage, "That which is worth doing is worth doing well," is an implied, if not an actual acknowledgment that individuals of equal ability and experience performing similar service under identically the same conditions produce dissimilar results; the attainments of each being dependent largely upon the degree of interest in the task at hand. This quality is the inevitable outgrowth of regular systematic education by study, observation, contact with persons possessing superior minds, or through all of these channels. Since a terminal yard organization is composed of individuals, many of whom must perform similar duties and have had similar experience and training, logical reasoning seems to justify the belief that the successful operation of a terminal yard must follow the adoption and application of a plan, the underlying principle of which is represented by continuous active interest on the part of individual members of the organization, because interest is the unmistakable evidence of properly utilized education (mind development) and the latter is indicative of progress.

Mind training of the individual member of a department of whatever nature may of itself be classified correctly as the elementary step of the series of steps essential to the various stages of development in connection with the formation of an organization or working plan. The moulding or crystallization of this available mental energy of any number of members into a compact and powerful mental force capable of effectively resisting opposition to desirable or necessary methods and practices is the result which the head of a department must be able to accomplish. These two factors, namely, continuous active interest on the part of individual members of an organization in their respective positions and duties, and proper utilization of the available energies of all members form the true basis of a terminal yard operation plan.

The executive head of a railway, who is responsible, morally at least, to its stockholders, for the satisfactory management of their affairs, should possess qualifications that will enable him to perfect an organization arrangement efficient not only when applied to one detail, but when subjected to tests involving maximum demands and extreme conditions. The assumption that this reasoning rests on the right principle appears to be ample ground for the conclusion that the head of a terminal yard organization must be as capable an executive in his limited sphere as is the president of a railway whose responsibility extends to the operation of a complete system. Hence the standard of a terminal yard organization, be it good, bad, or average, as indicated by its acts, must thus reflect directly the ability of its head and, perhaps, indirectly the strength or weakness, as the case may be, of the entire organization scheme of which it is a component part.

Having indicated that the true basis of a terminal yard organization plan are, first, a maximum degree of continuous active interest on the part of each unit (member) in his particular service assignment, and the general results; and, second, a proper utilization of the maximum degree of combined energies of all units (members); and having placed the head of a department or organization, irrespective of what his title may be, in the same relation to each of his assistants as is the president of a railway company to each member of his staff, the foundation is thus laid for the question, "What should be the qualifications of a man capable of perfecting an efficient yard organization and obtaining the maximum service from it?" The answer to this question must deal with the standards of many attributes, the more prominent being morality (including temperance), honor, in-

tegrity, perseverance, patience, knowledge (including experience), and the innate desire and ability to grow along the right line and influence others to do so.

While a high standard as applied to each of the attributes specified, and each of numerous others of lesser prominence, but of a distinctly kindred nature, has always been recognized as a desirable and valuable asset of a representative of a railroad, particularly one vested with a considerable measure of governing or supervisory authority, too often those qualities which cannot be absent from the life of that type of man whose services are exemplary, and therefore, educational and inspiring to his associates (assistants and others) have been disregarded in the interest of greatly over-estimated ability based upon practical experience only. This statement is not made with the view of depreciating the value of experience to the head of an organization, but to emphasize the fact that since "like produces like" the development of members of a terminal yard organization in accordance with instructions and examples of a head, deficient with respect to qualifications other than knowledge acquired by experience could not possibly conform to the standard of efficiency demanded by conditions of the present age.

The general prevailing tendency in almost all branches and departments of the business world is to employ, as far as practicable, methods which have back of them principles harmonizing with the results of scientific study and research; and that policy, indicating as it does, the growing need of earnest and persistent, but fair competition among individuals, to the end that reforms in the direction of development may be assured regularly, removes completely the basis for arguments favorable to the assumption that a man whose mind is not clear and active and whose moral character is not clean could meet so much as the preliminary requirements of a successful terminal yard organization head.

This conclusion is not expressed either for the purpose of thus conveying the impression that a man with a ripe experience to his credit is incompetent because his moral character is clouded; but in defense of the theory that the highest standard of usefulness and service of any man to his family, his friends, his employer, his community, or his country, must involve the highest standards of development in the attributes heretofore mentioned. Since serious, unprejudiced study, observations and discussions do not disclose many, if any, permanent benefits which accrue from lax morals and all they embrace, but do disclose divers substantial benefits attributable to the reserve condition, we are reasonable in declaring that the dominating influence for good in a terminal yard organization will not emanate from a head with lax morals as a qualification, regardless of the extent of his experience and educational training; the fact that he may possess a pleasing personality, or be able to boast of an enviable physical development, or justly claim credit for recognized social leadership among certain classes in a community.

GENERAL DUTIES

The duties of the head of a terminal yard organization are executive and supervisory in character. The limitations of the former are in general so clearly defined that unauthorized deviations therefrom would be the outgrowth (barring exceptions on account of emergencies) of willful disobedience or ignorance only, the first of which is a true indicator of disloyalty and the second of incompetency.

The supervisory duties of a terminal yard organization head, however, are practically without limitations other than his capac-

ity as measured by the standards heretofore described, and his ability to create among his assistants that degree of personal interest in their respective service assignments, which will insure not alone the transmission of a corresponding degree of interest to their subordinates or fellow members, but the proper utilization of the energy thus developed.

The supervisory duties are both comprehensive and important, involving, as they do, results dependent on services contributed by many employees and bearing a direct relationship to transportation expenses and net earnings. The member of an organization who is interested in his work and who knows the purpose of his existence and appreciates the opportunity to employ his faculties toward the accomplishment of something worth while, combines knowledge with theory and practice and gauges his progress by comparative results. The application of the principle supporting that method or system to all members of a department or division thereof suggests immediately as the foundation of supervisory duties, systematic education of employees and accurate measurement of member, branch and department efficiency.

The term "systematic education" implies training regularly in accordance with a stated course, embracing those features of terminal yard operation, which must undergo changes frequently to keep pace with progress, reference being made especially to new or improved methods, improved facilities including equipment and reforms affecting working regulations or the policies of a company.

It is true that different methods of training may be successfully employed by different men, and likewise true that the same methods will not produce the same results when applied to different organizations (qualifications of individual members representing one of the most common factors responsible for variation in training methods and practices); but that a head fully conversant currently with conditions under his jurisdiction may intelligently analyze his forces and their obligations, and prescribe instructions required for their development, is certain.

To be of the greatest possible value to an individual, a branch, a department, or a system as a whole, this training must extend from the unit of service in all cases to the final conclusion, with the relationship of each to each direct and indirect kindred detail clearly established; and the object of efforts and energy expenditures in that direction made manifest through deserved promotions and recognitions otherwise, and statistics disclosing the grades of unit efficiency determined by the employment of accurate measures.

The oft-repeated statement that a certain terminal yard is operated as economically as possible, consistent with the character of demands on it, because the head, a man of long experience is in close contact constantly with the services of each of the members of the organization, no longer has any weight or standing among progressive railroad men, it having been rightfully superseded by the principle that no matter how insignificant may be a position, the services involved by it should be performed under the supervision of some one who is able to judge, using as his guide a reliable measure, whether the services are or are not satisfactory.

Details, knowledge concerning which should be contemplated by a system of education adapted to the needs of terminal yard employees under the direction of the head are numerous, a few of the more prominent being:

The direct and indirect functions of a terminal yard; the relation of the yard to other parts of a railway system, and the relation of its organization to other departments and the public.

The value of loyalty and efficiency to the individual employee and an organization, and their probable rewards.

The meaning of the word "discipline"; the necessity for discipline, and the method of administration which is most effective.

The value of harmony among members of an organization.

Effect of dissensions and discord among members of an organization on operations.

The purpose and value of accurate reports relative to service;

extraordinary conditions affecting operations; prospective traffic movements (passenger and freight); personal injury and other accidents; classified cars on hand, cars damaged and cars repaired or relieved of lading by transfer; prospective new or enlarged industries and any other matters bearing upon some feature of terminal yard operation with which a head should be familiar.

Courteous treatment of passengers, shippers and receivers of freight and other patrons of the company contrasted with the reverse policy.

The connection of originality of the individual employee with success.

Punctuality, system and self-control; their value to the individual employee and an organization.

Team work contrasted with the reverse organization arrangement.

Patience and sympathy; when necessary, and why.

Economy contrasted with extravagance or near-extravagance.

Service measures; the necessity therefor and their value to the individual, branch (or sub-department), and an organization.

Harsh, rough language, and its effect on loyalty and efficiency.

Train and personal injury accidents; the common causes therefor and precautions necessary to prevent them.

The light loading of cars and the light rating of locomotives; the adverse effect of such practices on yard and train operations.

Rough handling of cars in yards, and the results as applied to freight claims and car maintenance expenses.

Detentions to foreign cars within yard limits; the common causes therefor and the character of reports and records, and individual employee interests, necessary to reduce detentions to the minimum.

The result of improper or late assignment of work to branch (or sub-department) heads of an organization, reduced to an efficiency loss representing abnormal operating expenses.

While each of these details, as well as each of various others, has a definite place to fill in the educational program of the head of a terminal yard organization, they are of unequal utility, of which fact through study and practice an individual employee will learn in the same manner as his knowledge concerning the function of each of the parts of his body, their service value to him, and the relationship to life, is acquired.

Summarizing briefly the substance of the foregoing, the head of a terminal yard organization must himself be a real man, which type cultivates interest and harmony, inspires confidence, encourages ambition, influences loyalty and capability, and condemns vice in every form, by acts founded upon honor, equity, fairness and frankness; the enforcement of intelligent and reasonable instructions, and the exhibition of results of precise unit service measurements.

RAILWAY CONSTRUCTION IN CHINA.—A recent British consular report says that the Chekiang Railway has been formally taken over by the Chinese Government and placed under the control of the Shanghai-Nanking Railway management. It is now known as the Shanghai-Hangchow-Ningpo Railway. Apart from a heavy deficit in the funds handed over it is found that, as a result of Chinese construction and management, the whole of the rolling stock will have to be replaced and the road bed relaid. The problem of bridging the Chientang river is still unsolved. The possibility of crossing near Fuyang has been debated, but the shifting bottom of the river presents a well nigh insuperable obstacle. Material held up at Tsingtau during the siege has now been delivered, and progress is being made with the construction of the bridge near Paikuan. The line beyond Hangchow will, it is surmised, eventually run via Chiakon and Fuyang to Chuchi, Shaohsing and Paikuan. Another branch will probably run from Fyang to Lanchi, the junction from Chin-hua and Wenchow in one direction, and Chi'chow, Changshan, Yushan, and the Ning Hsiang Railway (Nanking Hunan) in the other.

General News Department

Members of the Order of Railway Telegraphers employed on the Chicago Great Western, who have been negotiating with the management for increases in pay, have broken off negotiations and are said to be preparing for a strike.

The Department of Labor and Industry of Pennsylvania holds that women may not be employed as telegraphers or telephone operators more than six days in a week. The request for a ruling came from women employed in railroad work.

The Pennsylvania Railroad has notified the heads of departments that employees who wish to attend military training camps may be allowed two weeks' vacation for that purpose, in addition to the ordinary vacation, but the company will not pay any salaries or wages during this military vacation.

The Stockton division, the Shasta division and the Sacramento shops have been awarded the 1915 safety banners awarded annually by the Southern Pacific Company for the greatest progress shown during the fiscal year in the furtherance of "safety-first" work on the company's Pacific system.

The Pacific & Eastern, a 33-mile railroad running from Medford, Ore., to Butte Falls, Ore., has established passenger service between Medford and Eagle Point, a distance of 12 miles, with a gasoline motor car, formerly used for inspection service, on which has been mounted an omnibus body that will accommodate 8 or 10 persons.

The Agricultural Department at Washington reports that during the month of July railroads and shippers were fined \$18,000 for violations of the 28-hour law concerning transportation of animals, and the quarantine law. Fines aggregating \$5,100 were imposed on the Rock Island in 51 cases of violations of the 28-hour law; and similar fines, aggregating \$1,800, against the Chicago, Burlington & Quincy.

Pending the reconstruction of the damaged approaches of the Galveston causeway ocean-going traffic is moving through the port of Texas City. The steamships of the Mallory line will take on and land cargoes there and it is expected that cotton shipments will suffer comparatively little curtailment. All the Galveston railroads are running trains into Texas City. It is thought that it will probably be September 20 before trains can run into Galveston.

It is announced in Buffalo that arrangements for the sale of the Buffalo & Susquehanna Railway to the Western New York & Pennsylvania Traction Company have been finally completed, and that the auction sale of the property, which was to have been held on September 13, will not take place. The new owners are expected to run passenger trains with gasoline motor cars, while using steam locomotives for freight.

The board of arbitration appointed under the Newlands act which arbitrated the controversy between the western railways and their engineers and firemen, has recently been in session in Chicago, and on August 30 rendered a supplemental award deciding a large number of disputed points regarding interpretations of the original award, which had been submitted to the board by both sides.

The building of the "Salt Lake Route-Union Pacific" route at the Panama-California Exposition at San Diego has been awarded a gold medal for its unique features. This building was put up to provide information to world travelers and comfort to exposition visitors. It contains a rest room for ladies and children, with a maid in attendance, information bureau and telephone booths, smoking room for gentlemen and other accommodations. The special rest room provided for the entertainment of visiting railroad men is one of the prominent features.

The Massachusetts Terminal Commission, appointed by the governor of Massachusetts and the mayor of Boston, under authority of the Massachusetts legislature (*Railway Age Gazette*, July 9, page 71), is making an exhaustive study of railroad ter-

minals in some of the leading cities throughout the United States for the purpose of being able to recommend improvements in the terminal facilities in Massachusetts and around Boston. After visiting some of the principal Eastern cities, the commission spent two days, August 23 and 24, inspecting the St. Louis terminals, belt lines, etc., and on the following day visited the terminals at Kansas City, planning to visit New Orleans on the return trip.

Robert J. Bailey of Pittsburgh, Pa., secretary of the Individual Car Owners' Association, has issued a circular announcing that renewed efforts are to be made to secure for the 150,000 freight cars in the country not owned by the railroads better rates for use of cars, better means of preventing misuse, lower prices for repairs made on these cars by the railroads and better regulation of demurrage; and he invites all owners of such cars to join the association and to come to the annual meeting, to be held in Pittsburgh next Tuesday. There will also be considered at that time a proposal to form a corporation with \$200,000,000 capital, to acquire, hold and operate private cars of all classes, and to own shops and build and repair cars.

The Streets Company

The Streets Company, of Chicago, having purchased and taken over the cars and business formerly owned by the Street's Western Stable-Car Line, announces its officers as follows: F. J. Reichmann, president; M. L. Marston, vice-president and treasurer, to succeed H. Kiper, who held that position in the old corporation; Robert J. Mills, assistant to the president, and F. H. Sweringen, master car builder.

Valuation Order No. 20

The Interstate Commerce Commission has issued valuation order No. 20 regarding information concerning the corporate history of the carriers as follows:

It is ordered that every common carrier owning or operating a steam railroad whose property is to be valued by the commission under the valuation act of March 1, 1913, and every receiver or operating trustee of any such carrier, shall prepare and file in the office of the commission at Washington, D. C., on or before six months after the service of this order upon it, a statement showing the following facts as to each corporation, company or firm, at any time connected with said railroad.

1. Give name of corporation, company or firm; date of incorporation and date of organization. If a corporation, state whether incorporated under the general law or by special act. If incorporated under the general law, state where the articles of incorporation were filed. If incorporated by special act, give reference to the act.

2. Describe the railroad, or portion of the railroad, constructed by each corporation, company or firm and show as to each such railroad, or portion of railroad, as so constructed, the termini, the mileage of main line, the mileage of any branch or branches and the date of construction.

3. State the length of time any such railroad or portion of railroad was actually operated by any such corporation, company or firm, giving, in each instance the date of beginning and date of conclusion of such operation.

4. If any such corporation has gone out of existence, describe the proceedings by virtue of which the dissolution took place. If any such corporation is still in existence, state where its records are kept and give the name and address of the person who has custody of them.

5. State fully the chain of title by which the present corporation has acquired the property which it now owns or operates. In this connection, prepare and file with the commission, as aforesaid, a schedule of all deeds, leases, reorganization proceedings and other instruments bearing upon the corporate his-

tory and assemble and arrange the same for inspection and examination by representatives of the commission.

The carrier shall file with the commission copies of the above documents and records or extracts from the same as may be designated by the director of valuation within 30 days after notice.

6. Prepare and file with the commission a diagrammatic chart similar to and containing information like that given on the sample chart hereto attached.

Operating Revenues and Expenses of Express Companies for April, 1915

The following statement, which is subject to revision, has been compiled by the Interstate Commerce Commission from the monthly reports of operating revenues and expenses of the principal express companies for April, 1915. (The express companies have three months in which to make reports):

of the Air Brakes on Our Modern Trains?" C. M. Kidd, chairman; "Difficulties Accompanying Prevention of Dense Black Smoke and its Relation to Cost of Fuel and Locomotive Repairs," Martin Whelan, chairman; "The Electro-Pneumatic Brake," W. V. Turner; "The Effect of Properly Designed Valve Gear on Locomotive Fuel Economy and Operating," W. E. Preston; "Scientific Train Loading, Tonnage Rating, the Best Method to Obtain Maximum Tonnage Haul for the Engine Over the Entire Division, Taking Into Consideration the Grades at Different Points on the Division," O. S. Beyer, Jr.

In accordance with the usual custom there will be a goodly number of instructive exhibits furnished by the supply companies. On Wednesday the entire evening will be devoted to inspection of the exhibits. Thus far 43 companies have reserved space. They are as follows:

American Arel Company; American Locomotive Company; American Steel Foundries; Ashton Valve Company; Barco Brass & Joint Company; Chambers Valve Company; Chicago Car Heating Company; Commercial Acetylene Company; Crane Company; Dearborn Chemical Company; Dela-

A—FOR THE MONTH OF APRIL.										
Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Mileage of all lines covered (miles)	44,878.65	38,615.94	72,616.10	60,848.13	9,676.50	7,080.31	2,839.78	2,839.78	9,551.73	9,334.20
Charges for transportation.....	\$2,980,181	\$2,662,858	\$4,093,738	\$3,473,040	\$262,250	\$250,417	\$54,749	\$46,519	\$242,408	\$232,739
Express privileges—Dr.	1,378,349	1,391,869	2,045,960	1,757,461	123,579	113,178	27,289	23,844	147,072	141,549
Operations other than transportation	44,773	31,714	217,945	176,656	5,559	11,484	865	809	4,343	4,155
Total operating revenues.....	1,646,605	1,302,703	2,265,773	1,892,235	144,230	148,722	28,325	23,484	99,679	95,344
Operating expenses	1,448,925	1,352,335	1,966,906	1,862,847	121,914	129,504	27,702	28,286	87,093	89,827
Net operating revenue.....	197,679	49,631	298,867	29,387	22,315	19,218	622	4,802	12,585	5,517
Uncollectible revenue from transp'n	419	.....	449	49	11	.....	.....	.....	33	.....
Express taxes	16,300	18,260	31,646	35,454	4,000	3,000	1,600	800	3,122	3,440
Operating income	180,959	67,891	266,772	5,115	18,304	16,216	977	5,602	9,429	2,075

B—FOR THE TEN MONTHS ENDING WITH APRIL.										
Item	Northern Express Co.		Southern Express Co.		Well Fargo & Co.		Western Express Co.		Total for All Companies Named*	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Mileage of all lines covered (miles)	8,118.34	8,080.40	34,574.60	33,526.60	112,995.30	100,001.21	5,174.26	5,008.97	300,425.26	297,181.39
Charges for transportation.....	\$211,157	\$213,050	\$1,241,326	\$1,339,682	\$3,341,186	\$2,535,383	\$97,443	\$89,826	\$12,524,493	\$12,310,956
Express privileges—Dr.	116,097	116,959	657,257	692,956	9,709,748	1,273,784	46,410	50,520	6,251,766	6,326,857
Operations other than transp.....	3,613	3,276	26,000	29,710	65,820	57,660	3,203	2,463	372,135	340,496
Total operating revenues.....	98,673	90,367	610,077	675,436	1,697,258	1,319,260	54,236	41,770	6,644,862	6,324,595
Operating expenses	87,318	84,591	513,353	565,487	1,458,866	1,193,446	48,678	46,914	5,760,761	6,161,272
Net operating revenue	11,355	14,775	96,724	109,948	238,392	125,813	5,558	5,144	884,101	163,323
Uncollectible revenue from transp'n	18	2	84	1	1,063	.....	13	.....	2,094	52
Express taxes	5,000	4,500	14,132	15,266	31,561	35,000	905	1,095	108,370	127,523
Operating income	6,336	10,273	82,506	94,680	205,767	90,813	4,638	6,240	773,737	35,738

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Charges for transportation.....	\$28,351,210	\$27,874,524	\$38,198,826	\$34,591,037	\$3,571,009	\$2,638,179	\$593,099	\$557,354	\$2,575,967	\$2,686,241
Express privileges—Dr.	14,207,366	14,639,216	19,178,252	17,358,875	1,290,313	1,253,387	297,358	281,171	1,571,493	1,643,282
Operations other than transportation	412,837	302,814	1,844,674	1,811,578	49,994	92,061	8,053	8,263	42,989	41,653
Total operating revenues.....	14,556,680	13,538,122	20,865,248	19,043,739	1,330,690	1,476,852	303,794	284,446	1,047,463	1,081,611
Operating expenses	15,095,392	14,004,380	20,500,459	19,343,422	1,283,755	1,399,509	290,748	300,239	886,344	898,861
Net operating revenue	538,711	466,258	364,738	299,683	46,935	77,343	13,046	15,793	161,119	184,749
Uncollectible revenue from transp..	4,870	.....	2,201	207	88	.....	.....	.....	88	.....
Express taxes	168,789	169,399	329,061	313,282	40,000	28,700	10,606	10,800	38,002	38,402
Operating income	712,372	635,657	32,525	613,173	6,846	48,643	2,446	26,593	123,027	146,347

Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for All Companies Named	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Charges for transportation.....	\$2,261,871	\$2,476,051	\$11,691,037	\$13,134,357	\$31,490,638	\$26,130,420	\$953,923	\$992,760	\$118,687,585	\$127,461,753
Express privileges—Dr.	1,326,108	1,346,625	6,037,075	6,746,926	16,113,814	13,081,794	497,215	532,467	60,428,997	64,993,201
Operations other than transp.....	32,875	32,256	252,854	278,072	592,273	548,040	30,811	23,680	3,267,363	3,394,741
Total operating revenues.....	1,058,638	1,161,682	5,906,816	6,665,503	15,969,097	13,596,667	487,520	463,973	61,525,951	65,358,293
Operating expenses	834,940	906,664	5,251,464	5,779,514	14,803,204	12,336,913	517,837	495,368	59,524,148	64,145,943
Net operating revenue	173,697	255,017	645,352	885,988	1,165,893	1,259,753	30,317	31,394	2,001,903	1,712,351
Uncollectible revenue from transp.	150	38	528	127	8,908	.....	91	.....	17,018	373
Express taxes	50,000	45,000	145,888	150,901	351,015	333,000	9,986	8,570	1,143,344	1,207,776
Operating income	123,547	209,979	498,935	734,959	805,879	926,753	40,395	39,965	841,441	504,202

* Includes previous year's returns of United States Express Co.

Traveling Engineers' Association

The twenty-third annual convention of the Traveling Engineers' Association will be held at the Hotel Sherman, Chicago, commencing at 10 a. m., Tuesday, September 7, and continuing four days. The subjects to be discussed are as follows: "What Effect Does the Mechanical Placing of Fuel in Fireboxes and Lubricating of Locomotives Have on the Cost of Operation?" W. L. Robinson, chairman; "Recommended Practices for the Employment and Training of New Men for Firemen," L. R. Pyle, chairman; "The Advantages of the Use of Superheaters, Brick Arches and Other Modern Appliances on Large Engines, Especially Those of the Mallet Type," J. E. Ingling, chairman; "How Can the Road Foreman of Engines Improve the Handling

ware Railway Specialty Company; Detroit Lubricator Company; Equipment Improvement Company; Galena Signal Oil Company; Garlock Packing Company; Greene, Tweed & Co.; Hunt Spiller Mfg. Corp.; Jerome-Edwards Metalite Packing Company; Kelley Wood Safety Locomotive Side Curtain Company; Liberty Manufacturing Company; Locomotive Stoker Company; Locomotive Superheater Company; Manning, Maxwell & Moore, Inc.; Mudge & Co.; Nathan Manufacturing Company; National Boiler Washing Company; National Graphite Lubricator Company; National Railway Devices Company; Ohio Injector Company; O'Malley Beare Valve Company; Paxton Mitchell Company; Pillow Company; Pocket List of Railroad Officials; Pyle-National Electric Headlight Company; Railway Age Gazette; Robinson Company; William Sellers & Co., Inc.; Southern Locomotive Valve Gear Company; Standard Heat and Ventilation Company, Inc.; United States Graphite Company; Harry Vissersing Company; White American Locomotive Sander Company, Inc.

Railway Signal Association

The twentieth annual convention of the Railway Signal Association will be held at Hotel Utah, Salt Lake City, Utah, September 14, 15 and 16. The program is made up of the committee reports noted below:

Tuesday

Committee I: Signaling Practice.—The use of switch indicators or signals to serve the same purposes; economics of signal maintenance; capacity of single track.

Committee VII: Relays.—Report on resistance and other data obtained on various types of relays.

Report of Committee III: Power Interlocking.—Revised specification for electro-pneumatic interlocking, including ten typical circuit drawings (were discussed at May meeting); revised specifications for fiber conduit; specifications for incandescent electric lamps.

Committee VI: Standard Designs.—Twenty-six drawings showing details and assembly of signal apparatus.

Wednesday

Committee II: Specifications for electro-mechanical interlocking.

Committee V: Manual Block.—Instructions for testing and maintaining dry cells; instructions for maintaining gravity cells; instructions for maintaining caustic soda cells.

Special Committee on Lightning Protection.—Requisites for lightning arresters for signaling; requisites for choke coils for signaling; specifications for vacuum gap lightning arresters.

Wednesday afternoon: Trip to Saltair.

Thursday

Committee VIII: Electric Railways and Alternating Current Signaling.—Specifications for reactors for line and track circuits; historical data on alternating current signaling.

Committee X: Storage Battery.—Specifications for nickel-iron-alkaline storage battery.

Special Committee on Electrical Testing.—Progress report on recording apparatus.

Thursday afternoon: Ball game.

The annual dinner will be on Wednesday evening.

International Engineering Congress

The International Engineering Congress, organized and conducted under the auspices of the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, the American Institute of Electrical Engineers, and the Society of Naval Architects and Marine Engineers, will convene at San Francisco on September 20 for a six days' meeting. All sessions will be held in the Auditorium Building, Hayes and Larkin streets.

At the opening session on Monday morning, September 20, General Goethals and others will address the convention. Monday afternoon will be devoted to discussions relating to the Panama Canal. Among the papers presented will be one on the Commercial and Trade Aspects of the Panama Canal, by Dr. Emory R. Johnson, professor of transportation and commerce, University of Pennsylvania. On the following four days separate sessions will be held to discuss Waterways, Irrigation, Railway Engineering, Municipal Engineering, Materials of Engineering Construction, Mechanical Engineering, Electrical Engineering, Mining Engineering, Metallurgy and Naval Architecture and Marine Engineering.

The program of the Railway Engineering Congress is as follows:

RAILWAY ENGINEERING

Tuesday, 10 a. m.

Railways.—William Barclay Parsons, consulting engineer, New York.

The Status of the Railways of North and South America.—F. Lavis, consulting engineer, New York.

Italian Railways.—Luigi Luiggi, president of the Italian Society of Civil Engineers and former member of the Italian State Railway Board, Rome, Italy.

The Status of Indian Railways.—Victor Bayley, assistant secretary Railway Board, India, Simla, India.

The Status of Chinese Railways.—Charles Davis Jameson, supervising engineer and architect to the Imperial Chinese Board of Foreign Affairs, Peking, China.

The Status of Russian Railways.—V. A. Nagrodsky, Petrograd, Russia.

The Status of Railways and Tramways in the Netherland East-Indies.—E. P. Wellenstein, Netherlands Indian Government Railways' Engineer, The Hague.

Afternoon

Economic Considerations Controlling and Governing the Building of New Lines.—John F. Stevens, New York.

The Locating of a New Line.—William Hood, chief engineer, Southern Pacific, San Francisco.

The Locating of a New Line.—David Wilson, Johannesburg, South Africa.

Tunnels.—Charles S. Churchill, assistant to president, Norfolk & Western, Roanoke, Va.

Tunnels in Italy.—Luigi Luiggi.

Tunnels in Switzerland.—R. Winkler, Direktor der technischen Abteilung der Schweizer Eisenbahndepartements, Berne, Switzerland.

Thursday, 10 a. m.

The Reconstruction of the Panama Railroad.—Frederick Means, Lieut. U. S. A., formerly chief engineer, Panama Railroad; member Alaska Engineering Commission, Washington.

Railway Construction Methods and Equipment in Australia.—Maurice E. Kernot, chief engineer for Railway Construction, Victoria, Australia.

Track and Roadbed.—George H. Pegram, chief engineer, Interborough Rapid Transit Company, New York.

American Railroad Bridges.—J. E. Greiner, consulting engineer, Baltimore, Md.

Afternoon,

Recent Locomotive Development.—George R. Henderson, consulting engineer, Baldwin Locomotive Works, Philadelphia.

Rolling Stock (other than Motive Power).—A. Stucki, president Engineers' Society of Western Pennsylvania, Pittsburgh, Pennsylvania.

The Floating Equipment of a Railroad.—F. L. DuBosque, New York, N. Y.

Railroad Terminals.—B. F. Cresson, Jr., New Jersey Harbor Commissioners, Jersey City, N. J.

Friday, 10 a. m.

Electric Motive Power in the Operation of Railroads.—William Hood, San Francisco.

Electric Motive Power in the Operation of Railroads.—E. H. McHenry, consulting engineer, New Haven, Conn.

Signals and Interlocking.—Charles Hansel, New York.

Among papers to be presented on other subjects will be those on the Preservative Treatment of Timber, by Howard F. Weiss and Clyde H. Teesdale, Forest Products Laboratory, Madison, Wis.; Aggregates for Concrete, by E. S. Thompson, Newton Highlands, Mass.; Alloy Steels in Bridge Work, by J. A. L. Waddell, consulting engineer, Kansas City, Mo.; Testing Full-Size Members, by Gaetano L. Lanza, Philadelphia, Pa., and Equipment, Processes and Methods for Boiler Shops, by E. C. Meier, Phoenixville, Pa.

Central Railway Club

The next meeting of the Central Railway Club will be held at the grounds of the Automobile Club of Buffalo on Friday, September 10, and will consist principally of the annual outing of the club. Members will assemble at Statler's hotel at 10 a. m. J. W. Gibney and H. C. Edson are a special committee on sports. There will be a dinner at the club house. The only business on the program is the reading of a short paper, on "Rivers and Canals," by William Elmer, superintendent of motive power of the Pennsylvania Railroad at Buffalo.

MEETINGS AND CONVENTIONS

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

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 2-5, 1916, Atlanta, Ga.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago.

- AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill.
- AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 8 W. 40th St. New York. Annual convention, October 4-8, 1915, San Francisco, Cal.
- AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION.—H. G. McConaughy, 165 Broadway, New York. Meetings with American Electric Railway Association.
- AMERICAN RAILROAD MASTER TINNERS', COPPERSMITHS' AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, Chicago.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 19-21, 1915, Detroit, Mich.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 21-23, 1916, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June, 1916.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Ill.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, Rooms 1116-8, Woodward Bldg., Washington, D. C. Annual meeting, June 28, 1916, Detroit, Mich.
- ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Next meeting, May 19, 1916, Atlantic City, N. J.
- ASSOCIATION OF RAILWAY ELECTRIC ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual meeting, October, 1915.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 20-22, 1916, St. Paul, Minn.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.
- FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Traffic Manager, R. E. & P., Richmond, Va. Annual session, May 17, 1916, Washington, D. C.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio.
- MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. L. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.
- MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dunc, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.
- MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June, 1916.
- NATIONAL RAILWAY APPLIANCE ASSOCIATION.—C. W. Kelly, 349 People's Gas Bldg., Chicago. Next convention, March, 1916, Chicago.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May. Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915. Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.
- RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.
- RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.
- RAILWAY STOREKEEPER'S ASSOCIATION.—J. P. Murphy, N. Y. C. R. R., Box C, Collingwood, Ohio.
- RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders' and Master Mechanics' Associations.
- RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 7-10, 1915, Chicago.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St., Chicago. Annual meeting, October 19-21, Colorado Springs, Colo.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Annual meeting, January, 1916.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 201 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Hotel Astor, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRAIN DISPATCHER'S ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 21, 1916, Toronto, Ont.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Huiley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-19, 1915, Chicago.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

Name of road.	MONTH OF JULY, 1915.									
	Operating revenues					Operating expenses				
	Average mileage operated during period.	Freight.	Passenger.	Total.	Way and structures.	Maintenance of equipment.	Traffic.	Trans. portation.	Miscellaneous.	General.
Alabama Great Southern	309	\$275,185	\$100,248	\$402,147	\$36,643	\$92,270	\$12,934	\$124,238	\$3,432	\$8,399
Arizona Eastern	378	204,051	36,886	234,681	32,004	15,019	2,500	51,238	1,920	11,534
Baltimore & Ohio Chicago Terminal	79	635	128,206	128,841	15,345	15,345	9,005	52,241	2,242	5,697
Besemer & Lake Erie	205	1,214,711	36,831	1,265,807	72,376	165,698	9,305	23,832	.....	12,529
Bingham & Garfield	27	170,181	2,977	173,534	19,523	20,577	977	21,535	207	1,789
Buffalo & Susquehanna Railroad Corp.	253	106,485	7,189	113,065	22,232	33,001	1,047	32,634	.....	5,784
Buffalo, Rochester & Pittsburgh	586	819,946	105,041	961,397	184,267	198,571	11,261	267,894	1,063	21,281
Chicago & Northwestern	8,108	4,239,960	2,022,776	7,059,159	1,259,576	1,212,579	119,102	2,397,048	58,557	153,403
Chicago Junction	12	.....	168,499	168,499	23,833	17,449	1,031	86,552	.....	7,430
Chicago, Peoria & St. Louis	255	91,909	27,549	127,414	29,644	28,664	5,706	51,412	.....	5,671
Chicago, St. Paul, Minn. & Omaha	1,753	728,687	486,961	1,390,734	237,101	181,889	29,638	486,953	18,489	37,741
Cincinnati, New Orleans & Texas Pacific	337	585,260	135,847	766,776	86,902	151,989	23,735	236,835	4,556	18,017
Colorado Midland	338	86,418	27,169	121,917	32,065	31,061	8,127	52,125	1,944	5,316
Cumberland Valley	164	179,010	53,046	244,587	33,921	33,558	4,690	76,981	787	7,599
Delaware, Lackawanna & Western	959	2,186,542	814,565	3,387,072	497,956	537,162	74,782	1,081,975	33,620	74,438
Detroit & Mackinac	400	54,602	31,276	93,344	9,851	16,308	2,009	32,132	335	2,614
Duluth & Iron Range	273	818,505	184,452	862,399	65,874	80,516	3,347	98,128	692	8,853
Duluth, South Shore & Atlantic	626	186,832	91,635	308,484	67,713	33,371	7,332	96,827	3,879	8,482
El Paso & Southwestern Co.	1,027	576,134	125,547	748,842	121,976	97,710	18,639	161,804	5,875	26,982
Cripple Creek & Colorado Springs	87	98,867	42,381	143,132	21,196	13,837	6,933	31,956	.....	3,997
Illinois Central	4,767	3,346,774	1,144,361	4,878,826	884,672	1,263,856	105,814	1,659,103	29,589	147,973
Indiana Harbor Belt	110	.....	.....	.....	37,731	22,982	3,347	98,128	.....	7,582
International & Great Northern	1,160	457,958	146,910	659,699	115,053	141,171	20,581	302,461	4,566	28,200
Kanawha & Michigan	177	239,884	30,795	277,545	37,641	54,925	3,467	71,137	.....	7,836
Kansas City Southern	837	626,580	127,507	831,355	81,421	75,505	24,664	267,491	.....	34,810
Lehigh & Hudson River	97	137,192	10,324	154,095	24,503	19,874	1,418	49,748	.....	4,224
Lehigh & New England	296	304,694	1,156	320,002	42,233	33,708	1,951	63,564	.....	4,857
Louisiana & Arkansas	279	114,492	14,544	133,018	27,085	24,300	3,030	33,533	.....	4,211
Midland Valley	580	84,581	31,822	122,967	26,078	16,916	2,071	39,161	.....	5,893
Missouri & North Arkansas	365	56,221	20,882	92,586	24,445	20,047	1,905	32,947	.....	4,927
Missouri, Oklahoma & Gulf	334	65,293	18,691	86,764	33,947	18,534	4,175	40,888	110	7,232
Missouri, Texas & Gulf Ry. of Texas	19	8,342	370	8,712	1,712	1,903	835	4,481	.....	640

Traffic News

The Toledo Traffic Bureau has filed a complaint with the Interstate Commerce Commission, charging that the roads in putting into effect the order of the commission allowing them to increase rates five per cent have advanced rates from Toledo to Michigan points to a much greater extent.

The National Industrial Traffic League will hold a meeting at Toledo, Ohio, in the Zenobia Auditorium, on September 9 and 10. An informal dinner has been arranged for the evening of September 9 at the Toledo Club, at which E. E. Clark, of the Interstate Commerce Commission, will give an address.

The Eastern roads have filed tariffs showing advances in east-bound grain rates, and the Interstate Commerce Commission, suspending the tariffs, will hold a hearing on the subject at Washington, October 13. The most important advances are those on grain for export. Proposed changes in classification of freight will be heard at the same time.

For the movement of the Georgia peach crop to Eastern markets this year (May 27 to August 17), the Southern Railway ran 187 special trains from Atlanta to Washington, 649 miles, on fast passenger schedules, and 98.3 per cent of them reached destination on time. The total number of cars was 3,636; and 219 cars were sent to Western markets by 35 special trains from Atlanta to Chattanooga, all of which arrived on time.

The Union Pacific has announced that hereafter but one coupon will be required on tickets reading over two or more lines of that system. When this arrangement is fully effective it will be applicable to foreign interline, home interline and intersystem tickets. It will be some time, however, before tickets can be reprinted, and meantime the old forms with two or three coupons, as the case may be, will be honored. The object of this arrangement is to popularize the route with ticket agents of other roads.

Since its current passenger tariffs went into effect, the Boston & Maine has experienced a very notable diminution of travel. According to the Boston News Bureau there is one station near Boston where revenues have slumped to less than \$100 a month from \$400 formerly. At various stations traffic has disappeared altogether, or has gone to trolley companies or automobiles. In June the passenger revenues of \$1,186,000 represent a decline of \$164,000, or 12 per cent from June, 1914. Revenue passenger-train mileage was practically unchanged.

The steamship "Pennsylvanian," of the American-Hawaiian line, recently set a new record for time of transit from Philadelphia to San Francisco via the Panama canal, making the voyage in 14 days 17 hrs. 25 min. The distance is 5,130 nautical miles, making an average speed of about 348 miles a day. The Canal Record points out that if this vessel had made the voyage by way of the strait of Magellan, a distance of 13,003 miles, at the same speed, the voyage would have required approximately 37 days and 8 hours, or two and one-half times as long as the trip by way of the canal, and that the use of the canal saved about 5,965 bbl. of fuel oil, which would cost \$4,772.

Three judges of the United States district court at San Francisco, Cal., heard arguments on August 17 and 18 on the petition filed by the chambers of commerce of San José, Stockton, Santa Clara and Sacramento, Cal., for an injunction to restrain the enforcement of the Interstate Commerce Commission's order in the intermountain fourth-section case, effective July 15, which denied the four cities named the advantage of terminal rates. The commission held that terminal rates should be made only to ports of call. Joseph W. Folk, general solicitor for the Interstate Commerce Commission, and Blackburn Esterline, special assistant to the attorney general of the United States, argued that the issuance of the injunction would upset the entire order, which is the result of years of litigation, and which permits the railroads to some extent to meet the competition of the Panama Canal. The railroad lawyers present agreed to stand by the argument made on behalf of the commission. The case was taken under advisement.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Kentucky Cattle Rates Justified

Rock Spring Distilling Company, et al. v. Louisville, H. & St. L., et al. Opinion by Commissioner Clark:

Rates on cattle in carloads from Owensboro, Ky., to Chicago and New York, and points taking New York rates not found unreasonable or unjustly discriminatory; complaint dismissed. (36 I. C. C., 35.)

Discrimination at Henderson

Henderson Commercial Club v. Illinois Central, et al. Opinion by Commissioner Meyer:

The present adjustment of rates at the Evansville-Henderson river crossing is found unjustly discriminatory, and defendants are required to remove the discrimination. The carriers are required to provide for the rehandling of grain at Henderson, Ky., under the through rates from points in Illinois to Virginia cities, upon the same terms as at Louisville. (36 I. C. C., 20.)

Rates to Phoenix Regulated

Edward Eisle v. Atchison, Topeka & Santa Fe et al.

Complaints filed in 1912 attack rates to Phoenix, Ariz., from various points of origin on different kinds of groceries, hardware and other commodities. It is held that certain of defendants' rates on potatoes and onions are unreasonable; that the complaint against the other rates under attack has not been sustained, and that reparation will be denied. (This proceeding also embraces complaints in a half-dozen other cases. (36 I. C. C., 18.)

Lumber Rates From Wilson, Ark.

In re lumber rates from Wilson, Ark., and other points to Cincinnati, Ohio, and other points. Opinion by the commission:

The commission finds that the carriers have justified a proposed withdrawal of through rates on lumber from points of origin in Arkansas to Louisville, Ky., Cincinnati, Ohio, and Evansville, Ind. The rates from producing points west of the Mississippi to these destinations are normally on the basis of the lowest combination on Memphis or Thebes. The rates in issue are abnormally low, and were established to meet the competition of the barge lines. (35 I. C. C., 179.)

Rates on Wooden Building Material

Yellow Pine Sash, Door and Blind Manufacturers' Association et al. v. Southern Railway et al. Opinion by Commissioner Clark:

The commission finds that the rates on wooden building material from and to points in southern classification territory should bear a uniform relation to the rates on lumber. It is unable to establish or order the establishment of proper differentials from the facts of record. The matter is being taken up, however, in the general investigation of the rates on and classification of lumber and lumber products in docket No. 8131. (35 I. C. C., 151.)

Southern Pig Iron Rates Reduced

Gloss-Sheffield Steel & Iron Company et al. v. Louisville & Nashville et al. Opinion by Chairman McChord:

Following the principle of the original report in this case, 30 I. C. C., 597, it is held that the rates on pig iron in carloads from points in Alabama and Tennessee to points reached by defendants' lines in Central Freight Association territory, to which pig-iron rates were not reduced on October 1, 1914, are unreasonable. Reasonable rates are prescribed for the future,

and divisions of such rates between the carriers operating north and those operating south of the Ohio river are prescribed. (35 I. C. C., 460.) [The list of carriers who are defendants in this case fills ten pages.]

Coal Rates From Oak Hills, Colo.

Opinion by the Commission:

In its original report (30 I. C. C., 505) the commission required the establishment of joint rates on bituminous coal from Oak Hills, Colo., on the Denver & Salt Lake through Denver to stations on the Rock Island in Kansas, Nebraska and Missouri. The rates were to be on the basis of the rates then in effect from the Walsenburg, Colo., coal district, via Pueblo and the Rock Island to the same destinations. The carriers being unable to agree as to divisions, the commission finds that the Moffat road * * * to divisions on coal, soft, all kinds, but not slack and pea, of \$1 18 a ton, and on coal, soft, nut, slack and pea of \$1.12 a ton. (35 I. C. C., 456.)

Stopping Cars to Complete Loading

Investigation and Suspension Docket No. 549. Opinion by Commissioner Daniels:

Carriers in Central Freight Association and Western classification territories proposed to discontinue generally the practice of stopping cars in transit to complete loading, or partially to unload; but protest was made by the National Industrial Traffic League, and others, and the commission now finds that the proposed withdrawal of the practice is not justified. Small manufacturers and small merchants testified that only by means of the stop-over privilege could they fairly compete with large concerns; and the commission finds that the stop-over privilege tends to engender wholesome competition. Commissioner Harlan dissents, and will later file a separate report. (36 I. C. C., 130.)

Foreign Commerce Not Touched by I. C. Law

John S. Seymour v. Morgan's Louisiana & Texas et al. Opinion by Commissioner Hall:

Following U. S. v. P. & R. (188 Fed., 484) it is held that the transportation of sugar from Germany, through the United States, in bond, to destinations in Mexico, is not subject to the jurisdiction of the commission. This case had to do with 1,200,000 lb. of sugar shipped from Germany through New Orleans in 1913 for final delivery at points in Mexico. In a similar case—a cargo of sugar from Hamburg, Germany, shipped to Philadelphia on its way to Raymond, Alta.—the United States District Court for the Eastern District of Pennsylvania, decided that such a transaction would not be within the mischief which the act to regulate commerce was intended to remedy, and would not come within the language of the statute. (35 I. C. C., 492.)

Atlanta and Nashville Treated Ali'ke

W. S. Duncan & Company et al. v. Nashville, Chattanooga & St. Louis et al. Opinion by Commissioner Clements:

This decision concerning rebilling privileges at Nashville, Tenn., and discrimination against Atlanta, Ga., and nine other places virtually revives the commission's decision of June 9, 1911, which was suspended by the Commerce Court, but later approved by the Supreme Court. The Supreme Court of the United States announced its decision on December 7, 1914, reversing the order of the commerce court, which order set aside the order of the commission requiring the removal of unjust discrimination resulting from the granting to Nashville, and the denial to Atlanta and the other complaining cities in Georgia of the privilege of rebilling or reshipping grain, grain products and hay transported from the Ohio and Mississippi river crossings or beyond, and destined to points in the southeast, at the through rate from origin to final destination. Upon consideration of the record in the original hearings and in the recent hearings, and on the applications of the carriers under section 4, it is now held that the granting of the said privilege to Nashville and the denial of it to Atlanta and the other complaining cities results in a violation of section 3, and that no showing has been made, under

either section 3 or section 4, why the commission should not enter an order in substantial conformity with the order of June 9, 1911, and it is so ordered. (35 I. C. C., 477.)

Reconsignment by Telephone Disapproved

S. F. Scattergood & Co. v. Erie & Western Trans. Co., et al. Opinion by the Commission:

Messrs. Scattergood complained of a reconsignment charge of \$2, made at Renovo, Pa., on a carload of bran which came from Minneapolis, Minn., but the commission justifies the railroad and dismisses the complaint. Complainants, in Philadelphia, telephoned the railroad company, the Pennsylvania, in Philadelphia, June 17, to divert the car to New York; and confirmed the order in writing two days later. This delay of two days necessitated a charge of \$2. Complainant contends that the Pennsylvania Railroad's receipt of the telephone message of June 17, to reconsign the shipment, within 24 hours after the date of the arrival of the car at Renovo, satisfied the requirements of the tariff for free reconsignment. But the commission, finding that the tariff requirement of a written order was not observed, and that carriers never can be certain that the person speaking a diversion or reconsignment order by telephone has control of the bill of lading, holds that the charge assailed was lawfully applicable; and the complaint is dismissed. (36 I. C. C., 15.)

The Iron and Steel Cases; Advances Approved

Commercial Club Traffic Bureau (Salt Lake) v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Harlan:

Proposed readjustment of the rates on iron and steel articles moving from Mississippi river points, Missouri river points, Chicago and territory intermediate to Chicago and the Missouri river, on the one hand, to Utah and Colorado points and to points in Kansas, on the other, found justified except as to the rates on certain iron and steel articles to Colorado points. Existing rates on iron and steel articles from Pittsburgh and St. Louis to Hutchinson, Wichita and Topeka, Kans., not shown to be unreasonable or unjustly discriminatory. Proposed readjustment of rates on iron and steel articles from St. Louis and from Pittsburgh and other points in Central Freight Association territory to points in Oklahoma and to Fort Smith, Ark., found justified.

This is a group of cases involving substantially all the rates on iron and steel articles from Central Freight Association, Mississippi river, Missouri river, Chicago, and territory intermediate to Chicago and the Missouri river on the one hand, to points in Utah, Colorado, Arkansas, Kansas and Oklahoma on the other hand.

The opinion fills 20 pages and deals with everything made of iron, from boiler plate to woven wire fence, hay bale ties, hinges and sucker rods. Twelve different orders have been issued. (36 I. C. C., 86.)

Water and Rail Rates from Yonkers

Federal Sugar Refining Company v. Central of New Jersey et al. Opinion by Commissioner Hall:

Yonkers is 16 miles north of New York City. Complainants send sugar to Pennsylvania and other points west by way of the New York Central to Sixtieth street, New York, whence it is transferred across the harbor by boat to the Central of New Jersey. Complainants desire to send by boat direct from Yonkers to the New Jersey terminus, declaring that there is much delay at Sixtieth street. Sometimes cars have to wait ten days before they can be taken across the harbor. They ask that through rates be made by the Central of New Jersey with the Ben Franklin Transportation Company, a responsible concern operating boats on the Hudson river and in the harbor; and this request is granted, the commission ordering the railroad to join the boat company in through rates; the rates to points 90 miles and more distant from Jersey City to be the same as from New York; which is what is provided for by the through tariffs over the New York Central and the Central of New Jersey now in effect; and it is ordered that the rates by the new route shall be no higher than those made by the two railroads. Rates are ordered for only one com-

modity, sugar. The railroad argued that a single shipper, sending a single commodity, could not legally demand the establishment of a through route; but the commission finds that there are other shippers who may take advantage of the new route. The railroad also claims that the same issues had been decided by the courts in former proceedings, but the commission says that this technical plea has no application to an order of the commission; moreover, it is held that the question of establishing a through route and joint rates was not determined in the former case cited.

Rates Prescribed for Valuable Animals

Iowa State Board of Railroad Commissioners, et al. v. Atchison, Topeka & Santa Fe, et al. Opinion by Commissioner Hall:

Applying to the present record the principles enunciated in The Cummins Amendment, 33 I. C. C., 682, Held: (a) That, taking each class of animals by itself and making due allowance for the minimum, maximum and average values of each as shown by this record, the scheduled valuations carried by these defendants in their live stock shipping contracts are unjustly and unreasonably low and not representative of the average actual values of the animals shipped thereunder; (b) that defendants' rates for the transportation of certain specified animals, the actual values of which do not exceed the amounts set forth in the report, are, and will be for the future, unreasonable to the extent that such rates exceed the present rates based upon the present scheduled valuations; (c) that defendants' excess rates for excess valuations are unjustly and unreasonably high, and (d) that reasonable rates for the transportation of any animal of actual value exceeding the amount specified in the report will exceed said present rates by not more than 2 per cent of said present rates for each 50 per cent or fraction thereof of actual value over and above that named in the report. This proceeding was brought by the Iowa State Board of Railroad Commissioners and by the American National Live Stock Association, the Corn Belt Meat Producers' Association, and the Cattle Raisers' Association of Texas, organizations whose members are producers or shippers of live stock. Some 45 carriers are named as defendants. The railroad commissioners of South Dakota, Colorado and Arizona and a number of live stock exchanges and associations intervened in support of the complaint.

The commission finds that the average values of the different kinds of live stock at the present time are greatly in excess of the valuations named in the carriers' printed contracts. . . . The percentage of increase in rate for excess value has varied from 10 to 25 per cent of the released rate for each 100 per cent or fraction thereof of excess value. These excess rates for excess value have seldom been used.

It has long been the claim of the carriers that the amounts paid by them for damage incident to the transportation of live stock are disproportionately high as compared with the damage claims incident to the transportation of other freight. It does not appear, however, that all such claims are affected by these particular contracts. A large proportion—perhaps 85 per cent in amount—is on account of loss of market and incidental shrinkage in weights and value of the live stock. Such losses never do and never can equal the valuations named in the contracts. Only about 15 per cent of the total claims paid by the carriers for loss of or injury to live stock are, therefore, in any way affected by the rules and regulations here in issue. The amount of money actually paid by these defendants because of such loss or injury does not average more than 25 cents a car.

During the last two years long established insurance companies have entered the business of insuring shipments of live stock in transit. Their policies protect against loss by death or other total loss in excess of the legal liability therefor of the railroad or carrier caused by wreck, derailment, fire or lightning while on cars in transit. The rates of these companies are 50 cents per single-deck and 75 cents per double-deck car, and the indemnities specified are \$50 for each steer, \$30 for each cow, \$10 for each calf, \$10 for each hog and \$5 for each sheep or goat. The insurance rates are flat rates per car, regardless of whether the haul be long or short. For an additional premium of 25 cents or 50 cents per car, making in all 75 cents

or \$1 per car, the indemnity on steers is made, respectively, \$75 or \$100 per head. While there are no statistics of such insurance operations before us, the testimony as to the amounts paid for commissions and overhead expenses would indicate that the business is profitable.

It is of record that the average haul of live stock in the United States pays the carriers about \$50 per car in freight charges.

The defendants did not contend that the excess rates charged on account of excess value were reasonable, and they offered another schedule of rates in lieu thereof. That offer is in substance that for a 3 per cent excess rate the carrier will assume a 50 per cent excess liability, and that for a 5 per cent excess rate the carrier will assume a 100 per cent excess liability. These figures are not based upon the cost of additional insurance alone. They rest also upon the theory that the carriers' service on the higher valued animals is a more valuable service and should be compensated by a higher rate.

This proposal is rejected and the commission finds, as above, that the charge for excess value must not exceed normal rates by more than 2 per cent for each 50 per cent of actual value. (36 I. C. C., 79.)

STATE COMMISSIONS

At a hearing before the Railroad Commission of Michigan on August 24, on the application of the express companies for permission to increase their intrastate rates to conform to the interstate rates allowed by the Interstate Commerce Commission, the Grand Rapids Chamber of Commerce was the only protestant.

Application has been made to the California Railroad Commission by the Southern Pacific, the Atchison, Topeka & Santa Fe, the San Pedro, Los Angeles & Salt Lake, the Western Pacific and the Western Association of Short Line Railroads for such relief as the commission can grant under a state law prohibiting railroads from requiring their trainmen to receive or transmit train orders over the telephone.

COURT NEWS

Limitation of Time for Commencing Action for Damage to Freight

The Kansas Supreme Court holds that a stipulation in a contract for an interstate shipment of cattle that an action by the shipper to recover damages because of injuries and delays occurring during the transportation must be commenced within 91 days after the happening of the injuries and delays is not unreasonable nor invalid. Mere negotiations between the parties as to settlement or compromise of the claim did not waive the contract limitation nor estop the railroad from insisting that the right to sue had been lost by lapse of time. *Ray v. Missouri, K. & T.* (Kan.), 153 N. W. 397.

Measure of Damages for Injuries to Live Stock

A shipment of cattle was negligently delayed so that the cattle suffered excess shrinkage. The cattle brought the market price; the only loss suffered by the shipper was in lost weight. The Texas Court of Civil Appeals holds that, as the measure of damages is the difference between the market value of the cattle at the time and in the condition in which they were delivered and their value if delivered in time, the shipper, having recovered for shrinkage, could not also recover for loss in selling appearance. That would allow a recovery of double damages for the same item. *International & G. N. v. Rhoden* (Tex.), 177 S. W. 984.

Crossing Accident—Contributory Negligence

In Missouri a pedestrian in crossing a railroad at night along a board walk was struck and killed by a train going 40 miles an hour. He had an unobstructed view when 9 feet from the track. The train had been running every night for years, near his place of business, at a greater speed than 30 miles an hour. There was an ordinance of the town through which the line ran, which consisted of about 651 inhabitants, limiting the speed of trains to 8 miles. It was held that the deceased had no right to assume that the train was going no more than 8 miles an hour

and was guilty of contributory negligence as a matter of law.—*Vandeventer v. Chicago & A. (Mo.)*, 177 S. W. 834.

Hours of Service Act—Deduction of Lay-Off Time

In an action for penalties for permitting a train crew to remain on duty for more than 16 consecutive hours, in violation of the hours of service act, the Circuit Court of Appeals, Ninth circuit, holds that where a train is delayed en route to its destination, and the members of the train crew are laid off and released from duty during the period of the delay, the lay-off or release breaks the continuity of the service, and the period of such lay-off should be deducted in determining whether there has been a violation of the act, if it is for a substantial and opportune period of rest.—*Southern Pacific v. United States*, C. C. A., 222 Fed. 46.

Hours of Service Act—Omissions in Reports

A railroad inadvertently and honestly omitted from its report, required by order of the Interstate Commerce Commission, pursuant to the interstate commerce act, instances in which employees were permitted to remain on duty for a longer period than that prescribed by the hours of service act. The Circuit Court of Appeals, Ninth circuit, holds that the company was not subject to the penalties imposed by the interstate commerce act, but any omissions must be scrutinized, so as to prevent any evasions of the requirements to make reports in such instances.—*Oregon-Washington R. & Nav. Co.*, C. C. A., 222 Fed. 887.

Notice of Intention to Claim Damages

The Arkansas Supreme Court holds that a provision in a bill of lading requiring written notice of intention to claim damages to be given to the carrier is reasonable. Where no written notice is given, the burden is on the plaintiff to show that the railroad had such actual knowledge. Compliance with the rule was not excused by the fact that some employee of the carrier whose duties did not include the investigation of such matters or the report thereof to the agent, knew of the damaged condition of the goods, no agent in authority knowing that the shipment was damaged or that a claim would be made.—*St. Louis, I. M. & S. v. Cumbie* (Ark.), 177 S. W. 910.

Caretaker of Stock a Passenger for Hire

A shipper of horses was handed a live-stock contract which contained the condition that the shipper should feed and care for the animals and exempted the railroad from liability for their escape from the car. The shipper, who accompanied the stock as caretaker, was injured by a derailment. In an action against the railroad the circuit court of appeals, Fourth circuit, holds that the contract showed that it was in the interest of the railroad to have a caretaker in charge and that this was a sufficient consideration for his transportation. He was, therefore, a passenger for hire and the railroad could not by a further provision exempt itself from liability for his injury through its negligence. *Norfolk Southern v. Chatman*, C. C. A., 222 Fed. 802.

Drainage Assessment Apportionment

A railroad company was assessed \$1,500 towards the cost of a drainage system on about two miles of right of way within the drainage district. The total cost of the drainage system was \$91,000. The district court reduced this assessment to \$800. On appeal, the Iowa Supreme Court affirmed this judgment, holding that where the total cost of a drainage system is less than the total benefits therefrom, the tax on a particular taxpayer should bear the same proportion as the total cost bears to the total benefits; and, therefore, where the benefits were considerably in excess of the cost, but the assessment against the right of way was for the full benefit accruing to the railroad, the assessment was properly reduced in proportion to the excess. *Chicago & N. W.* (Iowa), 153 N. W. 110.

Liability for Injuries Received While Extinguishing Prairie Fire Caused by Sparks

A prairie fire was negligently caused by a railway company, and the wife of a homesteader who was left at home with her

daughter used every reasonable effort to put out the fire. In so doing she overworked and strained herself so that permanent injuries ensued. In an action against the railroad the North Dakota Supreme Court holds that she could recover damages from the company provided she did not unreasonably and recklessly expose herself to the injury. Whether she was reckless and negligent in this respect was primarily a question of fact for the jury and not of law for the court. The jury found for the plaintiff.—*Wilson v. Northern Pacific* (N. D.), 153 N. W., 430.

Order of Commission Compelling Operation at Loss—Reasonableness

Action was brought by the Saline River Railway Company against the Arkansas Railroad Commission to restrain the commission from proceeding to compel the company to operate its line. It appeared that the road, which was primarily built to haul logs, was nine miles long, running between two small towns, through sparsely settled territory. It had originally cost \$75,000, owed between \$100,000 and \$150,000, owned no property except tracks and rolling stock, the track being badly out of repair. The company had tried unsuccessfully to sell the franchise and property for \$18,000. The Arkansas Supreme Court holds that an order of the commission requiring the company to run one passenger and freight train each way daily, at an expense of \$50, while its greatest possible revenue per day was not more than \$10, was so unreasonable as to be void.—*Rowland v. Saline River* (Ark.), 177 S. W., 896.

"Railroad Hazard" Defined

An employee, engaged in taking old brasses out of journal boxes of cars, used, instead of a jack, a pole to force down a wheel. This is a less safe method, but customary when all available jacks are in use. The pole slipped and struck him in the side. In an action for his injury the Arkansas Supreme Court holds that he assumed the risk thereof, since, appreciating the danger, he deliberately chose this manner of doing the work. The Arkansas act of 1911, fixing the liability of railroads for injuries to employees, and abolishing the defense of assumption of risk, did not apply to the plaintiff. The act does not include all railroad employees engaged in every department of the service, but only those whose duties expose them to the characteristic dangers connected with the operation of railroads known as "railroad hazards," which are those peculiar dangers to which employees are exposed while engaged in work connected with, and necessary to, the operation or running of trains.—*St. Louis, I. M. & S. v. Wiseman* (Ark.), 177 S. W. 1139.

Safety Appliance Act—Automatic Couplers

Through an accident the automatic coupling on the front end of a locomotive became inoperative to the extent that the uncoupling device was out of commission, though the coupling feature remained intact and operative. The engine was used for some time in this condition, employees being notified that the front coupler should not be used, and no car was coupled to the front end. Had a car been so coupled to the front end it would have coupled automatically and could have been uncoupled, without going between the car and the engine, by the use of the uncoupling device on the car. In an action for the statutory penalty the Federal District Court, E. D. Pennsylvania, held that the company violated the safety-appliance act, since, while a locomotive engine need not be so designed that cars may be coupled at its front end, if intended in its use to be coupled at either end, it must have an uncoupling device at each end.—*United States v. Reading*, 223 Fed., 215.

Contract Exemption from Liability for Injury to Pullman Porter

The Pennsylvania Supreme Court, following its decision in *Coleman v. Pennsylvania* (1913), 242 Pa. 304, 89 Atl. 87, 50 L. R. A. (N. S.) 432, holds that a Pullman car porter, though not a passenger in the ordinary sense, is entitled to the rights of a passenger to safe transportation, and, though his employment contract purports to release the Pullman Company and railway company, he may recover from the latter for injuries resulting from the negligence of its servants. *Murray v. Reading* (Pa.), 94 Atl., 558.

The great weight of authority upholds the contrary doctrine sustaining contracts exempting railroad companies from liability for negligent injury to sleeping-car employees or others maintaining a similar relation to the carriers, such as employees of express companies, circus proprietors or news companies. The latest case on the subject holding such a contract valid is that of *Robinson v. Baltimore & Ohio*, recently decided by the United States Supreme Court, 35 Sup. Ct., 491, an abstract of which appeared in our issue of April 23, page 907.

Passenger Entering Wrong Train

In an action for damages by a passenger who had got on the wrong train and was carried six miles to the next stopping place notwithstanding his request to be let off when his mistake was discovered, the Alabama Supreme Court stated the law as follows: Where a person has regularly bought a ticket to a definite destination, and mistakes, in good faith, the train on which he has the right to be carried, and enters the wrong train, he is a passenger until, after being informed of his mistake, his conduct renders him a trespasser; and is entitled to the protection accorded passengers against negligence for which the railroad is responsible. It cannot be affirmed, as a matter of law applicable under all circumstances, what would be or is a proper place for affording the passenger an opportunity to disembark or to eject him. The schedule of the train, with reference to which nearby trains opposed or following were being operated, might suggest, in all proper prudence, the danger of stopping the trains between stations. The nearness of the next station after the discovery of the passenger's error might, in and of itself, entirely justify the conductor in taking the passenger to that not remote station. Other illustrative circumstances may be readily supposed.—*Southern v. Farquhar* (Ala.), 68 So. 289.

Local Assessment of Station Property for Street Improvement

A city attempted to assess the station property of a railroad for the widening of an adjacent street. While the authorities in the various jurisdictions are not in accord as to whether station property can be assessed for the improvement of an adjoining street, the New York Appellate Division holds that the sounder rule is that which denies the right. There were two offices on the property, one rented to a news company and the other to a real estate dealer. The court said: "The theory of local assessment is benefit. And the reason for exemption rests in the inability to perceive how such premises are made by the improvement any more valuable for the purposes for which the railroad company can use them. The widening of the street presumably improves it for travel and for access; but the railroad is not benefited in that it carries more passengers or receives a greater compensation. To assess this railroad station property for the reason that the widening of the street might make such office space in its station more valuable is, I think, assessing for benefits too remote and too speculative, and is to destroy the rule by refinement." *People v. Waldorf*, 153 N. Y. Supp., 1072.

Safety Appliance Act—Moving Defective Car to Shop

A switchman, employed by a railroad engaged in interstate commerce, was injured because of a defective grabiron on a boxcar which was waiting to be taken to the shop for repairs. There was nothing to prove that the defect could not have been repaired without taking the car to the shop. It was held by the circuit court of appeals, Fifth circuit, that the railroad was liable under the safety-appliance act.

Pardee, C. J., dissented on the ground that the act is intended to apply only to cars, etc., in use at the time. "It could hardly have been intended by the Congress," he said, "that a railroad company under heavy penalties should keep its cars in perfect order, with certain specific safety appliances and otherwise, and yet that, after a disabled car has been taken entirely out of commerce, not to be used for any traffic whatever, the railroad company is to be penalized in favor of employees fully advised and warned that the car was in bad order or was to be moved only to the shop for repairs, for taking the only practical means at hand to have the car repaired and put in order." *Texas & P. v. Rigsby*, C. C. A., 222 Fed., 221.

Railway Officers

Executive, Financial, Legal and Accounting

H. J. Simmons, who recently resigned as general manager of the El Paso & Southwestern on account of ill health, will continue as a director and vice-president of the El Paso & Northeastern and the El Paso & Southwestern of Texas, and as a director of the Tucson, Cornelia & Gila Bend.

E. A. Murphy, assistant freight auditor of the Chicago, Milwaukee & St. Paul at Chicago, has been appointed freight auditor, and W. W. Scannell, chief clerk to the freight auditor, succeeds Mr. Murphy. Francis J. Owens, connected with the accounting department of the Chicago, Milwaukee & St. Paul, has been appointed auditor of the Chicago Union Station Company, and F. E. Allen, traveling accountant of the Chicago, Milwaukee & St. Paul at Chicago, has been appointed auditor of expenditure, vice C. E. Dudley, resigned. Mr. Dudley retires after forty-seven years of service. Effective September 1.

Perry McCart, who has been appointed general attorney for the Chicago, Indianapolis & Louisville, to succeed H. R. Kurrie, was born near Orleans, Orange county, Ind., November 5, 1864. He was educated in the common schools of Orange county, in Orleans High School, Southern Indiana Normal College, Mitchell, Ind., and in the law department of the University of Tennessee, Knoxville, Tenn. In 1897 he was a member of the house of representatives of the Indiana legislature. For a number of years he has served as local attorney for the Chicago, Indianapolis & Louisville. He will make his headquarters in Chicago.

Operating

J. J. Sexton, trainmaster of the Northern Pacific at Glendive, Mont., has been transferred to Billings, Mont., vice R. R. Auerbach, promoted. William C. Sloan has been appointed trainmaster with headquarters at Forsyth, Mont., vice Thomas M. Flynn, transferred.

Thomas B. Turner, trainmaster of the Louisville & Nashville, at Mobile, Ala., has been appointed assistant superintendent with headquarters at Mobile, succeeding John Bose promoted, and J. P. Semmes has been appointed trainmaster of the New Orleans & Mobile division, with headquarters at Mobile, succeeding Mr. Turner.

F. C. Huntington, trainmaster of the Northern Pacific at East Grand Forks, Minn., has been appointed superintendent of the Fargo division, with headquarters at Dilworth, Minn., vice F. R. Bartles, who has been appointed superintendent of the Minnesota division, with headquarters at Staples, Minn., vice T. F. Lowry, transferred. T. F. Lowry has been appointed superintendent of the Rocky Mountain division, with headquarters at Missoula, Mont., succeeding F. L. Birdsall, resigned. Effective September 1.

Traffic

S. A. Williams has been appointed general agent, traffic department of the Chicago & Alton, at Peoria, Ill., vice E. J. Naylor, resigned.

William T. Price, traveling freight agent of the Union Pacific, with headquarters at Denver, Col., has been appointed commercial agent at Pueblo, Col.

A. C. Littlejohn, traveling freight agent of the Queen & Crescent Despatch, has been appointed commercial agent, with headquarters at New Orleans, La., vice A. B. Collins, transferred.

Frank Roach, chief clerk of the advertising department of the Union Pacific Railroad at Omaha, has been appointed advertising agent of the road, to succeed John T. Cummins, promoted.

T. O. Jennings, general freight agent of the Chicago & Eastern Illinois, has been appointed freight traffic manager, with headquarters at Chicago; E. S. Stephens, assistant general freight agent, has been appointed general freight agent, with headquar-

ters at Chicago; G. H. Kummer, coal freight agent, has been appointed assistant general freight agent; F. E. Webster, chief of the tariff bureau, has been appointed assistant general freight agent, and J. J. Clask has been appointed chief of the tariff bureau, effective September 1.

Engineering and Rolling Stock

W. W. Warner, general foreman of the Erie car repair shops at Marion, Ohio, has been promoted to the general foremanship of the steel car repair shops at Cleveland. Effective September 1.

E. S. Mudge, division engineer of the Atchison, Topeka & Santa Fe at Wellington, Kan., has been appointed assistant engineer in charge of valuation of the western lines, with headquarters at Amarillo, Texas.

C. D. Perry, assistant road foreman of engines of the Delaware & Hudson, has been appointed road foreman of engines with office at Oneonta, N. Y., vice O. E. Ackart, assigned to other duties.

R. D. Starbuck, special engineer on the staff of J. J. Bernet, vice-president of the New York Central at Chicago, has been transferred to New York as special engineer on the staff of A. T. Hardin, vice-president in charge of operation at New York.

OBITUARY

Robert Finney, general agent of the Baltimore & Ohio at Pittsburgh, Pa., died on August 24 at the St. Francis hospital in that city.

W. F. Stevenson, general agent of the freight department of the Canadian Pacific at New York, died on August 21, in that city, at the age of 60.

John Finnell, roadmaster of the Northern Pacific at Tacoma, Wash., was killed recently when the track motor car on which he was riding left the rails.

Edward F. McCrear, division engineer of the Northwest System of the Pennsylvania Lines West of Pittsburgh, with headquarters at Cleveland, died of cancer at the home of his parents in Logansport, Ind., on August 29.

Sidney T. Emerson, formerly well known as a civil engineer in railway construction work, died at his home in Chicago on August 30, aged 88 years. He served as consulting engineer for the Pennsylvania, the Missouri Pacific, Northern Pacific and the St. Louis, Kansas City & Colorado.

John H. Warder, secretary Western Society of Engineers since January 10, 1901, died at his home in Chicago on August 30, following a short illness. He was born in Cincinnati, Ohio, on January 21, 1846, and graduated from the Polytechnic College of Philadelphia in 1867 as a mechanical engineer. He was for some time connected with the Cincinnati Southern and with the bridge department of the Chicago, Milwaukee & St. Paul. He was also engaged for some time in bridge inspection at various points throughout the United States. He designed the waterworks system for West Pullman, Ill., in 1893, and following this he was in charge of sewer construction in Lake View and other parts of Chicago, until his election as secretary of the Western Society of Engineers.

J. G. Metcalfe, formerly president of the Mexican International (June, 1902, to April, 1904), and then for one year vice-president of the National Lines of Mexico, died on August 31 at Pocono Summit, Pa., at the age of 67. He had lately been connected with Speyer & Company, bankers, New York City. He was born in Cambridge, Ohio, and began railway work as a telegraph operator. He subsequently served as superintendent of the Louisville & Nashville and lines now forming part of that road. From July, 1900, to November, 1901, he was general manager of the Denver & Rio Grande; then to June, 1902, was general manager of the Evansville & Terre Haute, when he became president of the Mexican International and subsequently vice-president of the National Lines of Mexico. In 1905, Mr. Metcalfe became a consulting expert on railroad matters and was appointed vice-president of the Manila Railway Company, which position he held at the time of his death. He was also vice-president of the Bolivia Railway Company, and a director of the Missouri Pacific.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE CHICAGO & NORTH WESTERN is in the market for 34 locomotives.

THE ERIE has ordered five Santa Fe type locomotives from the American Locomotive Company.

THE SERBIAN GOVERNMENT has ordered 15 Prairie type locomotives from the American Locomotive Company. These locomotives will have 19 by 24-in. cylinders, 53-in. driving wheels and a total weight of 143,000 lb.

THE UTAH COPPER COMPANY has ordered six 6-wheel switching locomotives from the Baldwin Locomotive Works.

THE GARDEN CITY WESTERN, Garden City, Kan., has ordered one Mogul type locomotive from the Baldwin Locomotive Works.

THE AMERICAN RAILROAD COMPANY OF PORTO RICO has ordered three Consolidation type locomotives from the American Locomotive Company. These locomotives will have 14-in. and 20 by 20-in. cylinders, 37-in. driving wheels and a total weight of 83,000 lb.

CAR BUILDING

THE SAN PEDRO, LOS ANGELES & SALT LAKE is inquiring for five caboose cars.

THE WYOMING COAL COMPANY has ordered 50 mine cars from the Pressed Steel Car Company.

THE ATLANTIC COAST LINE has contracted with the Pullman Company for a private car.

THE INTERBOROUGH RAPID TRANSIT has ordered 489 sets of trucks from the Pullman Company.

THE WESTERN MARYLAND is in the market for 1,000 all-steel hopper cars and also for a few box cars.

THE MAINE CENTRAL has ordered 1,500 center constructions from the Standard Steel Car Company.

THE TENNESSEE COAL, IRON & RAILROAD has ordered 10 tank cars from the Pressed Steel Car Company.

THE ILLINOIS STEEL COMPANY has ordered 10 tank cars from the American Car & Foundry Company.

THE PITTSBURGH CRUCIBLE STEEL COMPANY has ordered 18 flat cars from the Pressed Steel Car Company.

THE UTAH COPPER COMPANY has ordered 50, 30-yd. extension side dump cars from the Clark Car Company.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS has ordered 200 box cars from the American Car & Foundry Company.

THE CENTRAL STEEL COMPANY has ordered one 20-yd. extension side dump car from the Clark Car Company.

THE ANACONDA COPPER MINING COMPANY has ordered ten 20-vd. extension side dump cars from the Clark Car Company.

THE JONES & LAUGHLIN STEEL COMPANY has ordered 20, 100-ton side dump, side hopper cars from the Clark Car Company.

THE EDMONTON, DUNVEGAN & BRITISH COLUMBIA has ordered 10 stock cars from the National Steel Car Company, Hamilton, Ont.

THE ALBERTA GREAT WATERWAYS and the Edmonton, Dunvegan & British Columbia have ordered 100 box cars from the Canadian Car & Foundry Company.

THE CLEVELAND CLIFFS IRON COMPANY has ordered six center dump ore cars from the Clark Car Company. These cars will be built by the Cambria Steel Company.

THE ILLINOIS CENTRAL has ordered 300 underframes from the Haskell & Barker Car Company and has let the contract for

repairing 1,000 gondolas to the American Car & Foundry Company.

THE ATCHISON, TOPEKA & SANTA FE, reported in an unconfirmed item in the *Railway Age Gazette* of August 27 as having ordered 50 ore and concentrate cars, has ordered 25 concentrate cars from the Pullman Company and 25 ore cars from the Western Steel Car & Foundry Company.

IRON AND STEEL

THE SEABOARD AIR LINE has ordered structural steel work amounting to about \$50,000 for its new shops at Portsmouth, Va., from the Virginia Bridge & Iron Company.

THE VANDALIA has ordered from the Wisconsin Bridge & Iron Co. five 113-ft. 3-in. single-track through-riveted truss spans, totaling 560 tons, for a bridge at Logansport, Ind.

THE CENTRAL OF NEW JERSEY's order for 800 tons of fabricated steel for a pier to be built on the North river, New York, has been given to the Pennsylvania Steel Company.

THE PHILADELPHIA (PA.) SUBWAYS has ordered 8,500 tons of steel from the Keystone Construction Company for the first section of this line and an additional 24,000 tons will be ordered shortly.

THE CHICAGO, MILWAUKEE & ST. PAUL has let a contract for 314 tons of steel to the American Bridge Company, to be used on track elevation work for subways at Pratt avenue, Ashland avenue and Fargo avenue, in Chicago. The St. Paul has also ordered 134 tons from the same company for steel work on substations in various locations.

THE NEW YORK PUBLIC SERVICE COMMISSION, FIRST DISTRICT, has awarded contracts for track materials, to be used upon various lines of the Dual Rapid Transit System, as follows: Untreated ties and timber, J. H. Burton & Co., \$1,273,856; treated ties and timber, Long Leaf Pine Company, Inc., \$100,362; special work, order No. 3, Ramapo Iron Works, \$54,960; order No. 4, Wm. Wharton, Jr. & Co., \$41,907; cast iron, American Brake Shoe & Foundry Company, \$10,528; screw spikes, American Iron & Steel Manufacturing Company, \$25,741; felt pads, The Q. & C. Co., \$9,957; malleable iron, Foran Foundry & Manufacturing Company, \$36,118; tie plates, type A—Herbert W. Lockwood, \$123,975; type B—L. D. Rockwell, \$13,267; type C—L. D. Rockwell, \$5,140; type D—Herbert W. Lockwood, \$8,239; types E, F, G and H—Herbert W. Lockwood, \$17,139; types E-2, W and X—Ramapo Iron Works, \$2,901; cut track spikes, Herbert W. Lockwood, \$34,338; bolts and nuts, Oliver Iron & Steel Company, \$117,910.

MACHINERY AND TOOLS

THE AMERICAN CAR & FOUNDRY COMPANY is in the market for a number of engine lathes, axle lathes and other equipment for its Detroit plant.

FRENCH RAILWAYS IN TURKEY.—Press despatches report that the Turkish government authorities have been authorized to buy back the following French railway and tram lines in Syria, the purchase money to be provided by the ministries of finance and the Wakuf Pious Foundations: The narrow gage railway from Beirut to Zeirib; the tramway from Beirut to Hamslekin, in the Lebanon; the Rejak-Aleppo line to the junction with the Bagdad Railway; the line from Homs-Tripoli to the harbor of Muavene; the line from Jaffa to Jerusalem, and all the rolling stock, workshops and other properties of these lines.

HUNGARIAN RAILWAYS.—The Hungarian State Railways operate 5,505 miles of line and in April earned \$5,961,068, comparing with \$6,593,088 in April, 1914. The total receipts from July 1, 1914, to April 30, 1915, were \$60,774,001, comparing with \$69,369,838 for the corresponding period of the previous year.

A SAMPLE OF RUSSIAN FREIGHT RATES.—A new tariff has been put into effect on shipments of tanning materials from Vladivostok to railway points west of Omsk. The rate on L.C.L. shipments is from 2.7 cents to 1.6 cents per ton per mile. For carload shipments the rate varies from 2 cents to 7 mills per ton per mile.

Supply Trade News

The Chicago Malleable Castings Company, West Pullman, Chicago, is enlarging its plant.

Bertram Smith has been appointed manager of the Detroit office of the Edison Storage Battery Company, Orange, N. J. For the last year and a half Mr. Smith has been assistant manager of the Edison Storage Battery Supply Company, San Francisco, Cal., which company acts as the Pacific coast distributor for the Edison nickel-iron-alkaline battery. Previous to his connection with the Edison company he was manager of the battery department of the Chicago branch of the United States Light & Heating Company, New York. He had been secretary and treasurer of the National Battery Company, Buffalo, until its consolidation with the United States Light & Heating Company. The Edison Storage Battery Company recently moved its office from



Bertram Smith

Cleveland to Detroit. The company's business in this territory has been rapidly increasing.

The Boss Nut Company, Chicago, has moved its offices from the Railway Exchange building to 1744-48 North Kolmar avenue.

C. B. Bouton, formerly president of the Union Foundry Works, Chicago, died at his home in that city on August 26.

William Graver, president of the William Graver Tank Works, East Chicago, Ind., died at his home in Chicago on August 26.

The Thorn Railroad Tie Company of Indianapolis, Ind., has been incorporated with a capital of \$80,000, and will manufacture railroad ties.

The Franklin (Pa.) plant of the American Steel Foundries, which has been closed for several months, opened on September 1.

Alexander Wilson, for many years superintendent of the railroad department of the Cambria Steel Company, died at his home in Johnstown, Pa., on August 30 at the age of 75.

J. W. H. James, for many years connected with the American Bridge Company, and a civil and mechanical engineer of broad experience, died at his home in Chester, Pa., on August 29.

Under the plan and agreement of May 12, 1915, of the Westinghouse Electric & Manufacturing Company, stockholders have taken all but \$457,000 of the \$20,710,000 new convertible bonds offered to them.

The Selby safety flag, described in the *Railway Age Gazette* of July 16, page 106, has been adopted as the standard flagman's outfit by the Mobile & Ohio, Illinois Southern, and St. Louis & San Francisco, and is now under service test on 15 other railways.

David Newhall has opened an office in the Lincoln building, Philadelphia, Pa., and represents in the eastern district the National Boiler Washing Company and the National Waste Company, both of Chicago. Mr. Newhall will handle also various lines of railway and mill supplies.

A new corporation, Johnson, Sharp & Co., has been formed, with office in the Commercial Trust building, Philadelphia, to deal in iron and steel and their by-products, scrap material

and coal and coke. George T. Johnson is president and Sydney T. Sharp is secretary and treasurer.

A. Q. Tucker, vice-president of the Hydraulic Press Manufacturing Company, Mt. Gilead, Ohio, has been elected president, succeeding M. Burr Talmage; W. G. Beebe has been elected vice-president, succeeding Mr. Tucker; F. B. McMillin continues as general manager and secretary, and M. W. Spear has been elected treasurer, succeeding H. B. McMillin.

The Chicago Great Western has awarded a contract to the Roberts & Schaeffer Company, Chicago, for building a fireproof standard counterbalanced locomotive bucket coaling plant with automatic operation at Clarion, Iowa. The Chicago Great Western has in operation three plants built by the Roberts & Schaeffer Company a year ago. The contract price for the plant at Clarion is \$10,000.

Robert W. Hunt & Co., Chicago, has been commissioned to make what is known as their special inspection of the 115,000 tons of rails and accessories which, as mentioned previously in these columns, has recently been ordered by the Russian Imperial Railways Commission from the Cambria Steel Company, the Pennsylvania Steel Company, the Illinois Steel Company and the Tennessee Coal, Iron & Railroad Company.

H. V. Jamison, advertising manager of the American Sheet & Tin Plate Company, Pittsburgh, Pa., has been awarded a gold medal by the Panama-Pacific International Exposition Society in recognition of his services in the installation of the exhibits of the United States Steel Corporation and its subsidiaries. The United States Steel Corporation decided to make an extensive exhibit at San Francisco and Mr. Jamison was appointed director of exhibits. The corporation was accorded a grand prize for its exhibit and the gold medal was awarded to Mr. Jamison.

Edward M. Grove, treasurer of the McConway & Torley Company, Pittsburgh, Pa., died on Thursday, August 26. Mr. Grove was born in Chambersburg, Pa., on October 12, 1857. He



E. M. Grove

went to Philadelphia when 14 years old and worked for a time in a printing office. In 1876 he became a telegraph operator. After three years of work as operator he was made district superintendent of the Pullman Company at Cincinnati, Ohio, and was later transferred to Jersey City, N. J. In 1886 he became assistant general manager of the Wagner Palace Car Company, with office in New York. In 1889 he resigned to become associated with the McConway & Torley Company. He has thus been 20 years with that company and for the last 15 years has been treasurer. Mr.

Grove was president of the Railway Supply Manufacturers' Association in 1910 and in 1911 and devoted his time and thought generously to the interests of that association.

TRADE PUBLICATIONS

CAST IRON PIPE—The Central Foundry Company, of New York, has issued a small pamphlet entitled, Cast Iron Soil Pipe vs. Wrought Pipe, which is devoted to a discussion of the relative durability of the two kinds of pipe as ascertained from samples of wrought iron pipe taken from the Waldorf-Astoria and of cast iron pipe taken from the old Astor House.

RESULTS OF ELECTRIFICATION.—This is the title of Circular No. 1505, which has recently been issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. This

so-called circular is a book 9 by 11 inches in size, containing 72 well-illustrated pages. It aims to show the results obtained by electrification on some of the important steam railways of the world, and to give information of interest and value to steam railroad operators on electrification work. Contained in the publication are well-illustrated descriptions of the Norfolk & Western, the Pennsylvania, the New Haven, and other electrifications installed by the Westinghouse company. The Westinghouse Electric & Manufacturing Company has also recently issued the first number of "Westinghouse Electrification Data," which is to be a periodical chronicling the latest advances in the field of heavy traction. The present number contains a discussion of electric locomotive characteristics, some interesting figures on the comparative maintenance costs of steam and electric locomotives, as well as data on the New York terminal electrification of the Pennsylvania.

SAND DRYERS.—The Roberts & Schaefer Company, Chicago, has issued Bulletin No. 30, illustrating and describing the "Beamer" patent steam sand dryer, made by that company for drying sand for locomotive use.

POWER TRANSMISSION MACHINERY.—The Mesta Machine Company, Pittsburgh, Pa., has issued Bulletin Ka. containing a horsepower chart for determining the variables for rotating parts transmitting power, such as gears, pulleys, rope wheels, etc.

PNEUMATIC TOOLS.—Bulletin No. 130, issued by the Chicago Pneumatic Tool Company, Chicago, deals with the lubrication of pneumatic tools and treats also of Airoilene grease and oil, Chicago Pneumatic Oilers and the Little Grant Grease Machine.

PIPE ACCESSORIES.—The William Powell Company, Cincinnati, Ohio, has issued a booklet relative to the company's line of oil and air vents, expansion joints, valves and other accessories for oil wells and refineries.

POWER HAMMERS.—Beaudry & Co., Boston, Mass., have recently issued a booklet relative to the Beaudry Champion and Peerless power hammers, respectively. The booklet describes the hammers in detail and contains tables of sizes and dimensions.

BALL BEARINGS.—The S. K. F. Ball Bearing Company, New York, has recently issued a very attractive booklet relative to the economies of the light car in electric street railway service and the saving to be obtained by the use of ball-bearing journals on such cars.

AUTOMATIC MAIL EXCHANGE SYSTEM.—The Hupp Automatic Mail Exchange Company, Washington, D. C., has issued a booklet describing its system for taking on and delivering material at high speeds and giving in detail the nature of the equipment and its performance.

OPTICAL INSTRUMENTS.—The Bausch & Lomb Optical Company, Rochester, N. Y., has issued a pamphlet describing its microscope for the inspection and testing of materials. The various instruments manufactured by this company for this purpose are described in detail with illustrations.

METAL SHEARS.—The Canton Foundry & Machine Company, Canton, Ohio, has recently issued a catalogue entitled Canton Alligator Shears, describing and illustrating the company's line of metal cutting shears. These shears are equipped with double gears to counteract torsional strain. They are furnished with either belt or motor drive, but the belt drive is advocated as being more flexible.

UNIONS.—The Jefferson Union Company, Lexington, Mass., has issued a catalog describing the Jefferson unions of various types. The booklet contains views of the different kinds of unions and shows for what purposes they are made. The patented feature of this company's product is the brass seat ring, placed in a recess away from the runway of the fitting.

CORROSION:—THE CAUSE, THE EFFECT, THE REMEDY.—The Stark Rolling Mill Company, Canton, O., has issued a 100-page pamphlet which calls attention to the marked increase in the tendency to corrosion attending the introduction of sheet steel manufactured by the Bessemer or open hearth processes. An account is also given of the various causes of corrosion and describes also the manner in which these troubles have been overcome in Toncon metal. Fifty pages describe and illustrate the various uses for this product.

Railway Construction

CANADIAN PACIFIC.—The report of this company for the year ended June 30, 1915, shows that the company has 60 miles of new line under construction, on which work is now under way, as follows: On the Interprovincial & James Bay from Kipawa, Que., north 10 miles; on the Alberta division, the Stirling East branch, from Stirling, Alta., east 25 miles, and on the Swift Current North branch from Coronation, Alta., northwest 25 miles.

CUMBERLAND TRACTION.—Organized in Kentucky with \$50,000 capital to build a line between Edmonton, Ky., and Elizabethtown. Right of way has been secured and the first section to be built will be between Edmonton and Hiseville, 16 miles. G. H. Greenup, Elizabethtown, is back of the project.

DAYTON & ST. MARY'S (ELECTRIC).—This company was organized recently, it is said, to build an electric line from Covington, Ohio, north to Ft. Loramie, about 16 miles. The surveys have already been started. D. Dwyer, president, Dayton, Ohio.

GEORGIA ROADS.—The Chamber of Commerce of Rome, Ga., is conferring with the Seaboard Air Line, it is said, to secure the construction of a railroad from Rome south to Fish, 14 miles.

GULF, FLORIDA & ALABAMA.—Construction work is being pushed it is said, on the extension from Broughton, Ala., north to Kimbrough, 52 miles, and it is expected that a connection with the Southern Railway at Kimbrough will be made early this fall. Abutments for the drawbridge over the Alabama river at Yellow Bluff, Ala., are nearly ready for the steel work, for which a contract has been given to the American Bridge Company. An additional pier is also being built at the marine terminal at Pensacola. (April 23, p. 913.)

HELENA & SOUTHERN.—Incorporated with \$500,000 capital, it is said, to build from Helena, Mont., to Yellowstone Park. A section of the proposed route is to be over a partly graded line of the Three Forks, Helena & Madison Valley, which started work in 1912, on a line from Helena south to Yellowstone Park, about 150 miles, and up to January of this year had grading work finished on about 20 miles. E. A. Tennis, Salina, Kan., and formerly of Three Forks, Mont., is an incorporator.

HURON & NORTHEASTERN.—The Huron Investment & Construction Company is engaged in preliminary work on the proposed line to be built from Huron, S. D., north to Wahpeton, N. D., and eventually east to Duluth, Minn. It is expected that construction work will be started next month. The company filed articles of incorporation in South Dakota early this year with a capital of \$25,000 and headquarters at Huron. The incorporators include F. W. Henderson, Summit, S. D.; W. Pelham, Sioux Falls, S. D.; C. E. Wolfe and F. Budack, Wahpeton, N. D., and C. B. Adams, Chicago, Ill. At the same time the Huron Investment & Construction Company, with a capital of \$50,000 was incorporated by the same interests.

ILLINOIS CENTRAL.—The extension of the Illinois Central from Benton, Ill., to Old Ben Mine, a mile and a half out of West Frankfort, has been completed. It will be used solely for freight purposes.

LEXINGTON & EASTERN. See Louisville & Nashville.

LOUISVILLE & NASHVILLE.—Engineers are locating a branch of the Lexington & Eastern, it is said, up Colly creek near Whitesburg, Ky., to reach a rich coal and timber field in Letcher county. It is expected that a contract to build the branch will be let before November.

MORGAN-FENTRESS.—An officer writes that the plans call for building a line from Nemo, Tenn., northwest to Jamestown, 56 miles. A contract has been let to the Cumberland Construction Co., Harriman, Tenn., to build a section of 13 miles. The first section of 15 miles from Nemo via Castoosa, Parker and Mantrin is now in operation. The company expects to develop a traffic in forest products, coal, etc.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—Work is now under way, it is said, on an extension of the valley line from Centerville, Tenn., to Totty's bend.

NEWTON, KANSAS & NEBRASKA.—This company, which was organized in 1912, to build from Milton, Kan., north via Newton and Abilene to Fairfield, Neb., will start work soon, it is said, on the line. A construction company has been organized at Newton to carry out the work. S. O. Waddell, chief engineer, Newton, Kan.

NEW YORK SUBWAYS.—The New York Public Service Commission, First District, has authorized the New York Municipal Railway Corporation to award the contract for the erection of steel, construction of track, etc., for the third tracking of the Broadway elevated railway in the borough of Brooklyn between Myrtle avenue and Aberdeen street to the Johnson-Gifford Company, the lowest bidder, at \$400,441. (July 23, p. 181.)

OZARKS RAILWAY.—Incorporated to build a railroad from a point in Ozark County, Mo., 10 miles from the Arkansas line, to Rothville, Baxter County, Ark., a distance of 36 miles. The capital stock is \$900,000, and the stockholders are: K. V. Lobbs, H. S. Wickersham, S. C. Bates and E. C. McAfee, of Springfield, Mo., and C. C. Feuster, of Mountain Home, Ark.

PETERSBURG & APPOMATTOX (ELECTRIC).—An officer writes that work is now under way building from Petersburg, Va., northeast to City Point and Hopewell, ten miles. The contract has been given to the Vaughan Construction Company, Roanoke, Va. The plan includes building a station, also a sub-station. T. M. Worthan, president, Richmond, Va.; W. W. La Prade and E. Wortham, engineers. (Aug. 20, p. 358.)

PHILADELPHIA (PA.) ROADS.—Contracts for the construction of the city hall station and tunnel section of the Broad street subway, and for the construction of foundations for the Frankford elevated in Philadelphia, Pa., have been signed, and the work is to be started on September 13. The Keystone State Construction Company was awarded the city hall station contract at \$1,700,000. The contract for the foundations for the Frankford elevated, extending from Callowhill street on the south to Unity street on the north, was awarded to James D. Dorney at \$142,590. (July 23, p. 182.)

SALEM & PENNSGROVE TRACTION.—Under this name a line is projected from Salem, N. J., north via Pennsville to Pennsgrove, about 12 miles. No action will be taken for the construction of the line until the engineers now at work make a preliminary report. A. B. Smith, secretary and treasurer of the Smith, Davis Lumber Company, Salem, is interested.

SALINA NORTHERN.—Contracts have been let for the equipment and for materials for building, from Salina, Kan., through Saline, Lincoln, Mitchell and Osborne counties to Downs and Osborne, 90 miles. Three miles of track has been laid and grading work is about finished between Salina and Lincoln, 35 miles. Several bridges are under construction. The Keystone Construction Company, Salina, Kan., of which E. A. Tennis is president, is building the line.

SHENANDOAH, FRACKVILLE & POTTSVILLE.—A contract is reported let by this company to J. B. Trexler, Reading, Pa., to build a line to connect Frackville, Pa., with St. Clair, five miles.

SOUTH DAKOTA ROADS.—A new company has been incorporated in South Dakota with \$2,000,000 capital by residents of Yankton to build a railway from Yankton, S. D., north through the counties of Yankton, Turner, McCook, Lake, Kingsbury, Hamlin and Codington to Watertown, 145 miles. The incorporators include Edward S. Johnson, W. J. Fantle and W. E. Heaton, of Yankton. The same interests have incorporated the Yankton County Bridge Company, with a capital of \$1,000,000, to build a bridge over the Missouri river at Yankton.

SOUTHERN RAILWAY.—Bids have been asked for double-tracking work, it is said, between Greenville, S. C., and Central, 26 miles, and contracts for the work will be let about September 6. Plans are also being made for double-tracking work between Charlotte, N. C., and Spartansburg, S. C., and it is understood that contracts for the work south of Charlotte, which will involve very heavy construction, will be let soon.

TAMPICO & PANUCO.—According to press reports from Tampico, Mexico, a large force of men is now at work grading this

line and track-laying will be started soon. The projected route is from Tampico, Mexico, to Panuco, 46 miles, and the plans call for extending the line eventually for a total distance of about 250 miles. The line is to be built to provide the Topila and Panuco oil fields an outlet in addition to the water route of the Panuco river. The project is backed by British capitalists.

THREE FORKS, HELENA & MADISON VALLEY.—See Helena & Southern.

RAILWAY STRUCTURES

ANACORTES, WASH.—The Great Northern is building a two-stall frame engine house.

BALTIMORE, MD.—An officer of the Baltimore & Ohio writes that plans have been made to build a new steel coal pier at Curtis Bay, Baltimore, but authority has not yet been given to begin the construction work.

CHICAGO, ILL.—The Illinois Central has awarded the contract for subways at Forty-eighth, Fifty-second and Fifty-sixth avenues, Cicero, to the Pleas Concrete Construction Company, of this city. The Bates & Rogers Construction Co., of Chicago, has been awarded the contract for the reconstruction of three bridges on the Indiana division of the Illinois Central.

CLARION, IOWA.—The Chicago Great Western has awarded the contract for a new 100-ton coal chute in this city to Roberts & Schaefer Co., Chicago. The coaling station will be a steel-balanced bucket type equipped with scales and reversible Ogle automatic hoist, operated by a distillate oil engine.

DALLAS, TEX.—The city commission of Dallas has passed an ordinance extending to December 20 the time in which to begin construction work on a union interurban railway passenger station in Dallas, to be built jointly by the interurban lines centering in Dallas. The Stone & Webster Engineering Corporation, Boston, Mass., it is said, has already secured a site for the proposed station and terminals.

DESHLER, OHIO.—A contract has been let to George Georgenson, Hamilton, Ohio, and it is expected that work will be started soon on a new union station in Deshler, to be used jointly by the Baltimore & Ohio and the Cincinnati, Hamilton & Dayton. The new station will be of brick construction with a tile roof.

FT. DODGE, IOWA.—The contract for remodeling the mechanical terminal of the Illinois Central at Ft. Dodge has been let to the Stoddard Construction Company, Chicago.

KENSINGTON, ILL.—The Illinois Central has let the contract for a new passenger station in Kensington to T. S. Leake & Co., Chicago.

LOGANSPORT, IND.—The Vandalia has let the contract for the construction of a bridge over the Wabash river on the Michigan division to the Wisconsin Bridge & Iron Company, North Milwaukee, Wis. The bridge will consist of five riveted Pratt truss spans 113 ft. 3 in. long on stone piers and abutments reinforced with concrete. The superstructure will contain about 200 tons of steel. The estimated cost of the superstructure, including erection, is \$60,000.

MACON, GA.—The Central of Georgia is making plans for a viaduct, to be built over Pine street. The work has not yet been authorized.

MOUNT VERNON, N. Y.—Contracts for the elimination of the Mount Vernon avenue and Oak street grade crossings and the erection of a new station on the West Side will be let by September 20, according to an order just issued by the New York Public Service Commission, First district. The order also provides that the work of removing the tracks from the present right of way to the right of way, 350 feet eastward, must be commenced on or before October 1, 1915.

NEW YORK.—The New York Public Service Commission, First district, has awarded the contract for the construction of station finish on Section No. 2 of Routes Nos. 36 and 37, the Astoria elevated line, in the Borough of Queens, to Charles Meads & Co., the lowest bidders, for \$268,102. (August 13, p. 302.)

The Altoria Realty & Construction Co. submitted the lowest bid at \$80,636, for the station finish work on Routes Nos. 16 and 18, being respectively the Jerome avenue and White Plains

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The New York Municipal Railway Corporation has awarded to John Thatcher & Son, the lowest bidders, at \$320,325, the contract for the construction of eight stations in connection with the third-tracking work on the Broadway elevated line in the borough of Brooklyn.

PORTSMOUTH, VA.—The Seaboard Air Line has given a contract to the Christian Construction Company, Durham, N. C., to build additional shop facilities at Portsmouth. The work will include a machine and erecting shop, blacksmith shop, flue shop, engine carpenter and paint shop, also a sub-station. The work will be pushed to completion, and it is expected that it will be finished early in 1916. There is considerable steel work involved in the construction of the main buildings, and hy-rib walls or similar material will be used in the machine and erecting shop.

ROCKFORD, ILL.—The Illinois Central has let a contract to the H. W. Nelson Company, Chicago, for the concrete work in rebuilding a bridge over the Rock river.

ROYSTON, GA.—Bids are wanted by the Southern Railway for building a new station of frame construction at Royston to replace the structure destroyed by fire.

SAN ANTONIO, TEX.—The directors of the San Antonio Belt & Terminal Company have formally accepted a 25-year franchise from the city commission authorizing the construction of new passenger and freight terminals.

SAN DIEGO, CAL.—The San Diego & Arizona will erect a steel bridge across Campo Creek at the end of Tunnel No. 4. Charles W. Corbaley Company, Los Angeles, has been awarded the contract for the construction work and the Llewellyn Iron Works of Los Angeles will furnish the steel.

ST. PAUL, MINN.—Work on the proposed St. Paul Union Depot has been delayed by the refusal of the United States board of army engineers to approve certain changes in the river channel suggested by the Union Depot Company.

THE DALLES, ORE.—The Oregon-Washington Railroad & Navigation Co. has let contracts for building roundhouses and machine shops, it is said, at The Dalles and at Pilot Rock. The estimated cost of the work is \$95,000.

WATERLOO, IOWA.—The Waterloo, Cedar Falls & Northern has given a contract to the Black Hawk Construction Company, it is said, to build a freight house on Utica street, near Mulberry street, in Waterloo. The building will be 40 ft. by 200 ft., and will be of steel, brick and concrete construction. It will cost about \$50,000.

WILMINGTON, DEL.—Contracts have been let by the Baltimore & Ohio to the James F. Brogan Company, Philadelphia, Pa., for the concrete foundation and to the King Bridge Company for the superstructure of a bridge to carry Lancaster avenue over the tracks in Wilmington. Work will be started on the improvement at once.

YANKTON, S. D.—See South Dakota Roads under Railway Construction.

EXTENDING AMERICAN COAL TRADE.—The first cargo of American coal that there is any record of as having reached Patras, Greece, was received there late in July. The cargo, consisting of 6,000 tons of Pocahontas coal, was shipped from Norfolk and 3,400 tons was for use on the Piræus-Athens-Peloponnesus Railway (locally called the Pap). It is said that the price of the coal at Patras was \$15.07 a ton.

PORT CONDITIONS AT MARSEILLES.—Almost since the beginning of the war there has been congestion at Marseilles, France, and a large number of ships have had to wait in the harbor for an opportunity to discharge cargo. There are now only about three ships in the outer harbor and 22 in the basins awaiting berths. It is expected that conditions will become normal in about six weeks. New warehouses, with a total capacity of 80,000 tons, have recently been completed.

Railway Financial News

DELAWARE & HUDSON.—A meeting of stockholders is to be called September 30 to authorize an issue of \$14,451,000 5 per cent 20-year convertible bonds to be offered to stockholders of record as of September 9 at par. The offering is to be made subject to the necessary approval of the New York Public Service Commission and has been underwritten by Kuhn, Loeb & Co. and the First National Bank, both of New York. The bonds are convertible for 10 years beginning October 1, 1917, on a basis of \$1,500 face value of bonds for 10 shares of stock, the total par value being \$1,000.

LAKE ERIE & PITTSBURGH.—The Public Utilities Commission of Ohio has approved the issue of \$3,540,000 first mortgage 5 per cent bonds of 1915-65, guaranteed jointly by the New York Central and the Pennsylvania Company.

LOUISIANA, TEXAS & MEXICO.—See New Orleans, Texas & Mexico.

MISSOURI PACIFIC.—A new protective committee has been formed to represent the trust 5 per cent bonds, due January 1, 1917, and the first collateral mortgage 5 per cent bonds, due August 1, 1920. The committee consists of Moreau Delano, of Brown Brothers & Co., New York, chairman; Willard V. King, president, Columbia Trust Company, New York; Asa S. Wing, president, Provident Life & Trust Company, Philadelphia, Pa., and L. Edmund Zacher, treasurer, the Travelers' Insurance Company, Hartford, Conn. Bondholders are requested to deposit their bonds with the Columbia Trust Company, New York. The interest due September 1 on the trust 5 per cent bonds was not paid by the receivers and the committee has arranged to advance to depositing bondholders the amount of the coupon due September 1 and has also arranged to advance the interest due February 1, 1916, on the collateral mortgage 5 per cent bonds in case that interest is not paid by the receivers.

NATIONAL RAILWAYS OF MEXICO.—The annual meeting is to be held October 6 and at that time it is proposed to ask authority from the stockholders to issue prior lien and general mortgage bonds as is found expedient, and at that meeting also will be presented the report of the board of directors for the two years ended June 30, 1915.

NEW ORLEANS, TEXAS AND MEXICO.—Arrangements are understood to be nearly completed for the formation of a new company to be called the Louisiana, Texas & Mexico, to take over the New Orleans, Texas & Mexico, which went into the hands of a receiver along with its parent company, the St. Louis & San Francisco. Stock of the New Orleans, Texas & Mexico is held by the St. Louis & San Francisco, but will receive nothing in the reorganization. Holders of the \$28,582,930 first mortgage 5 per cent and 4½ per cent bonds will be asked to subscribe to the extent of 20 per cent of their holdings to new first lien collateral trust 6 per cent bonds and will receive in exchange for this subscription and their present holdings, beside the first lien collateral 6s, 50 per cent of their present holdings in 5 per cent income bonds and 50 per cent in stock. Bondholders who do not subscribe for the new first lien 6s will receive but 40 per cent of the income bonds and 50 per cent new stock. It is said that the Guaranty Trust Company and the Columbia Trust Company, both of New York, are to underwrite the plan.

PENNSYLVANIA.—The Public Utilities Commission of Ohio has approved the issue of \$1,222,050 special guaranteed 4 per cent stock of the Cleveland & Pittsburgh, a subsidiary of the Pennsylvania, to the Pennsylvania to reimburse that company for expenditures made for capital purposes.

ST. LOUIS & SAN FRANCISCO.—It is understood that a syndicate is being formed to lend to the St. Louis & San Francisco stockholders \$45 of the \$50 assessment which the plan of reorganization calls for from the holder of each share of stock. Stockholders will, of course, put up as collateral for this loan the securities which they are to receive in the new company.

See also New Orleans, Texas & Mexico.

Railway Age Gazette

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GENERAL NEWS SECTION

* Illustrated.

Is it not true that the greater proportion of engine failures in the last analysis are "men" failures, due to poor judgment and lack

Responsibility for Engine Failures

of knowledge? This condition in turn may be charged to poor and inadequate supervision. To remedy it each failure must be carefully and thoroughly investigated. One great trouble on some roads is that the officers in charge are satisfied with superficial investigations and reports. These are useless and often result in having one branch of the service or department unjustly pass the blame to another, with resulting friction and waste of energy; meanwhile the real cause of a failure is overlooked and similar failures

may continue to take place with more or less frequency. Conditions of this kind require an iron hand and can best be handled by a committee or board of responsible officers, selected from the different departments interested, which will insist on such thorough and complete reports of each failure as to enable the blame to be properly placed. This board should also be charged with the responsibility of seeing that defects in either equipment or organization are remedied and that abuses are removed.

D. C. Buell, director of the Railway Educational Bureau, makes several suggestions in a letter on another page which demand

Make the Service More Attractive

consideration from those who are interested in the necessity of giving more attention to training railway employees. To attract and hold desirable young men the work should be made as attractive as possible and means provided by which those who are ambitious to fit themselves for promotion may do so. This does not mean that the work should be made easier or the responsibilities lightened. Hard work and responsibility have an attraction for live, wide-awake young men if they can see that their efforts count and are appreciated. Nothing is more disheartening than to grind along with the feeling that their work is unimportant or that their efforts are being overlooked and that there is little opportunity for advancement; and yet, considering the general atmosphere and conditions in many railroad offices, it is not surprising that this feeling should prevail. Railroad work, because of its very nature, has a fascination for most young men and it should not be difficult to make the service still more attractive by developing a comprehensive scheme for training the young men to increase their knowledge and efficiency and helping them to fit themselves for more important positions and greater responsibilities.

The address on "Train Despatchers and Division Officials," presented by J. P. Finan at the convention of the superintendents' association and published in the issue of

The Status of the

Train Despatcher

August 27, page 380, calls attention to a situation with reference to the treatment and status of the train despatcher that has rankled in the minds of the despatchers for a long time and has caused considerable agitation in the conventions of the Train Despatchers' Association for several years, without having attracted much notice elsewhere. In brief, Mr. Finan urges a better recognition on the part of division officers of the difference that exists, or should exist, in the relations between the company and the despatchers and other employees, and of the fact that the despatchers' relation to the company is, or should be, just a little broader than that comprehended by the word "employee." He shows that, rightly or wrongly, there exists in the minds of a great many despatchers a feeling that their superior officers consider, or at least treat them, no differently from what they do the employees who are affiliated with organizations that demand from their members a loyalty paramount to the loyalty they owe the company, and that possibly their condition might be improved by the formation of a "protective association" like others that have been able to force concessions from the railways. The Train Despatchers' Association has never been such an organization. Its aims and functions have been the same as those of other organizations of railway officers, being directed toward the increase of efficiency in the work of its members. However, only the most heroic efforts on the part of its officers have prevented turning it into a "protective organization," in other words, a labor union. Even now there is a strong movement on foot to affiliate the train despatchers with one of the great labor brotherhoods, and it is understood that many of the despatchers are in a receptive mood. As Mr. Finan says, there should be no more reason for a protective organization of despatchers than of superintendents, and the idea of the despatchers owing allegiance first to a union, and second to the railway, is almost unthinkable. It is gen-

erally recognized that railway officers and other employers in the past have been to a large extent responsible for the present strength of the labor unions, and it would be unfortunate if their treatment of the despatchers should lead to the formation of another labor union affecting so vital a branch of railway operation.

"Why do you suffer our ignorance, which so fatally injures your business?" This frank, forceful question tersely sums up "A

Inefficiency in Railroad Offices

Clerk's Plea," which appears in another part of this issue, and which should be carefully studied by every railway officer who is interested in cutting out waste and inefficiency in office work—and this means

the entire service, for men engaged in the actual work of carrying on transportation and looking after maintenance may be, and often are, seriously handicapped and discouraged in their efforts by inefficiency and lack of team work on the part of the office forces. The "clerk's plea" is an indictment of the thoughtlessness of the railroads in overlooking the vital necessity of providing for the proper instruction and training of the office forces. Agitation of this question, which is now going on, would indicate that many railway officers are awakening to the seriousness of the situation. The problem will be half solved if railway executives generally will recognize the necessity of taking steps to solve it and will concentrate their energies on improving the conditions which now exist. It is true that the criticisms made in the article may not apply to all roads, but the indications are that such conditions exist to a greater or less degree on most of them.

THE LICENSING OF ENGINEERS

ALTHOUGH the licensing of engineers has been the subject of much discussion among the technical associations for several years, Illinois is the first state which has actually passed a law providing for this. Prompted by dissatisfaction on the part of consulting structural engineers with the broad provisions of the existing state architects' law, a committee of the Western Society of Engineers procured the enactment at the last session of the state legislature of a similar law governing the licensing of structural engineers. Briefly, this law requires that any person engaged in designing or supervising the construction, enlargement or alteration of any structures other than buildings, shall have a license or be under the employ of a licensed engineer. The act defines structures as including coaling stations, elevators, docks, bridges, reservoirs, shops, roundhouses, power houses, etc. Provision is made for the licensing of any person now practising structural engineering in Illinois without examination upon the payment of a fee of \$50. No arrangement is made, however, for the licensing of non-resident engineers without examination regardless of professional standing or experience.

Thus, the chief engineers and bridge engineers of railroads with headquarters outside the state must pass an examination before the state examining board or arrange for some subordinate, resident in the state, to take out such a license and do work in the state over the latter's signature. Likewise, a consulting engineer or a manufacturer located without the state and engaged in the design and erection of structures coming within the limits of this law must pass an examination before he can compete on an equality with resident engineers. While the law contains a reciprocal provision authorizing the granting of licenses to engineers of other states in which similar laws are in effect, since Illinois is the only state which has passed such a law, this measure is of no consequence. Carried to its logical conclusion, the engineering executive of a railroad will be required to procure a license from every state through which the road passes and the expense, whether borne by the individual or by the road, will be considerable.

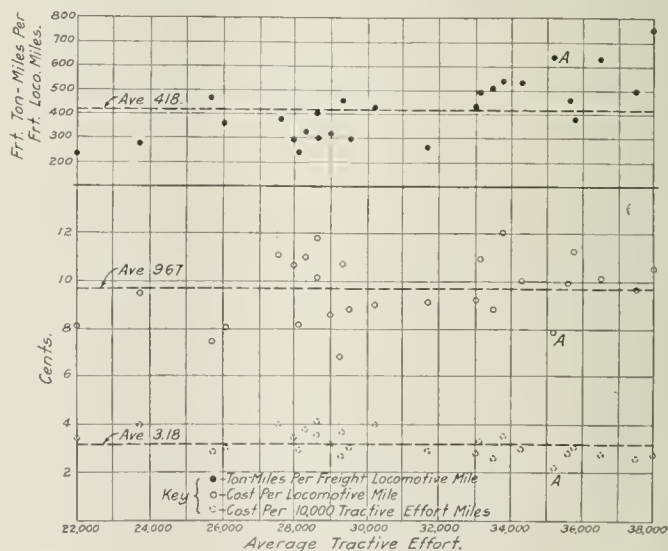
Even more serious is the confusion resulting from a variety

of laws with different provisions and requirements which may be expected if this movement becomes general. Thus, to improve a purely local situation, with only a secondary desire to improve the safety of design, this restrictive measure has been enacted. The licensing of engineers has never been favored by the majority of the engineers themselves, and it is not expected that this measure will meet with any greater degree of approval.

LOCOMOTIVE MAINTENANCE

IN order to secure a comprehensive idea of what the large capacity locomotives have done toward reducing the operating expenses of the railroads of this country, data taken from the 1913 report of the Interstate Commerce Commission is plotted on the accompanying chart. Twenty-seven representative roads whose locomotive repairs amounted to over a million dollars each were considered, and the cost of locomotive repairs per locomotive mile and per 10,000 tractive effort miles, and the freight ton-miles per freight locomotive mile were computed for each road. These results were plotted according to the average tractive effort of all the locomotives on the respective roads.

The upper set of points shows how those roads that have increased the capacity of their freight locomotives have been able to increase the ton-miles per locomotive mile; the middle set of points shows that the cost of locomotive maintenance per locomotive mile increased with the heavier engines, and the lower set of points shows that even though there was an increase in the cost of maintenance per locomotive mile there was, in reality, a decrease in the cost of locomotive maintenance if the hauling capacity of the locomotives is considered—that is, the cost of locomotive maintenance per 10,000 tractive effort miles was less for those roads having locomotives of the higher average tractive effort than for those roads having the lesser. While it would have been desirable to compare the cost of locomotive maintenance with the



ton-miles, it was impossible to do this as the statistics presented in the Interstate Commerce Commission's report do not differentiate between the cost of repairs for passenger and freight locomotives. However, by referring to the top and bottom set of points a clear conception of what is being accomplished may readily be obtained.

Although there is considerable variation among the "ton-miles per locomotive mile" set of points, it does not necessarily mean that all the roads that are low in their performance are inefficient, for the operating conditions will, to a large extent, affect this figure. The road which appears to have the best record in all these sets of points is marked with the letter A. This road is a low grade line and has a large amount of through business, its main line being over 500 miles long. The usual "cost per locomotive mile" basis of figuring the cost of locomotive maintenance

does not reflect the actual conditions, as does the cost per 10,000 tractive effort miles. The former shows an increase in maintenance cost for the larger locomotives, where there is in reality a decrease from the standpoint of the total work the locomotives are capable of doing.

The chart shows that the higher capacity locomotives are relatively cheaper to maintain and that they are being used, in most cases, to good advantage, but it should not be understood that the larger locomotives will be suitable in all cases. Heavy power has a big field of usefulness, but the traffic conditions must warrant it. Three large roads of the West and Southwest having locomotive maintenance costs much in excess of those shown above, according to both bases, have been omitted for the reason that their conditions are so different from the average road.

WHILE OTHER ACCIDENTS DECLINE TRESPASSING ACCIDENTS STILL INCREASE

RAILWAY travel has not for many years been especially hazardous and it is becoming safer every year. Working on a railroad, while properly classed as a more or less dangerous occupation, according to what department an employee is in, is also each year attended with a reduced degree of risk. But trespassing on railway tracks and trains has always been and still continues to be a very unsafe occupation, and is not growing less so.

While regulating bodies of all kinds have been very busy passing laws and issuing orders to prevent railway accidents, the railways themselves have exerted the most strenuous efforts to remove one of the most serious blots on their record, with the result that fatalities to passengers as well as to employees have been steadily decreasing. To the most numerous class of railway casualties, however, the fatalities to trespassers, the same bodies that have been most vigorous in regulating the railways have shown indifference; and this in spite of the fact that the number of people killed while unlawfully using the railroad tracks as a short cut or stealing rides on cars and engines, has continued to grow from year to year.

E. W. Camp, attorney for California for the Atchison, Topeka & Santa Fe, in his address before the convention of the American Association of Railroad Superintendents at San Francisco, described some of the experiences of the roads in their recent futile efforts to interest the legislatures of the various states in a bill to make trespassing a misdemeanor. For example, he showed that in some states the bill could have been passed with a proviso that it should not apply to pickets during a strike!

It is interesting, therefore, to contrast the tendency shown by the kind of accidents for which the railways may be held responsible with the tendency of those for which no one is to blame but the victims themselves and the public and its representatives who refuse to lift a finger to stop the slaughter.

The number of railway casualties is so greatly affected by the volume of traffic and other factors that comparisons of individual years, or that fail to take such factors into consideration, are liable to result in very misleading conclusions, and it is far safer to compare periods of years. The statistics needful for such comparisons are available in the reports of the Interstate Commerce Commission for the years 1890 to 1914. For many years railway casualties increased very rapidly, mainly because the number of people exposed to railway accidents of all kinds, the mileage of railroads, the number of trains run and the volume of traffic handled, were increasing very rapidly. The fact that the increase in accidents was less than the increase in the chances of accident is frequently overlooked.

Comparing the last five-year period for which we have the figures, 1910 to 1914, with the period 1890 to 1894, the number of passengers killed increased 8 per cent, while the mileage of railroads increased 58.9 per cent and the number of passengers carried increased 86 per cent. The passengers carried one mile increased 153 per cent. The number of employees killed in the last five-year period was 30 per cent greater than in the first

period mentioned, but the number of employees was 114 per cent greater, and the tonnage of freight handled was 185 per cent greater, while the number of tons carried one mile was 225 per cent greater. These are the accidents with which railroading as a business is fairly chargeable. The number of trespassers killed during the last five years, however, was 52.6 per cent greater than during the period 1890-1894, the increase in fatalities to trespassers being twice as great in proportion as the increase in fatalities to employees and over seven times as great in proportion as the increase in passengers killed.

Such comparisons go back to the unregulated days of railroading. What are the facts for more recent years? Comparing the period of 1910-1914 with the preceding five-year period, 1905-1909, we find that the number of passengers killed was 19.3 per cent less in the latter period than in the former; and the number of employees killed was 4 per cent less, in spite of an increase in railroad mileage, in the number of employees and in the volume of both freight and passenger traffic. While there were these absolute decreases in the numbers of fatalities to passengers and employees, there was an absolute increase of 1.7 per cent in the number of trespassers killed.

If the improvement in respect to the safety of railway travel and employment be largely attributable, as some maintain, to regulation, to what must we attribute the continued increase in the number of fatalities to trespassers? As a matter of fact, the reduction in other accidents is mainly creditable to the managements of the railways, while the continued increase in fatalities to trespassers is mainly due to bad government. The railways have policed their tracks and arrested trespassers by thousands, only to see them turned loose because the judges have refused to convict them and because local communities have declined to stand the expense of their incarceration.

That the percentage of increase in fatalities to trespassers has not been larger is due rather to the activities of the railways in keeping up an agitation regarding the evils of trespassing than to any assistance they have received from legislatures, courts or commissions.

A few years ago C. C. McChord of the Interstate Commerce Commission called attention to the fact that from 1890 to 1909 a total of 86,733 trespassers had been killed on American railways. This represented 53 per cent of all railway fatalities. Since then many laws have been directed against the 47 per cent, but none against the 53 per cent. In the five years since 1909 the total fatalities to trespassers has been swelled to 113,480, an increase in five years of 26,747, and in 1914, 5,471 trespassers were killed. The percentage of trespassing fatalities to all railway fatalities is now slightly over 53 per cent.

In 18 years out of the last 25 more trespassers were killed than during the year before. In the five-year period, 1890-1894, the total was 17,523; from 1895-1899 it was 19,464, an increase of 11 per cent; from 1900-1904 it was 23,455, an increase of 20 per cent; from 1905-1909 it was 26,291, an increase of 12 per cent, and from 1910-1914 the increase was 1.7 per cent. While the railways have succeeded in reducing their own accidents in spite of the increase in mileage and traffic, the number of trespassers killed has almost invariably fluctuated with those factors. In other words, it has been governed almost entirely by the increase in the chances of accident. The more railroads there are and the more trains there are run the greater is the hazard that they will kill persons who insist in walking on the track, and apparently the more people there are in the United States the more trespassers there are.

The railway accident record is bad enough without being exaggerated. It has always been widely published and hence has received more than its proper share of attention as compared with the casualties in other industries. We sometimes read of an accident in which people have been "slaughtered like sheep." But the American railway accident record can never be properly understood nor adequately dealt with until some action is taken by the constituted authorities to separate the sheep from the goats and protect the goats from the consequences of their natural propensity.

Letters to the Editor

FACTOR OF ADHESION

ST. MARY'S, Pa.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The letter published in your issue of May 7, 1915, on the above subject, was written along the lines that appealed most forcibly to the writer at the time, without a thought of evading the direct issue on the question. To satisfy the criticism of Mr. Baxter, published on page 1463 of your issue of June 25 1915, he will endeavor to show why he does not believe in factors of adhesion higher than from 4 to 4.25.

The adhesion of a locomotive is the resistance which prevents or opposes the slipping of the driving wheels on the rails, and is due to the friction of the former on the latter. When we consider the process of starting a locomotive there is, at any instant, as we gradually apply the effort, an amount of friction called into play just sufficient to balance the effort; as the effort increases so does the friction, until it reaches a certain limiting value beyond which it cannot go. Any increase, then, causes the slipping of the driving wheels. Therefore, the logical conclusion is that the limiting friction should just balance or slightly exceed the tractive effort for the most economical condition of the rails. As the limiting friction is governed by the same laws as the friction of motion, with, however, a slightly greater co-efficient in most cases, it stands to reason that the factor of adhesion should be chosen from the analysis of the values obtained from these laws; the values of which can be easily demonstrated if one chooses to go to the trouble of making a few simple experiments. These values for the four most important rail conditions are nearly as follows:

On a dry sanded rail	3
On a dry rail	4
On a wet, sanded rail	5
On a wet or frosty rail	6

The most economical factor of adhesion is the one that will give the greatest earning power the year round at the least cost per pound of locomotive. There is no use in spending time on the factors 3 and 6, as we are all aware that they are unreasonable; the former because a locomotive could not carry enough sand to sand the rails every trip from start to finish, and even if this were possible, the cost of tires and rails would prohibit its use; the latter because we do not have wet or frosty rails the whole year round and the loss in tonnage is excessive. The advent of the trailing wheel types, such as the 4-4-2, 4-6-2 and 2-8-2 in late years is probably responsible for increasing the factor of adhesion to from 4.5 to 5 or over. These types were primarily developed to obtain boiler capacity, but it has been found that they are more slippery than the non-trailer types on grades with a factor of 4, consequently the wheel arrangement has possibly forced the increase in the factor of adhesion.

Now, let us decide upon a factor, say 4 or 5, by working out an example. Suppose we have two locomotives weighing 200,000 lb. on the driving wheels, one with a factor of 4 and the other with a factor of 5. The locomotive with the factor of 4 would have 50,000 lb. tractive effort, and the one with 5 would have 40,000 lb. Suppose that it requires 50 lb. per ton of locomotive and train to start on the controlling grade; then the two locomotives would handle 1,000 tons and 800 tons respectively, of locomotive and train, the one with the factor of 5 losing 25 per cent in tonnage. It is a well-known fact that a locomotive can handle considerably more tonnage after the train is in motion than it can start, consequently the locomotive is only valued for what tonnage it will start. Therefore, starting power, limited only by the dry-rail condition, is what is needed. It may be said that the locomotive with the factor of 4 cannot always handle the 1,000 tons. True, but the tonnage can be cut to suit the conditions and still it will usually handle more tonnage than the locomotive with the factor of 5. On the other hand the

locomotive with the factor of 5 cannot take advantage of dry rail conditions to the fullest extent because dry rail conditions will utilize a lower factor of adhesion than the locomotive can attain.

The conclusion is that the factor of adhesion should be slightly greater than the ratio between the limiting friction in pounds, and the weight on the driving wheels in pounds which, for the most economical rail conditions would be from 4 to 4.25.

As the writer is very much interested in Mr. Baxter's communication appearing in the issue of June 25, he would be pleased to see a further analysis by Mr. Baxter of the statements made therein to show why a high factor of adhesion is necessary.

E. F. GWIN

Pittsburgh, Shawmut & Northern.

THE TRAINING OF RAILWAY EMPLOYEES

OMAHA, Neb.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The article "How to Select and Promote Your Men," written by Roy V. Wright, which appeared in your issue of August 6, is a very timely one.

I have been closely in touch with Dean Schneider's work and agree with him largely. While there no doubt is something in phrenology, character reading, etc., the fundamental truths underlying such a science as character reading—if it may be so spoken of—are not yet known, and, consequently, attempts to work out anything but very general results along these lines are as apt to fail as to succeed.

Railroad work is not as attractive to young men as it was ten years ago. One of the important problems today is to make the work more attractive to the younger generation so that there will be a better class of material to select from.

One who has had experience in trying to interest railroad men in increasing their efficiency by study and thus fitting themselves for promotion, finds that from this particular point of view railroad employees can be divided into several main classes:

There are those ambitious fellows who deny the right of seniority, so-called lack of "pull" or any other condition to stop them for a moment in their strenuous efforts to reach the top of the ladder.

Then, there is another class that sit back and say, "What's the use. You've got to have a pull; you can never get any further without it."

Still a third class is impressed with seniority promotions in the office. They plug along, impatiently waiting for the man ahead of them to die or get fired so that they will get another \$5 a month. There is an appalling number of such men in our railroad general offices today. They need to be reached to increase general office efficiency more perhaps than any other class of men.

Again, we have a considerable number of men who fail to realize the fundamental principles which their unions stand for and misuse their affiliation, depending on it to hold them in their jobs and get them the highest possible wages for the work, irrespective of its quality. The characteristic of this class of man is that he does not aspire to a higher position than a workman at his trade and depends upon his affiliation to hold him where he is. He is not going ahead, and, consequently, the procession is passing him.

Then there is another large number of railroad employees that are not affiliated with railroad organizations and that have not been intelligently handled by their immediate superiors. Promotions of this class of men have been more or less guesswork, and such guesswork promotion breeds inefficiency as is the case with those depending upon seniority.

Of all the educational work that is being done by railroads, either directly or through co-operation with outside educational institutions, the greatest success has been obtained where officers of the railroad have been sufficiently impressed with the educational work so that they have kept in touch with it closely, and have encouraged those who are ambitious enough to study by promoting them as their increased efficiency justifies and opportunity offers.

There is no doubt that a very important feature of railroad

work should be the intelligent selection and training of new men. It is also true that these men should be watched as outlined by Dean Schneider. Henry Ford has worked out a practical solution of the problem of transferring a man to work at which he will be successful rather than firing him because he does not make good at some certain job. A railroad with its many different lines of work should be able to do this.

On the other hand, the question arises as to whether the railroads give sufficient encouragement to the men in their employ who are ambitious and would be willing to increase their efficiency if they felt the effort would be appreciated.

At present railroad employees can obtain educational service at a nominal charge. With such service available to its employees, a railroad might well use the money, otherwise necessary to spend for a comprehensive scheme for the education of their men, on a department that would be responsible for the employment and proper placing of employees.

If it was understood that only those sufficiently ambitious to take time to study the literature of their business, as outlined in a recent editorial in the *Railway Age Gazette* entitled, "The Student in the Railway Business," could reasonably expect advancement, practically every man worth while would be anxious to become a student. Then the department responsible for the men could keep in touch with their studying on one hand and their practical work on the other, so that promotion would become more or less of an exact science instead of a hit-and-miss proposition, and something would be accomplished toward a solution of the problem at a cost ridiculously low compared to the results which it is possible to obtain.

D. C. BUELL

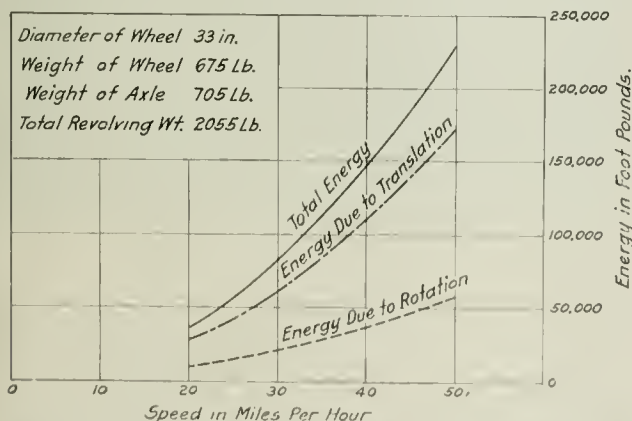
Director, Railway Educational Bureau.

ENERGY CONTAINED IN REVOLVING WHEELS AND LOCOMOTIVE SIDE RODS

CHICAGO, ILL.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Recently I had occasion to prepare some data on the energy contained in the revolving parts of locomotives and freight car wheels for different rates of speed, and as it may be of interest to your readers I am glad to submit it herewith. The diagram shows the energy contained in one pair of freight car wheels, including the axle, for speeds ranging from 20 to 50 m.p.h. Each wheel was 33 in. in diameter and weighed 675 lb.; the axle weighed 705 lb., making a total weight of 2,055 lb. To



Energy Contained in a Pair of Mounted Car Wheels at Different Speeds

obtain the total energy per car for all the revolving parts the results shown should be multiplied by four. In switching movements the average engine speed may be far below the minimum here shown, and the speed at which cars actually come in contact is below that of the engine used in accelerating them to speed. From the figures given, however, it should be clear that the destructive effect of impacts, or shocks, from switching, particularly to detached cars when brakes are not used to decelerate speed, is far in excess of the generally accepted estimates among railway men.

ENERGY CONTAINED IN MOUNTED DRIVING WHEELS OF DIFFERENT WEIGHTS AT VARIOUS SPEEDS

Road	Size of Locomotives Considered	Speed in M.P.H.	Foot Pounds of Contained Energy		
			Rotation	Translation	Total
A	Type 2-8-0	10	14,450	27,480	41,930
	Weight.....175,000 lb.	20	57,430	110,810	168,240
	Boiler pressure.....200 lb.	30	128,950	249,740	378,690
	Cylinders....22 in. by 30 in.	40	237,560	442,990	680,550
	Revolving unit wt...8,300 lb.	40			
B	Type 2-8-2	10	17,340	32,380	49,780
	Weight.....218,900 lb.	20	69,360	130,570	199,930
	Boiler pressure.....170 lb.	30	158,100	294,270	452,370
	Cylinders....25 in. by 32 in.	40	279,480	521,970	810,450
	Revolving unit wt...9,800 lb.	50	437,580	816,700	1,254,280
C	Type 4-6-0	10	14,480	28,120	42,600
	Weight.....143,000 lb.	20	58,960	113,390	172,350
	Boiler pressure.....185 lb.	30	127,950	255,550	383,500
	Cylinders....20 in. by 28 in.	40	237,240	453,290	690,530
	Revolving unit wt...8,480 lb.	50	361,050	709,840	1,070,890
D	Type 4-4-2	10	20,030	39,190	59,320
	Weight.....105,000 lb.	20	88,100	158,060	246,170
	Boiler pressure.....185 lb.	30	198,290	356,200	554,510
	Cylinders....27 in. by 28 in.	40	284,580	631,860	916,440
	Revolving unit wt...11,860 lb.	50	464,510	988,630	1,453,140
E	Type 4-4-2	10	17,640	32,160	49,800
	Weight.....105,400 lb.	20	72,320	129,700	202,020
	Boiler pressure.....200 lb.	30	162,170	292,340	454,510
	Cylinders....21 in. by 26 in.	40	289,300	518,530	807,830
	Revolving unit wt...9,700 lb.	50	450,710	811,320	1,262,030
F	Type 4-4-2	10	21,460	36,630	58,090
	Weight.....93,000 lb.	20	84,630	147,750	232,380
	Boiler pressure.....225 lb.	30	189,530	332,990	522,520
	Cylinders....21 in. by 24 in.	40	336,140	550,650	886,790
	Revolving unit wt...11,100 lb.	50	525,670	924,160	1,449,830
	Type 4-4-2	10	21,460	36,630	58,090
	Weight.....93,000 lb.	20	84,630	147,750	232,380
	Boiler pressure.....225 lb.	30	189,530	332,990	522,520
	Cylinders....21 in. by 24 in.	40	336,140	550,650	886,790
	Revolving unit wt...11,100 lb.	50	525,670	924,160	1,449,830

The table gives the foot-pounds of energy contained in mounted driving wheels of six different locomotives at speeds varying from 10 to 80 m.p.h. The weight of each revolving unit in the table represents one pair of wheels mounted on an axle, plus the proportionate amount of side and main rod weight. This sum multiplied by the pairs of wheels would give the total weight of the revolving parts. In the last column of the table is given the total foot-pounds of energy contained in each revolving unit, due to both rotation and translation. Attention is called to the fact that in a freight engine (Road A) with small drivers, the total foot-pounds of energy at 40 m.p.h. in the revolving parts alone, is in excess of one-half million while the large passenger engine (Road F), with 84-in. drivers, at a speed of 80 m.p.h., the total foot-pounds of energy is in excess of three and one-half million and this, together with the many additional millions in the complete engine, must be absorbed by the brakes each time the engine is decelerated from the speeds shown to a state of rest.

A careful study of the foregoing cannot fail to lead one into profitable fields of investigation that hold much in store for those who have to do with the design, maintenance and operation of railway equipment, and through whose acts of omission or commission standards of efficiency are not as high as they should be. To those who advocate, or use, special brands of high-grade material in the revolving and reciprocating parts of engines, for the purpose of reducing weight and increasing the factor of safety of those parts, these figures serve as an unqualified endorsement and inversely offer a mild rebuke to those who have not recognized this potent factor in engine design. If the transportation men who handle freight cars will study the diagram in conjunction with the paper* on this subject presented at the last convention of the Master Car Builders' Association by Professor Endsley of the University of Pittsburgh, they cannot fail to see that by handling equipment carefully many millions of dollars may be saved to the carriers annually in the item of reduced cost of freight car maintenance, and many millions more in the items of personal injuries, damaged freight, and increased freight car mileage. The writer is indebted to the Baldwin Locomotive Works for weights of parts of locomotives from which these calculations were made.

W. E. SYMONS

* See *Daily Railway Age Gazette* of June 17, page 1,391

Important Realignment Problem on the Pennsylvania

**Three Tunnels Will Eliminate 12.23 Miles of Line;
One Involved Unusual Difficulties with Falling Rock**

The Pennsylvania is completing some heavy realignment work on the Allegheny division, consisting almost entirely in the construction of three tunnels with a combined length of 8,703 ft., which will result in a saving of 12.23 miles. The portion of the Allegheny division, comprising that part of the system between the junction of the Allegheny and the Kiskiminetas rivers, 28.9 miles north of Pittsburgh, and the town of Oil City, Pa., is located on the left bank of the Allegheny river, which flows in a

average of 25 freight trains in each direction. It was concluded that this traffic justified the construction of tunnels at three points where the river makes wide detours around high bluffs, the topography lending itself to a relocation of the railroad, eliminating distance, and incidentally a considerable amount of curvature. The tunnel at East Brady is 2,468 ft. long and will result in a saving of 5.36 miles of line; the tunnel at Wood Hill is 2,730 ft. long, saving 3.4 miles of line; and that at Kennerdell is 3,505 ft. long, effecting a saving in distance of 3.47 miles.

THE EAST BRADY TUNNEL

This article will deal entirely with the tunnel at East Brady, which is the shortest of the three, although it cuts off the most distance and eliminates 363.7 deg. of curvature. As shown in one of the illustrations, the situation is one that would naturally suggest a tunnel. In fact, a tunnel was considered at this location at the time that the line was built by the Allegheny Valley Railroad Company, but the idea was abandoned because of the pressure brought to bear by the Brady's Bend Iron Company, whose plant was located and operated on the opposite side of the river, near the middle of the loop, which the tunnel would



View of Roof After Rock Fall

very winding and tortuous course between two ranges of bluffs varying from 100 to 700 ft. in height for practically the entire distance of about 102.8 miles. When the railroad was built, between 1855 and 1870, the demands for cheap construction resulted in a



Shovel Buried Under a Fall of Rock



Steam Shovel at Work at South Portal

location following the winding course of the river on a bench on the sides of the bluffs.

Since this line was acquired by the Pennsylvania the traffic has increased to such an extent as to justify double tracks from Pittsburgh to East Brady, a distance of 68.9 miles. The traffic at the present time consists of five passenger trains, and an

have eliminated. The project was kept alive, however, and surveys were made from time to time. In November, 1912, new surveys were made and in February, 1913, actual construction was commenced. The scheme originally authorized involved approach lines at each end of the tunnel considerably closer to the river than the original alignment. This was of advantage because it afforded a much better alignment through the tunnel and gave an economical and convenient location for the spoil from the tunnel excavation. In March, 1913, however, an extraordinary flood in the Allegheny river caused the Secretary of War to make provision for extensive revision of harbor line limits of that river, which precluded the construction of the realignment on the location originally intended. In consequence, it was necessary to bring the approaches closer to the bluffs, resulting in a sharpening of the curve at each end of the tunnel. The final alignment consisted of a 3-deg. 16-min. curve, 2,393 ft. long, through the central portion of the tunnel, with 4-deg.

curves on either end, that on the south being 439 ft. long and that on the north 560 ft. long.

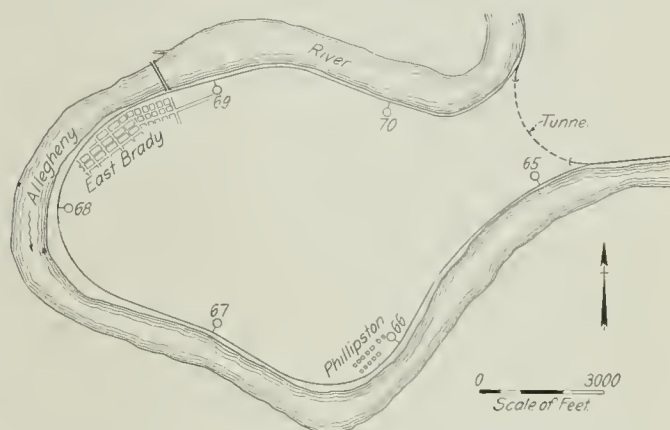
The approaches consist of side-hill cuts ranging in height from 10 to 100 ft. These consisted mostly of sandstone and were taken out by steam shovels, the material being disposed of along the river banks. Under-crossings were provided at each end, so that the material could be hauled away without interference with main line traffic. After 4,000 cu. yd. of material had been excavated at the south approach, the contractor was enjoined from disposing of any more material on the river banks until the harbor line was permanently established by the Secretary of War. During this delay the spoil from the excavation at the south end was turned over to the maintenance of way department of the railroad, on standard-gage flat cars, and hauled to various points on the division. The approach cuts required the removal of 55,800 cu. yd. of material.

TUNNELING METHODS

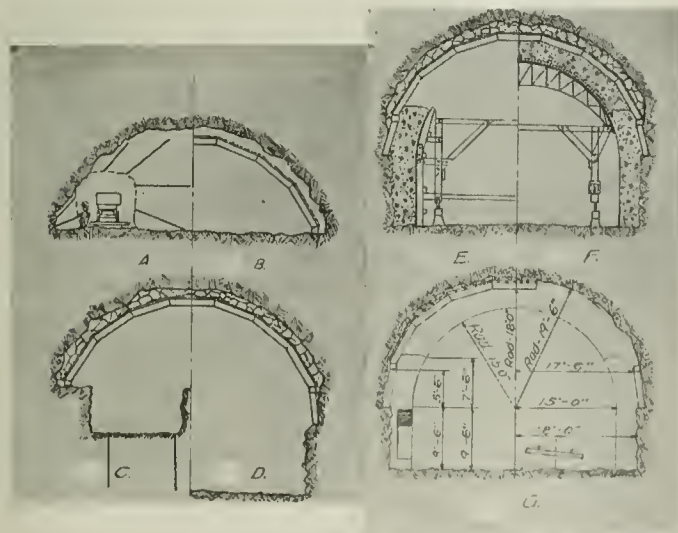
The headings were started in July, 1913, and in order not to wait for the completion of the approach excavation it was necessary to enter the tunnel proper through two side drifts from the face of the hill on a line at right angles to the center line. The drifts were 2,378 ft. apart and were carried to the center line of the tunnel proper, and then driven in both directions from that point. By the time the approach cuts were completed the heading at the south end had been driven and timbered 330 ft. and at the north end 135 ft. The headings were worked by driving two 8-ft. by 8-ft. side drifts adjacent to each side of the full tunnel section, at the elevation of the wall plate of the arch, 15 ft. above subgrade. They were driven from 15 to 20 ft. ahead of the timbering. The drill holes in the face of the drifts were in four horizontal series; four sub-cut holes 6 ft. deep were

allow the setting of one ring of timber at a time. The timber ring was cut on an 18 ft. radius and consisted of seven segments of 12-in. by 12-in. or 10-in. by 12-in. hard wood. Two-inch hard wood lagging was placed over the ring and the remaining space was packed with one- and two-man stone, except where there from the knuckles of the ring and then packed. The record for lineal feet of heading timbered in one month at both ends, working day and night shifts, was 310 ft.

The bench material was worked by digging trenches, usually 6 ft. deep and of a sufficient width to permit the erection of a tripod drill and leave, at the same time, a sufficient width in the center to support muck tracks. Three holes were drilled to subgrade, one near the center line of the bench and one on either side 6 or 7 ft. from the wall plates. It was necessary to spring the holes several times, using 40 to 45 sticks of dynamite per hole, and thus obtain a pocket large enough for the final shot of



Map Showing Location of the East Brady Tunnel



Typical Sections, Showing Various Stages in the Construction of the Tunnel

loaded with four sticks of dynamite, four cut holes 8 ft. deep were extra large breaks, where the roof was supported on posts were loaded with six sticks, three straight holes 8 ft. deep were loaded with three sticks and two dry holes at the top 8 ft. deep were loaded with two or three sticks, all of 60 per cent dynamite. Muck was loaded into one-yard cars, pushed to the end of the bench by hand and dumped onto the muck pile, from which it was removed by a steam shovel. This haul varied from 100 to 600 ft., depending upon the progress of the bench excavation. Wall plates for the arch timbering were of 12-in. by 12-in. by 16-ft. hard wood timber and were set 15 ft. above subgrade, 17½ ft. to either side of the center line.

As the material was of such a nature that the roof would not support itself for more than 4 or 5 ft., the core between the two side drifts was taken out in sections just large enough to

125 or 175 sticks per hole. These charges shattered the bench material sufficiently for ready handling by the shovel without any further shooting. The rock was loaded into 4-yard dump cars by a steam shovel operating by compressed air, and hauled to the respective dumps. The cars were placed one at a time at the left of the shovel by Porter 18-ton and Vulcan 20-ton locomotives, but wherever possible a siding was maintained 100 ft. or more in the rear of the shovel, upon which the empty cars were placed by the locomotive, three drum hoists being used to switch them to and from the shovel. By this method 100 cars of bench rock were removed in a 10-hour shift. In front of the shovel 12-in. by 12-in. plumb posts were placed under the wall plates from 1 to 7 ft. long, according to the distance to solid footing. In several instances the posts extended to subgrade; the condition of the wall plates and the overhead timbering governing the number of posts, which were placed on an average of 3 ft. apart. Frequently it was necessary to provide additional posts and renew old ones at the time of trimming. After the bench was excavated a variable amount of trimming was necessary to give a minimum thickness to the masonry of 3 ft., the trimming being done by means of Ingersoll-Rand Jap drills.

LINING AND PORTALS

The tunnel lining is of concrete, using a 1:3:6 mixture for the side walls and a 1:2½:5 mixture in the arch. The materials used were Lehigh Portland cement and Allegheny river washed sand and gravel, and in addition, 120 deg. of the arch crown was faced with a single layer of Mack vitrified paving brick as a protection against the disintegrating action of gases. The side wall forms were built of timber 42 ft. long, extending up to the edge of the brick lining. These forms were supported from a frame traveler which moved on a track laid on 12-in. by 12-in. timbers 2 ft. 3 in. above subgrade. The forms were adjusted laterally by means of turnbuckles and screwjacks between the forms and the traveler, which were supplemented by timber bracing to take up the concrete pressure. The concrete was placed by Pneumatic Concrete Placing Company's mixer and

conveyors. A mixer was set up at each portal until the lining was completed for a distance of about 750 ft. inside the tunnel, then the mixer was placed at a convenient point within the finished tunnel and the bins were fed by a conveyor. Delivery pipes were connected up and the material was placed from the top of the forms at either side, an average record for concreting the side of walls being 20 cu. yd. per hour. The forms were allowed to stand from 24 to 48 hours, according to weather conditions, before they were moved ahead.

The arch form consisted of steel lattice truss ribs supported on a traveler similar to that used for the side walls and running upon the same tracks. A platform was built at the elevation of the top of the traveler for handling the brick material for the brick work, which consisted of a single course laid in 1:2 cement mortar, one header course to four stretcher courses. The entire brick lining for a 32-ft. section of the tunnel was usually laid in about six hours. The brick work was allowed an initial set of from four to six hours, during which time bulkheads of bags of sand braced with planks were built to retain the concrete about to be placed. The concrete of the arch ring was generally placed at the rate of about 16 cu. yd. per hour. The forms for the arch were left in place from two to six days, according to weather conditions, before they were removed. A workman's retreat 5 ft. wide, 7 ft. 6 in. high and 2 ft. deep was provided in the side walls every 50 ft., and 4-in. cast-iron drain pipes were usually placed 13 ft. center to center, but were omitted where there was no leakage.

Both the north and south portals are of ashlar sandstone with concrete backing. The face of the portal has a batter of 3 in. to the foot, and the sandstone construction extends into the barrel of the tunnel a distance of 14 ft. at subgrade, reducing to 8 ft. at the crown of the arch because of the face batter. The parapet walls are 8 ft. high above the intrados at the arch crown and are capped with a 24-in. coping, 3 ft. wide. On the inside of the curve the end of the portal joins neatly with the rock cut of the approach, while on the outside a wing wall 38 ft. long is built parallel to a tangent to the curve at the face of the portal, the tops of these wings being finished in steps on a 1½:1 slope, with a batter of 1 in. to 1 ft. on the face.

The power plant for the work was located at the south end of the tunnel. One Aimes locomotive type and two Fitzgibbons stationary boilers furnished steam for two Sullivan compressors having a capacity of 1,380 cu. ft. of free air per minute, a reservoir of 191 cu. ft. capacity being placed near the compressor. The air was piped to the south portal by a 6-in. line and over the top of the hill to the north portal by a line consisting of a 6-in. pipe for two-thirds of the distance, then reducing to 4-in. From the portal 4-in. lines were run to the shovels taking out material at the bench and reducing there to 2-in. lines, which were carried on to the drills. Electric lights were supplied at the south heading by a generator operated by a steam engine, which furnished light for the entire tunnel as soon as it had been holed through. Up to this time the light in the north heading was provided by a generator operated by a gas engine, and located at the north portal.

DIFFICULTIES ENCOUNTERED

The material encountered in the tunnel was of a varied nature. Extending for about 400 ft. from the south end it was a gray sandstone. This dipped down to the north and the remainder of the material in the heading was of various formations. A bluish shale rock that was broken with irregular thin veins of coal and small outcrops of sandstone prevailed, while near the middle of the hill there was a pocket of glassy soapstone resembling fire clay that dipped into the heading abruptly and after some distance disappeared. The blue shale rock, after coming in contact with the atmosphere, had a tendency to decompose, with the result that more weight was thrown on the timbering than had been anticipated. Whenever settlement of the timbering indicated this condition, measures were taken to strengthen it. False rings were erected between the original

rings and posts were also placed. In spite of these precautions, a number of very serious falls occurred, the rock in some places continuing to drop until a natural arch had formed with the top as much as 35 ft. above the top segment of the timbering. In all, 425 ft. of timbering fell, requiring 9,000 cu. yd. of extra excavation, 2,000 cu. yd. of additional concrete in the arch ring and 7,000 cu. yd. of slag packing.

The worst features incident to these falls were the delay and loss of plant. In August, 1914, two separate breaks in the roof several hundred feet in the rear of the shovel at the north end tied up the work of this shovel until the one from the south end could be brought around to uncover it. After a delay of two and a half months in the work of this shovel, another fall in January, 1915, fell directly on the shovel, partly covering it and causing serious damage. On May 2, a fall of 101 lin. ft. of the tunnel roof buried the shovel and completely wrecked it.

The restoration of the tunnel after the falls involved painstaking and skillful effort. The arch rings under the larger falls were greatly strengthened by increasing the thickness of the ring by 4 ft., but in addition to this great care was exercised in packing the space between the ring and the top of the void resulting from the fall. Of particular interest in this connection is the use of granulated slag (formed by quenching hot slag with water) for this purpose, and the application of this material by the use of the pneumatic concrete mixer. The material was simply blown dry, using the mixing and transmitting apparatus without modification from the arrangement when concreting. It was found possible to place and pack the materials solidly much more conveniently and cheaply than would have been possible with any other material or method. In fact, the slag packed so solidly that there was a shrinkage of 45 to 50 per cent from the volume as delivered in cars.

At the present time the heading has been holed through, and the tunnel is completed, including the lining, except for a distance of above 700 ft., where the bench has not been removed.

The construction of the East Brady tunnel has been handled by the engineering department of the Pennsylvania Railroad, A. C. Shand, chief engineer, and H. C. Booz, assistant chief engineer, with N. F. Brown, assistant engineer, in direct charge of the work. We are indebted to the engineers in charge of the work for much of the above data. The Allegheny Construction Company, Arthur McMullen, president, New York City, has the contract for the entire work.

THE WORLD'S PETROLEUM.—The production of petroleum throughout the world in 1914 was 400,483,489 gallons, as compared with 384,667,550 gallons in 1913. The United States headed the list very decidedly last year, the American yield having been 265,762,535 gallons in 1914, as compared with 248,446,230 gallons in 1913. Russia ranked second with a yield last year of 67,020,522 gallons, as compared with 62,834,356 gallons; while Mexico came third with 21,188,427 gallons, as compared with 25,902,439 gallons. India produced 18,000,000 gallons of petroleum in 1914, as compared with 7,930,149 gallons in 1913; Roumania, 12,826,579 gallons, as compared with 13,554,568 gallons, and the Dutch Indies, 12,705,268 gallons, as compared with 11,966,857 gallons. It will be seen that the United States last year contributed 66.36 per cent to the world's yield of petroleum, while the corresponding contribution of Russia was 36.74 per cent, and that of Mexico 5.29 per cent.

SCOTTISH RAILWAY DISCONTINUES BRANCH LINE.—The Highland Railway closed on August 7 the Keith and Buckie branch line, including the stations of Buckie, Rathven, Drybridge, Enzie and Aultmore. Through traffic from the coast line will not be interfered with, as passengers going east can go through Cullen and Portsoy, and those going west through Forchabers-on-Spey and Elgin. The general manager has explained that the branch has been closed because of a scarcity of motive power, and that unless the southern companies send help in the shape of locomotives and men other branches will have to be closed.

A CLERK'S PLEA

By M. S.

"Clerks are a crowd of competent and incompetent men—usually in blind-alley jobs, with no training and no outlook."

So much truth is contained in this simple statement that no one who feels the vital importance of having an army of competent and efficient workers, instead of an incompetent crowd, can help from memorizing it at the first glance.

The subject touched on by George M. Basford in the *Railway Age Gazette* of July 23, 1915, page 150, is almost of national importance since the stockholder, the employer, the employee and also the public, which has acquired the habit of holding the railroads to account, are concerned by it. This concern is often equally shared by many of that competent and incompetent crowd, and if the existence of such a crowd is too costly to be permitted the incompetent man is really the one paying the highest price for it. He is doomed to the average job which is filled at any time by anybody, therefore commanding a relatively small salary; the job which requires (not principally, but under the existing circumstances) no responsibility, where individuality is a quality uncalled for, hard work the source of fun for the fellow coworkers, who have long ago banished the desire to do something for the company so as to have something done for themselves, or who have never had such a desire. It reduces his productiveness, his ability—therefore individuality; it makes him a living automat with no desires to be fulfilled, no task to be accomplished. It gradually produces a man incapable of thinking, deprived of his sense of duty to do his best, deafens his conscience; in short, it makes him a degenerate, a man who does not actually steal nor commit crime, and yet is touched by the underlying factors of both evils. His task in life is to be at the office "on time," stay until quitting time, do enough to look busy and keep out of trouble, gossip whenever the chief clerk leaves the room, expect promotion with every vacancy for a higher position, and very naturally blame "the company" for not getting it.

Of course, there are hardworking, conscientious fellows who have the interests of the company at heart, but they are few, and it is only a question of time before unrecognized ability prompts them to look for another field.

Do not understand this as a personal plea, though I am a clerk, a railroad clerk with heart and soul, who entered railroad service, not because of lack of opportunity in other fields, but for the recognition of opportunities offered by a railroad, for the desire to study this vast industry which has made progress a reality. It is in behalf of the hundreds of my type that I venture to speak, not because we are better than the rest, but for the reason that we choose what the others consider a burden and therefore are a type of our own.

Among us are those who took up railroad work to make it their profession, to make the best of it. Have we succeeded?

To answer this question we must first analyze the meaning of the word profession. What is a profession? Is it not trained ability intelligently and successfully applied in a certain direction? If so, have we attained that high degree of training and intelligence in our daily work which will enable us successfully to apply our energy in the chosen direction? We have not; and therefore we are the unfortunate professionals without a profession.

We may be honest and earnest in our efforts, but the lack of skill, specific knowledge, proper experience and cultivated and trained self-confidence nullifies the results of our efforts, decreases the value of our energy, reduces our productiveness, removes the possibility of development, and we gradually join the undesirable class, which is inclined to exaggerate its value.

Is it our fault? If it is, our failure to do the right thing has not as yet been pointed out to us.

Not to praise ourselves, we are honest, conscientious, eager to accomplish something, to work for the benefit of the company and not merely for the salary; furthermore, to work because we consider ourselves fit for that kind of work better than for

any other, because (excuse the expression) we consider that work our life-mission. Will all of that make us efficient, masters of our profession? Positively not. Our ignorance—unpreparedness—does not permit us to fulfill our task.

Where can we get that needed knowledge and training? One knows where to learn the trade of a blacksmith, a carpenter, a tailor, the profession of a physician, a lawyer, but where must one go to study the profession of a railroad man?

You, men above us, we know that it is not your intention to hurt us by calling us a crowd of incompetents, that you fully sympathize with us; but why don't you help us to get rid of this incompetency? Why don't you require a standard amount of knowledge before giving us employment? Why do you blindly promote us on our supposed merits instead of applying the iron test of the standard examination? Why do you suffer our ignorance, which so fatally injures your business?

Of course, it is impossible to require a standard as long as there is nothing provided for its attainment, but why are there no schools for us? Why don't competent men in railroad science write books for us, thereby enabling us to make better workmen and employees? If such books are written why are they not placed within our reach—in the office, public library; why are they not recommended by our superiors? Why is our professional education left entirely to ourselves when it is of equal importance to our employer and when previous experience has shown that we totally neglect it? Why are such a few magazines published on railroads, and those published read by such a few men? Why is the literature of enlightening the man on the small job so limited? Why is there no co-operation between a man and his superior? Why should we not be made devoted friends, co-operators in the corporation giving us our bread and butter, instead of an ungrateful crowd habitually knocking the railroads, secretly talking about government ownership, about rebates to shippers of which the I. C. C. is ignorant, about watered stock, too large profits, and all the nonsense which is originated by the politician, cultivated by the shipper, and delivered to the public ignorant of such affairs by the daily press, whose editors dare not make suggestions to a doctor or electrician, but feel quite at home talking (spell same as knocking) a railroad? Why overlook the fact that before entering railroad service we were a part of that public whose sentiments, for reasons too numerous and various to mention, are antagonistic to the railroad, and that while there may be an excuse (if there is, I am ignorant of it) for not pointing out to the public their erroneously formed ideas, it is an absolute necessity to point out such ideas to us since we are employed by the railroad.

I am not suggesting that the railroad regulate our opinions, but would it not be fair to let us take a glance at this great issue from the railroad point of view? Furthermore, is it not as improper to employ a man who is not serving to the best of his capability, as it is to render service for a corporation considered unjust? Why not permit us to see the railroad issue from a point of view other than that inherited from our fathers and give us a chance justly to create public sentiment based on personal experience and study, not on baseless theories inspired by anything but truth and knowledge?

Of course, I am not entirely blaming the railroad for our unfitness, but are we not almost helpless in our struggle? While the requirements of a railroad man can roughly be described by many, who can say, "Go there, young man, there you may secure the knowledge essential for a good railroad man?"

It is an irony of life to neglect the greatest things. Take the greatest industry of the country—agriculture—and it is surprising to learn how few are the institutions teaching us to be good farmers. Step to the next largest field, the railroad field, and you find no school at all.

We are professionals without a profession, ignorant, incompetent, inefficient; yes, we take the blame, we deserve it. But have we ever rejected the remedy? Were we given a chance to do better and did we refuse it? Have our employers taken sufficient interest in us—the necessary links of their business—

to make us, at least to help us, to become what we ought to be?

It is a tragedy when under the pressure of correct as well as erroneous legislation, and of economic and political conditions the railroads, the greatest and the least appreciated contributors to the nation's present growth and wealth, are facing a crisis never witnessed before and are eagerly looking for the trained, intelligent and earnest men, whereas, on the other end, a crowd of incompetents, fully aware of their incompetency, are vainly stretching out their hands for training and intelligence of that kind which will give the restless brain rest, the unlimited ambition realization, the country good citizens and the employers efficient and useful men.

Help us. If there are schools in existence direct us to them. If there are none, create them. It will be an investment, not an expenditure. Help us to render you the service which you deserve.

THE RAILROAD AND THE HOBO*

By E. W. CAMP

Attorney for California; Atchison, Topeka & Santa Fe Coast Lines

Some weeks ago a brakeman while in discharge of his duty was killed by a hobo. Within 30 days the brakeman's heirs had put in a claim under the state compensation act. No strenuous effort has been or will be made by the state to find the hobo; but the state would have forced the railroad to pay for the hobo's crime except for the fact that the brakeman was engaged in interstate commerce.

But when a brakeman, instead of getting killed, gets the hobo off the train there is turned loose on the right of way a source of peril to train crews, freight and passengers. Dynamite is not hard to come by and bridges are numerous. Likewise a can of phosphorus may produce interesting results. Especially when tramps move through the country in organized bands the railroads cannot safely refuse to let them ride. But if the hobo could be kept off the trains the whole tramp problem would be much nearer solution. On the other hand, the railroad is a serious danger to the hobo. Hundreds of them are lured to death every year by the chance of a free ride. Apparently the states care little for either hobo or brakeman, otherwise they would long ago have found means to keep the wandering gentry off the tracks.

What shall be said, however, of the failure to protect children, women and old men who now use the tracks in the daily walks of life—and death—more than 10,000 a year paying the penalty of life and limb? Would not one suppose the governments might at least adopt measures to save the lives of their own citizens? And all these lives would be saved and injuries avoided were trespassers kept off the right of way, as in other countries. But what are the facts?

Three years ago a campaign was inaugurated by public-spirited railroad officials for laws to prevent this wastage of life, a wastage greater than that of all our wars except the civil. Bills were prepared for the legislatures of some 40 states. They were short and simple; simply prohibited under penalty all trespassing on railroad rights of way—confining the use of the roadbed to the purposes to which it is adapted. Were they welcomed and gladly passed? No, they were rejected in every single state. In one at least the railroad commission, when asked to advise the legislature, recommended that the bill be killed. That was rather astonishing, for the commissioners are able, fair and fearless, but after reflection we may conclude that they were right. They probably reasoned that the law if passed would not be enforced and did not wish to see another added to the multitude of dead statutes.

The capacity to make laws in our states and cities has far outrun the machinery and especially the energy of enforcement. I greatly fear that if in every one of those forty-odd states the bill had become law the number of trespassers and the dead and injured trespassers would be no less. In other words, no serious,

persistent effort to enforce would have been made. For the very statements which were used to support the bills to which I have referred showed conclusively that where laws or ordinances against trespassing exist they are not enforced, and the police and courts not only do not initiate steps to enforce them, but refuse to act when cases are brought to their attention. What is needed is not more laws but more law, better performance of the primary duties of government. We have become soft, flabby and think altogether too much of the suffering of the criminal. A law that does not mean suffering to its violator is no law at all and any expectation to enforce law without suffering is foolishness. I doubt if in any other civilized country there is such disregard of law, such a state of undiscipline and absence of respect for law, as exists in the United States.

But there were other and less worthy reasons for refusing passage to these bills. In one state at least representatives of certain unions demanded to know the author of this damnable attempt to prevent strikers from wrecking trains and killing scabs. To secure favorable action it would have been necessary to insert a proviso that trespassing shall be permitted during strikes.

We must surely wish all success for every effort to shorten the roll of death along the rails. But, in my humble opinion, there is in this and other respects only one hope, and that lies in putting into the hands of the federal government everything pertaining to the regulation of railroads. That these trespassers are an interference with interstate commerce there is no doubt. You pay damages in many cases where men, women and children are run down on the track. Hundreds of emergency stops are made in attempting to avoid injury to trespassers, and emergency stops mean damage to engines and cars, injuries to passengers, bruising and death of livestock, even damage to common freight. Stops must be made to pick up men killed or hurt, and a stop on the main line means danger of another accident. Trespassing means pilfering of cars and burning of structures not fireproof.

Now, the Supreme Court of the United States has held that the railroads are national highways, and that any railroad doing interstate commerce must have all its engines and cars equipped with all safety appliances as required by the federal law. Every railroad must keep all its accounts, whether of interstate commerce or not, according to the rules of the federal commission. There can be no doubt that the general government may regulate everything pertaining to the maintenance and use of the roadbed and incidentally forbid its use by any other persons than railroad employes and for any other purpose than the rolling of cars. In fact, when it is once conceded that the federal government has power to own and operate railroads it must be admitted that it has power to do anything short of that. In this, as in other matters, your hope lies in replacing by a single national control the conflicting, shifting, multitudinous regulation of states, cities, counties and villages.

THE PARIS NORD-SUD RAILWAY.—Last year was the fourth during which the Paris Nord-Sud Railway had been worked. This line, which may be described as the younger sister of the "Métro," has just issued its annual report, which shows how gravely it has been affected by the war, like the larger and older undertaking. Mobilization exercised an extraordinary effect on the Nord-Sud. If the military authorities had not granted a brief stay, the company would on the eleventh day of mobilization have been left with only one motorman; and, as a matter of fact, the traffic had for a time to be worked with no more than 153 employees, of whom 64 were women, compared with the 1,096 who figured on the pay sheets at the beginning of last year. Nevertheless—and largely owing to the zeal of the wives of employees called to the colors—it was possible to maintain an uninterrupted though restricted service to meet the requirements of the public, and at the end of the year the staff had grown to 691, of whom 231 were women.—*Railway Gazette, London.*

*Address before the American Association of Railroad Superintendents at San Francisco on August 21, 1915.

The Railways and the California Expositions

First of Two Articles on the Preparations Made by the Roads, Attendance, Passengers Carried and Exhibits

The Panama-Pacific International Exposition at San Francisco and the Panama-California Exposition at San Diego, held this year in celebration of the opening of the Panama Canal, are of interest to railway men in several ways. The opening of the canal was itself a great transportation event. The expositions have stimulated travel to California and the West in general in such proportions as to require a great deal of preparation for it on the part of the Western railways, and during the past few weeks to such an extent as to tax the facilities of the lines serving the Pacific Coast. It is believed that the expositions have introduced large numbers of Eastern people to the attractions and opportunities of the far West in such a way as to have a permanent effect both in the way of stimulating future travel and in attracting settlers. Moreover, the railways themselves have taken an active part in the effort to make the expositions a success, spending large sums in advertising them and making low rates, and the transportation exhibits at the San Francisco Exposition, of the railways and of the railway supply companies, are among the most interesting features.

The Panama-Pacific International Exposition was opened on February 20 and will close on December 4, while the Panama-California Exposition at San Diego was opened on January 1, and is to remain open through the calendar year.

RATES AND ROUTES

On account of the expositions the railroads early announced round-trip rates to California on a basis lower than has been made for summer travel to the coast for several years; \$50 from

miles and the \$80 rate well over 6,000 miles, making the rates per mile approximately 1.25 cents and by some routes as low as 1.12 cents.

PREPARATIONS MADE BY THE RAILWAYS

The railways have been preparing for handling the exposition business for two or three years. The first preparations consisted mainly of arrangements for adequately advertising the event, and a vast amount of literature has been prepared by the railway advertising departments on the exposition and the points of interest to which the special exposition rates would naturally attract many visitors.

The Atchison, Topeka & Santa Fe also built a new passenger station in San Diego and the Southern Pacific built new stations at Los Angeles and at Third and Townsend streets in San Francisco, partly to accommodate the increased travel expected this year. These stations are illustrated herewith. The new Santa Fe station at San Diego, completed on December 31, 1914, is an adaptation of Spanish colonial architecture to the commercial requirements of a railway, the chief features of the plan consisting of an open-air waiting room or patio and a long covered concourse uniting the different elements of the station. This building cost \$260,000, and with the covered concourse occupies an area 106 by 650 ft. The main waiting room is 55 by 170 ft. The architecture is in harmony with the exposition buildings. The covered concourse consists of an arcade 650 ft long and 27 ft. wide connecting the passenger station with the baggage and express departments. This, with the patio and the two towers



Southern Pacific Station at Los Angeles and Santa Fe Station at San Diego; Both Built to Accommodate the Exposition Crowds

the Missouri river, \$62.50 from Chicago and from \$94.30 to \$98.80 from New York, the lower rate applying via the differential lines. These rates were made effective from March 1 to November 30, with a final return limit of three months from date of sale, but not later than December 31. Liberal stop-overs have been allowed on both going and return trips and many free side trips were offered, so that considering the total mileage thus made possible the rates offered have probably been the most liberal ever offered for travel to the Pacific Coast. The rates were made available by a great variety of routes and with an additional fare of \$17.50 via Portland, Tacoma and Seattle almost any combination of routes, including steamship lines along the Pacific Coast, could be selected. Several of the roads published booklets outlining 40 or more routes which were available from the Middle West. Tickets via most of these routes included the round trip from Los Angeles to San Diego and return and free side trips were offered to Denver, Colorado Springs or Pueblo, Salt Lake City, Seattle and Tacoma, and many other points from the routes which do not reach them directly. Low rates were also made for side trips to many other points of interest. With the free side trips added the \$62.50 rate from Chicago covers from 5,000 to 5,400

flanking the arch at the entrance to the waiting room, forms the principal architectural features of the exterior.

The Southern Pacific station at Los Angeles replaced the old Arcade station and is especially interesting on account of the convenience of its arrangement. Indicators are placed at all entrances to trains for the information of passengers, and the trains are reached by inclines and a subway, which does away with the necessity of crossing any track and makes it unusually easy to locate the right train. The main concourse is large, light and airy. At the north is a rest room for women, at the south a smoking room, and the mezzanine floor is fitted up as a lounging room for men.

The ticket office represents an innovation in station architecture. It is located in the center of the main waiting room and instead of the clerks waiting on the public through windows from a closed-in ticket office they are placed behind a low counter which puts them in a more approachable position. Instead of the usual ticket cases the tickets are kept in a revolving drum at the clerk's side, so that he does not have to turn his back to a customer. This plan the management believes will result in better service, and it has also been adopted in the new station in San Francisco.

This is the terminus of the company's lines running through the old mission towns, and, therefore, the mission style of architecture has been adopted. This is also a very attractive and convenient station.

Several of the transcontinental roads put on new trains in anticipation of the exposition travel. The Atchison, Topeka & Santa Fe, on February 7, put in service a new train called "The Missionary" from Chicago to Los Angeles and San Francisco, and also a new train between New Orleans and California. On April 12 a new train called the "Scenic Limited" was put in service between St. Louis and San Francisco by the Missouri Pacific, Denver & Rio Grande and Western Pacific. New service was also established on May 30, June 19 and June 20 by the Chicago & North Western, Chicago, Milwaukee & St. Paul, Chicago, Burlington & Quincy, Chicago, Rock Island & Pacific and Wabash in connection with the Union Pacific and other Western lines, the Union Pacific putting on three additional trains in each direction.

ATTENDANCE AND PASSENGERS CARRIED

With the exposition period only partly over it is, of course, impossible at this time to accurately gage its success as compared with other expositions as measured by attendance or the number of passengers carried by the railways, but some figures are available covering July and a part of August.

On August 20, after the San Francisco exposition had been open for six months, the total attendance as given out by the exposition officials was 10,813,153, an average of nearly 60,000 a day. The attendance figures by months are as follows:

February	830,980
March	1,690,042
April	1,439,777
May	1,677,947
June	1,584,198
July	2,157,661
August (20 days)	1,432,545
Total	10,813,153

On September 4 it was reported that the attendance had passed the 12,000,000 mark. About one-third of the attendance has been free, including employees, exhibitors, press representatives, etc. The attendance at first was very large and during the first few days, after the special rates went into effect, the travel from the East was very heavy. The attendance during the opening week was 519,599, but after the first month both the attendance and the passenger traffic from the East were considerably reduced until the vacation season, toward the end of June, when both the attendance and the number of passengers from the East began to increase rapidly. From July 1 on, the attendance increased at an average rate of about 10,000 a day for a time, and the increase continued through August. The highest recorded attendance for a week was 559,936, for the week ending August 8, which exceeded that of the opening week by about 40,000.

The attendance at the San Diego exposition for the first six months was 1,265,718.

During the first days after the special rates went into effect all of the roads out of Chicago ran their trains with extra cars and in several sections, and during the vacation period some trains were run with extra sections every day. Practically all of the lines participating in the transcontinental business have shown a considerably increased travel, but for a time, between the first rush and the heavy summer travel, business was so light that many of the roads were greatly disappointed with the results. Considering the entire season to date, while the California terminal lines, which are all fed by a number of intermediate lines, have enjoyed an unusually large traffic, the more easterly lines that have had to divide the business to a greater extent have not fared so well and many have reported that business has not been up to their expectations. No statistics are available showing the total number of passengers carried to the expositions by the railways, but the number handled on the special rate round-trip through tickets from the East is indicated by the fact that 218,000 of these tickets from points east of the Rocky mountains had been validated at San Francisco, Los Angeles, San Diego and other points on the coast up to August

25. As the heaviest travel was during the months of July and August, a large number of Eastern people were in the West at that time who had not yet had their tickets validated for the return trip.

Figures compiled by individual railways show a large amount of duplication because so many passengers took advantage of the wide variety of routes offered to go out by one line and return by another, and most people rode over two or three lines in California or took a steamboat trip for part of their journey. Also, of course, the number of passengers carried by single lines gives no indication of the length of haul.

CALIFORNIA TERMINAL LINES

The lines to San Francisco, which have handled all the through passengers to the exposition in that city, except those carried by the steamship lines, are the Southern Pacific, the Atchison, Topeka & Santa Fe and the Western Pacific. The Southern Pacific, with its Shasta route from the north; the Ogden route from the east, and the Sunset route from the south, connecting with the various lines running from the Middle West, naturally has handled the bulk of the passengers into and out of San Francisco, and has probably handled a very large percentage of all of the through passengers over at least a part of its lines. This road, therefore, showed the remarkable increase of 300 per cent in its trans-



Southern Pacific Station in San Francisco, Built to Accommodate the Exposition Crowds

continental passenger business for the month of July as compared with July, 1914. From February 20, the date of the opening of the exposition, until July 31, the Southern Pacific received from or delivered to its Eastern connections a total of 280,095 passengers traveling on the special exposition excursion tickets, of which 120,777 were handled in the month of July, and 75,083 during the last two weeks of July. During the same period a total of 212,100 passengers to the exposition were handled on local tickets, the heaviest movement also being for July with a total of 64,354. During March the Southern Pacific handled on its system 33,238 westbound transcontinental passengers, as compared with 21,016 in March, 1914; in April the total was 29,118, as compared with 20,337 for the corresponding month in 1914, in May 32,042, as compared with 14,528, in June 49,171, an increase of about 30,000, and in July 78,582, an increase of 59,683. Most of these passengers visited southern California as well as San Francisco. Up to August 16 the Southern Pacific had handled 117 special trains averaging at least 125 passengers each, and 190 special car parties, averaging at least 20 passengers to a car, in addition to special parties handled on extra sections of regular trains. On July 16 there were 24 special trains and special car parties on the system. Between Los Angeles and San Francisco the Southern Pacific in July handled 99,340 passengers, as compared with 17,962 between the two cities in July, 1914. Between San Francisco and Portland 39,471 passengers were carried in July, 1915, as compared with 9,573 in July, 1914. During July and August

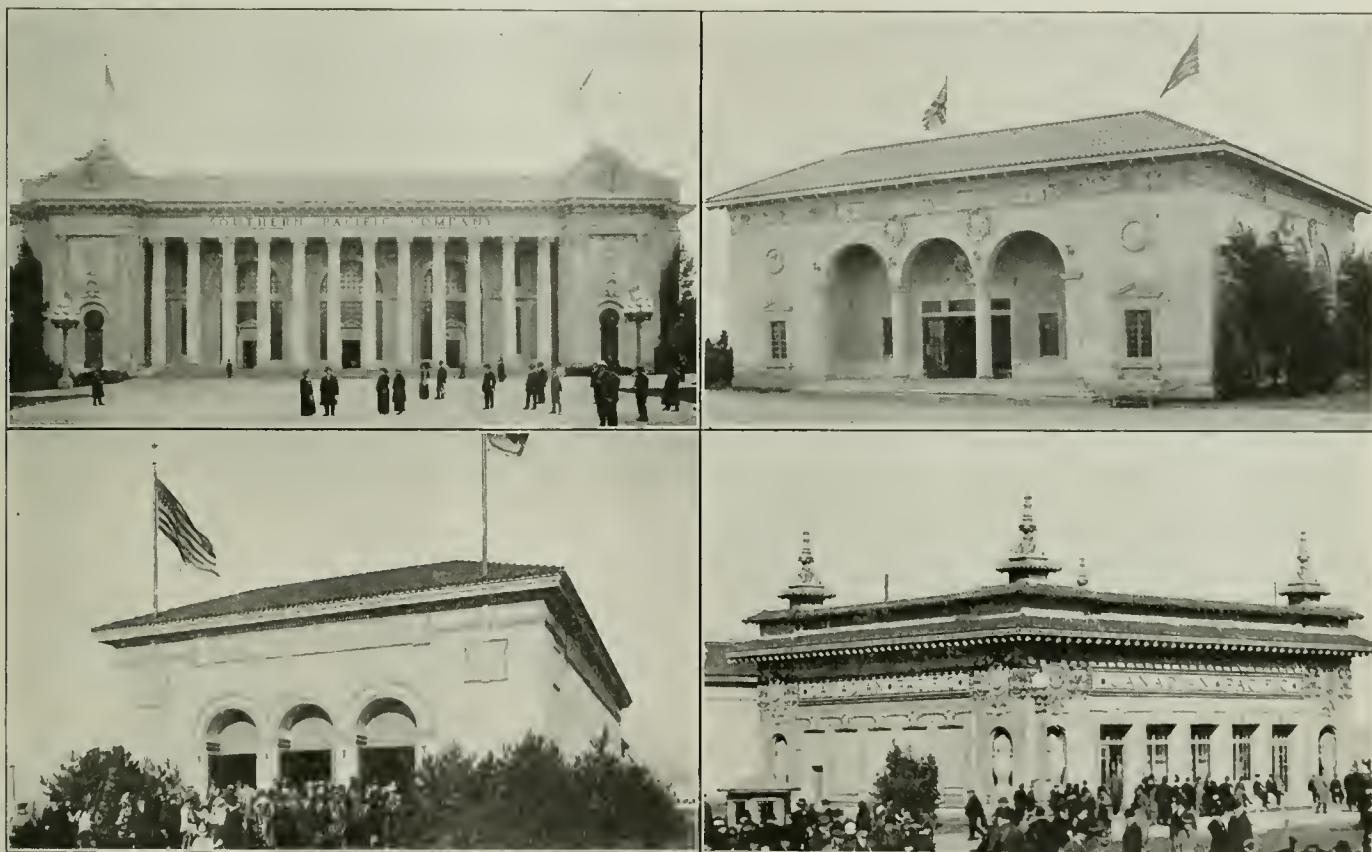
the Overland Limited, the Pacific Limited, the San Francisco Limited and frequently the Atlantic Express were run in two sections between Ogden and San Francisco, and between Los Angeles and San Francisco "The Lark" was run in three or four sections every day northbound and in two sections southbound, while the Shore Line Limited was run in two sections northbound, and extra equipment was run on all other trains. On July 20 "The Coaster," a day train from Los Angeles to San Francisco carried 692 passengers. For a time it was necessary to deadhead empty trains between the two cities.

The Atchison, Topeka & Santa Fe, which is the only single through line from Chicago to California, and which also reaches both San Francisco and Los Angeles, as well as being the only line to San Diego, also participated to an unusually large extent in the exposition travel. On March 1 the California Limited was run in eight sections. During July the passenger business west of Albuquerque showed an increase of 40 per cent, and 54 special trains were handled westbound and 43 eastbound.

The Grand Canyon on this line was also an added attraction,

As the Santa Fe had the only rail line San Diego, it enjoyed an unusually profitable business between that city and Los Angeles. Nearly all of the round trip tickets from the East to California included a coupon for the trip from Los Angeles to San Diego without extra charge and a large percentage of the tourists took advantage of the opportunity. Figures showing the number of passengers handled by the Santa Fe on this line were not available, but the total attendance from January 1 to July 1 was 1,265,718. With six regular scheduled trains in each direction many trains were run with extra sections, and as a large percentage of the travel was on day trains this was an unusually profitable business, capable of being handled in an economical way. With day coaches it was possible to seat 80 passengers in a car, as compared with almost 24 in a Pullman, and it was also possible to accommodate the number of cars in a train to the number of people who wanted to go on that train so that the trains were just comfortably filled.

Officers of the Western Pacific estimated that this line had handled over 400 through passengers a day into San Francisco during June, July and August, and a slightly larger number



Railway Buildings at the Panama-Pacific Exposition

and during July and August three trains a week were run directly to the Canyon in each direction. On some days as many as 1,500 people visited the Canyon, the average for July being 575 a day, requiring the installation of temporary facilities, such as tents and parking cars. During the first months after the opening of the exposition the travel was of course largely westbound and equipment was moved east empty, but since June the business has been well balanced, although it has been necessary to deadhead equipment in both directions in order to maintain the standards for certain trains. During the first two weeks in July the Santa Fe handled more Pullman equipment in Los Angeles than was handled in New York City by both the Pennsylvania and New York Central lines.

The heavy travel also made the problem of serving meals an important one, and during recent weeks the experiment has been tried of stopping the limited trains at eating houses in addition to carrying dining cars.

in the reverse direction, in connection with the Gould lines and other connections east of Salt Lake City. July showed the largest passenger business in the history of the company, and as the local passenger traffic is comparatively small, the increase is attributable to the exposition travel. In addition to three regular trains each way a day, filled to capacity and with frequent extra sections both eastbound and westbound, the Western Pacific handled about one special train a day on the average in each direction.

The heaviest train was the Scenic Limited, running solid from St. Louis over the Missouri Pacific and Denver & Rio Grande, which was put on to accommodate the extra travel early in the season. The Western Pacific also handled four sleeping cars from Chicago every day, two from the Chicago, Rock Island & Pacific and two from the Chicago, Burlington & Quincy.

The San Pedro, Los Angeles & Salt Lake also experienced an unusually large increase in passenger traffic on account of

the expositions. During July this road handled 35,707 through passengers between Los Angeles and Salt Lake, including 16,966 received from connections, westbound. August promised to show even higher figures. In June the total was 24,835, and in May 16,604. This road has three regular through trains in each direction a day, which were run in sections several times a week during July and August, and up to August 15 had handled 112 special trains and sections for organized parties. At the beginning of the season this company took over all the eating houses on its line in order to make sure of good service and turned over their operation to the dining car department. On the Pacific Limited train the plan was tried of serving an attractive 50-cent club luncheon in the dining car, which proved very popular and increased the dining car receipts. Its subsidiary, the Pacific Navigation Company, operating the steamships Yale and Harvard, which during the summer make four trips a week in each direction between San Francisco, Los Angeles and San Diego, carrying from 600 to 900 passengers each per trip.

Low rate excursion rates were also made during the summer for local travel between Los Angeles and San Francisco and between Los Angeles and San Diego. To San Diego rates as low as \$4 and \$5 for the round trip were made for special occasions, for a distance of 250 miles, while tickets good for three months were sold for \$6.25. Between San Francisco and Los Angeles a round trip rate of \$18.75 was made on certain days, while a rate of \$22.50 was effective every day.

The westbound exposition traffic was balanced to some extent by "back east" excursion rates—\$72.50 to Chicago and return, \$110.70 to New York and return, and \$60 to the Missouri river and return.

An illustration of the concentration of traffic at San Francisco is afforded by the fact that 449 Pullman cars were brought into San Francisco in three days in July by all roads, and the Pullman Company's laundry in San Francisco during July washed from 75,000 to 82,000 pieces of linen a day.

STEAMSHIP LINES

Steamship lines on the Pacific coast also have enjoyed a large passenger traffic on account of the expositions. In addition to the Pacific Navigation Company, already mentioned, the Pacific Coast Steamship Company operated two steamships between Seattle, San Francisco, San Pedro and San Diego and two between San Francisco, San Pedro and San Diego. The North Pacific Steamship Company also operated a weekly service with two boats between Portland and San Diego, calling enroute at San Francisco, Santa Barbara and Los Angeles, and service every five days with two boats between Portland and San Francisco, calling at Astoria, Coos Bay and Eureka.

The San Francisco & Portland Steamship Co. also operated three boats, making trips every five days in each direction between Portland, San Francisco and San Pedro.

RAILWAY EXHIBIT BUILDINGS

Four railway companies have exhibit buildings of their own at the San Francisco Exposition, which are illustrated herewith. Chief of these is the Southern Pacific Building, of modern Renaissance architecture, 200 ft. square, well located at the head of Palm avenue, near the Fillmore street entrance to the grounds. This building is kept open daily from 9.00 a. m. to 8.00 p. m. for the convenience of visitors, and among its features are comfortably furnished rest rooms for women and men, provided with desks, writing materials and files of newspapers, a spacious foyer which is a convenient place in which to arrange to meet friends, a ticket office and information bureau where are located representatives of the Southern Pacific and of its principal eastern connections, and a validation office. The building also contains a central court called "The Glade," where at frequent turns in the pathway appear natural panoramic views depicting scenes along the Southern Pacific lines. In a small theater, patterned after the Little Theater in New York, three

lecturers alternate in giving travel talks. These lectures, given eight times a day, have been attended by from 100 to 500 persons each.

The Canadian Pacific has a building on the Marina devoted to the products and resources of Canada, which includes a rest room and lecture room in which motion pictures are shown, a model of the company's supply farm at Strathmore, Alberta, and a model of the irrigation dam at Bassano, Alberta.

The Great Northern building, also located on the Marina, contains writing tables for the convenience of visitors, samples of the products of the Northwest, a lecture room in which are shown motion pictures accompanied by lectures on the resources of the Northwest, and illustrations of scenes in Glacier National Park. Eight full-blooded Blackfeet Indians from Glacier National Park, sent to the exposition as delegates from their tribe, make their headquarters here and entertain visitors with their ceremonies and dances.

The Grand Trunk and the Grand Trunk Pacific also have a building on the Marina, in which are shown samples of the products of Canada and illustrations of scenes along the lines of these companies, and motion picture lectures are given.

The Canadian Pacific, Great Northern and Grand Trunk exhibits were each awarded a gold medal.

There are few railway exhibits at the San Diego exposition. The Atchison, Topeka & Santa Fe has a concession on the "Isthmus," called the "Painted Desert," an interesting reproduction of the conditions existing in the Spanish provinces of New Mexico and Arizona at the time of the coming of the Spaniards in the sixteenth century, which to some extent continue to the present day. The exhibit consists of an Indian village of Pueblos, in which a number of Indians live and go about their work, making pottery, baskets, blankets, etc.

The Union Pacific and the San Pedro, Los Angeles & Salt Lake have a building conforming architecturally to the general plan of the exposition structures, containing rest rooms and an information bureau for visitors and a traffic exhibit showing the opportunities for settlers along the line of the two roads. This exhibit was awarded a gold medal.

Wells, Fargo & Co. have an exhibit in the Varied Industries building, including an office, one of the old Wells Fargo coaches built in 1863, one of the company's safety trunks used for the transportation of express packages, and photographs of scenes and incidents illustrating the history of the company and its present methods.

The second article, describing the exhibits of the railways and of the railway supply companies in the Palace of Transportation and other exposition buildings and on the "Zone" at San Francisco will follow in a later issue.

ADVANTAGES OF MOBILIZABLE PROPERTY.—For the first time in many years The Official Guide appears without the sailing schedule of the Pacific Mail Steamship Company. The service of that company has been discontinued owing to legislation last winter in Washington. It is reported that the ships are to be sold to companies which will operate them on other routes. It would doubtless be a not unwelcome circumstance to many owners of railroads of they, too, were able so easily to move their property under its own steam out from under the strenuous hand of fullcrew laws and such iniquities of regulation.—*Official Railway Guide.*

CANADIAN SHIPBUILDING.—The Canadian Department of Marine and Fisheries reports that Canadian shipbuilding represented last year an aggregate new displacement tonnage of 43,346 tons—the largest annual total attained during the last fourteen years. Of last year's total, 23,167 tons were credited to the province of Ontario, which has been advancing as a shipowning and shipbuilding province since the development of trade upon the Great Lakes began to require a larger class of steamers.

An Interesting Structure Over the Buffalo River

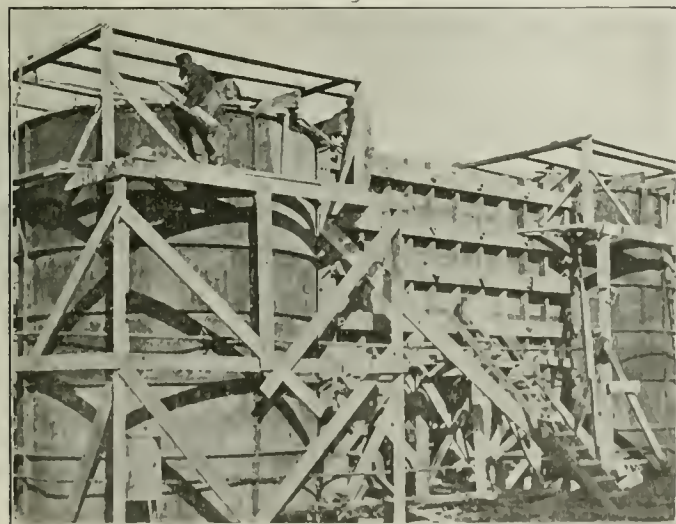
The Lackawanna Is Now Building a Strauss Bascule Span Involving Complicated Foundation Problems

In the *Railway Age Gazette* of January 31, 1913, there appeared an article describing three lift bridges built over the Buffalo river, Buffalo, by the Lake Shore & Michigan Southern, the New York, Chicago & St. Louis and the Pennsylvania jointly, and the Buffalo Creek Railroad. These bridges were made necessary by the deepening of the Buffalo river to 23 ft. at mean water level, to allow navigation by the deep-draft vessels travers-



General View of Bridge Site, Showing Completed Cylinder Pier and Diverted Westbound Track

ing the Great Lakes. Since then the deep-water navigation of this stream has been authorized to its junction with Cazenovia creek, a little over a mile beyond the crossing of the Buffalo Creek Railroad, the present terminus of the deep-water dredging. This improvement will necessitate three additional lift bridges over the



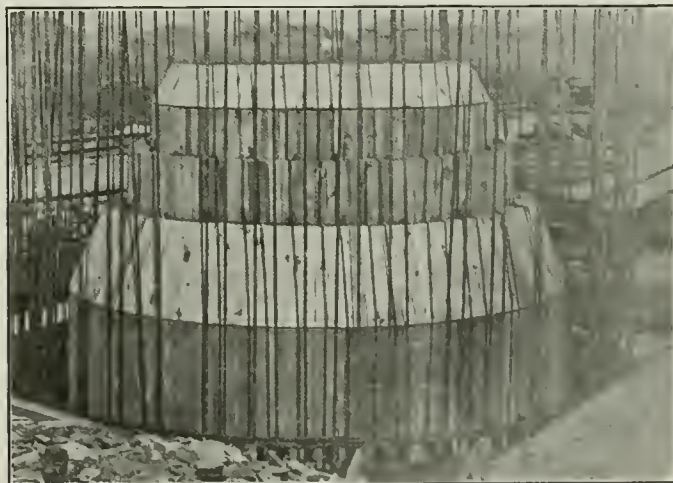
Forms in Position to Concrete Transverse Strut of Cylinder Piers

Buffalo river, two to be built by the Delaware, Lackawanna & Western and one by the city of Buffalo, on the line of Abbott road.

This article describes the double-track lift bridge which the Delaware, Lackawanna & Western is now building a short distance east of the present grade crossing of the New York, Chi-

cago & St. Louis, the Pennsylvania and the Buffalo Creek railroads. The present bridge consists of two double-track plate girder fixed spans, each about 116 ft. long, supported by two abutments and one central pier of coarsed ashlar stone masonry, with a track elevation about 18 ft. above mean river level, which conforms very closely with that of Lake Erie, into which the Buffalo river empties, about five miles farther down stream. In rebuilding the bridge the rail elevation is being raised 22 ft. at the river crossing to cross the joint tracks of the New York, Chicago & St. Louis and the Pennsylvania, and the tracks of the Buffalo Creek railroads overhead. The track was raised 26 ft. at the crossing to give ample head room. At the same time the river crossing was moved about 200 ft. farther east to rectify the existing channel of the Buffalo river, which is now being dredged by the Great Lakes Dredge & Dock Company, under contract with the city of Buffalo.

An examination of the map shows that the river is very sinuous at this locality, three sharp "ox-bow" bends doubling upon themselves. The proposed new channel shown in dotted



Inside Form for Cutting Edge of Cylinder Pier. Reinforcing Bars in Place

line was never constructed mainly on account of the opposition of the riparian owners.

An embankment adjoins the east end of the new bridge, which carries the railroad to the next river crossing, a little over half a mile farther east. A short embankment will join the west end of the new bridge, followed by a short bridge span, and then by two longer spans over the railroads mentioned.

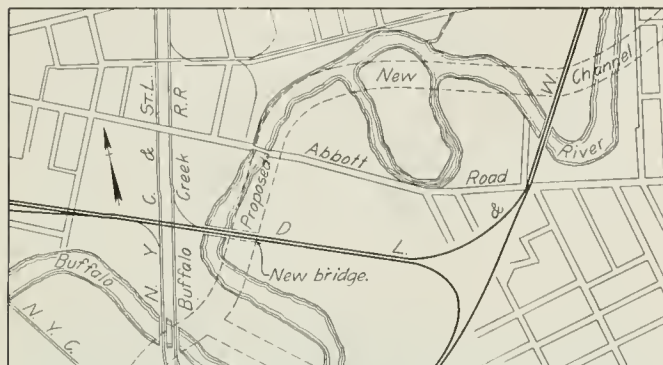
After the type of bridge and spans had been decided on five test holes were put down on the site of the new piers, four on the east side and one on the west side of the river. One of the four holes was only put down part way because of an obstruction, necessitating a new hole in another position close by. These borings were made by contract. Steel pipe was first driven and the material inside brought up in its natural condition by earth augers instead of by the wash-drill method. It is claimed that the "dry method" gives by far the best information as to the actual character of the material penetrated and encountered.

The crossing of the river is square or at right angles to the river current. The main channel span of the new bridge is a Strauss bascule, with a 114-ft. opening between the pier faces. There is an auxiliary fixed deck-plate girder span on the west with an opening of 107 ft. between pier faces. In addition there is a short girder span at the east end 36 ft. long between masonry faces and one at the west end with a 39 ft. opening, the slightly

longer span being due to the change in plan of the west pier. Until the new channel is excavated the old one must be maintained and it will be crossed on temporary plate girder spans secured from other work.

As the new bridge occupies the present alignment the plate girder spans for each track comprising the old crossing were each moved outward $41\frac{1}{2}$ ft., or 83 ft. between centers to allow working space for the new structure.

Pile bents were driven for the end and center supports of these old girders. The spreading of the old tracks was also continued for a considerable distance east and west of the bridge crossing to allow the building of the embankment, made necessary by the raising of the grade. As the base of this new embankment



Map Showing Channel Change and Location of Bridge

occupies a greater width than that available between the tracks temporary lines of piling and timber cribbing were placed to prevent the encroachment of the embankment.

The superstructure of the bridge is carried by two abutments and four piers. The abutments have no wing walls, the embankments spilling around them at the ends. They are founded on piles driven to rock. The height of the east abutment to base of rail is 43 ft. and that of the west abutment 49 ft., the lengths of the supporting piles being respectively 55 and 49 ft.

The piles for the east abutment were driven by a land driver, after suitable excavation had been made, the material being removed by locomotive crane with an orange-peel bucket. The

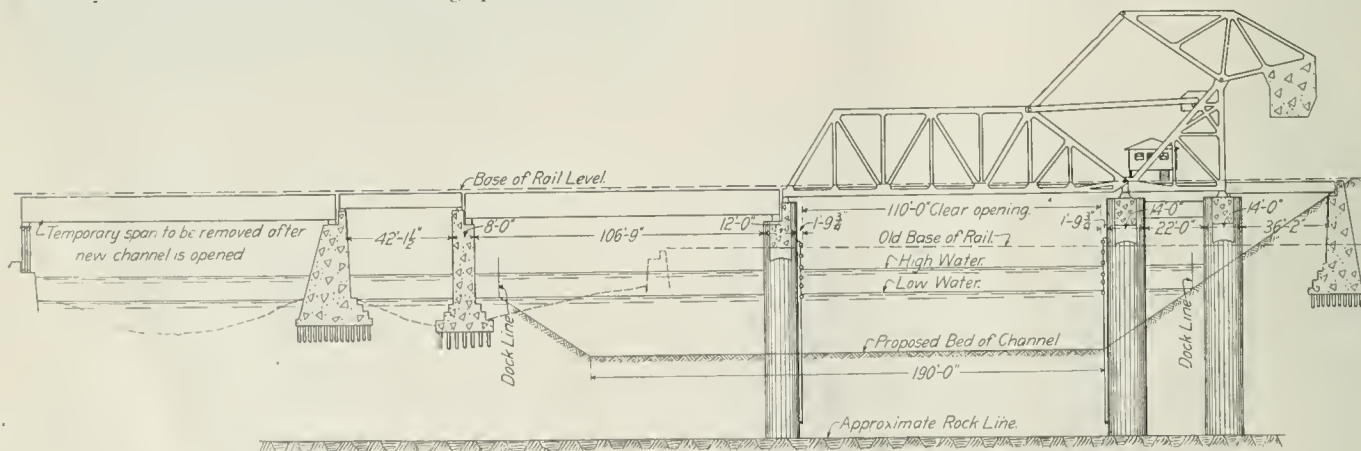
of the piles for the west pier are 12 ft. below water and were also driven with a follower. All piles are of Southern pine with the smaller end 8 in. and the larger 14 in. in diameter.

After the foundation piles had been driven the cofferdams were constructed, the larger one being about 55 ft. long and 30 ft. wide, and the smaller one 55 ft. long and 21 ft. wide. They were built of Wakefield sheet piling, driven by the same pile-driver that drove the foundation piles. It was about 27 ft. long and projected about 3 ft. above water level. In driving the sheet piling an imbedded butternut log was encountered which gave considerable trouble, causing much leakage, which was finally overcome. Interior bracing was added as the cofferdam was unwatered.

The main or tower piers of the bascule span consist of four concrete cylinders in pairs, connected at the top both transversely and longitudinally by heavy concrete struts. The cylinders are 14 ft. in diameter and average about 90 ft. in height. The rest pier is composed of two cylinders of similar construction, each 12 ft. in diameter.

The cylinders were sunk through about 70 ft. of material, consisting of 6 ft. of filled-in ground, 14 ft. of black clay, 12 ft. of sand and gravel, 28 ft. of clay and, finally, 10 ft. of sand and clay overlying the limestone bedrock. After the location of the pier was established, an excavation about 4 ft. deep and 20 ft. square was made, which was lined with cribwork, built up of 12 in. by 12 in. timbers. Upon the prepared bottom of the excavation was placed a steel ring with a diameter 6 in. larger than that of the finished cylinder pier and forming the cutting edge for sinking it. This ring was 20 in. high and a shelf 8 in. wide was riveted to its inner edge. A wooden form having roughly the shape of a truncated cone, was then fitted to the ring and formed the inside of the concrete cutting edge. This consisted of a series of inclined and stepped surfaces, intended to control and accelerate the sinking of the piers.

The outside forms were steel rings 5 ft. high, stiffened both horizontally and vertically by angles and built in halves with angles at the abutting vertical edges to serve as flanges for bolted connections. Before filling the form the outside ring was securely held in position by struts braced against the timber cribwork lining the excavation. This steel-concrete cutting edge was reinforced by two concentric rows of plain steel rods, spaced



Elevation of New D. L. & W. Bridge Across Revised Channel of the Buffalo River, Buffalo

sides of the excavation were vertical, supported by sheet piling, which was first driven and then braced as the excavation proceeded, and which stopped at an elevation about 2 ft. below water level. The piles were then driven with 3-ft. intervals each way to bed rock and cut off at an elevation of 1 ft. below low-water level.

The piles for the west abutment, as well as those for the west pier, were driven by a floating piledriver. The west abutment occupies the site of the central pier of the old bridge, which was removed. The top of the supporting piles are 7 ft. below water level and were driven to this depth with a follower. The tops

about 12 in. between centers. The bars of the outer row were carried up vertically about 4 in. inside the outer circumference to the top of the pier, while the bars of the inside row, which start adjacent to the outside row at the bottom, were bent to come within 4 in. of the inner circumference and terminate at the top of the first course or section of concrete.

The cutting edge formed the lower or initial course of the cylinder pier, being an annular ring of concrete 14 ft. in outside diameter for the large piers, and 12 ft. for the smaller ones, with central concentric openings or wells 7 ft. in diameter. To build the second course, the outside steel form was raised 5 ft.,

and a cylindrical concentric inside form was hung from timbers resting upon the upper edge of the outer form. After several sections had been built in this manner, a locomotive crane was employed to remove the material inside the well and underneath the cutting edge, using an orange-peel bucket. It was aimed to secure an average daily settlement of about 10 ft., successive courses of concrete being added to give the necessary weight until bedrock was reached. After the surface of the rock was thoroughly cleaned the space under the cutting edge was sealed with concrete, which was also used to fill the central well.

No difficulty was experienced in sinking cylinder 4 N, but some trouble was encountered in cylinder piers 3 S, 3 N and 4 S. After cylinder 3 S had reached a point within 8 ft. of bedrock, a large amount of material was removed without any corresponding settlement. Investigation developed that material of a soft nature was flowing in at the bottom from a north-easterly direction, between cylinders 3 N and 4 N, and which caused a subsidence of the surface of about 9 ft. between them. This subsidence caused cylinder 4 S, which was within 12 ft. of bedrock at the time, to move in a northwesterly direction, affecting its perpendicularity. The cylinder was restored to its normal position by means of a 35-ton jack braced against the side of cylinder 3 S with wooden struts. After cylinder 3 N had reached within eight feet of bedrock, further movement was prevented when the northwest side of the cutting edge encountered a very large boulder which could not be removed by excavation from within the cylinder. To overcome this a well drill was used to drill a hole close outside the cylinder to the boulder, and the latter was then shattered by a heavy charge of dynamite. After these mishaps, air locks were installed on cylinders 3 N and 4 S, and the sinking continued under compressed air at a pressure of about 28 lb. After reaching bedrock it was found that cylinder 4 S had righted itself and was in its proper position within a small fraction of an inch. The deviation of the other three cylinders from the exact location was also negligible.

The top ends of the tower piers and the connecting transverse strut are of monolithic construction, but the longitudinal struts between the cylinders were placed later, the ends resting in niches left for that purpose.

The concrete mixing plant was located at the east end of the bridge. To facilitate the construction of the embankment at this end a pile trestle had been driven, and the spaces between the bents immediately behind the east abutment were utilized for a storage bin for broken stone and gravel. These aggregates were dumped directly from gondola cars into the bins. A house built of corrugated iron for the storage of cement adjoined the material bins, alongside the present low railroad tracks, so that the cement could be unloaded directly into the house.

A Smith mixer was located adjacent to the bins and track, the whole arrangement of the plant being admirable for quickly charging and discharging the mixer. For the transportation of the mixed concrete, small cars were used, running on a 2-ft. gage track and laid parallel to the present westbound railroad track, extending to about the middle of the river. The cars on this narrow gage line were operated by an endless cable, with a hoisting engine stationed near the mixer. At the end the concrete was handled by a derrick into the west pier and abutment. The concrete for the cylinder piers was handled by the locomotive crane, which was used for excavating the material from within the cylinder piers.

Below the ground level the concrete was made of 1 part Portland cement and 5 parts of Niagara river sand and gravel, natural mixture. Above the ground level the mix was 1 part Portland cement, 2 parts sand and 5 parts broken stone.

Simultaneous with the construction of the new lift bridge work was undertaken on the elimination of the grade crossing of the New York, Chicago & St. Louis, the Pennsylvania and the Buffalo Creek railroads. The crossing consists of two main double track through spans over the several railroads mentioned,

each composed of three plate girders, 106 ft. long center to center and one shorter span, 30 ft. in the clear, over a private road to the works of the Contact Process Company.

This section of work extends from the overhead crossing of the Lake Shore & Michigan Southern easterly to the overhead crossing of Abbott road, a distance of 1.4 miles. The elimination of this crossing required the elevation of what is known as the Nickel Plate interchange yard, where all the freight and passenger traffic between the Lackawanna and Nickel Plate is interchanged.

The contractor for the substructure was Walter H. Gahagan, Inc., Brooklyn, N. Y., and the piledriving was done under a subcontract by the D. E. Horton Construction Company, Buffalo, N. Y. The Strauss bascule bridge superstructure was fabricated and erected by the Pennsylvania Steel Company, Steelton, Pa. The grade elimination work was all done by the Lackawanna Railroad Company's own forces. All of the work is being done under the direction of G. J. Ray, chief engineer, Delaware, Lackawanna & Western, under the immediate supervision of A. E. Deal, bridge engineer, and George E. Boyd, division engineer.

AN AUTOMATIC FREIGHT TRUCK COUPLER

The success of power trucking in freight houses is dependent largely on the perfection of the details of operation and the elimination of lost motion wherever possible. This has led to the development of an automatic coupler for freight trucks by Edward Fitzgerald, general foreman of the Twelfth street freight house of the Chicago & Eastern Illinois, at Chicago.

As shown in the photographs this coupler consists of a yoke on the forward end of the truck, consisting of a $\frac{3}{4}$ -in. round rod bent in the shape of a U and slightly pointed in the middle of the loop to form a groove. The device on the rear of the truck consists of a malleable-iron fork equipped with a trigger suspended from the upper arm and seated against a projection on the lower arm to keep it from swinging backwards while



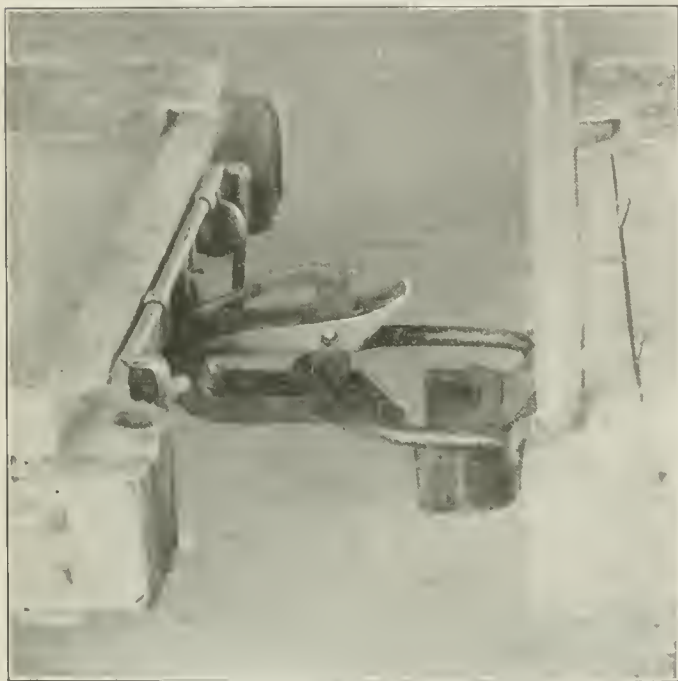
Automatic Coupler Cars Separated

allowing it to swing freely forward. In operation, as the trucks are brought together, the yoke on the front of the rear truck comes in contact with the trigger in the fork on the rear of the forward truck, which it swings forward, allowing the yoke to enter the fork. As the yoke passes the trigger the latter drops back into place, locking the two trucks together. The point of the yoke cannot come in contact with the base of the fork because the point of the lower arm of the fork strikes a U-shaped bumper located on the forward end of the rear truck

just under the yoke. A hand lever similar to that on standard M. C. B. couplers raises the trigger and permits the release of the yoke to disconnect the trucks. On the motor car a cord attached to the hand lever enables the motorman to uncouple his car without leaving his position.

The principal advantage of the device is that the trucks may be coupled without requiring that they be accurately centered and aligned. A reasonable variation is allowed by the spread of the yoke which is $7\frac{1}{4}$ in., and the spread of the bumper which is $4\frac{1}{2}$ in. After the trucks are coupled, they are lined up by the trigger as it slips along the yoke until it reaches the groove at the point.

Any difference in elevation of two trucks is adjusted by means of the $5\frac{1}{4}$ -in. vertical spread of the fork. The inclined faces



Automatic Coupler Cars Coupled

on the ends of the fork serve to deflect the yoke upward or downward into the slot. The yoke is pivoted on two eye-bolts attached to the truck sill and has an extension which bears against a pivoted counterweight attached under the truck. By means of this the yoke is normally held in a level position, but may be deflected up or down with variations in the relative elevation of the two adjoining trucks.

These couplings have been in use about two months in the outbound freight house of the Chicago & Eastern Illinois at Chicago on 125 four-wheeled trucks with 3-ft. by 6-ft. platforms and three motor trucks. The cars are ordinarily handled in trains of three to seven trailers each, over a trucking length of about 1,700 ft. The motor car operators very quickly developed skill in handling the couplers, which have materially increased the efficiency of the trucking. The couplers are manufactured by Guilford S. Wood, Chicago.

RAIL SHIPMENTS FROM THE UNITED KINGDOM.—The shipments of rails from the United Kingdom have necessarily been much reduced by the great European war. They showed, however, rather more strength in July. The exports for that month came out at 33,224 tons, as compared with 43,133 tons in July, 1914, and 53,570 tons in July, 1913. The aggregate exports to July 31, this year, were 157,190 tons, as compared with 303,991 tons and 308,185 tons. The United Kingdom has been sending scarcely any rails this year to the Argentine Republic, the shipments to that country to July 31, having been only 569 tons, as compared with 20,823 tons and 32,602 tons in the corresponding period in the preceding years.—*Engineering, London*

FRENCH RAILROAD EXCURSIONS IN WAR TIME

BY WALTER S. HUNT*

One of the curious aspects of the war in France is the effort of the railroads to encourage the customary tourist and excursion travel of peace times. While the number of American tourists is limited this year, because of the ungrounded fear of traveling in a country at war, there are a good many English tourists. It is common to see notices in the newspapers and elsewhere, "Welcome to France," stating that behind the armies France works and lives as usual. The Touring Club of France, the Automobile Club of France, the hotel associations, together with the railroads, are issuing their customary booklets. That of the Touring Club was printed in English and 300,000 copies sent broadcast. Much of this work is useless, however, as addressed to the American public, which certainly will not venture abroad until peace comes; and then there will not be enough ships to accommodate the people who will flock to see the new ruins of Europe.

Domestic France is traveling, not in the customary numbers, but nevertheless in surprising numbers to take the usual summer rest away from home. The French man and woman work hard the year around; employees work their ten and twelve hours a day, and this past year has been such a nerve-racking one for all that the needed rest is being taken whenever possible. It is not the lack of money that is preventing those not engaged in army work from going, so much as the short-handed conditions that prevail everywhere.

The travel is taking the direction opposite to the trench country, for two reasons: First, the army regulations prevent free movement in the so-called army zone to the north and east of Paris, and the traveler must have a pass before he can buy his ticket. Then public opinion is strong against idle visitors to any part of the country where so many thousands of Frenchmen have lost their lives. Recently a party of French excursionists took an automobile in Paris and rode out beyond Meaux, where the fighting was severe during the battle of the Marne. At the present time trenches are being perfected all through that region, as a precautionary measure, and when an army captain spied the party of visitors he stopped it and asked why they had come there. One of the men of the party explained the reason. "Very well, I'll give you a chance to see what a trench is like," said the captain, with pleasant irony. "Get down, every man of you, and dig." The men of the party were thus forced to dig all through a hot afternoon, and when night came they were permitted to go home. "Now you can say that you have done something for France, and I hope you will go home better Frenchmen," the captain told them sternly.

There are two interesting features of French railroad travel that are not familiar to the American manner of encouraging excursionists and travelers. One is the so-called family ticket, issued as usual this year. A family of three may get reduced rates that cut the usual rates in half, and a family of five may travel at 40 per cent of the ordinary rate. The father of the family, in buying the ticket, if he desires, may arrange to travel, going and coming, at a different time from the other members of his family. In addition, any member of the family may go and come at any time at half fare between the points named on the ticket if at the time the original family ticket is purchased an identification card is asked for.

The second feature adopted in France to encourage travel is the organization of an automobile service by the railroad at points of interest, by which the traveler can see readily and cheaply the country adjacent to the railroad. For instance, the Southern Railroad (chemin du fer du Midi), which operates in that part of France lying next to Spain and connects the Atlantic ocean with the Mediterranean sea, has begun the organization of such automobile service. It has this service at the springs of Biarritz, in the gorges of the Tarn river, and elsewhere. Despite the war this service is running this year.

Still another feature of French tourist travel is the existence

*Our Special European Correspondent.

all over France of narrow-gage railroads that run where it would not pay a broad-gage road to go, or else where broad-gage roads could not be built except at heavy expense. These railroads, known as the "Economiques," act as feeders to the large railway systems in that they bring travel and freight to them from out-of-the-way districts.

SUPERHEATER LOCOMOTIVES AND GRADE REVISION

BY PAUL M. LA BACH

Assistant Engineer, Chicago, Rock Island & Pacific, Chicago, Ill.

In these days of tight finances probably more schemes are investigated with the idea of saving money than at any other time. Many projects also, which would have shown a profit a few years ago, will not pay under the present revision downward of freight and passenger rates by railroad commissions. The idea is best expressed by the formula:

$$\frac{R - E}{C} = p$$

Where R = annual revenues from operation.
 E = annual operating expense (including depreciation and taxes).
 C = cost of construction.
 p = per cent of profit.

It is evident that if R is decreased and E is increased at the same time, the profits expressed in percentages will decrease very rapidly. This is exactly what has been going on for a number of years. The revenues from operation have been cut down by the reduction of rates, while the cost of operation has been increased by full crew laws, taxes, special equipment, etc. It becomes necessary, therefore, to fix the value of p before making any investigation as to anticipated profits. A term of years of interest rates should be used and not the low rate which has been prevalent for some time. To this should be added promotion fees, discounts, etc., which decrease the amount actually received.

One writer, who has been feeling pessimistic about the outlook, said, not long ago, that it did not pay to make any improvements of any kind because a commission of some sort or an extra crew law would rise up and take the profits away as soon as they were earned. When one sees a public official urged to get a public appropriation for an uneconomic improvement, in order that the money may be spent in his district, and at the same time exhorted to secure the reduction of rates or the passage of bills that will increase operating expenses, when a safe margin between R and E would cause a much greater expenditure for improvements in the same district, the situation can hardly be said to possess much logic. This is a condition and not a theory, and has resulted in a state of affairs such that paying improvements cannot be made on light traffic lines. If railroad building were now in its infancy it is probable that 25 per cent. of the steam lines now constructed would never be built with present returns contemplated. On lines with heavy traffic many improvements may still be made that will show a profit. The medium traffic lines are the ones that present the most difficult problems, as a misconception of the method of operation may cause an assumption which is not justified by the facts and operation under the new conditions will not show sufficient profits to justify the expense of changes. For this reason 6 per cent. is chosen as the interest rate.

A thorough understanding of the present working conditions is essential. It may be found that although a change in grade alone might not effect a sufficient saving, when a superheater is added to the locomotives in use, then a saving will be made. To illustrate this point the profile in Fig. 1 will be assumed. The length of the engine district is such that the rating of the locomotive is dependent on time rather than on distance. The 16-hour law makes it imperative to reach the destination in that time. The engine crew will draw the same amount of wages in any event, as the men have their choice between payment by hours or by miles. Passenger trains will not be affected by a change in the grade line except as they may make faster time. On a short line they might add a car, but on a long line between two important

points they would not be able to do so, as competition governs the time. The same is true of time freight. No addition in train load is to be expected. This will narrow the tonnage affected down to the slow freight, which we will assume is handled by Consolidation engines in this case.

The method adopted by the American Railway Engineering Association, and published in its Manual for 1911, has been used for calculating the draw-bar pull of this locomotive. Without going into details* the results are given in Table I, which shows the drawbar-pull of this locomotive on a level grade for different speeds. It will be noted that the fuel used has a heat value of 11,000 B. T. U., and that 4,000 lb. per hr. is taken as the capacity of the fireman. With the present method of operation each slow freight loses 3 hrs. at meeting and passing points, waiting for orders and taking coal and water. Allowing one hour for emergencies this would make the maximum running time allowable 12 hrs. This is for summer conditions. Train resistance for 32.5-ton cars, which is about the average car weight in the Mississippi Valley, is taken at 5.4 lb. per ton at speeds of 4 m. p. h. to 30 m. p. h., which is believed to be a fair average. An inspection of the profile shows that the hardest work must be performed and that the longest time will be needed for westbound trains on account of the greater rise in that direction. While for very accurate work a speed curve should be calculated from acceleration tables, this will be omitted in this case, as the profile will make it unnecessary. The 4 hr. delayed time given includes the time needed to decrease from rated speed to a stop and from a stop to the rated speed for those points where this must be taken into account. The train will therefore be treated as though when rated properly it will travel at uniform speeds on the different sections of the profile.

TABLE I

Drawbar-Pull of Saturated Steam Locomotive, Consolidation Type.			
M. P. H.	Lbs.	M. P. H.	Lbs.
0	38,980	18	14,985
1	38,512	19	14,082
2	38,043	20	13,179
3	37,574	21	12,334
4	37,104	22	11,561
5	36,634	23	10,869
6	33,328	24	10,197
7	30,567	25	9,617
8	28,259	26	9,074
9	26,324	27	8,565
10	24,669	28	8,103
11	23,221	29	7,687
12	21,870	30	7,298
13	20,577	31	6,932
14	19,345	32	6,584
15	18,168	33	6,256
16	17,041	34	5,954
17	15,962	35	5,672

Grate area, 50 sq. ft.
 Heating surface, 3,318 sq. ft.
 Diameter wheels, 63 in.
 Steam pressure, 200 lb.
 Coal consumption, 4,000 lb. per hour (while working steam)
 Coal at 11,000 B.T.U.
 Cylinders, 22 in. by 30 in.
 Weight locomotive and tender with coal and water, 172 tons.

For a saturated steam Consolidation locomotive (see Table I) the drawbar pull at 5 m. p. h. will be 36,634 lb. At 5 m. p. h. on a 0.5 per cent. grade the rating will be found as follows:

10 lb. grade resistance + 5.4 lb. train resist

$36,634 - [10 \times 172 \text{ tons (wt. of eng.)}]$
 = 2,267 gross tons, including the caboose

The resistance of this load on a level grade will be 2,267 x 5.4 = 12,242 lb. By consulting Table I this is about equal to the drawbar-pull at 21 m. p. h. For a train moving westward the following schedule will be had when 35 m. p. h. is the maximum speed:

18 miles at 21 m.p.h.	0.71 hours
20 miles at 35 m.p.h.	8 hours
60 miles at 21 m.p.h.	2.86 hours
28 miles at 8 m.p.h.	3.50 hours
40 miles at 11 m.p.h.	3.64 hours
Total	11.94 hours

* The calculation of tables of acceleration and retardation for 60 m. p. h. plus speed curves showing train movement is treated in "Tables for Finding Proper Tonnage Rating" by the author in *Railway Age Gazette*, August 23, 1912.

As the total is below the 12-hour limit set and the speed is only 5 m. p. h. on the adverse grade, it is apparent that there are only two ways of increasing the train load. Either reduce the grade or get more efficient engines. The profile in Fig. 2 is known to be possible from a topographical point of view; the dotted lines indicate the changes.

The following is the rating of the locomotive on a 0.3 per cent. grade at 7 m. p. h.:

$$\frac{30,567 - (6 \times 172 \text{ tons})}{6 + 5.4} = 2,590 \text{ tons}$$

The train resistance on a level grade will be 2,590 x 5.40 = 13,986. This is equal to the drawbar-pull at 19.1 m. p. h. This would provide the following:

42 miles at 7 m.p.h.	= 6.00 hours
33 miles at 35 m.p.h.	= .94 hours
95 miles at 19.1 m.p.h.	= 4.98 hours
Total	11.92 hours

The time necessary to haul this load is just inside the limit set. The increase in tons per train due to the change in grade will be 2,590 - 2,267 = 323 tons when the element of time over the division is considered.

Within the last few years the locomotive superheater has come into general use on new locomotives. These superheaters can also be applied to the saturated steam locomotives already in use.

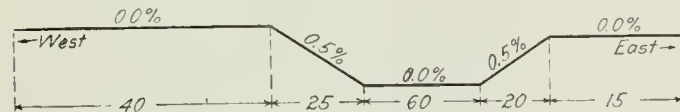


Fig. 1—Assumed Profile Before Revision of Grade

The Pennsylvania Railroad has made numerous tests of superheaters at the Altoona testing plant, and the report of the subcommittee on Stokers and Superheaters of the committee on the Economics of Railway Location of the American Railway Engineering Association* makes this information available for use when the heating value of the coal, hourly coal consumption and heating surface are known. This makes it possible to calculate the additional tonnage which one of the saturated steam locomotives, given above, would haul if equipped with a superheater. Table II gives the resulting drawbar-pull for parallel conditions of coal consumption, heating value of coal and heating surface of boiler. If Table II is used in the same manner as Table I, then,

TABLE II. Drawbar-pull of Superheated Steam Locomotive, Consolidation Type.			
M. P. H.	Pounds.	M. P. H.	Pounds.
0	39,071	18	18,750
1	38,778	19	17,919
2	38,484	20	17,087
3	38,190	21	16,392
4	37,895	22	15,695
5	37,600	23	15,102
6	37,304	24	14,507
7	37,008	25	13,947
8	36,711	26	13,388
9	36,412	27	12,909
10	36,117	28	12,428
11	35,820	29	12,014
12	35,523	30	11,608
13	35,226	31	11,218
14	34,928	32	10,840
15	34,630	33	10,500
16	34,331	34	10,169
17	34,031	35	9,841

This locomotive is the same as shown in Table I, with the exception that it has been equipped with a superheater.

for the 0.3 per cent. grade, the rating of the superheater locomotive at 7 m. p. h. would be:

$$\frac{37,008 - (6 \times 172)}{6 + 5.4} = 3,155 \text{ tons.}$$

The resistance of this tonnage on a level would be 3,155 tons x 5.4 = 17,037 lb., or the drawbar-pull of the superheater locomotive at 20 m. p. h., making a schedule as follows:

42 miles at 7 m.p.h.	= 6.00 hours
33 miles at 35 m.p.h.	= .94 hours
95 miles at 20 m.p.h.	= 4.75 hours
Total	11.69 hours

* American Railway Engineering Association's December, 1914, Bulletin, page 135.

By a similar process the tonnage rating (including the caboose) of the superheater locomotive on the 0.5 per cent. grade at 5 m. p. h. would be:

$$\frac{10 + 5.4}{37,600 - (10 \times 172)} = 2,329 \text{ tons.}$$

The drawbar-pull on a level grade would be 2,329 x 5.4 = 12,577 lb., which could be maintained at 27 m. p. h. This would give the following schedule:

25 miles at 5 m.p.h.	= 5.00 hours.
25 miles at 35 m.p.h.	= .57 hours.
115 miles at 27.7 m.p.h.	= 4.15 hours.
Total	9.72 hours.

The last case shows a considerable advantage in time, but as the loading on the adverse grade reduces the speed to as low a point as could be considered feasible, there will be no method of increasing the size of a given train. Subtracting the weight of the caboose, the following results are obtained:

	Rated tonnage on		Increase tons.
	0.5 per cent gradient.	0.3 per cent gradient.	
Saturated steam locomotive.....	(A) 2249	(B) 2572	323
Superheater steam locomotive....	(C) 2311	(D) 3137	826

	Time, hours		Drifting.
	Delays.	Working steam.	
Saturated locomotive—			
(A) on 0.5 per cent grade.....	4.0	10.47	.57
(B) on 0.3 per cent grade.....	4.0	10.98	.94
Superheater locomotive—			
(C) on 0.5 per cent grade.....	4.0	9.15	.57
(D) on 0.3 per cent grade.....	4.0	10.75	.94

The savings or increases will be in fuel, train wages due to difference in the total engine mileage and caboose mileage and the release of locomotives. For this case the cost of the fuel will be considered at \$2 per ton and the following rates of combustion will be used:

- 4,000 lb. used per hour while working steam.
- 1,500 lb. firing up each trip.
- 400 lb. per hour while standing still.
- 700 lb. per hour while drifting.

A gross slow freight tonnage of 7,500,000 tons per year in each direction will also be assumed. This will give the following train miles for each case:

- A 6,666 trains x 160 miles = 1,066,560 train miles.
- B 5,832 trains x 160 miles = 933,120 train miles.
- C 6,525 trains x 160 miles = 1,044,000 train miles.
- D 4,782 trains x 160 miles = 765,120 train miles.

Figuring that the road enginemen and firemen will average 10.1 cents per engine mile, and the trainmen 11.9 cents per engine mile,

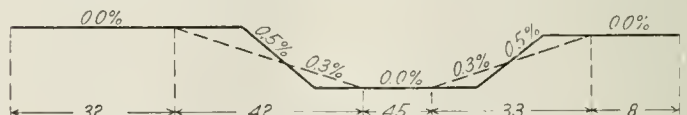


Fig. 2—Assumed Profile After Revision of Grade

the differences in enginemen's and trainmen's wages per year will be:

	Saving in Miles.	Saving in Wages.
A-B.....	133,440	\$29,356
A-C.....	22,560	4,963
A-D.....	301,440	66,316
B-D.....	168,000	36,960
C-D.....	278,880	61,353

The cost of fuel per year for case A will be, \$302,504; for case B, \$278,070; for case C, \$260,249, and for case D, \$223,605. The difference in the cost of fuel and supplies will be:

	Fuel.	Water, Oil and Supplies.	Total.
A-B.....	\$24,434	\$1,879	\$26,313
A-C.....	42,255	3,143	45,398
A-D.....	78,849	6,069	84,968
B-D.....	54,465	4,189	58,654
C-D.....	30,644	2,926	39,570

There will be 18.3 locomotives required to handle the business as outlined in case A, 15.9 in case B, 17.8 in case C, and 13.1 in case D. The saving in the cost of the locomotives and their interest and maintenance charges will be as follows:

	No. Loco- motives Released.	Cost.	Interest	Repairs \$0.09 Engine Mile.	Depreciation and Repairs.
			6 Per Cent. 5 Per Cent.		
A-B.....	2.4	\$36,000	\$3,960	\$12,010	\$15,970
A-C.....	.5	7,500	825	203	1,028
A-D.....	5.2	78,000	8,580	27,130	35,710
B-D.....	2.8	42,000	4,620	15,120	19,740
C-D.....	4.7	70,500	7,755	25,099	32,854

The following recapitulation shows the actual saving of one case over the other:

Trains.	Train Wages.	Fuel, Water and Supplies.	Release of Locomotives.	Total.	Totals Capitalized. at 6 Per Cent.
A-B.....	\$29,356	\$26,313	\$15,970	\$71,639	\$1,193,983
A-C.....	4,963	45,398	1,028	51,389	856,483
A-D.....	66,316	84,968	35,710	186,994	3,116,566
B-D.....	36,960	58,654	19,740	115,354	1,922,566
C-D.....	61,353	39,570	32,854	133,777	2,229,616

The estimated cost of building the line with the 0.3 per cent. grade is taken at \$41,000 per mile, or \$3,075,000. The capitalization amounts in the above table show that the expenditure of \$3,075,000 would not be justified if the same saturated steam locomotives are to be used, as the capitalized saving (A-B) of \$1,193,983 is much less. The only one of these capitalized savings in excess of the construction cost is (A-D). That is, if the grade is reduced to 0.3 per cent. and superheaters are added to the locomotives, at a cost not to exceed \$2,000 each, the improvement will be justified.

The largest return on the outlay will be found in (A-C), as nothing will be required except the expense necessary to equip the engines with superheaters. The savings will be largely in fuel per ton-mile, although a small saving is made in the other items. The expenditure needed to make these alterations should not exceed \$40,000. The designers of superheater locomotives have the choice of using the additional power by increasing the size of cylinders and getting a larger drawbar-pull at low speeds,

NEW ENGLAND RAILROADS IN 1845

The accompanying map is a reproduction of one which appeared in Dickinson's Boston Almanac, showing the railroads diverging from Boston, as they were in the year 1845. At that time there was no through rail route between Boston and New York, the nearest approach to this being the Boston & Providence and the Stonington railroads from Boston to Stonington and thence by ferry 30 miles to the eastern terminus of the Long Island Road at Greenport. It does not appear, however, that this route was much patronized. Steamers from Stonington direct to New York were popular for some years prior to 1845.

The names of the railroads on the map show that the editor of the almanac did not take much pains to acquaint himself with the official titles. What he calls the Maine Railroad then, as now, went by the name of "Boston & Maine." The Worcester Railroad was the Boston & Worcester, and the Hartford Railroad was the Hartford & New Haven. The Lowell was the Boston & Lowell and the Norwich was the Norwich & Worcester.

The line which is shown as the "Brattleboro Railroad" was never built, if, indeed, any line was ever proposed over the route here shown. The railroad from Springfield northward lies on the west side of the Connecticut river. It was opened to Greenfield in 1845, and four years later to the Vermont



Railways in New England in 1845

provided the weight on drivers permit, or using the same cylinders and getting greater efficiency at higher speeds.

It may be argued that the profile is not typical. There cannot be a typical layout for guidance in all cases. The speed over a profile depends upon the percentage of down, level and adverse grades. The adverse grade in this case is only about 25 per cent of the distance and may be found in many cases where engine districts are a succession of up and down maximum grades. The well known fact that superheater locomotives are more efficient at higher speeds than the saturated steam would seem to indicate that this fact should be taken advantage of especially when the district involved is a long one.

SOUTH AFRICAN RAILWAY RECORD. The reconstruction of the railway establishing the Union gage in what was formerly German Southwest Africa, is now completed between Walvis Bay and the Union. The last section of 32 miles was accomplished in 50 hours, constituting a new South African record.

line. The "Hudson Railroad" was the Hudson & Boston, which was owned in the interest of the Western Railroad, now the Boston & Albany. Between New York and Albany the water route, in 1845, had everything its own way.

The two names most familiar on this map are those in the extreme margins, the Long Island and the Erie; but the Long Island alone is the only name in the whole list which still survives, both as an owner, and as operating its own line; for the Erie which existed in 1845 died and was long since buried. The present Erie might be called, perhaps, the grandchild of the original Erie.

The total mileage shown on the map is apparently the total railroad mileage in the States of Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire and Maine, and on Long Island. Leaving aside the railroads shown in New York, there is a total mileage on the map of 1,120. In these same States and Long Island to-day the total length of railroads is 8,472 miles, much of it, of course, double-track and a considerable proportion four-track road.

SHOWING THE TRAIN NUMBER ON THE ENGINE

BY W. E. WATTS

Train Despatcher, Atchison, Topeka & Santa Fe, Raton, N. M.

The use of indicators on locomotives showing the designation of the train is a practice that should be more widely adopted. The standard code of train rules provides that "Regular trains will be designated in train orders by their number . . . adding engine numbers if desired." A large number of railroads do use engine numbers in train orders, while an equally large number do not. Very few of those roads using engine numbers have made any special provision for illumination of the engine number by night, outside of placing the number in the headlight. On some lines this is shown across the face of the headlight; on others in small spaces provided for that purpose on each side of the headlight. On yet others the number is not illuminated at night in any manner whatsoever, and at stations it is often necessary for the engineman or fireman to hold a light so it will shine on the number on the side of the cab or the tank.

The train indicator has been generally adopted by the Union Pacific and the Southern Pacific with great success. They use the indicators as an additional means of identification of a train, as the dispatchers also incorporate engine numbers in train orders when possible.

These indicators are arranged to show six figures, e. g. 401 or 2-155 or X-1705. These letters and figures are about six inches high and three inches wide, white against a black background and illuminated by a small electric light connected with the cab circuit. On some portions of these systems acetylene or oil is used with good results, but the electric light is best. These numbers are also a useful means of identification in the day time.

Some officers have advanced the objection, "what about the indication getting clogged up with snow and ice in the winter time?" Very little trouble has been experienced from this cause. The indicators are usually placed in a horizontal angle of 45 degrees, and neither snow nor sleet will stick to the face of the indicators as would be the case if they were placed broadside towards the front. Even if there is a little interference from snow and sleet at times, it is less than that which actually occurs every winter season now in that respect as regards obscuring the numbers in the headlight.

Quite often in present practice it is necessary to use the form "Eng unknown" in train orders, when the engine number is not known at the time the order is placed, as a good many train and engine men will refuse to accept an order unless the number is shown or this form is used. This, of course, where the rules require numbers to be given. And again, quite often it is necessary, for some cause or other, to change engines on a train which is all ready to depart, and it is then necessary to inform all trains concerned that "No. 1 has Eng. 1 instead of Eng. 2," or "Orders Nos. — should read Eng. 1 instead of Eng. 2," etc. If indicators showing train numbers were used on all locomotives thus used, engine numbers would be unnecessary. It is but a moment's work to change the display of an indication to any other designation.

From the standpoint of "safety first" the indicator is a valuable asset. There are numerous contingencies whereby one train may mistake another train for something else than what it is, as all railroad men well know. But with the indicator there is very little chance for doubt or mistake. The number of the train is shown in good sized figures, much larger than the usual headlight number, and when properly placed, these indicators are much more easily "picked up" by the crew on another train, whether standing or moving, than are the engine numbers as usually displayed.

Nowadays, when it is the practice to run several trains in the same direction closely following each other, and the equipment of one looks practically the same as that on the others, a crew in the siding for 1, 3 and 7 cannot know which is which, if they are on time, or nearly so (the train in the siding having no orders regarding them which would give the engine numbers), and if No. 7 comes first it may be taken for No. 1, etc. If they all come

along carrying no signals the train in the siding may proceed, but if one should be carrying green signals the man in the siding does not know who's who, and there is some little confusion.

It is true that those roads which do not require the use of engine numbers get along very well, but the indicator, I reiterate, is a strong factor in "safety first."

RAPID-FIRE REGULATION

The Cincinnati Enquirer quotes J. M. Davis, general manager of the Baltimore & Ohio Southwestern, in the following interview on the vexations of regulation, given just after a long session with the road's legal department:

"Every railroad officer who looks at the matter of public relations in a broad-minded way agrees that regulation has been beneficial up to a certain point. The law prohibiting rebates which undermined commercial concerns, the law to protect railroad employees by means of safety appliances, the anti-pass law and numerous others have helped us serve the people better and enabled the public and the carriers to understand the rights of each other. So I say that, considered from this viewpoint, the railroad officials do not and would not return to the methods of the old days.

"But while the laws which I have mentioned have been placed on the statute books, the way has been smooth for the demagogues and the unscrupulous, who have taken advantage of their opportunities to harass the railroads with laws which not only were unjust, but which saddled large expense upon them without benefit to the public or the service.

"In an address before the American Bar Association, Senator Elihu Root, of New York, decried the indiscriminate passing of laws and stated that this country makes too many laws. The speaker said that 62,000 statutes had been passed in five years and a big percentage of these affected the railroads.

"These new laws are being written on the statute books so rapidly that an attorney is often unable to give counsel promptly because of being unable to keep up with the pace of the legislatures.

"Of the more important laws pertaining to the railroads which we have with us always are the hours of service law, employers' liability, ashpan laws, caboose, full crew and semi-monthly payroll statutes, two-cent rate, electric headlight, automatic block signal, train limit and automatic fire-door laws. One legislature had up for consideration last year a bill to compel the railroads to provide air-tight and dust-proof locomotive cabs—about as practicable as the bill introduced in Colorado to compel bulls when traveling alone at night on the public highways to wear lanterns and the bill in Kansas to revise the Ten Commandments. I have in mind conflicting laws of states which the railroads are required to comply with. One of these states requires a cuspidor between every two seats in passenger coaches, while the adjoining state through which the trains travel on the same run requires that the cuspidors be removed.

"The safety appliance law has been a great help to the railroads, but with the changes which have been made and the modifications which have taken place and continue it is difficult to carry out the provisions. At a recent staff meeting the question was asked whether anyone present could name the parts of a car subject to defect, and it could not be done, because there are 257 defective possibilities on a passenger or freight car and 30 on a locomotive."

TASMANIA COAL.—There are abundant seams of marketable coal in Tasmania. They belong to the permo-carboniferous and mesozoic measures, and range from 20 in. to 12 ft. in thickness. In the basin of the Mersey the seams belong to the older measures. In the eastern part of the island those of younger age prevail. Eleven collieries are now engaged in producing coal in Tasmania. The output in 1910 was 82,445 tons, valued at \$250,000.

Traveling Engineers' Association Convention

Report of the Proceedings Covering the First Two Days' Sessions, Held on Tuesday and Wednesday of This Week

The twenty-third annual convention of the Traveling Engineers' Association was held in Chicago, September 7-10, J. C. Petty, of the Nashville, Chattanooga & St. Louis, presiding. The opening prayer was made by Bishop Fallows, after which the president made a brief address of welcome. He also directed special attention to the economies that may be obtained by the co-operation of the traveling engineers with the other departments of a railway.

As is customary at the meetings of this association several special addresses were included in the program, in addition to the committee reports and technical papers. For Tuesday and Wednesday these included addresses by C. H. Markham, president, Illinois Central; F. W. Brazier, superintendent rolling stock, New York Central Lines east of Buffalo, and Frank McManamy, chief inspector of locomotive boilers, Interstate Commerce Commission.

Mr. Markham took occasion to pay tribute to the courage, skill and intelligence of the engineer. He also spoke of the unfair attacks on railroads and the fact that there was entirely too much regulation. He urged unity of all railroad forces in the great movement toward securing a better understanding of railroad problems and better treatment of the railroads. He emphasized also the necessity of seeing that the internal relations of the railroads should be amicable, stating that a great strike that would stop all trains would be followed by government ownership.

Mr. Brazier sketched briefly the development of locomotives and cars in recent years. He mentioned several prominent railway men that had started their railway careers on the locomotive, calling attention to the opportunities of the traveling engineer for advancement.

Mr. McManamy spoke of the necessity of obtaining good intelligent men as firemen, and called attention to the necessity of keeping locomotives in safe and serviceable condition. Since the boiler inspection law has been in effect accidents causing injury have been reduced to 51 per cent; the number killed from these accidents has been reduced 86 per cent, and the injured 54 per cent. This also must indicate a reduction in engine failures. He spoke of the locomotive inspection rules as being designed to protect the enginemen from injury due to defective equipment.

SMOKE PREVENTION WITH OIL BURNING LOCOMOTIVES

The committee on smoke prevention confined its report this year to the consideration of oil burning locomotives with the purpose of determining whether or not this fuel can be used with less smoke than coal. From the report, and the discussion which followed, it is evident that as much and possibly more difficulty may be experienced in securing smokeless firing with oil burning than with coal fired locomotives.

The amount of smoke produced by an oil fired locomotive depends to a great extent on the condition of the locomotive and the way in which it is handled by the crew. Although little difficulty is experienced in firing stationary boilers with oil, there being a large furnace volume and a low pressure draft, the conditions on a locomotive are not such that smokeless firing can always be obtained readily. The variations in draft, due to the intermittent use of steam, especially in switching service, greatly aggravate the problem. When a locomotive boiler is forced it is practically impossible to eliminate smoke when oil is used as fuel, either because of insufficient air supply or the fact that the temperature cannot be raised sufficiently high to insure complete combustion. This is especially true when locomotives are fired up at terminals.

The oil should be preheated before it is delivered to the

burner in order that it may be thoroughly atomized; dry steam should be used in the burner as wet steam, caused by carrying the water too high in the boiler, will sometimes extinguish the flame entirely, causing explosions which damage the combustion arch. The consumption of oil should be carefully regulated, the fireman being careful to gage the oil supply with the working of the throttle. Ashpans should be as large as possible and air openings should be large enough to provide a plentiful supply of air for complete combustion with a minimum amount of draft. The brick work should be arranged to provide for an equal distribution of heat, and where this is done the brick arch can be used to good advantage. If smokeless firing is to be realized the engine must be carefully maintained and the firebox and tubes must be kept clean. The temperature of the firebox should be maintained as nearly constant as possible with the aid of dampers in order to prevent harmful effects to the various parts of the boiler because of sudden contraction and expansion.

TRAINING OF NEW MEN FOR FIREMEN

Nothing will so well repay the time and money spent as the education and development of railway employees in general and of locomotive firemen in particular. The locomotive firemen are using many million dollars' worth of coal, a great percentage of which is wasted through improper methods of firing and indifference to the fact that this coal represents so much money to the companies they work for.

Years ago when the number of men employed on one division was comparatively small, the fireman came into direct contact with the master mechanic and often with the superintendent of motive power. As a result the enginemen were more interested in the welfare of the company and took interest enough in their work to find out the correct methods to use in performing their different duties.

It is an admitted fact that the class of men employed as firemen during the past few years have not been up to the desired standard. Instead of enginemen working for the interest of the railways, we now find them promoting adverse legislation in every state. This legislation will cost, or has already cost, the railways much money in many ways. If the engineman could be made to see that his interest is directly connected with the welfare of the company that pays him, this condition would be eliminated.

We believe that the one thing which leads all others in causing this lack of interest, and oftentimes real opposition against the railways is the fact that in most cases the rank and file of the enginemen only know their superior officer through the chairman of the order to which they belong. The men and officials have grown apart until there is a great lack of confidence on both sides. Right here is where the traveling engineer can be of the greatest help in regaining this lost confidence, if he has the proper backing.

Every company should have a distinct policy regarding the education and development of firemen from the day they are employed until they have passed all examinations to make them full-fledged engineers. This system should be as clean cut and as vigorously maintained as the best of other operating systems are maintained. The new man should by all means have some special training before starting to fire a modern locomotive with its multitude of special appliances. He should be well grounded in the reasons for doing the work.

The work of educating the firemen should be placed in the hands of a broad-minded man who believes in this work, and is willing to give the best there is in him to it. He should have a practical knowledge of firing a locomotive and should thoroughly understand the burning of coal (or other fuel which may be

used) on the locomotive. He should have a general knowledge of all fuel used on the road and how it should be fired. He should have the knack of imparting his ideas to others on the locomotive or in class talks at terminals. Then, last, but not least, he should have the confidence of the officers of the road and be given full charge of the work, so that there will be no interference from any source.

Lesson papers should be prepared covering a course in elementary combustion, standard firing practice, boiler feeding, care of firebox on the road and at terminals, use of special equipment on the locomotive, rules and signals, instruction in safety first and locomotive running and breakdowns. Class instruction should be given at the different terminals. The class-room should be fitted with a portable moving picture outfit. Several roads now use the moving picture and speak very highly of it as an educational item of great value. A dummy firebox of standard size and shape, equipped with a brick arch so that the conditions will be the same as on the locomotive, should be used for giving practical instruction.

The employing of new men is very important and should be given the attention of some one capable of judging and handling men. We would suggest the type of man wanted as locomotive fireman as one who is twenty-one years old, with a bright, clean-cut appearance. It is necessary that he should have a common school education and be able to assimilate instruction. He should have good habits and if married so much the better. Such a man will repay any time spent on him if he has the right spirit. The prospective fireman should be given a position around the roundhouse in some capacity, such as wiper, mechanist helper, or on the cinder pit. If there are shops near or at the terminal, the new men can be placed there. With the men in the shops and in the roundhouse we will have them where we can start their education at once. There they will get experience which will be of great value to them after they get on the road as firemen and even after they go running.

When a man is employed he should be given a letter which will outline the position of the company with regard to his future. It will be explained to him that the company intends to educate him along the best lines of standard practice pertaining to his work; that if he will devote his time during working hours and some of his time out of working hours to the best interests of

the classes each day he should have been under the observation of some one who is interested to know if he is the right kind of man for the work. As soon as the new men are through the course in firing practice they should start on the locomotive running course. The traveling engineer should have charge of this work.

By following this system you first have picked men to start with. Then the company will have a chance to instill into their minds right thoughts about the position of locomotive fireman, and rights thoughts about the position of the company toward the men. They will be ready to fire an engine from the start instead of probably never learning to fire. In the end it will give us a body of firemen on our locomotives who are interested in their work, who know how their work should be done, and who are looking forward to better positions on the road.

The report is signed by L. R. Pyle (M., St. P. & S. S. M.), chairman; J. C. Heyburn (St. L. & S. F.); J. C. McCutcheon (Wabash); J. Fred Jennings (M. C.), and W. H. Davies (Son. Schools of Railway Science).

Discussion.—The presentation of the report was followed by an exhibition of moving pictures, as used by some of the roads in connection with instruction in firing. Martin Whelan laid particular stress on the necessity of making the enginemen feel that they are a very important part of the railway organization and that the officers have their best interests at heart. As a general thing the men do not appreciate the interest that is taken in them. A great deal more care should be taken in educating the enginemen, as with the changed conditions they do not now receive the benefit of individual instruction from a single engineer.

The closing sessions of the convention will be reported in next week's issue.

LOCOMOTIVES FOR THE RUSSIAN STATE RAILWAYS

Early in the summer it was announced in these columns that orders had been placed in America by the Russian State Railways for 400 locomotives of the Decapod type, 250 with the Baldwin Locomotive Works, 100 with the American Locomo-



Decapod Type Locomotive Built by the American Locomotive Company for Russian State Railways

the company, the latter will give him an education in everything pertaining to his work as a fireman and as a future engineer; that the company expects, as a reasonable return, that the man will give, first, loyalty to the company's interest in every way, striving to promote the welfare of the company whenever possible; then, that he will do his work energetically and according to instructions. If these things are kept before the new man from the beginning, always showing him that the company is taking an interest in him, we will be able to combat a great deal of the other influence at work among the men.

During the time this man has been in the shops and attending

tive Company, and 50 with the Canadian Locomotive Company. Apart from the magnitude of the order, these engines are of interest because of their design and the urgency with which they are being built. The orders were placed during the latter part of June, and the first of the locomotives were ready for shipment soon after the middle of August. During this time much of the designing was done, the engines were built and tested and then knocked down and packed for shipment.

The locomotives are designed for operation on track of 5 ft. gage, which is used on a large part of the mileage of the Russian State Railways. The axle loads are light as compared with

RATIOS		Baldwin Loco. Wks.	American Loco. Co.
Weight on drivers ÷ tractive effort.....	3.40		3.39
Total weight ÷ tractive effort.....	3.80		3.78
Tractive effort × diam. drivers ÷ equivalent heating surface*.....	.777		.784
Equivalent heating surface* ÷ grate area.....	.53.4		.53
CYLINDERS			
Kind.....	Simple		Simple
Diameter and stroke.....	25 in. by 28 in.		25 in. by 28 in.
VALVES			
Kind.....	Piston		Piston
Diameter.....	12 in.		12 in.
WHEELS			
Driving, diameter over tires.....	52 in.		52 in.
Driving journals, main, diameter and length.....	10½ in. by 12 in.		10½ in. by 12 in.
Driving journals, others, diameter and length.....	8½ in. by 12 in.		8½ in. by 12 in.
BOILER			
Style.....	Straight		Straight
Working pressure.....	180 lb. per sq. in.		180 lb. per sq. in.
Outside diameter of first ring.....	70 in.		70¾ in.
Firebox, length and width.....	108½ in. by 86 in.		107¾ in. by 85¾ in.
Tubes, number and outside diameter.....	195—2 in.		195—2 in.
Flues, number and outside diameter.....	28—5½ in.		28—5½ in.
Tubes and flues, length.....	17 ft.		17 ft.
Heating surface, tubes and flues.....	2,393 sq. ft.		2,386 sq. ft.
Heating surface, firebox (including arch tubes).....	208 sq. ft.		200 sq. ft.
Heating surface, total.....	2,601 sq. ft.		2,586 sq. ft.
Superheater heating surface.....	563 sq. ft.		553 sq. ft.
Equivalent heating surface*.....	3,446 sq. ft.		3,416 sq. ft.
Grate area.....	64.5 sq. ft.		64.4 sq. ft.
TENDER			
Tank.....	Water bottom		Water bottom
Frame.....	Channel		Channel
Wheels, diameter.....	36 in.		36 in.
Journals, diameter and length.....	5½ in. by 10 in.		5½ in. by 10 in.
Water capacity.....	7,400 gal.		7,400 gal.
Coal capacity.....	8 metric tons		8 metric tons

* Equivalent heating surface equals total evaporative heating surface plus 1.5 times the superheating surface.

COAL SHORTAGE IN EUROPE

By WALTER S. HIATT*

With the war expected to last until next year the coal shortage in Europe is going to be a distressing subject this winter. It means that the railroads will have a hard time because of the increased cost of coal; it means that many families will have to go without heat; it means that coal may be slightly higher in price in the United States if the American coal merchants are able to deliver all the coal they have contracted to deliver in Europe. If American railroad terminal methods and machinery for handling coal rapidly and in large quantities existed at Italian and French ports, American coal merchants would this year sell upwards of 50,000,000 tons.

Belgium normally produces 20,000,000 tons, more than enough for home consumption, but these mines are not being worked now except in the interest of the Germans. Italy, France and Russia will suffer for want of coal because of the limited home output and lack of the normal amount of importations. Italy produces little coal, Russia barely over 30,000,000 tons and France just over 40,000,000 tons. Of the powers at war England and Germany are the most favored. While the price of coal has already gone up in Germany, its mines are being worked and its production this year will still, despite the number of soldiers taken out of the mines, be adequate for home consumption, though far less than its average production of about 200,000,000 tons. Austria produces almost its normal coal consumption.

The railroads of Germany certainly will not suffer in their war activities from lack of coal, since they consume in normal times but slightly over 11,000,000 tons per year. The increased consumption of coal due to the intricate war movements of trains will not raise this figure to more than 25,000,000. In Russia, however, which because of the blockaded seas has been forced to bring its imports of all kinds of war materials from the Far East on its Siberian railroad, the coal question will further hamper the railroads, which have been working none too smoothly.

The situation in France is typical of many European countries.

While France has, of course, all the seas open to her, to date she has been unable to import or obtain at reasonable prices the quantity of coal required either for her railroads or for her civil population. As early as last December coal for domestic uses almost doubled in price, going from \$6 to \$11 a ton, and the majority of families went without heat rather than pay the extra price. The railroads were not seriously hampered in this respect because of supplies on hand, and the situation was eased somewhat later in the winter by English imports.

France normally consumes 60,000,000 tons a year, of which amount she herself produces 40,000,000 and the other 20,000,000 she imports either from England or Belgium. But the German invasion cut off the Belgian supply and at the same time cut off the 20,000,000 tons of coal that France normally gets from her northern district on the Belgian frontier.

The French railroads normally consume about 15 per cent, or nearly 9,000,000 tons of the total of 60,000,000 required each year in France. The other 85 per cent is normally distributed as follows: Private use, 20 per cent; industries and manufactures, 28.6 per cent; gas factories, 7.5 per cent; mine industries, 8.9 per cent; metal factories, 17.9 per cent; tug boats, canal barges and ships, 2.2 per cent. This year the railroads will consume about twice the normal quantity because of the necessity of the rapid and quick movements of troops, which require more than the normal number of engines either attached to trains or else always held in readiness for unexpected movements.

In this connection, as a curious fact worthy of note, I counted one day recently in the Paris yards of the Western Railroad no less than 45 locomotives with steam up and merely held in reserve. While a German attack on Paris, or even a general movement to break through the line of trenches 50 miles from Paris, is no longer plausible, the military authorities are today ready for any emergency. For that reason they hold in reserve an army at Paris variously estimated at from 100,000 to 300,000 men, ready either to defend Paris proper or to be launched rapidly out of Paris on a few hours' notice to any part of the trench line that may be overwhelmed.

For the same reason and merely as a precaution the railroad tracks that run out toward Compeigne, Soisson and Reims are either themselves part of a line of reserve trenches or are flanked by a vast network of trenches. In short, the country between Paris and the German line of trenches is protected by some 20 immense lines of reserve trenches spreading out from Paris like a fan and each trench line increasing in length as it is removed from Paris until it may be a hundred miles in length.

Because of the enormity of the importance of railroads in this war, which cannot be overstated, so far as concerns France, a country of short distances, where a false move might wreck her entire plan of campaign, where the loss of a mile or two of territory even, might prove irreparable, it is certain that there will be no coal shortage so far as concerns the railroads. As an arm of the government any available coal will first be placed at their disposition.

The coal question for these various railroad and military uses, as well as for private family consumption, was carefully gone over lately by the Central Committee of the Collieries of France. It pointed out that the miners mobilized in the early part of the war to the number of 4,500 have been returned to the mines and that 3,000 workmen among the refugee Belgians have been employed, and that these workmen, together with others never mobilized, were now working in the mines of central and south France, so that the coal production was now being carried on at the rate of 20,000,000 tons a year, or about half the normal supply, and which supply is directly under the control of the government. The railroad coal, that costs \$3 a ton in the United States, is quoted at \$10 for French coal and \$12 for English coal. It would appear that the first sufferers from the coal shortage will not be the railroads, but the private consumer, who at present is unable to secure deliveries at any price. Despite the high cost of ocean transportation, it is expected that American coal deliveries will ease the situation for all classes of consumers and will tend to keep down prices.

* Our Special European Correspondent.

General News Department

United States Consul Silliman, telegraphing from Vera Cruz, September 4, reports the wreck of a railroad train near Mexico City, in which 200 persons were killed.

The Chesapeake & Ohio reports that on its line between Richmond, Va., and Old Point Comfort, 85 miles, more than 300 convictions for trespassing were secured in one month.

The Rock Island Lines have made arrangements with the Railway Educational Bureau, of Omaha, Neb., to extend the privileges of the bureau to Rock Island employees.

The Missouri, Kansas & Texas is reported to have let a contract to Dorset Carter of Oklahoma City for a large part of its coal supply from the southern Oklahoma fields for a term of years.

Trains were run into Galveston, Tex., September 1, the damage to the causeway occasioned by the hurricane of August 16 having by that time been sufficiently repaired to allow the laying of one track.

Sir William MacKenzie, president of the Canadian Northern, announced in Winnipeg last week that that road would be opened for passenger and freight traffic through between the Atlantic and the Pacific in the month of October.

Between Broad street, Philadelphia, and Paoli, 20 miles, the Pennsylvania Railroad is now running a few trains by electric power. The equipment of this section of the road for electric traction has been going on for about two years and the expenditures have amounted to about \$4,000,000. Current is supplied by the Philadelphia Electric Company.

Near Uno, Man., on the morning of September 2, about two o'clock, a trestle bridge of the Grand Trunk Pacific, 1,700 ft. long, and in the middle 85 ft. high, was completely destroyed by a cyclone; and a freight train, coming to the bridge a half hour afterward, was wrecked, resulting in the death of the engineer. A passenger train had passed over the bridge a short time before the storm.

The 57 railroads in Texas which pay taxes under the gross receipts tax law are to receive a refund amounting to \$76,343 out of a special appropriation by the legislature. Some of the larger roads contested the law and had it declared unconstitutional, but many of the smaller roads paid the tax and the state controller refused payment of the refund. The attorney-general of the state has recently rendered an opinion that there is no legal impediment to such payment.

New York Port Improvement Commission

The City of New York, acting through the Board of Estimate and Apportionment, has adopted the proposal made some time ago by the Merchants' Association and endorsed by the Chamber of Commerce to appoint a board of engineers to investigate the freight transportation facilities of the city; and it is announced that the commission consists of John F. Stevens, George F. Swain and William C. Loree. The plan contemplates a study extending over two or three years, at an expense of \$125,000 a year. The estimate includes annual salaries of \$15,000 for each commissioner, \$5,000 each for five assistants; \$2,000 each for five assistants of lower grades, etc. The commission will not organize until the appropriation for its support shall have been approved by the Board of Aldermen. A member of the commission outlines the proposed work as follows:

"We understand that the problem is the study of the terminal facilities of New York City, and the formulation of some plan which will correlate, simplify and facilitate the methods of collection, storage and distribution of freight in New York City. This problem involves the study of the various railroad and steamship terminals, their relation to business centers, the method of carrying freight through the streets, the interchange

of freight between railroad and steamship lines; in general, the entire terminal facilities of the city.

"It is hoped that a feasible plan may be developed by which existing congestion and inconvenience may be removed, cost of handling reduced, and in general the terminal facilities of New York, both as a port and as a manufacturing and consuming center, may be improved and provision made for future growth."

Mr. Stevens is well known as a railroad officer, having been engaged in engineering work in the West from 1874 to 1902, when he became general manager of the Great Northern, with which road he remained, in that and higher offices, until 1905, when he went to the Rock Island. Later he was chief engineer of the Panama Canal, and an officer of the New York, New Haven & Hartford. Dr. Swain is the well-known civil engineer of Boston, consulting engineer of the Massachusetts Railroad Commission since 1887, and member of the Boston Transit Commission for the past 21 years. Mr. Loree was superintendent or general manager in the Baltimore & Ohio System from 1903 to 1914, having before that served 19 years in the engineering department of the Pennsylvania lines west of Pittsburgh. Since January 1, 1914, he has been out of the railroad service.

Newport News Elevator Burned

The grain elevator of the Chesapeake & Ohio at Newport News, Va., was destroyed by fire on the night of September 4, with about 500,000 bushels of grain; estimated loss \$2,000,000. An office building was also destroyed.

New York Railroad Club

At the next regular meeting of the New York Railroad Club, to be held in the Engineering Societies Building, 29 West 39th street, New York, on September 17, a paper will be presented by C. M. Himmelberger, superintendent of the Raritan River Railroad, entitled, "The Freight Terminal."

Traveling Engineers' Association

The twenty-third annual convention of the Traveling Engineers' Association at the Hotel Sherman, Chicago, commenced on Tuesday, September 7, and lasts four days. Abstracts of some of the papers presented and the discussion of them appear elsewhere in this issue. The following is a list of the exhibitors:

American Arch Company, New York.—Represented by Le Grand Parish, W. T. Allison, H. D. Savage, J. P. Neff, A. W. Clokey, G. M. Bean, R. J. Himmelright and J. T. Anthony.
American Locomotive Company, New York.—Photographs. Represented by C. A. Delaney.
American Steel Foundries, Chicago.—Vulcan trucks, Simplex couplers, Economy draft arm, Vulcan brake beams and Simplex truck column. Represented by W. A. Wallace, W. G. Wallace and J. G. Russell.
Ashton Valve Company, Boston, Mass.—Gages, safety valves, whistles and gage-testing devices. Represented by J. W. Motherwell, J. F. Gettrust and H. O. Fetting.
Barco Brass & Joint Company, Chicago.—Barco engine and tender, flexible connection for air, steam and oil, Barco automatic smoke box blower fitting, Barco flexible joints and Barco gage bracket. Represented by F. N. Bard, C. L. Mellor and L. W. Millar.
Bird-Archer Company, New York.—Boiler compounds. Represented by L. E. Wilson, J. M. Robb and W. S. Reid.
Boss Nut Company, Chicago.—Lock nuts. Represented by J. A. MacLean.
Chambers Valve Company, New York.—Photographs. Represented by F. H. Clark.
Chicago Car Heating Company, Chicago.—Steam hose couplers, pressure-reducing valves, steam traps, stop valves, steam gages and end trap pipe valves. Represented by E. A. Schneider, R. P. Cooley and E. E. Smith.
Chicago Pneumatic Tool Company, Chicago.—Pneumatic tools.
Commercial Acetylene Railway Light & Signal Company, New York.—Headlights. Represented by H. G. Doran.
Crane Company, Chicago.—Valves. Represented by F. D. Fenn and F. W. Venton.
Dearborn Chemical Company, Chicago.—Represented by J. D. Purcell, G. R. Carr and J. H. Cooper.
Delaware Railway Specialty Company, Wilmington, Del.—Automatic drifting device for superheater locomotives. Represented by W. H. Savery.
Detroit Lubricator Company, Detroit, Mich.—Detroit automatic flange lubricator. Represented by A. D. Homard.
Economy Devices Corporation, New York.—Rushon screw reverse gear, Casey Gwyn reverse gear, Ragonnet reverse gear, Universal valve chest and radial buffer and engine truck. Represented by H. E. Ball and J. L. Randolph.

Edna Brass Company, Cincinnati, Ohio.—Injectors, valves and fittings. Represented by E. O. Corey and H. A. Glenn.

Equipment Improvement Company, New York.—Market locomotive devices, Wine side bearings and Trojan packing. Represented by E. E. Sawyer and C. W. Cross.

Franklin Railway Supply Company, New York.—Franklin fire-door. Represented by C. W. F. Coffin, W. H. Coyle, R. Coburn, J. Sinkler and S. Rosenfelt.

Galena Signal Oil Company, Franklin, Pa.—Represented by J. E. Linahen, W. J. Walsh, W. Holmes, I. A. Roosevelt, G. E. McVicar, W. O. Taylor, D. L. Eubank, C. B. Royal, W. E. Brumby, M. M. Meehan, J. S. Brown, J. P. Ferguson, F. B. Smith, J. A. Graham and J. G. Arn.

Garlock Packing Company, Palmyra, N. Y.—Garlock packing. Represented by J. P. Landreth, G. H. Green and M. E. Hamilton.

Greene, Tweed & Co., New York.—Packings. Represented by N. B. Nickerson.

Henry Manufacturing & Grease Cup Company, Terre Haute, Ind.—Grease cups. Represented by M. Henry.

Hunt-Spiller Manufacturing Corporation, Boston, Mass.—Hunt-Spiller gun iron and Hunt-Spiller cylinder and valve packing. Represented by J. G. Platt, V. W. Ellet, J. M. Monroe and H. B. Parker.

Jerome-Edwards Metallic Packing Company, Chicago.—Metallic packing. Represented by G. C. Jerome and R. L. McIntosh.

Kelley-Wood Safety Locomotive Side Curtain Company, Chicago.—Locomotive side curtain. Represented by W. F. Kelley.

Leslie Company, The, Lyndhurst, N. J.—Presto coupling nuts and regulators. Represented by S. I. Leslie and J. Cizek.

Liberty Manufacturing Company, Pittsburgh, Pa.—Locomotive tube cleaners. Represented by C. L. Brown and C. T. Davis.

Locomotive Pulverized Fuel Company, New York.—Represented by J. E. Muhlfield.

Locomotive Superheater Company, New York.—Model of welded superheater unit, pyrometer, and grinding tools. Represented by John Bell, W. Boughton, W. A. Buckbee, G. Fogg, C. D. Hilferty, B. G. Lynch, S. MacDonald, A. C. McLachlan, J. E. Morn, R. M. Ostermann, R. R. Porterfield, G. E. Ryder, G. E. Spangler, W. G. Tawse and C. N. Wickerham.

Long, Jr., & Co., Charles R., Louisville, Ky.

Manning, Maxwell & Moore, Inc., New York.—Inspirators, valves and gages. Represented by C. L. Brown and F. J. Wilson.

McCord & Co., Chicago.—Journal boxes and lubricators. Represented by O. H. Neal.

Mudge & Co., Chicago.—Mudge-Slater Iron end. Represented by G. W. Bender and B. W. Mudge.

Nathan Manufacturing Company, New York.—Injectors, lubricators, boiler checks and boiler supplies. Represented by A. S. Work, J. S. Seeley, W. R. Walsh and G. Royal.

National Boiler Washing Company, Chicago.—Safety-first fire door. Represented by H. A. Varney.

National Graphite Lubricator Company, Scranton, Pa.—Represented by L. S. Watres.

National Railway Devices Company, Chicago.—Shoemaker fire door. Represented by J. G. Robinson.

Okadee Company, Chicago.—Blow-off cocks, tank hose and strainer drain valve. Represented by A. G. Hollingshead.

Ohio Injector Company, Chicago.—Ohio injector, Chicago injector and Chicago flange lubricator. Represented by W. S. Furry, F. W. Edwards, F. B. Wiperman and A. C. Beckwith.

O'Malley-Beare Valve Company, Chicago.—Multi-plate valves. Represented by E. O'Malley and T. O'Malley.

Paxton-Mitchell Company, Omaha, Neb.—Metallic packing. Represented by C. A. Coons.

Pilliod Company, The, New York.—Baker valve gear. Represented by R. H. Weatherly.

Pocket List of Railroad Officials, New York.—Represented by C. L. Dinsmore.

Pyle-National Electric Headlight Company, Chicago.—Young locomotive valve gear and Pyle-National electric headlight. Represented by R. C. Vilas, W. Miller, J. E. Kilker, C. W. Young, W. T. Bretherton, L. H. Steger, F. Kersten and C. E. Miller.

Robinson Company, Boston, Mass.—Exhaust nozzle. Represented by H. M. Parker.

Sellers & Co., Inc., William, Philadelphia, Pa.—Injectors and boiler fittings. Represented by S. L. Kneass, G. W. Wilson and L. H. Burns.

Simmons-Boardman Publishing Company, New York.—*Railway Age Gazette* and *Railway Age Gazette, Mechanical Edition*. Represented by R. E. Thayer, L. B. Sherman and F. H. Thompson.

Southern Locomotive Valve Gear Company, Knoxville, Tenn.—Southern valve gear. Represented by E. L. Chollman and J. A. Murrain.

Standard Heat & Ventilation Company, New York.—Represented by C. H. McCormick.

Storrs Mica Company, Owego, N. Y.—Represented by C. P. Storrs.

United States Graphite Company, Saginaw, Mich.—Graphite and graphite paint. Represented by J. W. Ediston and J. G. Drough.

United States Metallic Packing Company, Philadelphia, Pa.—Metallic packing. Represented by M. Brewster, H. M. Wey and J. C. Mace.

Vissering & Co., Harry, Chicago.—Metallic packing and bell ringers. Represented by Harry Vissering, G. S. Turner and W. H. Heckman.

Western Railway Equipment Company, St. Louis, Mo.—Locomotive devices. Represented by Louis Hoerr.

Westinghouse Air Brake Company, Pittsburgh, Pa.—Represented by L. M. Carlton, W. M. Sleet, A. K. Homeyer, J. A. O'Malley, W. V. Turner and S. J. Kidder.

White American Locomotive Sander Company, Roanoke, Va.—Represented by W. H. White.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the *Railway Age Gazette* for each month.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 8 W. 40th St. New York. Annual convention, October 4-8, 1915, San Francisco, Cal.

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

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, Chicago.

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

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

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.

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

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

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

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

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

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

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

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

MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.

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

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

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

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

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 53 Church St., New York. Meetings, alternate Thursdays, October to May. Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

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

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

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

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

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

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

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, October 19-21, Colorado Springs, Colo.

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

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

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

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

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

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.

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

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-19, 1915, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

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

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

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JULY, 1915

Name of road	Average mileage operated during period.	Operating revenues			Operating expenses			Net From Railway (Operation.)	Railway tax accretals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Total.	Freight.	Passenger (inc. misc.)	Way and structures	Maintenance of equipment	Traffic.	Trans- portation.	Miscel- lanous.	General.	Total.
Alabama & Vicksburg	143	\$75,999	\$34,760	\$121,633	\$17,358	\$30,815	\$3,695	\$43,539	\$2,067	\$5,417	\$102,882
Albion, Topeka & Santa Fe	8,620	5,057,387	2,959,805	8,706,365	1,250,392	1,386,338	199,669	2,394,935	2,550	165,688	3,412,644
Atlanta & West Point	638	44,476	30,784	96,784	35,674	40,000	13,729	30,331	2,550	11,645	79,559
Atlanta, Birmingham & Atlantic	63	166,624	45,017	230,834	33,574	40,000	13,729	30,331	2,550	11,645	172,225
Atlantic & St. Lawrence	167	68,151	29,180	108,239	21,552	15,937	3,999	52,270	24	9,461	36,729
Atlantic Coast Line	4,698	1,441,687	562,156	2,177,387	380,434	442,021	51,746	846,953	6,386	73,010	1,799,834
Baltimore, Chesapeake & Atlantic	88	150,517	57,904	153,760	11,270	28,830	2,203	72,498	.....	2,916	102,718
Bangor & Aroostook	632	95,155	22,263	226,295	18,480	48,577	2,781	72,498	.....	10,774	185,904
Belt Ry. Co. of Chicago	24	.....	.....	239,227	16,681	25,669	671	96,561	.....	5,280	145,501
Buffalo & Susquehanna Railway	91	16,934	.....	26,299	3,892	5,005	459	11,273	.....	2,324	13,555
Canadian Pacific Lines in Maine	233	39,402	16,425	62,260	18,409	13,792	5,588	27,291	.....	3,224	68,303
Carolina, Clinchfield & Ohio	283	166,481	20,723	191,354	19,249	24,630	8,477	32,387	.....	8,354	92,222
Carolina, Clinchfield & Ohio of S. C.	18	7,496	1,137	8,934	1,615	89	1,632	1,126	.....	410	2,679
Central of Georgia	1,924	626,848	276,550	987,827	145,596	168,549	35,870	347,329	1,166	39,833	737,882
Central of New Jersey	681	1,758,376	697,357	2,599,547	245,302	514,219	37,846	879,970	16,899	67,449	1,761,685
Central New England	304	306,103	43,430	364,141	52,681	27,797	1,053	97,827	.....	4,234	183,544
Charleston & Western Carolina	341	82,719	27,416	116,593	27,697	21,713	3,754	44,524	.....	4,881	102,569
Chesapeake & Ohio Lines	2,374	2,868,953	546,181	3,642,577	415,858	770,271	52,044	1,054,904	18,872	74,420	2,384,974
Chicago & Alton	1,052	730,725	337,801	1,188,358	165,684	285,403	34,002	415,285	9,298	30,184	938,873
Chicago & Erie	270	435,054	55,874	538,658	81,074	48,182	16,237	213,931	2,129	14,649	375,195
Chicago, Burlington & Quincy	9,366	4,557,034	2,045,636	7,374,125	1,027,346	1,361,506	142,359	2,283,596	76,480	169,150	5,060,437
Chicago, Great Western	1,452	226,494	296,070	1,128,798	191,966	214,261	47,354	391,286	8,452	34,922	887,051
Chicago, Milwaukee & St. Paul	10,076	5,530,592	1,804,529	8,219,281	156,644	2,730,886	156,644	2,730,886	68,985	165,815	4,960,321
Chicago, Rock Island & Gulf	477	134,992	55,456	228,561	42,660	34,679	9,460	97,274	2,149	7,672	193,803
Chicago, Rock Island & Pacific	7,657	3,298,355	1,729,508	5,457,925	987,625	1,105,730	151,292	2,136,801	59,701	143,721	4,534,870
Chicago, Terre Haute & Southeastern	374	143,626	15,185	163,270	33,400	33,103	3,468	48,517	733	8,344	127,565
Cincinnati, Hamilton & Dayton	1,003	678,006	146,801	920,751	135,150	130,650	19,514	350,222	3,032	19,734	667,440
Cincinnati, Northern	246	111,143	21,777	139,018	30,951	30,791	2,326	43,203	.....	3,926	104,398
Cleveland, Cincinnati, Chicago & St. L.	2,381	2,078,846	801,519	3,163,458	421,786	613,075	71,778	1,087,936	2,934	70,328	2,285,075
Colorado & Southern	1,089	423,632	149,598	618,145	98,374	130,757	11,152	181,284	5,088	24,502	471,158
Detroit & Toledo Shore Line	79	153,529	.....	105,897	14,254	7,477	1,554	30,678	.....	2,574	56,530
Detroit, Grand Haven & Milwaukee	191	164,000	55,000	249,120	18,158	24,924	6,080	103,120	.....	4,225	159,841
Detroit, Toledo & Ironton	441	109,163	14,175	133,103	16,197	21,218	3,799	60,590	.....	5,891	107,615
Duluth, Missabe & Northern	370	1,398,480	267,37	1,445,079	101,411	114,513	1,949	179,980	4,137	9,139	411,130
Elgin, Joliet & Eastern	777	826,556	15	882,467	89,623	144,488	6,186	233,868	.....	18,793	492,958
Erie	1,988	3,742,838	934,202	5,134,470	471,368	817,366	85,777	1,649,477	33,630	103,768	3,149,757
Florida East Coast	745	207,574	66,875	362,787	65,488	53,772	5,638	147,372	2,577	19,788	292,529
Fort Worth & Denver City	454	246,735	128,483	399,618	67,548	82,038	7,629	130,642	3,041	15,253	306,151
Galveston Wharf	13	.....	.....	112,734	5,086	3,338	581	32,339	.....	410	69,959
Grand Rapids & Indiana	575	239,894	174,568	454,957	54,376	59,689	12,367	183,527	3,879	14,327	327,166
Grand Trunk Western	347	452,000	144,000	635,951	64,820	110,704	18,551	221,523	6,027	13,596	435,312
Great Northern	8,102	3,668,317	1,327,896	5,388,125	701,599	572,437	107,361	1,509,211	84,623	103,292	3,122,769
Gulf & Ship Island	308	98,978	33,773	122,751	26,436	26,436	2,622	37,809	277	6,464	37,880
Gulf, Colorado & Santa Fe	1,937	884,009	295,331	1,251,324	228,894	196,382	28,206	437,850	.....	32,522	920,987
Hocking Valley	351	421,199	74,575	543,136	50,045	82,833	8,306	160,078	.....	16,809	318,071
Lake Erie & Western	900	393,132	69,801	489,379	68,817	110,807	12,967	170,518	.....	12,960	375,399
Lehigh Valley	1,442	3,043,820	442,387	3,733,762	411,661	786,632	84,637	1,197,862	12,292	74,606	2,566,419
Long Island	398	300,144	1,064,109	1,553,353	135,256	132,879	5,603	479,458	6,514	11,928	254,444
Louisiana Ry. & Navigation Co.	351	131,066	29,192	169,239	30,617	25,484	18,626	57,375	.....	4,936	124,038
Louisiana Western	208	104,773	53,871	171,565	21,170	33,252	7,035	47,696	2,100	6,286	117,538
Louisville & Nashville	5,037	3,202,853	964,513	4,485,843	704,835	822,476	112,065	1,342,490	29,950	108,088	3,116,579
Louisville, Henderson & St. Louis	200	71,727	32,618	111,028	39,239	15,746	5,117	37,109	.....	2,839	100,049
Moquis, La. & Texas R. & S. Co.	405	195,198	80,177	306,439	51,529	53,252	11,725	123,951	2,593	11,928	254,444
Maine Central	1,220	505,039	367,424	996,964	96,964	127,815	15,562	338,154	10,025	58,769	698,060
Michigan Central	1,785	1,705,319	990,561	3,049,542	382,832	464,069	58,769	1,035,865	44,563	56,414	2,042,512
Minneapolis & St. Louis	1,646	563,154	175,631	703,675	101,407	114,982	18,575	279,963	90	20,530	535,547
Minn. St. Paul & Sault Ste. Marie	4,190	1,538,533	614,204	2,388,189	317,847	308,797	51,869	713,691	22,132	65,198	1,477,040
Missouri, Kansas & Texas System	3,865	1,647,833	692,862	2,517,205	429,908	402,213	58,227	931,010	16,388	80,990	1,912,586

Traffic News

Western Railroads to Ask Rehearing of Rate Case

C. C. Wright, general solicitor of the Chicago & North Western and chairman of the committee of railroad lawyers that had charge of the western freight rate advance case for the railways, announced, after a meeting on September 3, that the roads had decided to petition the Interstate Commerce Commission for a rehearing of the case. The petition is to be filed with the commission this week.

Low Freight Rates Between New York and California

At hearings held in New York City, September 1, 2 and 3, by Examiner Thurtell, of the Interstate Commerce Commission, L. J. Spence, director of traffic, and other officers of the Southern Pacific, presenting their request for the approval of reductions in the freight rates on 20 or more commodities from New York to Pacific coast seaports, gave testimony concerning what they had heard relative to rates at which freight is carried by water all the way from New York to Los Angeles and San Francisco through the Panama canal. The principal items in this statement are shown below:

COMPARISON OF RATES SOUGHT TO BE ESTABLISHED BY SUNSET GULF-ROUTE, WITH LOWEST KNOWN WATER RATES SINCE THE OPENING OF THE PANAMA CANAL.

Commodity	Mon. Weight	Proposed Rate via Sunset-Gulf Route	Lowest Known Rates Via Panama Canal
Calcium, Chloride of.....	80,000	45	30
Canned Corn.....	70,000	50	40
Canned goods, other.....	70,000	50	50
Coffee, Green.....	70,000	50	45
IRON AND STEEL—Various articles.....	80,000	45	25
Chain.....	80,000	45	30
Nails and Spikes.....	90,000	40	25
Oil Cloth and Linoleum, etc.....	60,000	60	50
Paint, in Oil.....	50,000	60	50
Paint, Dry.....	60,000	50	40
PAPER, Boxes, k. d., etc.....	60,000	60	40
Book, (Surface-Coated), etc.....	50,000	60	50
News, and Book, n. o. s.....	60,000	50	45
Building, etc.....	60,000	50	45
Soap.....	90,000	40	35
Soda, Bi-Carbonate.....	80,000	45	40
Twine and Cordage, Rope, etc.....	50,000	55	50
Wire Rope and Cable.....	60,000	55	50
Wire, Telephone, etc.....	60,000	50	50

* Contract rate.

Counsel for all-water freight lines running through the canal, objecting to a reduction of rates by the Southern Pacific, questioned the figures of all-water rates given by the Southern Pacific, claiming that in some cases they were too low.

The Southern Pacific laid before the commission data showing that with the present facilities of its water line from New York to Galveston and the rail line from Galveston to the Pacific coast the rates proposed, with goods moving in full carloads, would produce revenue in excess of the out-of-pocket cost of handling the goods.

The rates proposed apply to westbound shipments. Similar reductions have already been made on important commodities eastbound.

Of the commodities named in the foregoing list, it was said that the total volume in the last fiscal year was 296,000 tons, of which the Southern Pacific estimated that its water and rail line secured about one-fourth.

Testimony was introduced tending to show that some of the steamship lines operating through the Panama canal are making good profit, and that they have taken large quantities of numerous classes of goods, which before the opening of the canal went by more northern routes; and they expect to take still more.

As to the application of the long-and-short-haul clause of the Interstate Commerce law, Mr. Spence said that none of the commodities named in his application is produced at any point on the Southern Pacific's Sunset-Gulf Line.

The westbound freight traffic of the Sunset-Gulf Line has fallen off greatly since 1907, and it appears that some of the loss occurred before the opening of the Panama canal, being due to the inroads of the Tehuantepec route.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has postponed from October 1 to December 1 the date on which the reductions will go into effect in the rates on anthracite coal from the mines in eastern Pennsylvania to tidewater and other Eastern points. The commission's decision ordering these reductions was abstracted in the *Railway Age Gazette* of August 20, page 313.

Midcontinent Oil Rates

Milliken Refining Company v. Missouri, Kansas & Texas et al. Opinion by Commissioner Harlan:

This proceeding, which is numbered 6129, also embraces a large number of other complaints, and in connection with it the commission reopened ten other cases that were decided sometime ago. The midcontinent field includes the oil territory of Kansas and Oklahoma, though in Kansas the wells no longer flow and the business there is made up of the shipments from refineries which receive crude oil largely through pipe lines from Oklahoma wells. Railroad rates from this field have been a source of complaint for many years. The report in this case fills 20 pages, separate chapters being devoted to the tariffs to different cities, St. Louis, Chicago, Milwaukee, St. Paul, Winnipeg, Des Moines, Omaha, Sioux City, Salt Lake City, Denver, Kansas City, Joliet, New Orleans, Hannibal, and a number of other places. The situation is so complicated that the demand for reparation is denied; and, indeed, all of the formal complaints are dismissed, but without prejudice; and the carriers are simply directed in a general way to carry out the ideas of the commission, as set forth in detail. These require many increases as well as reductions. The decision is summarized in the headnotes as follows:

1. Reasonable rates are fixed on petroleum oil and its products from the midcontinent oil field, in Kansas and Oklahoma, to Kansas City, St. Louis, Chicago, and various other points.
2. All points in the midcontinent field are grouped with respect to rates to the Mississippi River and points beyond, including St. Paul territory, Winnipeg, Salt Lake City and Denver.
3. Reasonable maximum rates prescribed on low-grade products from midcontinent points to St. Louis and Chicago.

Hoboken Demurrage Charges Reasonable

Plymouth Coal Company v. Delaware, Lackawanna & Western Railroad. Opinion by Commissioner Hall:

Defendant's demurrage regulations governing anthracite coal awaiting transshipment at or near tidewater at Hoboken, N. J., are found reasonable. For many years prior to 1904 the defendant maintained at Hoboken a large number of bins and piers set apart for the storage of anthracite coal. These facilities were open to all shippers without other charge than the regular rates for the transportation of the coal from mine to tidewater. They were destroyed by fire on May 29, 1904, and were not rebuilt. Thereafter shippers obtained the substantial equivalent of this service by what was known as the "borrow and loan account." Under this arrangement shippers would "loan" to defendant the excess stock of any size of anthracite coal which they might have at tidewater. When stock conditions were reversed, the shippers would "borrow" coal from defendant. This system was in vogue until, in 1909, the Delaware, Lackawanna & Western Coal Company was organized by defendant as a result of legislation and litigation in respect of the commodities clause, and took over the coal sales business theretofore conducted by defendant.

From this time until the establishment of the demurrage regulations now in question, shippers were given free storage of coal in cars at the transshipment point for indefinite periods, subject to occasional endeavors by defendant in times of congestion to effect the release of cars by embargo of further shipments to designated consignees until the congestion was relieved. In its brief defendant admits that "prior to the effective date of the

tariff attacked in this proceeding, no demurrage was ever charged on tidewater coal held for transshipment at Secaucus or Hoboken."

Complainant asserts that the present situation is exceptional in that the business of complainant and other shippers has been built upon a system which permitted free storage of coal at Hoboken for an indefinite period; that any system of demurrage regulations inevitably operates for the benefit of the largest shipper because it can more readily meet the varying demands for the eight sizes of anthracite coal and is thus able promptly to dispose of its coal; and that the interest of the consuming public requires the continued maintenance of free storage at or near tidewater at Hoboken in order to prevent coal shortages in the New York market. If the present regulations are found to be just and reasonable, the commission is asked to reduce the rates for the transportation of anthracite coal to tidewater. It is undoubtedly the right of defendant to establish and maintain demurrage regulations under which a reasonable charge will accrue for detention of cars beyond a reasonable period. Defendant's facilities for transferring coal to vessels at tidewater are modern and are more than adequate to meet any demands thus far made upon them. The free storage is purely a commercial convenience and not a transportation necessity. Upon this record, and in accordance with the cases cited, we conclude that the demurrage regulations in issue are reasonable. The complaint will be dismissed. (36 I. C. C., 76.)

STATE COMMISSIONS

The hearing before the Texas Railroad Commission on the application of the Texas railroads for authority to increase freight rates 15 per cent throughout the state was resumed on September 1 at Austin. Testimony prepared for the commission was introduced in rebuttal to the testimony given by the carriers at the previous hearing, which was held at Dallas. Attorneys for the railroad commission issued a statement contending that the railways are not entitled to any general increase because they are already earning a sufficient revenue on state business and upon the value of their property as apportioned to use in state traffic.

The New York state public service commission, second district, announces that, at a conference held in Albany on Wednesday of this week, it induced the railroads to modify their requirement as to certificates of value of baggage. Hereafter the passenger need not declare a specific value unless it is high enough to incur the extra charge; that is, unless it is over \$100 in interstate travel and over \$150 for a journey within the state of New York. Passengers will still be required to sign a slip declaring that it is below these limits, or, if above them, to specify the value and pay the extra charge. The commission, according to its announcement, is determined to do justice both to actresses who travel with wardrobes worth \$30,000 and to gentlemen hurriedly departing with a toothbrush and another rubber collar. "No man can, and no woman wants to tell what the things in his or her trunk are worth," says Chairman Van Santvoord; and he is determined that the up-state citizens, whose consciences are declared to be exceedingly sensitive, will not be required to subscribe to any falsehood, even a potential one.

PERSONNEL OF COMMISSIONS

C. P. Howard has been appointed field engineer of the valuation department of the Interstate Commerce Commission for the Central district, with headquarters at Chicago.

COURT NEWS

Interstate Shipments—Presentation of Claims—Waiver

An interstate shipper, required by a contract of shipment to give notice of any claim for loss within a specified time, gave notice of claim after the expiration of the time. The railroad's auditor asked for particulars and stated that the records showed a delivery of the freight with billing instructions. The shipper did not comply with the request for particulars and did not reply to the auditor. In an action for damages for injury by weather in transit the Texas Court of Appeals held that the act of the auditor did not constitute a waiver by the railroad of the shipper's failure to present notice of claim within the time stipulated. A

stipulation or written notice of claims for loss, damage or delay within four months after delivery, was held valid notwithstanding the provision of the Carmack amendment, making the initial carrier liable for any loss caused by it, or any connecting carrier, and providing that no contract shall exempt the initial carrier from the liability imposed.—*Stevens & Russell v. St. Louis S. W.* (Tex.), 178 S. W. 810.

Power of State Commission to Change Passenger Rates

The Supreme Court of Nebraska holds, by a divided court, that the power conferred in general terms on the state railway commission does not authorize the commission to increase the maximum passenger rate of two cents a mile as fixed by the legislature in 1907. The rule is that a particular intention expressed in a legislative act, if in conflict with a general intention expressed in a later enactment, should be given effect, leaving the later act to operate only outside of the scope of the former.—*State ex rel. Mo. Pac. v. Clark* (Neb.), 153 N. W. 623.

Crossing Accident—Physical Facts

In an action for injuries to an automobile in a crossing collision the driver of the automobile admitted that though he had a clear view he did not stop, look, or listen, and did not look at the tracks until within 25 feet of them. It appeared that he was struck by cars which were kicked from some distance down the track. It was held by the Texas Court of Appeals that he was, as a matter of law, guilty of contributory negligence, though he testified to seeing the engine standing quiet on the tracks before he attempted to cross (*Ft. Worth & D. C., Tex.*, 178 S. W., 795).

Validity of Contracts with Labor Union

Suit for injunction was brought by switchmen against the Texas & P. and other railroads to prevent their carrying out contracts which, it was alleged, substantially provided that no switchmen should be employed who were not members of the Brotherhood or Railway Trainmen. The Texas Court of Civil Appeals holds that the fact that a contract between a railroad and a labor union providing for the employment of a specific percentage of employees from members of such union, and preference of such members in employment, was one-sided, wanting in mutuality and unenforceable at law, could not be complained of by strangers to the contract not in privity with the parties thereto. Such a contract was not void as against public policy. The railroads by entering into the contracts did not unlawfully create a monopoly which interfered with or prevented others from exercising the freedom of contract in relation to the sale of labor. There was reason in contracting with the Brotherhood, for its membership greatly exceeded the membership of any other particular union, which was a guaranty of keeping a full working force. But the contract was not exclusive; it provided for only a certain per cent of Brotherhood men, and the evidence showed that the railroads have a larger percentage of other classes employed than of the Brotherhood, in proportion to membership. The injunction was denied (*Underwood v. Texas & P., Tex.*, 178 S. W., 38).

Gross Earnings Tax—Double Taxation—One Company Agent of Another

Where one carrier enters into arrangements with other carriers by which the first becomes practically the hiring and disbursing agent of the others in the performance of duties partly owing by both principals and agents, paying out for and receiving from the others only the actual cost of the service, with no intention of making a profit out of the transaction, the Minnesota Supreme Court holds that, if such arrangements are made in good faith and not in fraud, subterfuge or evasion of the obligations of either party to the state or to the public, such moneys are not subject to the gross earnings tax. Where such services are included in the freight charges of the other railroad companies, which pay a gross earnings tax thereon, to compel the agent company to pay a tax on these same receipts would be in the nature of double taxation, exacting the commutation taxes on the same property twice, which cannot lawfully be done.

The defendant and certain navigation companies agreed that the defendant should employ stevedores to perform certain work

part of which it was defendant's duty to perform; the navigation companies paying to the defendant the actual cost of the labor. The defendant, in hiring the men to do the work, really acted for the boat companies as hiring and disbursing agent, paying for the actual cost of the work and receiving back from the boat companies what is expended. Under the rule above stated the moneys so received back were held not subject to the gross earnings tax.—*State v. Northern Pacific (Minn.)*, 153 N. W. 850.

Free Pass—Assumption of Risk

A contract with an express company provided that messengers should render service to the railroad and in consideration thereof receive a sum of money and also two passes a month for the use of his family. In an action for injuries to the wife of a messenger while traveling on a pass, the New Jersey Court of Errors and Appeals holds that such a pass is a "free pass," in the sense intended by the interstate commerce law, and a clause printed on the pass, whereby the passenger undertakes to assume all risks, is binding on the party using it (*Morris v. West Jersey, & S., N. J.*, 94 Atl., 593).

Guarding Low Bridges to Protect Brakemen

A railroad maintained standard "telltales" at a proper distance on each side of a low bridge. The bridge gave about three feet headway above the cars. A brakeman was killed by striking his head against the bridge. In an action for his death the New Jersey Court of Errors and Appeals holds that a railroad is not chargeable with negligence as regards brakemen on its freight trains, in failing to illuminate at night a low bridge over its tracks, in the absence of proof that such a provision was customary in railroad practice (*Raub v. Lehigh Valley, N. J.*, 94 Atl., 567).

Crossing Accident

Employees, seeing a person standing to one side of the track at a crossing, in a place of safety, are not negligent, the Oklahoma Supreme Court holds, in assuming that he will remain in that place of safety, and not heedlessly run upon the track in front of moving cars. If he does so, and it is impossible to stop the train in time to avoid killing him, the company cannot be held liable for his death. In such circumstances failure to ring the bell and sound the whistle on approaching the crossing would not make the company liable, for such failure would not be in any manner responsible for the deceased's going on the track (*St. Louis, I. M. & S. v. Gibson, Okla.*, 150 Pac., 465).

Crossing Accident—Testimony Contrary to Physical Facts

In an action for personal injuries it appeared that plaintiff crossed a railroad of seven tracks in a rubber-tired open buggy at 8:45 on an ordinary July evening. There were no obstructions, the tracks were straight, and he was familiar with the locality. He testified that he looked and listened all the time while crossing, without seeing or hearing the locomotive, bearing a red light, which struck his buggy on the last track. The St. Louis Court of Appeals held that his evidence would be treated as of no effect, as being contrary to the established physical fact that by looking and listening, an object of the size and attributes of a moving locomotive may be detected before collision. Judgment for the plaintiff was reversed (*Landrum v. St. Louis, I. M. & S., Mo.*, 178 S. W., 273).

Taxation of Railroad Property

A railroad was forced to construct a subway to carry a street under its roadbed and overhead bridges to carry streets over it. In its application to be relieved from items of an assessment, the New York Court of Appeals holds that its share of the cost of the work was improperly included in the assessment of its special franchise on the theory that the subway and bridges were tangible property of the road "situated in, upon, under or above any street, highway, public place or public waters" in connection with the special franchise made assessable by the New York tax law. In such a case the structure, the cost of which was attempted to be assessed, was part of a public street and belonged to the municipality, though there was physical connection between the struc-

ture and the road's right of way.—*People ex rel. New York, O. & W. v. State Board of Tax Comrs. (N. Y.)*, 109 N. E. 547.

Sufficiency for Claim of Damage

A bill of lading provided that claims for loss must be made in writing within four months after delivery. On the arrival of the freight at its destination the consignee notified the consignor by telegram that it had arrived in bad order. The consignor immediately went to the place of delivery and notified the claim agent of the terminal carrier that he would file a claim, but no claim was filed. The yard agent was also notified by an employee of the consignee that a claim for damages would be filed. A notation made on the expense bill by the agent of the terminal carrier at the point of destination recited that the freight was more or less damaged. It was held by the Texas Court of Appeals that there was a failure to give notice of a claim for damages and there could be no recovery of damages.—*St. Louis S. W. v. Overton (Tex.)*, 178 S. W. 814.

Evidence as to Reasonable Time for Run

In an action for damages to live stock by delay in transit the Texas Court of Civil Appeals holds that the admission of testimony of the plaintiff as to what, in his opinion, was a reasonable time for the run of the train, was erroneous, since what is a reasonable time to make a given trip is a mixed question of law and fact for the jury, under proper instructions. A duly qualified witness might give evidence as to what was the usual or customary time required to make the run, such testimony not being matter of opinion infringing the province of the jury, "usual time" being a matter of fact. "Reasonable time," on the other hand, is the time necessary under the circumstances to do conveniently what the contract or duty requires should be done in a particular case, a question of law depending on the subject-matter and situation of the parties (*Gulf C. & S. F. v. Bogy, Tex.*, 178 S. W., 577).

Manager's Right to Salary While on Leave of Absence

A general manager appointed an assistant general manager to hold the position at his discretion at a fixed salary per month. On the ground of ill health from application to his duties, the assistant was granted a leave of absence from October 13, 1911, to January 8, 1912, on salary and subject to orders and directions. The railroad's by-laws then contained no provisions as to leave of absence or deduction of salary. The assistant general manager during his absence had written daily letters relative to the business of his office. On his return on January 8, and on his request, he was relieved of his position and appointed to another. In an action for the balance of his salary the Texas Court of Civil Appeals held that the relation of employer and employee continued, and that the assistant general manager could recover his fixed salary for the period of his absence. Payment thereof was not prohibited by the Texas statute of 1911, providing that no corporation shall employ or use its means except in the legitimate objects of its creation (*Missouri, K. & T. v. Bryant, Tex.*, 178 S. W., 685).

Termination of Relation of Passenger

In an action for personal injuries it appeared that the plaintiff, traveling on a ticket which entitled him to ride from New York to South Orange, stayed in the train after it left that station stop, without the payment of extra fare, for the purpose of alighting at a place in the company's yard about three-quarters of a mile beyond. This place was nearer to his residence than the station. He was thrown off when about to alight by a lurch of the train going through a switch. He and others frequently got off at the place in question, which was covered with cinders between the tracks, though there was no station or platform there. The New Jersey Court of Errors and Appeals held that, after leaving the South Orange station, the man ceased to be a passenger and became only a licensee on the train. The company no longer owed him the high degree of care due to a passenger, but only the exercise of ordinary care against inflicting injury upon him. It was held, further, that the trial judge was right in granting a nonsuit, because the question at issue arose upon uncontroverted proofs, and was therefore one for the court and not for the jury.—*Keeney v. D., L. & W. (N. J.)*, 604.

Railway Officers

Executive, Financial, Legal and Accounting

A. A. Holmes, assistant to president and purchasing agent of the Atlanta & St. Andrews Bay, has been appointed auditor, with headquarters at Panama City, Fla.

H. A. McLaurin has been appointed auditor and car accountant of the Gainesville & Northwestern, with headquarters at Gainesville, Ga., succeeding Robert E. Farmer, who has resigned to go to another company.

William G. Wheeler, who was appointed general solicitor of the Chicago & North Western on September 1, was born



W. G. Wheeler

on November 11, 1861, in Janesville, Wis. After his graduation from Janesville High School he studied law in the offices of practising attorneys and was subsequently admitted to the bar. He entered railway service on April 1, 1909, when he became Wisconsin attorney for the Chicago & North Western. On January 1, 1912, he was appointed assistant general counsel for the same road, which position he held until August 31 of this year. Mr. Wheeler's headquarters will continue to be in Chicago.

The following have been elected officers of the East & West Coast Railway: Allen W. Jones, president; W. B. Wilson, vice-president; J. L. Strong, auditor; M. A. Clyburn, treasurer, all with headquarters at Bradentown, Fla.

Operating

W. T. Griswold, trainmaster of the Atlanta & St. Andrews Bay, has been appointed superintendent, with headquarters at Panama City, Fla.

Thomas M. Flynn, trainmaster of the Northern Pacific at Forsyth, Mont., has been transferred to Glendive, vice J. J. Sexton, transferred.

John J. Mulroy, chief dispatcher on the Northern Pacific, has been promoted to trainmaster, with headquarters at Jamestown, N. D. Effective September 1.

W. H. Smith has been appointed inspector of transportation of the Nashville, Chattanooga & St. Louis, reporting to E. M. Wrenne, acting superintendent of transportation at Nashville, Tenn.

C. E. Benjamin has been appointed chief train dispatcher of the Buffalo division of the New York, Chicago & St. Louis, with headquarters at Conneaut, Ohio, vice J. T. Callahan. Effective September 1.

Edward J. Moran, chief dispatcher of the Northern Pacific, has been appointed trainmaster, with headquarters at Pasco, Wash., vice Francis M. Smith. Mr. Smith has been transferred to East Grand Forks, Minn., vice F. C. Huntington, promoted. Effective September 1.

M. B. Bayer, assistant superintendent of the Oregon-Washington Railroad & Navigation Company at Tacoma, Wash., has been transferred to Portland, Ore., where he will join the staff of the joint facilities committee which supervises the operation of lines used in common by the O.-W. R. R. & N. and other companies.

F. W. Brown has been appointed assistant to general manager of the Southern Railway, the Virginia & Southwestern and the

Northern Alabama, with headquarters at Washington, D. C., in general charge of train tonnage and efficiency and such other duties as may be assigned to him. William M. Netherland, assistant to general manager, will continue as heretofore in charge of dining car, stores and test departments.

P. J. Flynn, manager of the Winnipeg Union Terminals, has been appointed superintendent for the Canadian Northern at Winnipeg, Man., vice M. B. Murphy, who has been transferred to Calgary, Alta. Mr. Murphy succeeds J. L. Bloomer, who has been transferred to Brandon, Man., vice W. E. Roberts. Mr. Roberts has been transferred to Dauphin, Man., vice J. Irwin, who was transferred to Toronto, Que. H. J. Hunt, trainmaster of the Winnipeg Terminals, succeeds P. J. Flynn as terminals manager.

C. A. Hodgman, whose appointment as superintendent of car service of the Minneapolis & St. Louis, with headquarters at Minneapolis, Minn., has been announced, entered railway service with the Chicago & North Western at Chicago. In the spring of 1909 he left the Chicago & North Western to go with the Minneapolis & St. Louis. After varied experience as reclaim clerk, chief record clerk and car distributor he was made yard clerk of the Cedar Lake yards at Minneapolis. In 1910 he was appointed traveling car agent, which position he held until July 1, 1913, when he was made chief clerk to the superintendent of car service. In March, 1914, when the office of superintendent of car service was abolished, he was made chief clerk to the general superintendent, in charge of the car service department, from which position he is now promoted.

G. F. Hawks, whose appointment as general manager of the El Paso & Southwestern was announced in these columns on August 27, was born on August 28, 1857, at Kirkland, Ohio. Following his graduation from high school at Rockville, Ind., he entered railway service in August, 1874, as a brakeman on the Logansport, Crawfordsville & Southwestern, now a part of the Vandalia System. Since that time he has held the following positions: brakeman of the Wabash System and other lines until 1878, conductor on the Pekin, Lincoln & Decatur, Chicago, Peoria & Southwestern, Canadian Pacific and Atchison, Topeka & Santa Fe from September, 1878, to May, 1890; trainmaster of the Panhandle and other divisions of the Santa Fe from May, 1890, to March, 1896; train inspector of the Mexican Central from October, 1897, to May, 1898; superintendent of the San Luis division of the same road until November, 1900; from that date until October, 1901, superintendent of the Mexico division; trainmaster of the Texas & New Orleans and Louisiana Western roads of the Southern Pacific System, from November, 1901, to February, 1902; assistant superintendent of the Louisiana lines of the same system from February, 1902, to March, 1903; superintendent of the El Paso division of the Galveston, Harrisburg & San Antonio from March, 1903, to April, 1904; superintendent of the Texas & New Orleans and the Galveston, Houston & Northern from April, 1904, to May, 1905; general superintendent of the Houston & Texas Central, Houston East & West Texas and Houston & Shreveport from May, 1905, to April, 1907; from April, 1907, to September, 1915, general superintendent of the El Paso & Southwestern.

Traffic

Frank Waterhouse has been appointed foreign freight agent of the Union Pacific, with headquarters at Seattle, Wash.

A. A. Boyle has been appointed commercial agent of the Missouri & North Arkansas, with headquarters at Birmingham, Ala.

Charles M. Andrews has been appointed district freight and passenger agent of the Southern Pacific at Seattle, Wash., to succeed Charles G. Chisholm, resigned.

W. H. Leahy has been appointed general freight and passenger agent of the Atlanta & St. Andrews Bay, with headquarters at Panama City, Fla., succeeding L. J. Rowell.

John T. Cummins, advertising agent for the Union Pacific Railroad, at Omaha, has been appointed general advertising agent for the Union Pacific System, and the advertising department of the system has been transferred from Omaha to Chicago. Mr. Cummins assumed his new duties on September 1.

F. S. Davis, chief of the joint tariff bureau of the New York, New Haven & Hartford, the Boston & Maine, the Maine Central, the New England Steamship Company and the Central New England has been appointed general western freight and passenger agent of the New York, New Haven & Hartford, the Central New England and the New England Steamship Company, with headquarters at Pittsburgh, Pa.

W. A. Hopkins, division freight agent of the Wabash at Toledo, Ohio, has been promoted to general live stock agent, with headquarters at St. Louis, succeeding J. L. Harris, resigned to accept service elsewhere. D. E. Gilbert, commercial agent of the same road at Cleveland, Ohio, has been promoted to division freight agent, Toledo, Ohio, vice W. A. Hopkins, promoted. R. A. Brown, traveling freight agent, Buffalo, N. Y., has been promoted to commercial agent, Cleveland, Ohio, succeeding D. E. Gilbert. J. E. Sunderland, traveling freight agent, Springfield, Ill., has been promoted to commercial agent, Peoria, Ill., succeeding James Gouran, deceased.

Edwin S. Stephens, who was appointed general freight agent of the Chicago & Eastern Illinois September 1, was born August 21, 1874, at Kansas City, Mo. He was educated in the public schools and entered railway service in 1892 as a clerk on the Kansas City, Ft. Scott & Memphis. Since that time he has been consecutively timekeeper in the shops of the Atchison, Topeka & Santa Fe, clerk in the auditor's office and stenographer in the transportation department at Albuquerque, N. M., and division clerk and chief clerk at Gallup, N. M., from 1893 to October, 1898; from October, 1898, to January, 1900, he was secretary to the president of the Kansas City, Ft. Scott & Memphis; from January, 1900, to June, 1903, chief clerk of the same office and with the St. Louis & San Francisco at St. Louis, Mo.; from June, 1903, to December 31, 1907, commercial agent of the St. Louis & San Francisco at Kansas City, Mo.; from January 1, 1908, to April 1, 1910, freight claim agent of the Chicago & Eastern Illinois at Chicago; from April 1, 1910, to January 1, 1912, general agent of the same road and the St. Louis & San Francisco at Chicago; from January 1, 1912, to September 1, 1915, assistant general freight agent of the C. & E. I. at Chicago.

Frank E. Webster, whose appointment as assistant general freight agent of the Chicago & Eastern Illinois was recorded in our issue of last week, was born on July 9, 1879, in Charles county, Md. He was educated in the public schools and in 1902 he entered railway service as a file clerk with the Southern Railway at Washington, D. C. In 1903 he went to the Rock Island, where he held the position of revision clerk in the office of the freight department. In 1904 he entered the employ of the Chicago & Eastern Illinois as a rate clerk in the traffic department. From 1905 to 1908 he was chief rate clerk in this department. In April, 1908, he entered the service of the Illinois Traction System as assistant to the general traffic manager. In October, 1909, he re-entered the service of the C. & E. I.-Frisco Rock Island lines as traveling freight agent, with headquarters at Nashville, Tenn. When the Rock Island and Frisco lines were separated, he was transferred to Milwaukee, Wis., and Minneapolis, Minn., as traveling freight agent of the C. & E. I.-Frisco lines. In April, 1910, he was appointed chief clerk in the general freight office of the C. & E. I. at Chicago. In November, 1911, he was appointed chief clerk to the freight traffic manager of the C. & E. I.-St. L. & S. F. at St. Louis, Mo. In December, 1912, he was appointed division freight agent of the C. & E. I. at Salem, Ill. On July 1, 1913, he was promoted to chief of the tariff bureau of the same road at Chicago, Ill., and on September 1, 1915, was promoted to assistant general freight agent, with headquarters in the same place.

Engineering and Rolling Stock

J. C. Gardner has been appointed chief engineer of the East & West Coast, with headquarters at Bradentown, Fla.

R. M. Boldridge has been appointed master mechanic of the Apalachicola Northern, with office at Port St. Joe, Fla., succeeding J. P. Dolan, resigned.

W. H. Owens, master mechanic of the Southern Railway at South Richmond, Va., has been appointed mechanical member of the valuation department of the Southern Railway.

W. D. Pearce, assistant engineer of the Northern Pacific, has been appointed supervisor of bridges and buildings on the

Yellowstone division, with headquarters at Glendive, Mont., vice W. C. Sloan, promoted.

John H. Pontius, general engine inspector of the Pennsylvania Lines West of Pittsburgh at Columbus, Ohio, has retired after 50 years of continuous service with the road.

J. E. O'Brien, assistant mechanical superintendent of the Missouri Pacific and St. Louis, Iron Mountain & Southern, has been appointed mechanical superintendent, with headquarters at St. Louis, vice R. J. Turnbull, resigned. W. C. Smith, general master mechanic of the western district of the Missouri Pacific, with headquarters at Kansas City, Mo., has been appointed to fill the vacancy created by the promotion of Mr. O'Brien.

C. A. Parker, telephone maintainer of the Buffalo, Rochester & Pittsburgh, has been appointed signal supervisor on the Middle and Pittsburgh divisions, with headquarters at Du Bois, Pa., succeeding F. G. Morehart, resigned to go to another company, and J. H. Moore, general signal foreman, has been appointed signal supervisor of the Buffalo division, with headquarters at East Salamanca, N. Y. The office of general signal foreman has been discontinued.

William C. Smith, who was appointed assistant mechanical superintendent of the Missouri Pacific-St. Louis, Iron Mountain & Southern on September 1, was born on September 25, 1869, in Michigan. He was educated in the common schools and entered railway service on December 7, 1887. From that time until April, 1895, he served as machinist apprentice and machinist on the Missouri Pacific Railway; from April to November, 1895, he was a machinist on the Atchison, Topeka & Santa Fe; from November, 1895, to January, 1897, he was gang foreman on the Missouri Pacific at Kansas City, Mo.; from January, 1897, to January, 1902, machinist and shop foreman at Osawatomie, Kan.; January, 1902, to January, 1905, division foreman at Hoisington, Kan.; January, 1905, to February, 1906, master mechanic at Ft. Scott, Kan.; February, 1906, to July, 1912, master mechanic at Kansas City, Mo.; July 1, 1912, to September, 1915, general master mechanic of the Western division of the same road.

J. E. O'Brien, who has been appointed mechanical superintendent of the Missouri Pacific-St. Louis, Iron Mountain & Southern, was born on December 4, 1876, at Stillwater, Minn. He completed his education at the University of Minnesota in 1898 and in the same year entered railway service as special apprentice with the Northern Pacific at Livingston, Mont. From November 1, 1901, to November 25, 1903, he had charge of the general inspection of material and tests at St. Paul, Minn. From that time until December 1, 1904, he served as master mechanic of the Dakota division at Jamestown, N. D., following which he held the position of assistant shop superintendent at South Tacoma, Wash. From August 1, 1909, to January 1, 1910, he was mechanical engineer of the same road at St. Paul, Minn. On January 1, 1910, he became superintendent of motive power for the Western Pacific at San Francisco, Cal., and held this position until October 8, 1913, when he was appointed assistant mechanical superintendent of the Missouri Pacific, with headquarters at St. Louis, Mo. In his new capacity as mechanical superintendent Mr. O'Brien will remain in St. Louis.

Julius Edgar Willoughby, assistant chief engineer of the Atlantic Coast Line, has been appointed chief engineer, with headquarters at Wilmington, N. C., succeeding E. B. Pleasants, deceased. Mr. Willoughby was born on October 12, 1871, at Arkadelphia, Ala., and was educated at the University of Alabama. In 1887 he began railway work as a rodman on surveys on the Louisville & Nashville. From 1892 to 1899 he filled subordinate positions in the land and engineering departments of the same road. In 1900 he was promoted to assistant chief engineer of construction for the lines in Alabama, and the following year became engineer of construction of the Alabama & Florida, now a part of the Louisville & Nashville. In 1902 he was appointed division engineer of the Knoxville, La Follette & Jellico, now a part of the Louisville & Nashville, and from 1902 to 1904 he served as chief engineer of the same road. From 1905 to 1912 he was engineer of construction of the Louisville & Nashville system, also chief engineer of several of the Louisville & Nashville subsidiary lines. He then served as chief engineer of the National Railroad of Haiti, and of the Caribbean Construction Company, engaged in the development of the Island of Haiti, until 1913, when he entered the service of the Atlantic Coast

Line as assistant chief engineer, which position he held at the time of his recent appointment as chief engineer of the same road.

OBITUARY

Frederick M. Spaidal, general superintendent of the Canadian Northern Quebec, died on September 2 at Montreal, Que.

F. A. Durban, of Zanesville, Ohio, general attorney of the Baltimore & Ohio for the states of Ohio and Indiana, died on Tuesday night of this week on a train near Cumberland, Md., while on his way home from the East. He was sixty years old.

Edward B. Pleasants, chief engineer of the Atlantic Coast Line, with headquarters at Wilmington, N. C., who died suddenly on his private car in Washington, D. C., on August 22, at the age of 65, as has already been mentioned in these columns, was born on August 2, 1850, in Richmond, Va. At an early age he entered the service of the United States Coast Survey, and remained in that service for five years, attaining the rank of assistant engineer. He began railway work as an assistant engineer on the Baltimore & Ohio, remaining with that road for two years. In 1878, he went to the Baltimore & Lehigh, now a part of the Pennsylvania system, as assistant engineer, and afterwards became chief engineer of the same road. During 1886 and 1887 he was engineer in charge of construction of a railway in Maryland. He then went to the Norfolk & Carolina, now a part of the Atlantic Coast Line, and since 1902 was chief engineer of the Atlantic Coast Line system.

E. F. McCrea, division engineer of the Pennsylvania Lines, died on August 28, near Logansport, Ind. He was born in that city on November 7, 1880. He entered the service of the Pennsylvania Lines in 1899 on the Grand Rapids and Indiana division; in 1901 he was transferred to the Cleveland and Pittsburgh division at Wellsville, Ohio. In 1904 he was appointed assistant division engineer at Richmond, Ind., and from September, 1905, to July, 1908, served as assistant engineer of the C. and P. division. From 1908 until February, 1911, he was assistant engineer on the Pittsburgh division; from the latter date until February, 1912, he was division engineer on the Zanesville division; from February, 1912, to November, 1912, he served in the same capacity on the Toledo division, and from that date until January, 1913, on the Cincinnati division. From 1913 until his death he was division engineer on the C. and P. division at Cleveland.

FINNISH RAILWAYS.—At the beginning of 1914 the total mileage of the Finnish State Railways, including 207 miles of line owned by private capital, but operated by the state lines, was 2,537. Finland has 2,765 miles of navigable waterways, of which, with the present facilities, it is estimated that the freight capacity is about 1,600,000 tons a year. The waterways as well as the railways are under the administration of the state.

NEW RAILWAY LINES IN BOLIVIA.—The line from Uyuni, Bolivia, a station on the Antofagasta & Bolivia Railroad, which has been under construction in a southeasterly direction towards Tupiza, is to be extended, it is said, to the present northern terminus of the Argentine railways at La Quiaca, a point on the frontier directly south of Tupiza. The completion of the line from Uyuni to Tupiza and the construction of a line between Tupiza and La Quiaca will provide a new through rail route from the Atlantic ocean to the Pacific.

RAILROAD CONSTRUCTION IN NORTHERN CHILE.—Construction work on the Longitudinal Railway has been completed and the line is now in operation as far north as Pintados, Chile. The construction of a connecting line to connect the main line with an ocean port at Iquique was started, but work has been stopped on account of exhaustion of funds appropriated for that purpose. The government proposes to spend \$134,000 to continue this work during the coming year. The completion of the line to Iquique will open up for development some nitrate land and other mineral deposits. The construction of the proposed line to connect the Longitudinal Railway with the ports of Antofagasta and Mejillones has been postponed. This branch, which was to start from the main line at Baquedano Station, will probably be built when financial conditions improve.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE NORFOLK & WESTERN is inquiring for prices on 30 Mallet type locomotives.

THE ILLINOIS CENTRAL is inquiring for prices on 50 Mikado type locomotives.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA has ordered four Pacific and six Mikado type locomotives from the American Locomotive Company.

THE TEXAS & PACIFIC, which has been in the market for 10 switching, six passenger and six freight locomotives, has ordered a number of locomotives from the Baldwin Locomotive Works.

THE CHICAGO & NORTH WESTERN is reported to have ordered 12 Pacific type, 12 Mikado type, 10 switching and one narrow gauge locomotives from the American Locomotive Company. This item has not been confirmed.

THE MADRID, SARAGOSSA & ALICANTE RAILWAY of Spain has ordered 25 12-wheel (4-8-0) locomotives from the American Locomotive Company. These locomotives will have 63-in. driving wheels, 16.53-in. and 25.2-in. by 25.6-in. cylinders and a total weight of 193,000 lb.

CAR BUILDING

THE COPPER RIVER & NORTHWESTERN is inquiring for prices on 50 freight cars.

THE BALTIMORE & OHIO has ordered 200 car bodies from the Greenville Steel Car Company.

THE BOSTON & MAINE is inquiring for six coaches, two smoking cars and six baggage cars.

THE ATCHISON, TOPEKA & SANTA FE has ordered 500 stock cars from the Pullman Company.

THE WHEELING & LAKE ERIE is inquiring for 650 70-ton steel gondola cars and 200 40-ton automobile cars.

THE CHICAGO & NORTH WESTERN has ordered 100 refrigerator cars from the Haskell & Barker Car Company.

THE PENNSYLVANIA LINES WEST have ordered underframes for 200 caboose cars from the Haskell & Barker Car Company.

THE BANGOR & AROOSTOOK has ordered 100 80,000-lb. capacity steel underframe flat cars from the Standard Steel Car Company for delivery in November or December.

THE ATLANTIC COAST LINE has ordered one combination passenger and baggage car, three combination baggage and mail cars and two coaches from the Pullman Company.

THE LAKE SUPERIOR & ISHPEMING was reported in the *Railway Age Gazette* of June 25 as having ordered 400 ore cars from the Cambria Steel Company. These cars are center dump ore cars. They were ordered from the Clark Car Company, Pittsburgh, Pa., and are being built by the Cambria Steel Company.

THE INTERBOROUGH RAPID TRANSIT has been authorized by the New York Public Service Commission, First district, to use on its elevated lines the 478 composite car bodies ordered by the commission to be withdrawn from service in the subway. The car bodies with new trucks and electrical equipment will be placed in service on the Second and Third avenue lines of the elevated system, now being third-tracked and reinforced.

IRON AND STEEL

THE LOUISVILLE & NASHVILLE is reported to have ordered 43,000 tons of rails from the United States Steel Corporation.

THE NORFOLK & WESTERN has ordered a quantity of structural steel from the Virginia Bridge & Iron Company for an addition to a framing shop at Roanoke, Va.

THE PENNSYLVANIA has ordered 300 tons of bridge steel from the American Bridge Company and 100 tons from the

Eastern Steel Company. This road has also ordered 350 tons of steel for an immigrant pier at Philadelphia from the Jones & Laughlin Steel Company.

MACHINERY AND TOOLS

THE PENNSYLVANIA RAILROAD has awarded a contract to the Mead-Morrison Company, Boston, Mass., for the installation of a car dumper at Baltimore.

THE SEABOARD AIR LINE has placed orders for from 75 to 100 machine tools to be installed in the company's shops at Jacksonville, Fla., and Portsmouth, Va.

SIGNALING

THE WESTERN MARYLAND has contracted for 67 miles of single-track automatic signaling, with the Union Switch & Signal Company, in addition to the 80-mile contract mentioned in the *Railway Age Gazette* of July 30. The new installation will cover the section between Colmar, Pa., and Connellsville. This work will complete all the single-track signaling on the main line of this road between Baltimore, Md., and Connellsville, Pa.

THE PENNSYLVANIA is to put up position-light signals on the Allegheny division, to be of the same type as those between Philadelphia and Paoli, but of different form. The signals of the position-light type will be installed at the entrances of a single-track tunnel. These signals will operate in the horizontal and 90-deg. positions, with a preliminary setting section of about 2,000 ft. The lights will be normally out and will be lighted when a train enters the preliminary setting section.

THE PENNSYLVANIA will install a 24-lever electro-mechanical interlocking machine at North Eddystone, on the Maryland division. The machine will be of the General Railway Signal Company's type. The signals will be electro-pneumatic, conforming to the type of automatic signals now in service in this territory. A 16-lever G. R. S. electro-mechanical machine will also be installed at the new interlocking at Franktown, on the Middle division. The signals at this plant will be electric motor-operated.

THE BALTIMORE & OHIO has just completed an extension of automatic signals between Weverton, Md., and Engle, W. Va., six miles, together with the necessary rearrangements of interlocking plants at Weverton, Harper's Ferry and Engle. At Harper's Ferry and Engle, power signals were substituted for the mechanical signals, with provision both for unlimited and for restricted speeds. Automatic signals (allowing permissive movements) are used to facilitate the movement of freight trains westbound. The extension of automatic signals west from Engle to Cumbo, a distance of 20.1 miles, is contemplated in the near future.

THE UNION TERMINAL COMPANY of Dallas, Tex., has contracted with the Union Switch & Signal Company for electro-pneumatic interlocking for the new union passenger station in that city. This station is a joint project of the Missouri, Kansas & Texas, the Texas & Pacific, the Houston & Texas Central, the Gulf, Colorado & Santa Fe, the Trinity & Brazos Valley, the St. Louis, San Francisco & Texas, the Chicago, Rock Island & Gulf and the St. Louis Southwestern. The Texas & New Orleans will use the new station as a tenant of the Houston & Texas Central. The station is of the through type, with the various lines diverging both north and south of the station, known respectively as North and South Junction. The machine at North Junction will have 82 working levers and 21 spare spaces, and the one at South Junction 53 working levers and 18 spare spaces. Lever light indicators will be furnished for all working switch levers. Alternating-current track circuits will be installed with Union model 15 vane relays.

WAR STOCKS IN MANCHURIA.—A consular report says that the South Manchuria Railway shops at Shahoku now undertake all kinds of work in metals, even the manufacture of munitions of war and of locomotives.

A WHALE CAR. An English concern is building some cars for the South African Railways. One of these cars is designed to transport a whole whale just as it is caught. The concern is also building 500 fifty-ton box cars for 3 ft. 6 in. gage.

Supply Trade News

The Pressed Steel Car Company is reported to have secured a large order for shells.

The Edison Storage Battery Company, Orange, N. J., has removed its Cleveland office to the David Whitney building, Detroit, Mich.

E. D. Graff, for several years in the sales department of the Pittsburgh office of Joseph T. Ryerson & Sons, has been transferred to the sales department of the Chicago office.

The American Steel Foundries has reopened its plant at Granite City, Ill., which has been closed for the greater part of the year. Although only a portion of the plant will be utilized, it will be operated entirely on domestic orders.

Milliken Brothers, Inc., has removed its executive and general offices from the Whitehall building, New York City, to its plant at Milliken, Staten Island, and has also removed its sales office from the same building to the Trinity building.

Dr. N. Tucker, the founder of the company's business, has been elected president of the Hydraulic Press Manufacturing Company, Mount Gilead, Ohio, succeeding M. Burr Talmage. Other officers elected at the recent meeting of the board of directors are W. G. Beebe, vice-president, and M. W. Spear, treasurer.

The New York Air Brake Company was reported in the *Railway Age Gazette* of July 16 as having been awarded a medal of honor for its exhibit at the Panama-Pacific International Exposition. By a more recent decision of the superior jury of awards, the final official authority, the company has been awarded a grand prize, the highest award, for its "PS" electro-pneumatic equipment.

H. M. Roberts, until recently railroad representative of the General Lead Battery Company, has been appointed sales engineer of the railroad department of the Edison Storage Battery Company, Orange, N. J. Mr. Roberts graduated in 1905 from the Sheffield Scientific School with the degree of electrical engineer, and for six years was connected with the engineering department of the New York Telephone Company in power-plant work. He later spent several years in general contracting engineering on railroad and other large enterprises with James Stewart & Co., Inc., New York.

J. A. L. Waddell, consulting engineer, Kansas City, Mo., announces that his son, N. Everett Waddell, C. E., has recently become his partner under the firm name of Waddell & Son, with office at 800 Graphic Arts building, Kansas City, Mo. Robert C. Barnett will be connected with the firm as associate engineer and Shortridge Hardesty as assistant engineer. As in the previous years of Dr. Waddell's practice the field of activity will be mainly bridgework of all kinds and its allied branches of construction, but attention will be given also to the making of technical investigations and the solution of problems in engineering economics and to the preparation of reports and estimates on railroads and large engineering projects in various lines in the United States and foreign countries. J. A. L. Waddell was associated with the firm of Waddell & Harrington, consulting engineers, until it was dissolved on July 14, 1915.

The Railway Periodicals Company, Inc., has been incorporated under the laws of New York state and will henceforth publish the *Railway Master Mechanic*, *Railway Engineering and Maintenance of Way* and the *Monthly Official Railway List*, these papers having formerly been published by the *Railway List Company*, Chicago. The officers of the new company are as follows: Ernest C. Brown, publisher of *Gas Age*, president; Charles S. Meyers, vice-president and general manager, and S. A. Bates, secretary-treasurer. Benjamin Norton, at one time president of the Toledo, St. Louis & Western, has been made editor-in-chief, George S. Hodgins, managing editor, and Laurence A. Horswell, associate editor. The *Railway Periodicals Company, Inc.*, will have offices in the Vanderbilt Concourse building, New York, and that will be the office of publication.

Steel Corporation Given 46 Awards

The superior jury of awards of the Panama-Pacific International Exposition has made 46 awards to the United States Steel Corporation and its subsidiary companies for the elaborate exhibit at San Francisco. Included in the total there are a special gold medal for the "best, most complete and most attractive installation," 11 grand prizes, 10 medals of honor, one gold medal of honor, 20 gold medals and three silver medals.

Grand prizes (the highest possible regular awards) were awarded to the Steel corporation itself for its "comprehensive, educational exhibit of the steel industry and related industries" and to its bureau of safety, sanitation and welfare.

Grand prizes were also awarded to the following companies for the excellence of their exhibits, the greatest merit being recognized in certain of the products, some of which are named herein, as representing the highest development of the art: Carnegie Steel Company, armor plate, special alloy steels, railway wheels and axles, steel sheet piling, rail joints, etc.; Illinois Steel Company, ferro-silicon, electric carbon and alloy steels, railroad track specialties, axles, etc.; the Tennessee Coal, Iron & Railroad Company; the Lorain Steel Company, tadpole tongue switch, tongue-holding device and electrically welded rail joints; the American Bridge Company, sections of building columns, section of Hell Gate bridge chord, steel barges, standard railroad turntable, etc.; the American Sheet & Tin Plate Company; the American Steel & Wire Company, wire rope, wires, copper rail bonds, insulated copper wires and cables, etc.; the National Tube Company, National steel pipe and tubing, National protective coating, National Kewanee unions, valves and fittings and Shelby seamless steel tubing, and to the Universal Portland Cement Company.

Medals of honor were awarded the United States Steel Products Company, export department; the Oliver Iron Mining Company; the Pittsburgh Steamship Company; the Pittsburgh & Conneaut Dock Company; the H. C. Frick Coke Company; the Duluth, Missabe & Northern, and also to the Steel Corporation, the Carnegie Steel Company and the Illinois Steel Company.

Gold medals were awarded the Bessemer & Lake Erie, the Birmingham Southern, the Duluth & Iron Range, the Elgin, Joliet & Eastern, the Newburgh & South Shore and the Union Railroad for pictorial exhibits of typical roadbed, shops, yards, bridges, buildings and freight and passenger equipment employed in operation.

Gold and silver medals were also given to a number of the officers and employees of the various companies for their success in planning the respective exhibits.

TRADE PUBLICATIONS

WATER TUBE BOILERS.—The A. D. Granger Company, New York, has just published bulletin No. 2, sixth edition, describing its Oswego internally fired water-tube boiler. The bulletin, which is well illustrated, describes the latest improved features of this self-contained internally fired water-tube boiler. Dimensions, ratings and other data are given for both high-pressure and low-pressure boilers, and pictures of the detailed parts of the Vulcan shaking grates are shown.

RAIL REPORTS.—The Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., has issued Bulletin No. 8 of its series of rail reports. This bulletin contains detailed comparative data regarding 111 standard and 101 Titanium treated open-hearth A-rails with from 8 to 10 per cent discard and rolled by seven different manufacturers in the United States and Canada. Samples for the determination of carbon were selected from the points in the head specified in the revised specifications of the Pennsylvania, and the average difference in carbon between the required points for the standard open-hearth rails is shown as 17.2 per cent, as compared with 4.2 per cent for the Titanium treated rails. Sulphur prints of these various specifications are also shown with data regarding the individual sections. Based on formulae for tensile strength and elongation developed by M. H. Wickhorst in Bulletin 170 of the American Railway Engineering Association, dated October, 1914, detailed comparisons are made for standard and Titanium treated open-hearth rails with a revised formula showing similar improvement in physical properties for the Titanium treated rails.

Railway Construction

ATLANTA & ST. ANDREWS BAY.—This road has been extended from Panama City, Fla., to St. Andrews, two miles.

ALABAMA ROADS (ELECTRIC).—Plans are being made to build an electric line, it is said, from Jasper, Ala., southeast via Ensley, to Birmingham, about 35 miles. L. B. Musgrove and associates, Jasper, Ala., are back of the project.

CHESTER & CITY POINT (Electric).—Incorporated in Virginia with \$100,000 capital to build an electric line from Chester, Va., southeast to City Point and to Hopewell, crossing the Appomattox river at or near Point of Rocks. Preliminary surveys have been made and the company expects to have the line completed by next spring. H. D. Eichelberger, president, Richmond, Va., and Chester.

CLINTON & OKLAHOMA WESTERN.—Surveys have been made, it is said, for an extension to be built into the Panhandle of Texas, and surveys are to be made for an extension from Clinton, Okla., southeast to Chickasha, about 75 miles. The company now operates a 51-mile line from Clinton west to Strong City.

COLUMBIA, NEWBERRY & LAURENS.—Plans are being made to build a 65-mile branch, it is said, from Newberry, S. C., south via Saluda and Edgefield to Augusta, Ga. The company now operates a 75-mile line from Columbia west via Newberry to Laurens.

ELECTRIC SHORT LINE.—A contract has been given to H. F. Balch & Co., Minneapolis, Minn., it is said, to build an extension of about 45 miles from Winsted, Minn., west via Silver Lake and Hutchinson. (Jan. 22, p. 171.)

ETTRICK & NORTHERN.—The Railroad Commission of Wisconsin has granted permission to this company, it is said, to build a line from a connection with the Green Bay & Western southeast through the towns of Ettrick and Preston, Wis. J. C. Gaveney, president, Arcadia.

OIL FIELDS & SANTA FE.—This line has been completed from Jennings, Okla., to Oilton, Creek county, and from Cushing to Pemeta and Drumright, and at the present time is being built from Pemeta to Oilton.

OKLAHOMA UNION TRACTION.—See Tulsa Traction Company.

OREGON-WASHINGTON RAILWAY & NAVIGATION COMPANY.—This company has begun the construction of seven miles of railroad from Olympia, Wash., to Plum station, where it will connect with the water-grade line of the Northern Pacific. Grading was completed some time ago, and two tunnels are now in the process of construction. The new road already owns half a block in Olympia, which will be used for terminal facilities.

PENNSYLVANIA RAILROAD.—An officer writes that the company recently began work on a 3.5-mile extension of the Yellow Creek branch of the Pennsylvania Railroad from Homer, Pa., to the mines of the Sterling Coal Company. The contract for this work was awarded over a year ago.

SALINA NORTHERN.—This road has been opened for business from Salina, Kan., northwest to Lincoln Center, 35 miles, and is under construction on an extension to Corinth and Downs, 43 miles, also on a branch from Corinth to Osborne, 10 miles.

TEXAS ROADS.—Financial arrangements have been made, it is said, for building the line from Lamesa, Texas, south to Midland, or to some other point on the Texas & Pacific, about 55 miles. Miles Westbrook, Dallas, and T. J. O'Donnell, Sweetwater, are interested. (May 7, p. 993.)

TULSA TRACTION COMPANY.—This company was recently incorporated in Oklahoma with \$100,000 capital and plans to build from Tulsa, Okla., southwest to Sapulpa, also extensions connecting Broken Arrow, Bixby and Okmulgee and a line north to Collinsville, in all about 80 miles. The company has bought the Oklahoma Union Traction line in Tulsa. G. C. Stebbins, president; A. J. Biddison, vice-president and general counsel; I. F. Crow, secretary and treasurer, Tulsa, and B. C. Redgraves, superintendent.

RAILWAY STRUCTURES

BUREAU, ILL.—Bids have been let for the construction of a bridge for the Chicago, Ottawa & Peoria over Bureau creek to consist of five spans 34 ft. 8 in. long, with deck-plate girders designed for Cooper's E-40 loading. The cost will be approximately \$6,000.

CHICAGO, ILL.—The Chicago & Northwestern will soon build a grain elevator on the Indiana Harbor Belt in the Calumet district which will have a capacity of 2,500,000 bushels and will cost approximately \$2,000,000. It was the original purpose of the company to begin the erection of the elevator last spring, but the project was subsequently postponed.

Cravens, Tenn.—The entire mechanical plant of the Nashville, Chattanooga & St. Louis has been transferred from Chattanooga, Tenn., to Cravens yards, about four miles from Chattanooga. Additional tracks have been laid at Cravens, also a three-story stucco office building, sand houses and oil houses, and a 90-ft. turn table with concrete base, operated by electric tractor. The plans contemplate the erection of car repairing sheds, also the construction of an incline to permit the transfer of freight to and from the river.

Greenville, N. J.—The Pennsylvania Railroad asked for bids on September 8 for the construction of a new pier to be built at Greenville.

La Salle, Ill.—The Chicago, Ottawa & Peoria has let the contract for a bridge over the Vermillion river to the Joliet Bridge & Iron Company. The structure will consist of two 26-ft spans, with deck-plate girders designed for Cooper's E-40 loading. The total estimated cost is \$3,800.

McAllen, Tex.—Engineers for the St. Louis, Brownsville & Mexico are laying off the grounds for a new brick depot at McAllen, the estimated cost of which is \$7,000.

Manchester, N. H.—Plans are being made for building a new bridge at South Elm street in Manchester, to cost about \$76,000. The city of Manchester will pay \$40,000, the Boston & Maine \$24,000, and the Manchester Street Railway \$12,000 of the cost of the structure.

New York.—The New York Public Service Commission, First district, has awarded the contract for station finish on the Jerome avenue and White Plains avenue rapid transit lines, in the borough of the Bronx, to the Altoria Realty & Construction Company, the lowest bidder, for \$860,363. (September 3, p. 449.)

Spartanburg, S. C.—The Southern Railway has given a contract to J. P. Pettyjohn & Co., Lynchburg, Va., for the construction of new freight station facilities at Spartanburg, to consist of a one-story in-bound freight house 40 ft. by 250 ft., with two-story office section. The building is to be constructed of brick with concrete floor and fireproof roof and is to be equipped with rolling steel doors. There will also be a modern one-story out-bound freight house 22 ft. by 250 ft., with concrete floor and base, frame construction and fireproof roof. The terminal will also include four house tracks, with a capacity of 32 cars, and four team tracks, with a capacity of 29 cars. A 20-ton Pillar crane will also be provided for the handling of heavy freight. Work on these improvements will be started as soon as the necessary material can be assembled and will be rushed to completion.

Vancouver, B. C.—An officer of the Canadian Northern is quoted as saying that work will be started soon on a terminal in Vancouver for the Canadian Northern.

COMMODITIES CARRIED ON THE MANCHURIAN RAILWAYS.—Coal furnishes the greatest tonnage of any commodity carried by the railways from Manchuria into Kwantung. Next to this come beans, of which there was 637,612 tons carried in 1914, and in addition 67,027 tons of bean cakes. There was also 62 tons of bean sauce carried, while on the other hand there was only 3,611 tons of timber and wood of all kinds carried.

Express in Russia.—The European representative of an American Express company is now in Petrograd, Russia, investigating the advisability of establishing a branch office there with agencies in other parts of Russia.

Railway Financial News

Boston & Maine.—Of the holders of \$17,083,000 extended notes of the Boston & Maine, which matured September 2, all except the holders of about \$400,000 have agreed to postpone any cash payment until March 2. About \$150,000 of these non-assenting notes are held in Great Britain and are therefore affected by the British treasury's rulings.

Chicago, Rock Island & Pacific.—Arthur Curtiss James and James McLean, both representing Phelps, Dodge & Co., New York, interests, have resigned from the board of directors of the Chicago, Rock Island & Pacific. Both Mr. McLean and Mr. James endorsed the note which the Chicago, Rock Island & Pacific gave to the Bankers' Trust Company on March 31 for \$1,600,000, which note falls due October 1.

Ft. Smith & Western.—This company has made an agreement with the Missouri, Kansas & Texas whereby it uses the M., K. & T. tracks from Fallis, Okla., to Oklahoma City, 32 miles.

Wabash-Pittsburg Terminal.—The following statement has been issued by the reorganization committee of the Wabash-Pittsburg Terminal:

"On August 24 the court at Pittsburgh made an order authorizing H. F. Baker, the receiver of the Wabash-Pittsburg, to enter into a contract with the Pennsylvania road for the construction of the so-called Bridgeville connection.

"This marks a long step forward in the rehabilitation of the terminal properties. The importance of the Bridgeville connection lies in the fact that it gives to the Terminal company a direct outlet over the lines of the Pennsylvania and permits a direct interchange of traffic with that company. The Terminal company is thus enabled to reach a territory extending from the Atlantic seaboard to the Middle West over the lines of the Pennsylvania that have for a number of years been closed to it.

"Pursuant to the authority granted by the court, the receiver has signed the agreement, and construction of the connection has already been commenced and is progressing. It will be about October 1 when the interchange of business will commence.

"The incalculable benefit to the Terminal company of this connection can best be judged by the history of the Wabash-Pittsburg Terminal on this particular point. The Terminal was a prosperous property, enjoying this connection at the time when Mr. Gould and Mr. Cassatt, the latter representing the Pennsylvania road, became estranged. The Goulds controlled the Terminal property. By reason of this dispute the Pennsylvania terminated its traffic relations with the Terminal road and the latter since that time has suffered accordingly. This renewal of traffic relations will be to the great benefit of the Wabash-Pittsburg Terminal, and it is expected will be very profitable, as it opens up an avenue of business that has been closed since the break with the Goulds."

JAPANESE RAILWAY DEVELOPMENT.—The English commercial attache at Yokohama reports that of the Imperial Government railways about 175 miles of new sections and about 150 miles of light railways were open to traffic during 1914. The most important sections were 25 miles on the Tokushima line, 23 miles on the Sakata line and 20 miles each on the Murakami and Gwanyetsu lines. Two of the most interesting events of the year were the completion of the splendid new central station in Tokyo, and the opening of the new government electric railway between Tokyo and Yokohama. This railway, which runs side by side with the existing steam track, is 19 miles long and connects the two above-mentioned towns. Between the two termini there are 14 intermediate stations. Unfortunately, the railway had only been in operation for a few days at the end of the year when it became necessary for the authorities to discontinue the service. As far as it is possible to ascertain, the whole of the trouble lay with the overhead equipment, which at the time of opening to public service was in an unfinished state, so that trial running of the trains was only carried out for about two days.

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*Illustrated.

The train accident record for August, printed in this issue, contains one collision and one derailment which together are charged with the deaths of seven passengers, a record more fatal in this respect than has been published before for ten months. Not since September, 1914, has there been a collision or derailment killing as many as four passengers. The accidents now reported, Orient, Ohio, and McCorkle, W. Va., are both typical, in that they were occasioned by well-known dangers, the prevention of which is so costly that on most railroads it is deemed necessary to accept the risk. At McCorkle, according to the inspector for the State of West Virginia, a guard rail would have prevented the fatal consequences; but the question with the railroad engineer is how to protect the right places. Guard rails would add to safety in a thousand places; which of these shall be dealt with first? We have not enough facts to judge of this particular case; but the main general fact is constantly with us: where shall the available money be spent? What road has installed guard rails (and other precautionary fixtures) at every place where they might sometime be useful? At Orient the risk was in suspending the block system, to save time. Every road, everywhere, deems it necessary, under some circumstances, to trust to enginemen to follow preceding trains according to their own judgment, not imposing an absolute space interval. In automatic block signaling this is done everywhere, almost every day. Where and when should this laxity be forbidden? In city subways, equipped with automatic stops, it is forbidden at practically all times. Where extra passenger trains are running at night, and where there are unusual and troublesome causes of delay (as at Orient) there would seem to be good reason for always imposing the absolute space interval, even though this should necessitate blocks ten miles long, or longer. But, again, who shall have authority to direct the imposition of this requirement? It may have to be done at a half hour's notice. Such a general rule would imply the employment of very high grade men for train dispatchers—or of superintendents who should be on duty night and day.

Many years ago the railroads adopted a code of locomotive whistle signals which soon became standard on all lines. The same number and length of blows mean the same thing on every line. The whistle is expected to be used reasonably and for business purposes only; no screeching or playing with the whistle is very common; the code can scarcely be recognized. The road-crossing signal is most abused; what we usually hear is two long, one short and then one very long blast, with varying degrees of emphasis and screeches on the last blast. The call for the proceed signal at a railroad crossing (four moderately long blasts) is also greatly abused in four unreasonably long and loud blasts. We all know this from experience. We have all often "heard 'em blow" for a crossing at 4 o'clock in the morning. The whistle is a necessary device, but it should not be abused; all playful, slouchy, sloppy, vicious and abusive whistling should cease. The foregoing is an editorial, slightly condensed, from the Alton (Ill.) Evening Telegraph. It is printed here without quotation marks because it has an application in hundreds of places, and in at least 47 states; and we wish to adopt the words of the Evening Telegraph as our own. Why do not appeals like this have more visible effect? As railroad officers have been trying for half a century to abate the whistle nuisance, and yet in a multitude of instances have failed, there will be no unfairness in turning elsewhere for relief. Why not try the impractical proposal of a New York magazine editor, to make an appeal to the locomotive engineers? Is not the engineers' brotherhood a public-spirited body, thoroughly devoted to the interests of the people? We have called this proposal impractical, but no engineer can claim that it is unreasonable. We say impractical because we have never discovered any way

"Sloppy, Vicious and Abusive Whistling"

to elicit the public spirit of the members of the brotherhood; but their leaders, when appealing for sympathy in case of a strike or threatened strike, seem always to be willing to be as fair with the public as they expect the public to be with them. And here is a chance to show good will. There is no question but that the public feels aggrieved at the whistle nuisance. The locomotive engineers of the United States have been called the highest class of "labor"; men of character and intelligence; members of the most enlightened labor brotherhood. It must be that a fair percentage of them have in their souls enough music to know slovenly whistling when they hear it, and enough influence, courage and regard for invalids, and critics' feelings to stir up their brethren. In asking the best engineers in this manner to lend a hand in reforming some of the second best we may seem to be ignoring the superintendent and the trainmaster; but nobody will object if the engineers get the start and attack this nuisance first. As long as the present condition continues, the feeling of the public, in the towns along the lines of the great majority of the big railroads of the country—a feeling that does not find very frequent expression, but which, nevertheless, is deep-seated—is that both the officers and the engineers are very deficient in those fine qualities of mind which are characteristic of men who do their tasks skilfully and who have a reasonable amount of consideration for the "other fellow."

THE GALVESTON CAUSEWAY FAILURE

THE storm which struck Galveston and vicinity on August 16 and 17 has attracted a great deal of attention from railway men, primarily because of the destruction of a part of the Causeway, completed in 1912. The importance of this structure lies in the fact that Galveston is located on an island and this Causeway provides the only avenue for rail communication with the mainland. Since the storm various methods of repairing the structure and of preventing a recurrence of its destruction have been suggested, but all of these appear to overlook one of the main reasons for its failure.

After several days of southeast winds such as preceded the recent storm, there is a marked increase in the water level in the gulf and also in the inland waters of West bay and Galveston bay. All adjustment of water levels is necessarily obtained by the ebb and flow of water through the Galveston jetty or via the San Luis inlet and West bay. The discharge of water through these inlets is a matter of common knowledge and strong currents have been observed even during moderate disturbances. Previous to 1900 three timber railroad trestles and a highway bridge over West bay connected Galveston with the mainland, but all these were destroyed by the storm of that year. Following this, only one trestle was rebuilt. Stimulated by a demand for a permanent structure which would afford connection with the mainland at all times, the well-known Galveston causeway was built jointly by the city, the county and the railroads at a cost of \$1,750,000 and opened in 1912.

In this structure the channel width of 10,680 ft. offered by the pile trestle was reduced to 2,437 ft. of concrete arch viaduct, the remainder of the crossing being constructed of sand fills restrained between two lines of concrete sheet piling and concrete blankets on the slopes. The grade of the new structure as established brought the crown of arches at least 2 ft. below the level of high water of 1900. Thus the waterway was cut down over 75 per cent. In the recent storm, water overtopped the embankments and washed out the sand, allowing the concrete blankets to fall in. In this way practically all of the Virginia Point approach embankment was destroyed and all but 2,300 ft. of the Galveston end went out, while the concrete structure was uninjured. Various suggestions have been made to the effect that the embankment would have stood if it had been made of heavy rip-rap instead of sand, or if the concrete blanket had extended over the entire surface. It would appear, however, that owing to the restriction of the waterway, the embankments

must have been subject to considerable static head in addition to the wave action. It is said that the water level was 2 ft. higher than in 1900. Therefore, even if the embankment had been made impregnable to wave action, it is not certain that it would have long withstood the pressure of the water as a dam, for the concrete sheet piling extended only 14 ft. below low water and rested in the sand without entering the clay found at a lower level.

Now that a considerable portion of the causeway approaches must be rebuilt, it would seem that more attention should be given to the provision of ample waterway. The construction of additional arches is doubtless the most practical solution and even a raise of grade of the entire structure appears desirable.

CAR SURPLUSES AND SHORTAGES

AN encouraging indication of reviving business prosperity, as measured by the growth in volume of railway traffic, is afforded in the latest report of the American Railway Association, just issued, showing a reduction of 76,000 in the number of surplus freight cars during the month of August. The total surplus on September 1 was only 189,919, as compared with 266,312 on August 1. The surplus on September 1 of this year was, however, still 24,000 greater than that on September 1, 1914, when the surplus was 165,244.

The increasing demand for freight cars is, of course, due primarily to the beginning of the crop movement, which, according to the latest report of the Department of Agriculture, is likely to exceed slightly the high-water mark of 1912. In 1912 similar predictions of bumper crops were usually accompanied by warnings of a car shortage. This year talk of a car shortage would seem as music to the ears not only of railway officers but of most business men also. All of which serves to call attention to the fact that for a long time the car-shortage problem has been somewhat like the snakes in Ireland.

The last period in which there was a car shortage was the month of October, 1913, when shortages in various parts of the country exceeded the surpluses in other parts by from 2,000 to 6,000 cars. It is necessary to go back three years, to the fall of 1912, to find a net shortage serious enough to constitute a problem either for the railways or the shippers.

The popular notion is that the railways are constantly being confronted by the problem of getting cars to move their traffic. The facts show that for some years their problem has been to get traffic to move in their cars. The statistics compiled by the American Railway Association demonstrate that car surpluses have been much more chronic and general than car shortages ever since there were such loud complaints about car shortages some years ago. The car shortages have always been but small, brief and local in their effect, while the car surpluses have been large, protracted and general.

The American Railway Association began to compile and publish statistics of car surpluses and shortages on January 2, 1907. It continued to make such reports fortnightly until November 1, 1914, when they were temporarily discontinued. Since February 1, of this year, the reports have been made monthly. During the period from January 2, 1907, to October 1, 1914, in only 25 of the fortnightly statements did the shortages exceed the surpluses, while in 175 the surpluses exceed the shortages. It is a matter of common knowledge that during the time when no statistics were compiled business was greatly depressed, and that there were large net surpluses, and since February 1, this year, the monthly reports have shown consecutive surpluses varying from 189,000 to 327,000. Back in 1906 and 1907 the railways were denounced from coast to coast for not providing enough facilities to handle their business. Yet in the 8 years and 8 months since the first statistics of surpluses were compiled we have had net shortages of cars only about 10 per cent of the time, while during 90 per cent of the time there have been from a few thousand to nearly a half million cars for which there was no business, but which were

costing their owners large sums in interest on the idle investment as well as for maintenance.

The car shortage "bugaboo," as it has since turned out to be to a large extent, came into prominence in the fall of 1906, when a very rapid expansion of business of all kinds culminating at the time of the heavy demand for cars for crop-moving, found the facilities of the railways seriously inadequate. There was, therefore, widespread agitation, and much ill-advised legislation was passed to penalize the roads for failure to furnish cars promptly on demand. In the fall of 1907 there was another shortage, less serious, which was followed in the spring of 1908 by a surplus which on April 29 reached 413,605 cars. In 1909 and 1912 there were also shortages, but during most of the time, as already shown, there have been large surpluses.

The prevalence of car surpluses during the last eight years has, of course, been due largely to the circumstance that the freight traffic has been growing less rapidly than formerly. It is also largely due to the fact that, when transportation facilities were found to be inadequate in 1906 and 1907, the railways, in anticipation of a continued rapid growth of traffic, began making extensive enlargements and improvements of facilities. From 1898 to 1906 the density of freight traffic—ton miles per mile of road—on the railways of the United States increased 59 per cent, while the investment in road and equipment per mile increased only 3.88 per cent. During the years since that time the situation has been decidedly different. From 1906 to 1914 the investment in road and equipment per mile was increased 20 per cent, while the traffic density increased only 19.8 per cent. When the facilities proved to be temporarily inadequate to the demands of traffic a large number of "reciprocal demurrage" laws were passed to punish the railways for not furnishing cars promptly. If the wise law-makers who passed them would devise some remedy for the true evil, that of an insufficiency of traffic to load the available cars, they would render a real public service.

CO-ORDINATION OF MECHANICAL ASSOCIATIONS

DURING July two mechanical department associations met in convention. The president of one of them went on record as favoring some scheme of co-ordination of such associations, calling attention to F. F. Gaines' remarks on this general subject at the last Master Mechanics' convention. This was President Scott, of the General Foremen's Association, who suggested that the chairman of the executive committee of the various organizations get together with a view of investigating some plan of co-ordination, believing that such a plan would be of benefit to the various organizations in that more and better co-operation would be obtained. The convention of the Tool Foremen's Association afforded an example of the possible advantages of such a plan. This association had long realized that it would be of benefit to the railways if standard reamers could be obtained for frame and rod work. Its members have spent much time in considering the subject and it was very thoroughly discussed at last year's convention. This year the association drew up and recommended definite standards, but under the present system it is difficult to get these standards adopted by the roads. Under a satisfactory plan of co-ordinating the work of the mechanical department associations the recommendations would automatically go up to those who have the power of fixing standards.

Such a scheme would be of advantage in many respects. It is always a more or less difficult matter for the minor associations to determine upon subjects for consideration at their conventions. The major organizations acting in an advisory capacity and having a familiarity with the entire mechanical department, would be in a position to suggest in many cases the matters which could be most profitably considered.

Such a plan would also bring about much more concerted action among the various associations. It would relieve the major associations of some of their work, eliminate some duplication of work, and give the minor associations more definiteness of purpose. Having thus been recognized by the major organizations it would be easier for the minor associations to obtain a larger and more comprehensive attendance at the conventions.

At present there are railroads that do not give the minor associations the recognition they deserve, whereas if they were under the control of the major associations, reporting to them the results of their deliberations at each convention, they would be in a better position to secure support. Several of the roads that send their men to the minor conventions request, on their return, reports of what they gained by their attendance. With a general report to the supervising body, the heads of the mechanical departments would thus be assured as to whether or not it is profitable to have their men attend.

The co-ordination idea is a very good one, and should not be allowed to pass with simply the recommendation of Mr. Gaines. The members of the minor organizations should be made to feel their responsibility, and in no case should these organizations be allowed to lose their individuality. They are in a position to be of material assistance to the railways, as past results have shown. But they do need the co-operation of the higher officers, and only by this co-operation can they be made to be as successful as they should be.

NORFOLK & WESTERN

With a decrease of more than a million and a half dollars in revenues, and with an increase of more than seven hundred thousand dollars in maintenance-of-way expenses due to the fact that the Norfolk & Western has begun to charge depreciation on its principal structures, the company had within a few thousand dollars of as much available for dividends on its common stock in the fiscal year ended June 30, 1915, as in the previous year. The amount in 1915 was \$9,490,000, and the 6 per cent annual rate on the common calls for \$6,477,000. There was a saving of 11 per cent made in transportation expenses, with a falling off in freight tonnage handled of but 3.63 per cent and an increase of 2.37 per cent in the number of passengers carried.

The distinguishing feature about the Norfolk & Western's annual report for some years has been the liberality of maintenance charges and of expenditures for additions and betterments and the economies which have been effected in transportation expenses. The great point about the Norfolk & Western's economies in transportation expenses is that while the average trainload of freight has increased with remarkable steadiness, the increase in transportation expenses per train mile has not offset this gain, so that the company is actually getting some return from the gain in the more effective use of its plant and its expenditures for betterment of the plant, whereas so many railroads have had the gains from these sources more than eaten up by increased wages or other expenses. Of course the Norfolk & Western has had the same increase in wages as other roads in its territory. Perhaps one explanation is that the expenditures on betterment of the plant have not only been liberal but have been quite extraordinarily free of mistakes in judgment. The steadiness with which the trainload has shown an increase is presumably an indication of the smoothness of the working of the plan of development that makes for stockholders' profits. In 1909 the trainload of revenue freight was 616; in 1910, 635; in 1911, 643; in 1912, 692; in 1913, 764; in 1914, 802, and in 1915, 841. Other roads have shown as great an increase in trainload over this period, but few, if any, have shown gains made so steadily and so uniformly. The credit for such a showing as this must be in part attributable to the foresight and wisdom of the management and in part to the constant supervision by the operating officers.

The following table shows the ratio of each class of expenses to total operating revenues in 1914 and 1915:

	1915	1914
Maintenance of way and structures	13.35	11.20
Maintenance of equipment	19.40	20.64
Traffic expenses	1.63	1.65
Transportation expenses	29.13	31.50
Miscellaneous expenses	0.25	0.45
General expenses	1.95	2.05
Total	\$64.74	67.49

*A charge amounting to 0.97 per cent of operating revenues was made to expenses for transportation for investment—C., in accordance with the new rules of the Interstate Commerce Commission.

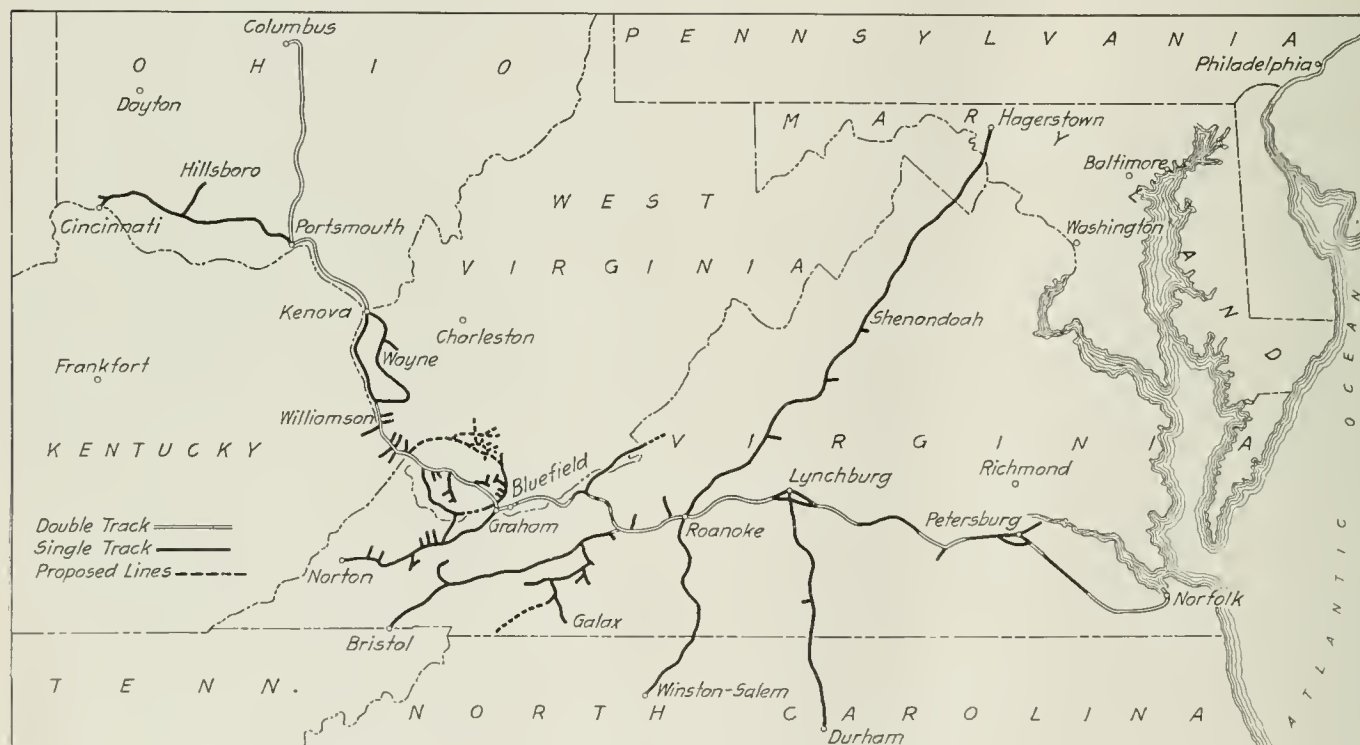
The fact that the Norfolk & Western has availed itself of the Interstate Commerce Commission's rules, which permit charging depreciation on structures in addition to the depreciation which has been charged since 1907 on equipment, has already been mentioned. The charges made are particularly interesting, because the Norfolk & Western is the first road to make a report showing in detail such charges, and only a few other roads, such as the Louisville & Nashville, have been making any such charges at all. President Johnson says in his report: "Your company has availed itself of the permission to set up such accounts [depreciation on property other than equipment], but, to begin their operation conservatively and to avoid large initial charges to operating expenses for depreciation of such property, only the larger structures have been considered, leaving the extension of the plan to cover smaller structures for consideration at a later date when experience shall have more clearly indicated the best permanent course." A total of \$643,000 was charged for depreciation under maintenance of way and structures. Roadway maintenance, on which \$525,000 was spent, was charged also under the heading "roadway depreciation," \$326,000; station and office buildings, on which \$113,000 was spent for repairs and

Per passenger-train car	826.00	870.00
Per 100 miles	1.53	1.55
Per freight-train car	91.00	108.00
Per 100 miles	0.90	1.01

The fact that the Norfolk & Western's traffic fell off and the train mileage was reduced to an even greater extent, permitting the use of only the newest and best locomotives and cars, possibly accounts for some of the decrease in repair costs.

The Norfolk & Western spent \$6,870,000 for additions and improvements to its property and equipment in 1915. Of this amount \$2,017,000 was net expenditure for new equipment, and of the remainder the two largest items were for second track, \$1,648,000, and for electric power transmission, \$1,636,000. The Norfolk & Western's electrification work was described in some detail in the issue of the *Railway Age Gazette* for June 4, 1915, page 1153.

President Johnson draws attention to the fact that from October 1, 1896, to June 30, 1915, \$123,649,000 has been spent on additions to road and equipment, and in addition to this amount \$15,474,000 was spent from income for what the Interstate Commerce Commission now classifies as additions and betterments. In other words, in these 19 years investors have put into the prop-



The Norfolk & Western

renewals, was charged also with \$40,000 for depreciation, and shops and engine houses, on which \$136,000 was spent for repairs and renewals, was also charged \$47,000 for depreciation.

Without any actual inspection of equipment it is impossible to say with absolute certainty whether smaller expenditure means economies or delayed maintenance. On the other hand, the Norfolk & Western's whole policy toward maintenance is so clearly shown in the other figures in the annual report that it is almost inconceivable that a shortsighted policy would be pursued in regard to maintenance of equipment. Furthermore, it is quite unlikely that any such showing for increased trainload could be made if locomotive repairs were not made promptly and comprehensively.

The following table shows the amount spent per unit of equipment and per 100 miles run for repairs, renewals and depreciation in 1915 and 1914:

	1915	1914
Per locomotive	\$2,855.00	\$3,120.00
Per 100 miles	13.36	12.40

erty \$139,123,000 of new money. The showing made by the company in the year ended June 30, 1915, is a good indication of how wisely this money has been spent.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Mileage operated	2,044	2,037
Freight revenue	\$36,550,550	\$38,038,622
Passenger revenue	4,739,538	4,908,679
Total operating revenues	42,987,044	44,650,310
Maintenance of way and structures	5,738,074	4,998,612
Maintenance of equipment	8,341,419	9,214,007
Traffic expenses	699,827	737,690
Transportation expenses	12,521,665	14,068,577
Miscellaneous expenses	109,468	199,565
General expenses	836,607	916,954
Transportation for investment—Cr.	415,245	.....
Total operating expenses	27,831,815	30,135,407
Taxes	1,878,000	1,620,000
Operating income	13,275,462	12,894,539
Gross income	15,318,696	15,171,921
Net income	10,409,905	10,462,426
Dividends	7,396,293	7,180,592
Surplus	3,013,612	3,281,834

The Interstate Commerce Commission and Its Work*

A Reply to Some Criticisms and a Discussion of Some of the Unsettled Questions Pertaining to Railway Regulation

By E. E. CLARK

Member of the Interstate Commerce Commission

In some quarters the tribunal of which I happen to be a member is accused of entertaining, and of exercising, a spirit of hostility toward the railroads. If a railroad, whose financial history has been little, if anything, less than a public scandal from a time that antedates the enactment of the act to regulate commerce, goes into the hands of a receiver, certain publications solemnly announce that it has been forced into bankruptcy through the hostile and unreasonable policy and actions of the Interstate Commerce Commission. If the commission finds that certain proposed increased rates are reasonable, those same writers sneeringly assert that it is a delayed and reluctant granting of but a small part of that which should be granted to the railroads. If the members of the commission disagree as to the propriety of, and justification for, the proposed increased rates, they assail those members who disapprove and laud those who approve. Thus, if a commissioner happens to be on one side in one case and on the other side in another case he is both approved and disapproved.

CRITICISM OF THE COMMISSION

From another quarter we are accused of being desirous of doing only those things that the railroads wish us to do; and the assertions and accusations from that quarter are as extreme and as violent as are those emanating from the quarters first mentioned.

And so, dependent upon the point of view, we are different beings, animated by different impulses and doing things which are diametrically opposed to each other. But is the one who will not see more than one side of a question, who attributes dishonesty to everyone who does not see as he does, and as narrowly as he does, necessarily the only one who sees rightly? Is his point of view infallible? May not some of his conclusions or deductions be wrong?

I remember reading when a boy a poem which described the trip of six blind men of Hindustan to see an elephant. The first approached the animal and happening to fall against its side exclaimed, "Why, bless me, but the elephant is very like a wall." Another chanced to grasp the elephant's tusk and asserted that the beast was like a spear. The one who came in contact with the elephant's ear declared that the animal was like a fan; the one who grasped the elephant's tail was sure that the elephant was much like a snake; the one who laid hold upon the elephant's trunk was certain that the animal resembled nothing but a tree, etc.

And so these men of Hindustan
Disputed long and loud,
Each in his own opinion
Exceeding firm and strong,
Though each was partly in the right
And each was in the wrong.

Every nation or people has a national sport, pastime or game. I have long known that in the United States we had two national games. The first is played in small parties, and generally in private. Of that one I will only remark that no one cares to play with the man who continually grumbles because he cannot win every pot. The second, baseball, is played in public; the crowd is always with the home team, and many of the on-lookers find their greatest enjoyment in roasting the umpire. Of late I have been almost inclined to think that a third pastime—finding fault with the Interstate Commerce Commission—is becoming so popular as to be almost national, and I am disposed

to pattern after the manager of a Texas baseball team, who appealed to the crowd, "Don't shoot the umpire, he is doing the best he can."

But, seriously, the questions which you gather together to discuss, and with which you deal, are parts of a problem of tremendous importance. Transportation is the very life blood of the commerce of the nation. The railroad industry of this country is probably, with the exception of agriculture, the greatest of our industries. Efficient and adequate railroads are essential to the maintenance and expansion of our commerce. Under our plan of private ownership, railroads have been, are, and will be built only when those who promote and further the enterprise have faith that in due time it will be profitable. Excepting the lands which were granted to some roads, a railroad has only transportation to sell and no other source of revenue. The railroad company, created by public grant of franchise, is obliged to assume certain obligations, among them the regulation by public authority of many of its affairs, and is given certain privileges and guarantees, among them the right of eminent domain and protection against confiscation of its property through regulation or other means.

It must submit to regulation because otherwise, as has been amply demonstrated, unjust discriminations, undue preferences and unreasonable rates would be indulged in and imposed, and commerce, instead of flowing in natural channels, would thrive or languish according to the will of those who possessed the transportation facilities. Business, manufacturing, producing and marketing would all be subject to artificial domination and control. It must be accorded the right of eminent domain, as, otherwise, spite and greed would throw insuperable obstacles in the way of its construction. It must be protected against confiscation because it is, after all, private property which the public has no right to use except upon the payment of reasonable compensation.

I do not doubt, and I have never doubted, the willingness of the great majority of the people to pay reasonable compensation for reasonable and proper service. I do not doubt the willingness of the great majority of those who manage the affairs of our railroads in these days to furnish good service in return for reasonable compensation. The difficulty comes in the difference of opinion as to what is reasonable compensation, either as a whole from all of the traffic, or in individual instances. These differences are often so acute that they must be decided by some disinterested, impartial tribunal, and manifestly they should be heard in an open forum in which all parties' rights are respected and protected.

THE COMMISSION DOING THE BEST IT CAN

Under our form of government these questions, in so far as they do not involve confiscation of the carriers' property, are within the jurisdiction of the legislative branch of the government. Acting within its lawful powers, the Congress has delegated certain authority to a body created for the purpose of deciding controverted questions of unreasonable, unjustly discriminatory or unduly preferential rates, rules, regulations or practices. That body, like the Texas umpire, is doing the best it can. I do not mean that it is doing the best it can to please everybody. It does not aspire to accomplish the impossible. It is doing the best it can to discover and establish that which is right, reasonable and just. It stands with its face to every wind that blows, decides the questions that come to it in a judicial spirit, endeavors to be helpful when it can in promot-

*Address before the National Industrial Traffic League, at Toledo, Ohio, on September 9, 1915.

ing harmony and thorough understandings between the carriers and their patrons, and does not worry about whether or not its decision or action is going to be popular.

The act to regulate commerce has been on the statute books since 1887, but it can fairly be said that real regulation under it dates back only to 1906 when by amendment the act was given vitality. The problem was not then, and is not now, to devise a model system of rates and regulations for railroads not yet built, or for industries and communities not yet located or developed. The conditions of trade and transportation that had grown up in a rapidly developing country served by railroads that had always been operated as private industries, free from governmental control, each going its own way in accord with the policy or ideas of those who for the moment were in control of it, had to be dealt with.

I think the court was perfectly right when it said that the purpose of the act was to promote and not to hamper trade and commerce. We may see situations and conditions which are wrong and which apparently should be corrected. But if, upon thorough investigation, it is demonstrated that in order to correct it other situations equally as bad, or worse, will be created, no real progress is made by forcing such action. The conditions which the law was enacted to correct or overcome did not grow up in a day and they cannot be corrected or overcome in a day without doing inestimable and irreparable injury. The evils at which the law is aimed were not created by one party to the transactions. No railroad official ever paid a rebate except to some receptive shipper. The ideal situation cannot be attained except through a general disposition and desire on the part of both railroad officials and shippers to support and observe the principles which form the foundation and cornerstone of the law. Just such associations as yours and the various traffic clubs of the country assist in getting men to think alike, and when they think alike, there is little trouble about getting them to act alike. The solution of these profoundly important and far-reaching problems must be approached and dealt with in a broad way. The foundation must be laid in sound principles of right. If a railway company imposes wrongs upon, or deals in bad faith with, an individual or a community, its owners may expect hostility against the company and its interests. If a shipper defrauds or attempts to defraud the railway company by falsifying as to his shipments or his claims he cannot expect its officers to attach much importance to his representations in a matter that is of real importance to him, and in which his contentions are right. Every temporary or transient advantage that is secured by trickery or by evasion of truth and right retards the progress toward the conditions which we all should seek to enthrone.

The law provides that the patron of the railway shall be accorded reasonable and nondiscriminatory rates and service. If he has been charged an unreasonable rate or has been damaged by an unlawful discrimination he may recover reparation. If the railway maintains an unreasonably low rate it cannot repair losses sustained as a reason thereof on past transactions. If the railway maintains unreasonably low rates as to some traffic or as to some communities, it may not recoup itself by laying unreasonably high charges against other traffic or other communities. This principle has been well established in recent decisions of the courts.

REASONABLE RATE: A QUESTION OF JUDGMENT

And this leads to the query, What is a reasonable rate? There is no statutory definition of it. No scales or yard sticks are provided by which it can be weighed or measured. It cannot be determined solely by the cost of the service, because that cost, plus a reasonable profit, might, as to some commodities, be prohibitive. It cannot be measured alone by the value of the service, because that would open the way for the railway to absorb, as to some traffic, the profits that legitimately belong to the shipper. It cannot be ascertained from a consideration of distance only, because so to do would destroy competition between producing fields and in common markets. In

the last analysis it is a question of judgment, and very properly, the judgment that finally controls is that of a disinterested, impartial tribunal, whose decisions must be made only in the light of full hearings and proper investigations, and are, as to matters of law, reviewable in the courts.

Some questions, which to my mind are of fundamental importance, remain to be decided by the commission and the courts, or to be disposed of by the Congress.

SOME UNSETTLED QUESTIONS

As I have suggested, the laws guarantee the owners of the railways against confiscation of their properties. What constitutes confiscation? What is the reasonable profit which the railway may lawfully demand? Upon what property may that profit be based? I think that the courts have clearly laid down the principle that the carrier is entitled to earn a reasonable return upon the property that is devoted to the public use, as of the time of its use. Now come the questions, What is the value of the property, and how is it to be determined? Certainly not by figuring a return upon the outstanding bonds and stocks. Two railroads may have been built in a common territory, under substantially similar conditions, at approximately the same time, and should have cost approximately the same per mile. Throughout its construction and operation one of them may have been conservatively managed and financed as a straight-out business venture, while the other one may have been the prey of graft during construction and of plunder under operation. The capitalization of the one may represent actual investment and outlays, while that of the other may represent all the money that those in control of its affairs have been able to borrow, or to raise by the sale, at ruinous rates of discount and interest, of securities far in excess of the cost or value of the property, or of stocks that can never have any value.

Being in common and competitive territory, their rates must, under the law of competition, be the same. Will any one say that the capitalization of these properties forms any reasonable basis for determining what they may properly earn from serving the public?

Within a period of two or three years in proceedings before the commission and the courts, one railway company proved by witnesses several different valuations of its property, and the differences in those valuations exceeded one hundred million dollars. The item of interest during construction was variously shown in sums which differed so widely that it seemed obvious they were not taken from any records which were considered reliable or permanent.

Such experiences as this led to the conviction that an official and dependable valuation of the railway properties should be had, and by authority of the Congress that work has been undertaken. The law which was adopted for this purpose is exhaustive and requires the performance of a vast amount of detail work and the determination of many vexed and vastly important questions. No one has blazed the path. The results ought to be sound, equitable and right. When these valuations are finally fixed they will be of great assistance to the commission and to the courts in connection with cases which involve alleged confiscation of property of carriers. It will not be possible for each railroad to earn the same return upon the value of its property, because controlling competition in transportation and in commercial life will require substantially equal charges in competitive territories, and we have so many railroads and such a vast commerce that there is not much territory that is not competitive.

THE RECENT WESTERN RATE ADVANCE CASE

There are those who think that if the railroads in a particular section of the country can, as a whole, show that their net return from operation is unusually or unduly low they should all be permitted to increase their charges on all of the traffic or upon important parts thereof. If all of those roads had been constructed, financed and operated on business principles and as

business concerns, and the net results of their operation showed an improperly low return, I would find no difficulty in accepting the view that they were justly entitled to such increases in their charges as would render their operation properly profitable. But in such a case the tribunal that authorized such an increase should have the power also to fix the minimum rate so that the burden might not be inequitably distributed. The carrier has a right to fair compensation for each service performed by it, and for its services as a whole. The public should pay such compensation. The carrier is entitled to earn a profit from legitimate enterprise and effort, but when it comes to increasing rates in general or upon an important part of the traffic, I find difficulty in accepting the theory that because certain roads are in financial straits, all roads in that section may properly increase their rates, when the greater number of those roads have for a series of years been able, under existing rates, to maintain their properties in splendid condition, pay all fixed charges and taxes, declare each year handsome dividends upon their stocks, and carry rather liberal sums to their surplus accounts.

I do not wish to draw invidious comparisons, but I want to make this point clear. I do not attempt to analyze the reasons for the conditions to which I refer as to some carriers, and I refer only to matters that are public property and common knowledge. The Burlington and the Rock Island systems are very generally strongly competing systems. They have operated in common territory and largely under common scales of rates. The one has maintained in good condition a splendid transportation system, has a strong and healthy financial standing, and has regularly paid fair, if not liberal, dividends to its stockholders. The financial condition of the other, and in general, the reasons therefor, you all know.

And so I say that, while desirous of according that which is right to the carriers as much as to the shippers, one may well hesitate about assuming responsibility for approving large increases in rates for the purpose of relieving a financial strain that is composed of the average of the necessities of such roads as the Burlington, the North Western, the Union Pacific, the Great Northern, the Northern Pacific and the Santa Fe on the one hand, and the Frisco, the Rock Island, the Alton, the Wabash, the Great Western and the Missouri Pacific on the other hand.

The commission has consistently declined to prescribe rates based alone upon the favorable conditions obtaining as to the short line and the strongest, richest carrier. It should, of course, decline to approve rates based only upon the conditions and needs obtaining upon the line of the carrier that is poorest and that has an unfortunately located line.

UNITED STATES HAS BEST RAILROAD SERVICE

I have traveled some upon the railroads of Europe. They have some roads which, for those countries and for the services demanded from them, are excellent, well-equipped transportation agencies, which perform an acceptable service. They would not, however, be able to meet the demands in our country. Taking into consideration circumstances and conditions I think that we have the best railroad service in the world. There are many improvements that might be made, and some that ought to be made, but in general it is good and efficient.

The latest figures available show that the charge for the transportation of freight is much lower per ton-mile in the United States than it is in other countries. Glancing over comparative figures for recent years we find that the ton-mile revenue in various countries is: United Kingdom of Great Britain, 2.39 cents; Germany, 1.37 cents; France, 1.3 cents; Austria, 1.45 cents; Norway, 1.6 cents; Belgium, 1.14 cents; Switzerland, 2.92 cents; New South Wales, 1.76 cents, and South Australia, 1.94 cents; while for the United States it was in 1913, 7.29 mills.

These figures, however, do not tell all the story. Referring to other figures we find that the railroads of the United States move 2,737 tons of freight one mile per capita per annum, while

in Germany, where the movement by rail is heavier than in other European countries, the railroads move only 582 tons one mile per capita per annum. I believe it has been recognized by successful business men that a large volume of business with a small profit on each transaction is more desirable than a small volume and larger profits on each deal.

The railroads of Europe are capitalized much more heavily than are those of the United States. They are much more completely equipped with signal and other safety devices than are our roads, and generally their roadbed and stations are more expensively constructed and with a view to more permanency.

In many of those countries the railroads are largely or wholly owned and operated by the governments. But on the whole, such ownership and operation has not proven entirely satisfactory, and it certainly has not afforded the people cheaper transportation than could have been furnished under private ownership, properly regulated.

We have 250,000 miles of railroad, serving a broad territory in much of which the commerce and traffic is heavy, and in all of which the commerce and traffic is growing rapidly. We hear much about inducements to build new roads. In my judgment, what is needed is not so much the building of new roads, but the development of those that are already built, so as to make of each an efficient agency, properly equipped with terminals and rolling stock, all maintained in such condition as to afford prompt, dependable and safe service.

If the public demands such roads it must be willing to pay reasonable prices for the services performed by them. If the railroads desire to have and to operate with profit such roads they must convince the public that they are, and are to be, operated along business lines and at rates that fairly compensate for the service performed and yield a fair profit upon the value of the property which is devoted to the public use.

Both the railroads and the public must contribute to the effort to bring about this nearly ideal condition. Each, while guarding its own rights and interests with appropriate jealousy and zeal, must recognize and respect the rights of the other. But even when that is done there will be honest differences of opinion which must be decided by a third party, whose decisions must be based in law and in right, and in whose integrity and fair-mindedness both have confidence.

PROPOSED CHANGES IN INTERSTATE COMMERCE LAW

And now a few words as to changes in the law and in its administration. I know that you are giving attention to these questions and I disclaim any desire or intent to influence your conclusions or actions. I express a few thoughts along those lines for what they are worth.

The Supreme Court of the United States has decided that the courts have no jurisdiction to review a negative order of the commission, and some think that this gives the carriers a right that is withheld from the shippers. Personally I see no reason why the law should not give the shippers the same right of appeal that it gives to the carrier. I do not think that such right would be of great benefit to the shippers. The Supreme Court has laid down the limits within which the courts can review the findings of the commission. The court may inquire whether or not the commission has proceeded lawfully, whether or not its findings are supported by competent evidence, and whether or not its order invades the constitutional rights of the carrier. If the proceeding has been conducted lawfully, and the findings are supported by evidence, and the order does not invade the carrier's constitutional rights, the court may not set aside the order or substitute its judgment for that of the commission.

Of course the shipper has just as much right to a lawful proceeding and a finding based upon competent evidence as has the carrier. The constitutional rights of the shipper are not at all the same as those of the carrier. The law does not attempt to regulate the shippers' selling prices.

As has been seen by the annual reports of the commission,

we think that there is a defect in the law in that the periods of limitation within which the carrier may demand the payment of uncollected undercharges are much longer than the period within which the shipper may bring action for recovery of an unreasonable charge. In a few instances this has caused real hardship.

Conditions that are probably different from those that were anticipated have sprung from the most recently enacted amendment to the act to regulate commerce. It has been strongly urged that the amendment was never intended to apply to shipments by express or to the transportation of baggage. We have been unable to discover any clear indication that it attempts to draw any distinction between carriers by rail and express companies. The Supreme Court had held that that portion of the law applied to the transportation of baggage. Congress knew of that decision and it made no provision in the amendment for excluding baggage from its terms. By the canons of statutory construction, therefore, the law must be held to apply to baggage. If Congress desires to exempt the transportation of baggage and shipments by express from the operation of this provision, it can, of course, effect that by further amendment.

The question of reparation for damage suffered from the exaction of an unreasonable rate or from an unjust discrimination has been and is one upon which decided differences of opinion are entertained and expressed. The Supreme Court has made it clear that in a discrimination case the damage suffered may be more or less than that measured by the exact extent of the unjust discrimination, and the true measure of the damage suffered must, therefore, be shown by competent proof. There are those who assert that the same rule should be applied in awarding reparation because of the exaction of an unreasonable rate. The commission has not accepted this view, but has held that the one who bears the unreasonable charge has been damaged to the extent that the charge exceeded that which it has been found would have been reasonable.

REORGANIZATION OF INTERSTATE COMMERCE COMMISSION

A good deal has been said and written about the necessity for a reorganization of the work of the commission, or the commission itself. No one realizes more fully than do the members of the commission the magnitude and the complexity of the duties placed upon the commission. The system under which our courts are organized and their several jurisdictions defined is often pointed to as a pattern for organizing the work of the commission. Inasmuch as in ordinary litigation before the courts the parties affected are generally all before the court, while in matters coming before the commission the whole public is interested and many who are not before the commission in the case may be affected by the conclusion reached, we may well doubt the wisdom and practicability of dividing the jurisdiction geographically, with the certainty that at times cases involving substantially the same facts and the same principle will be decided differently in different jurisdictions. The Supreme Court pointed out the impossibility of maintaining the underlying principles of the act if the courts in their several jurisdictions were to pass upon questions of an administrative or a quasi-legislative nature.

The commission has given much thought to this subject and to the various plans that have been suggested for simplifying and expediting the work of the commission and reached the conclusion that the largest measure of relief and the best results would be secured by enlarging the membership of the commission, and authorizing it to divide itself into groups or divisions, each division to have and exercise all the powers of the commission in the matters or cases referred to it. This would give us a mobile but still a centralized body, which could change its divisions and assignments to divisions when and as circumstances might require.

Personally, I feel that the valuation work is of such magnitude and importance and of such a technical nature that a commission or a division of the commission should give their undivided attention to the new and intricate problems which

will arise in numbers as that work progresses, and especially as the time for fixing upon a valuation approaches.

The commission can perform the many duties devolving upon it only by thorough organization of its several bureaus and calling to its aid the most competent assistants available. Some features of our administrative work, as for example, the safety appliance features, are so well organized and the principles of those laws are so well defined and established that they give the commission but a minimum of trouble and demand but little of the time of the commissioners. Where work or business expands with rapidity it is not always possible to extend an efficient organization as rapidly as might be wished.

The development of effective and beneficial regulation of the affairs of an industry of such magnitude and vital importance as that of transportation in this country is absorbingly interesting. It inspires one who is actively engaged in the work to bring to it his best thought and efforts. It brings to one a tremendous responsibility, plenty of hard work, and like all public service, more or less unjust criticism. Bearing responsibility does not wear heavily on the one whose heart in it is his work and who has the courage of his convictions. Hard work does not hurt one, and unjust criticism, while unpleasant at times, will never affect the judgment or influence the actions of the man whose conscience tells him that he has done the right thing in the light as it is given to him to see.

But, be he never so able, the commanding general cannot win battles without assistants and soldiers, the manager of a successful industrial concern or railroad must have the loyal co-operation of his forces, the executive or administrative official who succeeds must have the cordial support of others who desire to see and participate in his success. And so, in order that those conditions which all right-minded men would be glad to see in the transportation business may be attained and firmly established, it is necessary that you and many others contribute each his part, no matter how small. As the light grows stronger and better days dawn for railroads and their patrons as a result of these efforts, everyone who has contributed to the better order of things by some helpful word or action will experience a sense of satisfaction over a good deed done.

HOURS OF SERVICE ACT INTERPRETED AS TO TELEPHONE COMMUNICATIONS

The United States Circuit Court of Appeals, Seventh circuit, in a case against the Chicago, Rock Island & Pacific, affirms a decision of the District Court for the Northern district of Illinois, Eastern division, penalizing the road for not observing the hours of service law in relation to a switchman in a shanty who regularly telephoned to a towerman, four miles away, informing him whether or not a certain passenger train was on time. The decision is summarized in the following five headnotes, all of which, except the fifth, follow well-known points which have figured in previous decisions:

1. The remedial purpose of the hours of service act (34 Stat., 1415), to protect human life and to promote railroad efficiency, demands that despite its penal character, its provisions shall be construed and the intent of Congress found from the language actually used, interpreted according to its fair and obvious meaning.

2. Congress may well have deemed it unsafe to permit employees whose duty it is, not primarily or principally, but ordinarily and habitually, to transmit orders pertaining to the movement of trains, and in doing so to exercise whatever measure of skill, care, alertness and attention the use of either telegraph or telephone requires, to work 16 hours, however simple or non-fatiguing their ordinary tasks may be.

3. The words in the proviso of section 2 of the hours of service act, "other employee who by the use," etc., transmits orders pertaining to the movement of trains are not to be qualified by an implied limitation to those whose primary and principal duty is thus described.

4. If the particular words "operators and train despatchers" in the proviso of section 2 do not exhaust the class and thus make the rule of *ejusdem generis* inapplicable, the only all-embracing designation covering those concededly within the proviso is an employee who ordinarily and habitually uses the telephone or telegraph for the purposes stated.

5. Switch tenders stationed at a shanty, and whose principal duty is to attend to freight-yard switches, but who also regularly and habitually transmit information by telephone affecting train movements to levermen at an interlocking tower, located at a point where there is a crossing for trains of another railroad, come within the class for whose service limits are established by the proviso in section 2 of the act.

The decision is by Baker, Kohlsaat and Mack, circuit judges; opinion written by Judge Mack. Judge Mack says:

"By this writ of error it is sought to reverse a judgment rendered on a directed verdict and based on six several violations of the hours of service act (34 Stat., 1415).

"Section 2 of the act, after making it unlawful for a common carrier subject to the act to permit employees to remain on duty longer than 16 hours.

"The section of the law applicable to this case says that no operator . . . or other employee who by use of the . . . telephone transmits, receives or delivers orders pertaining to or affecting train movements shall be . . . permitted to be on duty for a longer period than nine hours . . . except in certain contingencies not now in question. Violation of the statute is conceded if the employees in question come within the class designated and if the telephone communications made by them are included within the word 'orders' as used in the statute. Four miles north of the switch tender the B. & O. crossed defendant's main line. At this crossing there was an interlocking plant. Defendant's passenger trains were frequently held up at the crossing if it was blocked to let a B. & O. freight train pass. To obviate these delays, it was part of the duty of the switch tender to telephone the towerman at the crossing that defendant's passenger train was coming."

Defendant contended that what the switch tenders did in relation to the towerman was to impart information, not to transmit orders. It concedes, says Judge Mack, that orders are not confined to technical written train orders; that any specific direction or instruction *which a subordinate is bound to obey* would be an order; but it urges that only such orders the violation of which might result in some accident fall within the purpose and therefore within the scope of the statute.

"Unquestionably the important *object of the statute was to conserve the safety of the traveling public and of railroad employees. Not merely safety, but general efficiency, promptness of service is thereby promoted.* Concededly greater regularity in the passenger service is secured if the defendant's trains are no longer held up at the crossing. Orders designed to accomplish even this result would, therefore, be within the purview of the act.

"But who can say that the violation of any order pertaining to or affecting train movements *might* not result in some accident? That other measures obviated the possibility of a collision at the crossing is immaterial, for surely regularity of service at that point might well prevent an accident at some other point. . . ."

A similar decision was handed down the same day in a case against the Chicago & North Western.

THE ORURO-COCHABAMBA RAILWAY OF BOLIVIA.—Work is in progress on the construction of the railway from Oruro to Cochabamba, Bolivia. About 300 laborers are now employed. The rails will shortly be laid as far as Orcoma, a small village approximately 5 miles from Capinota. The distance between Oruro and Cochabamba is 125 miles and Capinota is about 36 miles from Cochabamba.

A DISTANT SIGNAL FOR AUTOMOBILISTS

The Southern Pacific has put in use at Tropico avenue, Tropico, Cal., what may be called a highway distant signal—a conspicuous warning for wayfarers, set about 100 ft. back from the railway.

This signal is of unusual design. Resting on an upright, which consists of a 3-in. iron pipe about 6 ft. high, is a cylindrical tube, 8 in. in diameter and 2 ft. 6 in. long. Its axis is horizontal, in line with the street, and it is painted both inside and outside a jet black. Fixed to the tube several inches from the upright post, as shown in the illustration, is a large circular disk, the front of which is painted red and the back side black. The rear end of the tube is closed, and on the inside, about 18 in. from the open end, is a red glass lens, which fits snugly within the tube. Behind this lens is a powerful incandescent lamp, backed by a brilliant reflector. The wires for the lamp run down through the hollow post and underground to the regular crossing signal, which is a "wig-wag," and also is electrically operated.

The wig-wag and the tube, or distant signal, are both used



Distant Signal for Automobiles

in daylight as well as at night. With the red lens set so far back in the 8-in. tube the signal can be seen almost as plainly during the daytime as it is in the night. In addition to this, during the daylight hours the large red disk serves to emphasize to the motorist his proximity to the railroad crossing.

There are two of these signals at Tropico avenue crossing, one on either side of the tracks. This double system has been installed only at crossings which are especially dangerous on account of their "blind" approaches or other reason, but it seems to have found much favor already, and the company proposes to install others.

SIR WILLIAM C. VAN HORNE

William Cornelius Van Horne, one of the chief citizens and notable philanthropists of Canada, and active head of the Canadian Pacific Railway during 15 years of the most important period of its development, died at the Royal Victoria Hospital in Montreal, on September 11, at the age of 72. He had been sick but two weeks, though he had been in failing health for several years. Since he relinquished the active management of the Canadian Pacific to Sir Thomas G. Shaughnessy, Sir William has devoted himself to numerous other interests, and, in particular, to the Cuba Company and the Cuba Railroad, of which he was president; but to the readers of the *Railway Age Gazette* he will be remembered chiefly as the general manager, vice-president and president of the Canadian Pacific Railway, one of the first of that notable line of brilliant railway officers who, educated in the United States

in the school of experience, were called to official positions on Canadian railroads and rose to be leaders by the sheer force of their individual characters. The railroads of the United States, in the 25 years following the Civil War, constituted the great railroad university of the world, and the owners of the railways of Canada, having very definite needs, were in a position to survey the field impartially and make intelligent selection of the best men, and their judgment in this and other instances was fully vindicated by the results.

The subject of this sketch was born in Will County, Ill., February 3, 1843. His father, a lawyer in Joliet, died when the son was only 13 years old, and at the age of 14 he entered the service of the Illinois Central, at Chicago, as a telegraph operator. He soon went to the Michigan Central and during six years, 1858-1864, held different positions on the Joliet division of that road. From 1864 to 1872 he was on the Chicago & Alton as ticket agent, telegraph operator, train despatcher, superintendent of telegraph, and finally, for three years, division superintendent. In July, 1872, he went to the St. Louis, Kansas City & Northern, now a part of the Wabash, where he was general superintendent for two years. Then for four years he was general manager of the Southern Minnesota, now a part of the Chicago, Milwaukee & St. Paul, and for a time was president of this company. In October, 1878, he went back to the Chicago & Alton, where he was general superintendent, until the end of 1879, when he went to the Chicago, Milwaukee & St. Paul. Here he was general superintendent for two years, when he resigned to go to the Canadian Pacific. For the first four years he was general manager, then from 1884 general manager and vice-president. He was made president in 1888, and chairman of the board on June 12, 1899. This position he held until May, 1910.

It will be seen that he went to the Canadian Pacific about four years before the line of that company was completed to the Pacific Coast, and his name stands among the few leaders in the

affairs of the company who are accorded the credit for carrying through that great enterprise. He was knighted by Queen Victoria in the last years of her reign.

Sir William was director in a number of the subsidiary railroad companies owned or controlled by the Canadian Pacific and in numerous other enterprises; the Canadian North West Land Company, the Dominion Iron & Steel Company, the Equitable Life Assurance Society of New York and numerous eleemosynary associations. He took a great interest in art, and in many forms, and was a vice-president of the Montreal Art Association. His house in that city was filled with objects of art collected from all parts of the world; Greek statuary, Oriental pottery, paintings by Spanish and Flemish masters, Chinese porcelain and innumerable other things. He had made with his own hands finely illustrated catalogues of pottery and other things in his collection and had no little ability as an artist.

As an officer of the Canadian Pacific, Sir William was popular. He had a rough and ready way with him and was often called a hard driver; and if things did not suit him could make quite a fuss. But he had a regard for men who did their duty, and he treated them with justice. Extremely hospitable, he never let an officer of the road come to headquarters without paying him some attention, and no matter how crude the man he was pretty sure to invite him to dine at his house. There was little formality about him, either in his office or at his home. He preferred the company of men who worked—artists, artisans, scientists, authors and musicians—to that of men whose interest was solely to make money in business.

Sir William was full of burning energy, which left him few idle moments. He enjoyed perfect health until two years ago; could do with very little sleep, and often stayed up nearly all night; ate prodigiously and was impervious to the cold. He was a mine of information on many topics. In conversation he was most entertaining, though as a public speaker he failed lamentably. With children he was in his element, liking nothing

better than to have a frolic with them.

Soon after going to the Canadian Pacific Van Horne invited to follow him Thomas G. Shaughnessy, who had been one of his associates on the St. Paul, and Shaughnessy was soon made general purchasing agent of the Canadian Pacific. He was steadily promoted and in 1899 succeeded Sir William as president. Sir Thomas, speaking of the death of his friend, says:

"From the time that I came to Montreal (1882) till the date of his death, Sir William and I have been intimate business and personal associates, and although in recent years his interests have been in one direction and mine in another, there is, I feel sure, no person, apart from the members of his own immediate family, who is more grieved by his death than I am. Probably I knew him more intimately than any one else. His was a great mind, a great heart and a lofty soul."



Sir William C. Van Horne

The Railways and the California Expositions

Second Article, Describing Exhibits of Railways and Railway Supply Companies at Panama-Pacific Exposition

Most of the railway and railway-supply exhibits at the Panama-Pacific Exposition in San Francisco are housed in the Palace of Transportation, one of the main group of the exposition buildings. This building and many of the exhibits in it were described in an article by William S. Wollner in the *Railway Age Gazette* of February 26, page 373. The structure covers seven acres and cost \$500,000. Unlike the transportation collections at previous expositions it has been the purpose to make this one contemporaneous rather than historical, no display being eligible for award unless it represents a product of the last 10 years, or a product that has not been improved upon within that period. The exhibits in the Transportation Building are under the direction of Blythe H. Henderson, chief of the department of transportation.

Special concessions were offered by the railways in the rates for the transportation of exhibits, by which all articles on which full rates were paid to the exposition may be shipped back without charge, provided the ownership has not been changed.

The building, in addition to railway and supply exhibits, which occupy a little over one-fourth of its space, is also devoted to the

ply companies show the improvement that has taken place in the various appliances for making transportation safer and more efficient.

RAILWAY EXHIBITS

The Southern Pacific, in addition to the exhibits mentioned in Mr. Wollner's article, also shows in its space in the Transportation Building an interesting collection of photographs and charts illustrating its shop-welfare and safety-first work, and giving statistics showing the great improvement in its safety record. In connection with this a small working model is shown demonstrating in a non-technical way the method of operation of the automatic electric block signal apparatus. There is also an exhibit of articles manufactured in the company's shops; a 60-foot steel coach, the first all-steel passenger coach built in the United States, designed and built by the Southern Pacific in 1905, since which time the construction of wooden passenger equipment has been discontinued by this company; a 58-ft.-all-steel electric motor coach, built by the Pullman Company; a 45-ft.-all-steel street car, with center side entrance, the body built



The Palace of Transportation

exposition of the latest developments in the field of automobiles, steamships and aviation, thus covering transportation by land, water and air. The foreign countries represented include Great Britain, Holland, Japan and China. Of the individual exhibits illustrating American railway progress those of the Westinghouse and General Electric companies occupy the greatest amount of floor space, with elaborate displays of electrical appliances as applied to transportation, including electric locomotives. The exhibit of the Southern Pacific shows the latest developments in car and locomotive construction, including freight and passenger cars and electric motor cars, the latest type of all-steel postal car, and the huge modern locomotives contrasted with the locomotive first used on the Central Pacific. The Pennsylvania exhibit shows the complexity and many-sided development of the work of a great railway system in all its phases. The exhibit of the western lines formerly comprised in the Gould system illustrates some of the scenic attractions and agricultural possibilities of the West, while the various exhibits of the railway sup-

ply companies. An important contribution to the illumination features of the exposition is an Atlantic type Southern Pacific passenger locomotive, which stands at the Yacht Harbor opposite the Agricultural Building, and at night furnishes steam and smoke which are utilized in conjunction with the exposition's battery of powerful searchlights for the production of striking lighting effects. The Southern Pacific was awarded a grand prize for its exhibits.

The large and interesting educational exhibit of the traffic department of the Pennsylvania system, which was awarded a grand prize, was described in the article of February 26. All of the attendants at this exhibit have been temporarily detached from railroad service. The exhibit is located in the center of the Transportation Building and has proved very attractive to visitors. The attendance at the moving-picture lectures, depicting journeys over the lines of the system, up to August 17, was over 74,000, and it was estimated that during the first five months of the exposition over 2,000,000 people visited the exhibit. Over

70,000 booklets describing the exhibit and the system have been distributed. Among the several models of terminals is one of the proposed new Union Station at Chicago.

The "Globe" exhibit of the Missouri Pacific, St. Louis, Iron Mountain & Southern, Denver & Rio Grande and Western Pacific, shown in one of the accompanying illustrations, was described in the *Railway Age Gazette* of May 28, page 1,133. This exhibit was awarded a gold medal and has been visited by about 3,000 people a day.

The Republic of China has an interesting display of models illustrating the types of equipment and structures used on the government railways, including a typical station, block signals, wooden bridge, passenger train, reserved car, goods car, coal truck, part of Yellow river bridge and the train staff system. This exhibit also includes photographs of views on the lines, charts showing the organization and statistics of the railways, and samples of the uniforms worn by officers and employees.

The Imperial Railways of Japan show a collection of maps and photographs of the government railways and charts of statistics.

The Wells-Fargo Company has an exhibit consisting of an express office at which travelers' checks were cashed, a lecture room in which motion pictures were shown illustrating the methods of handling the express business, a model of a Wells-Fargo Express refrigerator car, one of the steel trunks used for carrying packages, a clock that was installed in the company's offices in San Francisco in 1867, photographs, old money orders, etc., illustrating the history of the company, an old Concord stage-coach built for the company in New Hampshire in 1863, which was trans-

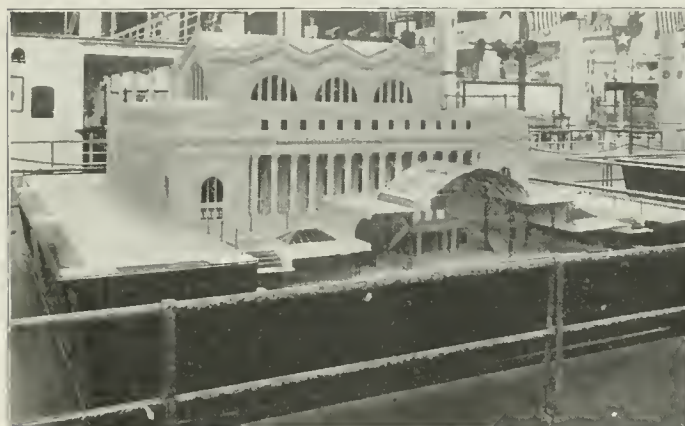
topographical map of the park, occupying 50,000 sq. ft., and this is surrounded by reproductions of some of the principal features of the park, built up of burlap and concrete. A Yellowstone trail 1,500 ft. long winds tunnel-like through the mountains disclosing an occasional vista of the Yellowstone landscape and opposite the inn a cataract falls 85 ft., discharging 1,000 gallons of water a minute. Inside of one of the mountains is a large lecture room in which are shown moving pictures of Yellowstone Park scenes. At the close of each lecture the screen is rolled to one side disclosing a reproduction of the upper geyser basin with a number of small geysers spouting steam and every 65 minutes there is a remarkably realistic imitation of the Old Faithful geyser in eruption. An admission fee of 25 cents is charged. Up to the end of July the attendance had reached 125,000.

RAILWAY SUPPLY EXHIBITS

A large proportion of the railway supply exhibits are shown in the Machinery Building, and some in the Palace of Mines.

The official list of awards has not yet been given out by the exposition officers. Although most of them were determined upon several weeks ago there have been some protests to be acted upon, and while most of the exhibitors have been notified of their awards, all of them have not, and it has been impossible to obtain an accurate list or to show what the awards covered. The awards mentioned in connection with the following list of exhibits are therefore not to be taken as a complete list of awards.

While this is the most complete list of the railway supply



Model of New Chicago Union Station in Pennsylvania Exhibit



A Contrast in Locomotives in the Southern Pacific Exhibit

ported to California around Cape Horn, and boxes of fruits, nuts, etc., packed ready for shipment by express.

The separate buildings of the Southern Pacific, Great Northern, Canadian Pacific and the Grand Trunk were described in the issue of September 10.

Two railways, the Atchison, Topeka & Santa Fe and the Union Pacific, are represented on the "Zone" where the amusement concessions are located.

The Santa Fe has a seven-acre reproduction of the Grand Canyon, which took three years to build and cost approximately \$250,000. Visitors enter a special observation car which makes stops at seven points, at which are seen reproductions of the view from some of the special points of interest in the canyon from different parts of the rim. An admission fee of 25 cents is charged. The Santa Fe also has a reproduction of a Pueblo Indian village, to which an admission fee of 10 cents is charged.

The Union Pacific space is devoted to a reproduction of scenes in Yellowstone National Park, occupying four acres. The principal feature is a full-size replica of Old Faithful Inn, covering a ground area of 47,000 sq. ft., in which is a dining-room and auditorium, seating over 2,000 persons. Here the exposition orchestra of 80 pieces gives daily concerts and here several banquets have been held by large organizations visiting the exposition. The central space of the enclosure is occupied by a relief

exhibits at the exposition that has been published, it may not include some companies that are to some extent engaged in the railway supply field, but whose displays were shown in connection with other departments of the exposition.

EXHIBITS

The exhibits of railway supply companies in the Palace of Transportation are as follows:

Ajax Metal Company, Philadelphia, Pa.—Ajax plastic bronze engine castings on Chicago, Burlington & Quincy locomotives exhibited by Baldwin Locomotive Works. Bronze medal.

American Arch Company, New York, N. Y.—Security sectional arch installed in Atchison, Topeka & Santa Fe locomotives exhibited by Baldwin Locomotive Works. Gold medal.

American Brake Shoe & Foundry Company, New York, N. Y.—Brake shoes and parts and shop photographs showing process of manufacture. Gold medal.

American Locomotive Company, Schenectady, N. Y.—This company's exhibit, which was described in the issue of February 20, page 373, was awarded a medal of honor.

Automatic Folding Fender & Cattle Guard Company.—Cattle guard.

Automatic Transportation Co., Buffalo, N. Y.—Electric tractor trucks and trailers. Gold medal.

Baldwin Locomotive Works, Philadelphia Pa.—This company's exhibit, which was described in the issue of February 20, was awarded a grand prize.

J. G. Brill Company, Philadelphia, Pa.—No. 77 E-trucks shown in exhibit of General Electric Company.

Cambria Steel Company, Philadelphia, Pa.—Rails and special track work, structural steel and axles, special axles twisted cold, agricultural steel, wire products, fencing, automobile steel parts, shop photographs and the original Kelly steel converter used in the Cambria Iron Works in 1861 and 1862. Medal of honor.

Chambers Valve Company, New York, N. Y. Chambers throttle valve in equipment of locomotives exhibited by Baldwin Locomotive Works.

Edison Storage Battery Company, Orange, N. J.—Storage batteries, models of signal apparatus showing the application of Edison primary batteries and automatic crossing signals.

Fairmont Gas Engine & Railway Motor Car Company, Fairmont, Minn.—Fairmont motor car with photographs and blue prints.

Flannery Bolt Company, Pittsburgh, Pa.—Tate flexible staybolts. Gold medal.

Franklin Railway Supply Company, New York.—Franklin fire door shown in the exhibit of the Chinese government railways,

Full size mail exchange system in operation delivering and collecting pouches of mail. Gold medal.

Locomotive Stoker Company, New York, N. Y.—Type "C" Street stoker installed on Chicago, Burlington & Quincy freight locomotive exhibited by Baldwin Locomotive Works. Gold medal.

Manganese Steel Rail Company, New York, N. Y.—Various sections of manganese steel rails bent under drop test. Gold medal.

McCord & Co., Chicago, Ill.—McCord journal boxes in equipment of cars exhibited by other companies.

W. H. Miner Company, Chicago.—Draft gears and draft bearings on locomotives and cars exhibited by other companies. Silver medal.

National Brake & Electric Company, Milwaukee, Wis.—Complete installations of brake apparatus on vehicles on exhibition in Palace of Transportation. Complete line of air compressors, portable air compressor, governor reservoir mounted on trucks, 100 cu. ft. alternating current motor-driven compressor in operation supplying air for various purposes throughout the exhibit, complete line of motorman's operating valves, compressor governors, and other detail parts of brake equipment.

National Malleable Castings Company, Cleveland, Ohio. M. C. B. couplers and journal boxes for freight cars, passenger cars and locomotives; half and three quarter size couplers for industrial equipment, brake equipment castings, coupler pockets, draft gear yokes, rail braces, rail anchors and tie plates, castings of malleable iron, open hearth steel and electric steel. Medal of honor.

New York Air Brake Company, New York, N. Y.—Electropneumatic air brakes for passenger service. Complete equipment for 12-car passenger train with locomotive and tender. Grand prize.

Ohio Injector Company, Chicago, Ill.—Ohio injector, lubricator, flange oiler, cab squirt, combination boiler check and stop valves, intermediate lift check valves on Pacific type locomotive exhibited by the Baldwin Locomotive Works. Similar equipment



The Globe Exhibit of the Gould Lines

McLaughlin flexible conduits, and Franklin automatic driving box lubricator and Franklin water joint included in equipment of locomotives exhibited by Southern Pacific, Baldwin Locomotive Works and McCloud River Railroad. Silver medal.

Galena-Signal Oil Company, Franklin, Pa.—Various kinds of lubricating and illuminating oils. Gold medal.

General Brake Shoe Supply Company, Chicago. One-piece steel back brake shoes.

General Electric Company, Schenectady, N. Y.—Five types of electric locomotives, including 1280 h.p., 80-ton electric locomotives designed and built by General Electric Company, to replace steam locomotives on Butte, Anaconda & Pacific, designed for operation at 2,400 volts; 780 h.p. electric locomotive for inter-urban freight and passenger service and heavy switching, designed for operation at both 600 and 1200 volts, direct current; electric mining locomotive for 42-in. gage, 20 tons; electric mining locomotive with three 85 h.p. motors and electric industrial locomotive for yard switching. Railway motors and other apparatus for electric railways. Signal accessory electric devices, electric apparatus and equipment for railway shops, electric illumination for cars, shops, etc. All essential parts of electric traction are demonstrated in operation. Storage battery truck cranes for loading, unloading and carrying articles weighing up to one ton. Storage battery platform trucks designed to run inside of freight cars. Several hundred stereomograph illustrations from photographs of important applications of railway equipment in city, suburban and heavy electrification service, and typical installations of new apparatus.

Griffin Wheel Company.—Griffin F. C. S. wheels for steam and electric railways. Gold medal.

Hewitt Rubber Company, Buffalo, N. Y.—Hewitt seat packing, stitched belting, aisle strip matting and plain belting, armored pneumatic tool hose, M. C. B. standard air brake hose, standard fire hose, water hose, suction hose, corrugated tank hose, boiler washing hose and standard steam hose.

Hupp Automatic Mail Exchange Company, Washington, D. C.



Union Pacific Exhibit at Panama-Pacific International Exposition

and hose strainer and Globe valves for oil burners. Chicago Class A lubricator on Mikado type.

Ohio Locomotive Crane Company, Bucyrus, Ohio. Ohio locomotive crane used to unload and place heavy exhibits and for work in construction of exposition buildings. Bronze medal.

Parkesburg Iron Company, Parkesburg, Pa. Charcoal iron boiler tubes on Mikado locomotive exhibited by Baldwin Locomotive Works. Bronze medal.

Pennsylvania Steel Company and Maryland Steel Company, Philadelphia, Pa.—Mayari nickel chrome steel from Cuban ore, 1½ in. frog bolts turned down to 1½ in. in diameter at a tension of 2,345 lb. Bonzano rail joints, Pennsylvania 125 lb. section, rail sections; sketch of Memphis bridge over Mississippi river, of which over one-half is of Mayari steel, the first use of nickel chrome steel for bridge construction. Samples of tested steel showing physical properties, switch stand track tools of Mayari steel, frogs and shop photographs. Medal of honor.

Pressed Steel Truck Company, Pittsburgh, Pa.—Atlas pressed steel hand trucks.

Pullman Company, Chicago. This company built the all-steel postal car exhibited by the Southern Pacific, which is the first

car built under the latest revised specifications of the postoffice department.

Rail Joint Company, New York, N. Y.—Continuous, Weber, Wolhaupter, one hundred per cent. continuous insulated, Weber insulated, continuous girder and Weber girder rail joints.

Sargent Company, Chicago. Iron clad safety water gate used on Baldwin Mikado type locomotives exhibited by McCloud River Railroad. Honorable mention.

St. Louis Car Company.—Various types of electric railway street cars. Gold medal.

Standard Steel Works Company, Philadelphia, Pa. Steel tires, wheels, castings, springs and flanges used in locomotives and cars exhibited by other companies. Gold medal.

Taylor Portable Steel Derrick Company, Chicago, Ill.—Taylor portable steel derricks in operation on gondola car and photographs showing various uses.

Union Switch & Signal Company, Swissvale, Pa.—This company has two exhibits in the Transportation building, one consisting of eight "T-2" top-post, four fixed-arm and two position-light signals, illustrating the operation of the absolute block, permissive block, automatic block, distance switch and automatic position light signals, operated by alternating current. The other includes styles B and S signals, the former being a two-position lower quadrant signal and the latter a three-position upper quadrant signal, both operated by Edison primary batteries. Gold medal.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.—A 4,000 hp. articulated Westinghouse electric locomotive, as used in Pennsylvania tunnels under the Hudson river, mounted on 65 ft. steel deck turntable rotated by electric motor, and making complete revolution each minute. Photographs of electric lines, trolley line material, insulating cloth and paper, voltmeters, outdoor sub-stations, railway motors and control equipment and lightning arresters.

William Wharton, Jr., & Co., Inc., Philadelphia.—Tioga Iron & Steel Company, Philadelphia, and Taylor-Wharton Iron & Steel Co., High Bridge, N. J. Manganese steel pointed split switch. O'Brien insulated switch rods, built-up frogs, solid manganese steel 100 min. radius tongue switch and mate and 30 deg. frogs. Manganese steel center 150 minute radius tongue switch and mate and 11 deg. frogs. Manganese steel frogs. Standard manganese steel center frogs. Solid manganese steel, steam over electric crossing frogs. Gold medal.

The exhibits of the German-American Car Company, the McCloud River Railroad and the California Despatch Lines, described in the article of February 26, were awarded silver medals.

The following exhibits are located in the Machinery Building:

American Rolling Mill Company, Middletown, Ohio.—Armco Iron Culvert Manufacturers' Association. Iron culverts.

E. C. Atkins & Co., Inc., Indianapolis, Ind.—Saws, saw tools, machine knives, handles, specialties, etc.

Automatic Transportation Co., Buffalo, N. Y.—Freight, baggage and industrial trucks. Gold medal.

Barrett Manufacturing Company, New York, N. Y.—Barrett specification roofs.

Brown Portable Elevator Company, Chicago, Ill.—Portable and sectional conveyors, pilers and unloaders.

Carborundum Company, Niagara Falls, N. Y. Carborundum abrasives; materials cut, ground or finished with carborundum products. Large grinding wheel of carborundum 78 in. in diameter, 8 in. thick, weighing 2,500 lb.

Ceresit Waterproofing Company, Chicago, Ill.—Concrete waterproofing with Ceresit waterproofing compound.

Edison Storage Battery Company, Orange, N. J.—Storage batteries.

Gold Car Heating & Lighting Company, New York, N. Y.—Steam, vapor and electric heating system, thermostat control, cyclone and window ventilators.

Golden-Anderson Valve Specialty Company, Pittsburgh, Pa.—Golden-Anderson valves and steel water towers.

Hauck Manufacturing Company, Brooklyn, N. Y.—Oil burning appliances.

Joyce-Cridland Company, Dayton, Ohio.—Lifting jacks for railway and industrial service. Track jacks.

Locomotive Superheater Company, New York, N. Y.—Schmidt superheaters for locomotive and marine service.

Lunkenheimer Company, New York, N. Y.—Valves.

Maelcoed Company, Cincinnati, Ohio.—Carbide lights, portable oil burners, rivets, forges, tire heaters, oxy-acetylene apparatus and paint sprayers. Honorable mention and silver medal.

Morton Manufacturing Company, Muskegon Heights, Mich.—Morton draw-cut shapers.

Muggley Wheel Corporation, New York, N. Y. Muggley differential car wheel.

Pennsylvania Metallic Tubing Company, Philadelphia, Pa.—Flexible tubing.

Pyrene Manufacturing Company, New York, N. Y.—Fire extinguishers.

Safety Car Heating & Lighting Company, New York, N. Y.—Pintsch gas and electric axle lighting systems.

St. Louis Steel Foundry Company, St. Louis, Mo.—Girder frog, mate and switch, steam over electric railway crossing. Exhibited by Parrott & Co., agents, San Francisco. Two bronze medals.

Standard Underground Cable Company, Pittsburgh, Pa.—Power cables, insulating cables and copper clad wire.

Warner & Swasey Company, Cleveland, Ohio.—Machine tools.

Waterloo Cement Machinery Company, Waterloo, Iowa.—Little Wonder concrete mixers.

Westinghouse Air Brake Company, Pittsburgh, Pa.—Air brakes and air compressors.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.—Parsons steam turbine, condensers, motors and other electrical apparatus.

UNITED STATES STEEL CORPORATION

The exhibit made by the United States Steel Corporation and its subsidiary companies is one of the largest in the entire exposition, as well as one of the most complete industrial exhibits ever made. This company's display occupies more than one-fourth of the entire exhibit space in the Palace of Mines. Twenty-six subsidiary companies are represented, 11 manufacturing, 5 mining and coke producing, 9 transportation and 1 selling corporation.

In addition the Bureau of Safety, Sanitation and Welfare presents an exhibit for all of the subsidiary companies. Every process in the manufacture of steel from the mine to the finished product is demonstrated either by photographs, models or the actual product, and in addition a series of motion pictures accompanied by a lecture gives "The Story of Steel from the Mine to the Finished Product." The exhibits of the mining, dock and steamship companies include relief maps, models and photographs illustrating the taking of ore from the mines and its transportation to the blast furnaces. Some of the exhibits by the subsidiary companies include the following:

American Bridge Company, New York, N. Y.—General view photographs and bottom chord sections of arch of the Hell Gate bridge. Photographs of the Panama Canal showing materials supplied. I-bars as used in new Quebec bridge. Locomotive turntable.

American Sheet & Tin Plate Company, Pittsburgh, Pa.—Models, specimens, photographs and lantern slides showing the sheet steel used for building construction, farm structures, railroad cars, etc.

American Steel & Wire Co., New York, N. Y.—Wires and cables as used for agricultural purposes, electric railways, signaling, aerial tramways, telegraph and telephone, reinforcing for concrete, also barbed wire, nails, spikes, staples and tacks, wire rope, electrical wires and cables, horse shoes, rail ties, round, square and odd-shaped wires and shafting for manufacturing purposes, flat wire and springs, music wire, wire hoops and sulphate of iron.

Carnegie Steel Company, Pittsburgh, Pa.; Illinois Steel Company, Chicago, Ill., and Tennessee Coal, Iron & Railroad Company, New York, N. Y.—Models of coke ovens in operation. Models of blast furnace operation. Steel making and rolling mill operation. Testing laboratory and finished steel exhibit.

Lorain Steel Company, Lorain, Ohio.—Special track work exhibit, consisting of various types and models of rails in tracks designed for use by electric street and interurban railways, track layouts and electric welding.

National Tube Company, Pittsburgh, Pa.—Samples illustrating each phase of the welded tubular industry, including Shelby Seamless steel products and Kewanee products.

Universal Portland Cement Company, Chicago, Ill.—Cement products and photographs, models, etc., illustrating the manufacture and various uses of cement and concrete. Transportation line photographs showing bridges, railroad yards, shops, tracks and trains.

United States Steel Products Company, New York, N. Y.—Models of steamships owned and operated by the company, map of location of branch offices and agencies in routes covered by steamship lines and sales booths.

The exhibit of the United States Steel Corporation was awarded a gold medal. The awards for the exhibits of the various subsidiary companies were described in the *Railway Age Gazette* of September 10, page 487.

RAILROAD AID TO GALVESTON

That railways often do notable public service outside their usual functions as carriers of persons and property, and that in many communities the public spirit of railway officers is one of the people's valuable assets, is well known to those who take an interest in matters of this kind. This was strikingly illustrated on the occasion of the recent Galveston storm and flood, officers of the Southern Pacific (Sunset Route) and the Santa Fe restoring the water supply of the city when its 40,000 people were dependent for fresh water almost entirely on supplies brought from the mainland by boats. Noticing in Texas papers commendatory references to the railroads' activities we inquired of an officer of one of the roads concerned as to what had been done, and from his reply take the following narrative:

The city is supplied with water from Altaloma, on the mainland, about 18 miles distant, through a cast-iron main 30 in. in diameter. Previous to the construction of the causeway across the bay, three years ago, the water pipe lay on the bottom of the bay about 600 ft. from the causeway. When the causeway was built a new 30-in. line was laid in the roadway, with gate valves at each end.

The storm of August 16 and 17 caused bad breaks both at the north and the south ends of the bridge. (The bridge proper is 2,437 ft. long, with earth approaches at the north end 2,647 ft. long, and at the south end 3,558 ft. long. The earth roadway was washed out in a number of places, so that the pipe had dropped and was covered with some two feet to seven feet of water.

The city government had such a multiplicity of perplexing problems on its hands that the water system was not attended to very promptly, but when finally the valves were set to turn water into the pipe on the bottom of the bay, it was found that this also was broken.

The railroad men met in Galveston on Friday evening, the 20th, F. G. Pettibone, vice-president and general manager, representing the Gulf, Colorado & Santa Fe, and I. A. Cottingham, assistant general manager, in charge of engineering, representing the Galveston, Harrisburg & San Antonio. There was also present John Sealy, a prominent banker of Galveston and president of the Galveston Wharf Company. It was at once seen that the restoration of the 30-in. pipe was a task of much magnitude, and Mr. Cottingham suggested that an 8-in. pipe be laid across the causeway. This was believed to be practicable, because although the earth roadway was badly washed the sheet piling was nearly or quite intact throughout.

While Mr. Cottingham was at the causeway about noon on the 21st a committee of citizens came out in a boat and handed to him a letter, addressed to Mr. Pettibone and himself, giving them full power in the matter of securing a supply of water and authorizing the necessary expenditures.

Measures were at once taken to secure a supply of 8-in. pipe. In the meantime it was made certain that the line across the bottom of the bay could not be used, about 800 ft. of it having been carried away.

Officers of the Southern Pacific at Houston, summoning the shop and other forces of the company at that city, had two miles of iron pipe loaded on the cars in that city on that day (Saturday) and by daylight the next morning (Sunday) had this pipe in Texas City. This was the nearest point that could be reached by rail, and from here the pipe had to be taken the eight miles to the bridge by a barge. The work of loading the barge could not be done rapidly, and the tug which towed it broke down in the middle of the bay, but the pipe finally reached the causeway Sunday night. Here there was further ill luck, the barge running aground; but the pipe was finally delivered Monday morning, and by that time large forces of bridge men and other workers with tools had been brought to the ground by the Southern Pacific and the Santa Fe.

The men began distributing the pipe at daylight Monday morning, and by 9 o'clock were putting some of it in place. The workmen were divided, and gangs of pipe layers were put at work at five places. As the gangs met the sections of 8-in. pipe

were connected by means of sleeves made of pieces of 10-in. pipe, sealed with lead joints.

The length of pipe laid at the north end was 3,700 ft., and at the south end 1,700 ft. On the bridge proper the 30-in. pipe was all right, and the 8-in. line was connected with this at the ends by plugging up the ends of the large pipe and tapping the smaller pipe in the center of the plug. The plugs were made in the Houston shops of the Southern Pacific, out of boiler plates. These plugs were finished late on Sunday night and sent to Texas City by a special train. The line was nearly completed, ready for the water to be turned in on Tuesday at 10:30 a.m., but just then there came up a heavy rain, with strong wind, which necessitated suspending the work for over two hours. Several hours more were used up because of some difficulty on the part of the forces of the city in managing the valves at the south end, but water was finally turned on about 7 p.m. Tuesday.

The 8-in. pipe was, of course, too small to meet all of the needs of the city, but it supplied more than 2,000,000 gal. a day and furnished water in the lower stories of buildings throughout the city; this enabled the electric light and the street car companies, as well as many other industries, to resume operations.

TRAIN ACCIDENTS IN AUGUST¹

The following is a list of the most notable train accidents that occurred on railways of the United States in August, 1915:

COLLISIONS

Date	Road	Place	Kind of Accident	Kind of Train	Killed	Inj'd
4.	N. Y., N. H. & H.	Atlantic	rc	P. & P.	0	13
*4.	Atchison, T. & S. F.	Richfield	bc	P. & F.	3	6
5.	Balt. & Ohio	Wash'n. C. H.	xc	P. & F.	0	9
†12.	B. & O. S. W.	Orient	rc	F. & P.	7	16
13.	Boston & M.	Fitchburg	rc	F. & P.	0	0
27.	Int. & G. N.	Mart, Tex.	bc	P. & F.	1	14
28.	Norfolk & W.	Gary, W. Va.	bc	P. & F.	1	22
30.	Boston & M.	Revere	xc	P. & F.	0	1

DERAILMENTS

Date	Road	Place	Cause of Derailment	Kind of Train	Killed	Inj'd
2.	Denver & R. G.	Moark, Utah	Malice.	P.	0	15
3.	Pennsylvania	Church Hill	Slide	P.	2	5
4.	Ches. & Ohio	Pottomoi	Malice	P.	0	0
5.	Norfolk & W.	Swords Crk.	Unx.	F.	2	3
5.	Del. & Hudson	Olyphant	D. track.	F.	1	0
9.	Pennsylvania	Elders, Ind.	Malice.	P.	2	4
12.	Pennsylvania	Titusville	D. switch.	P.	0	27
†17.	Ches. & Ohio	McCorkle	B. rail.	P.	4	8
19.	Western Pacific	Halleck, Nev.	B. track.	P.	0	25
20.	Fort Worth & D. C.	Quanah, Tex.	D. switch.	P.	0	8
†21.	Georgia & Fla.	Swainsboro	D. track.	P.	1	8
†27.	Atchison, T. & S. F.	Date Creek	Flood.	P.	4	17
30.	Mobile & Ohio	Tibbee		F.	1	0
30.	Chicago & Alton	Rush Hill	Unx.	P.	0	21

The trains in collision at Atlantic, Mass., on the 4th were a northbound local passenger train and a northbound suburban express, the express running into the side of the rear car of the local. The local was moving at low speed through a cross-over and the express was running about 35 miles an hour. The rear car of the local, a baggage car, was overturned and the next car, a combination baggage and passenger, was considerably damaged, but there were no persons in the rear car, and but a few in the next one, and the total number of injuries is reported as 13, all slight. The engineman of the express appears to have disregarded a stop signal.

The collision near Richfield, Cal., on the 4th was caused by a runaway freight car, which had escaped control on the Olinda branch and had run, at high speed, to the main line, at Richfield. Moving eastward at very high speed, it crashed into the head of westbound passenger train No. 51, consisting of a locomotive and three cars. The freight car contained oil, which immediately took fire, and the wreck was mostly burned up. An express messenger was killed, the engineman and the fireman were fatally injured, but the passengers escaped with minor injuries.

In the collision at Washington Court House, Ohio, on the 5th, westbound passenger train No. 105 of the Baltimore & Ohio

¹Abbreviations and marks used in Accident List.

rc, Rear collision—bc, Butting collision—xc, Other collisions—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, Unexplained—derail, Open derailing switch—ms, Misplaced switch—acc, obst, Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of locomotive on road—fire, Cars burned while running—P, or Pass., Passenger train—F, or Ft., Freight train (including empty engines, work trains, etc.)—* Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

Southwestern, was struck by a Cincinnati, Hamilton & Dayton freight train at the crossing of the two railroads, turning a Pullman car of the passenger train down the embankment and damaging the engine of the freight train. Seven passengers, the Pullman conductor and the engineer of the freight train were slightly injured. The collision was due to an error in judgment on the part of the freight engineer, who miscalculated the distance and the weight and speed of his train.

The trains in collision at Orient, Ohio, on the morning of the 12th, about 3 o'clock, were a southbound excursion train and a through freight train following it. The excursion had been stopped to take water and the freight train ran into the rear end of it. Seven passengers were killed and 16 injured. The collision was due to excessive speed on the part of the freight train, which had been warned that the passenger was ahead of it. It appears that the passenger train had been delayed by washouts and had consumed an hour and twenty minutes in covering a distance of 13 miles. The flagman had flagged the freight three times and, having notified the engineer of the freight that the passenger would stop at Orient for water and to let off passengers, had not thrown off fuses approaching that point; and he had not gone far, if at all, with red signals after stopping. The freight approached on a descending grade. It was running under rule 108, which allows a freight train, following a passenger train from a non-telegraph station, to leave such station ten minutes behind the passenger and to run under control to the first telegraph station.

The trains in collision at Gary, W. Va., on the 28th were westbound local passenger train and a locomotive without train which had escaped control at East Fitchburg and had run at high speed, unattended, to a point west of the station, where it struck the passenger train, crushing the rear platform. No person was injured. The passenger train had been standing in the station, but was warned of the coming runaway engine and had started forward. The rear car was empty. How the locomotive escaped control has not been determined.

The collision at Mart, Tex., on the 27th was due to a misplaced switch. A northbound passenger train ran into some freight cars standing on a side track. A trespasser was killed and 13 passengers and the fireman were injured. The responsibility for the misplacement of the switch has not been fixed.

The trains in collision at Gary, W. V., on the 28th were westbound passenger No. 1 and an eastbound freight. Both engines and several cars, including two passenger cars, were badly damaged. One fireman was killed and 21 passengers were injured.

The trains in collision on the Boston & Maine at Revere, Mass., on the 30th were a northbound passenger and a freight which was using a crossover without proper authority. Two freight cars were ditched. One trainman was injured.

The train derailed at Moark, Utah, on the 2d was the westbound "Scenic Limited" and two sleeping cars were overturned. The train was running at about 45 miles an hour, but the cars were of steel and no passengers were seriously injured, though 14 passengers and one waiter were considerably shaken. The derailment was due to malice, an anglebar being thrown under the train. The miscreant was caught and has confessed.

The train derailed at Church Hill, Pa., on the 3d was northbound express No. 63, and the engine was ditched. The train was running at full speed and four passenger cars went off the rails, but remained upright. The engineer and the fireman were killed and five passengers were slightly injured. The derailment, occurring at 1 a. m., was caused by a landslide due to a cloudburst. At stations two miles north and five miles south, the shower was not unusually heavy. August 3 was the date of the flood disaster at Erie.

The train derailed at Pottomoi, Va., on the 4th was eastbound passenger No. 46, and the engine and baggage car were overturned. The train, running about 40 miles an hour, was thrown off the track at a misplaced switch, but no person was seriously injured. The switch had been maliciously misset by a negro boy, who subsequently was arrested.

The train derailed at Swords Creek, Va., on the 5th was freight No. 86, and the locomotive was overturned. Several freight cars fell down a bank into a river. The engineer and fireman were killed and three other train men were slightly injured. The cause of the derailment was not determined, but it is believed to have been due to an obstruction on the track.

The train derailed at Olyphant, Pa., on the 5th was a switching freight and the engine was overturned. The engineer was killed. The derailment was due to insecure roadbed, made soft by heavy rains.

The train derailed on the Pennsylvania at Elders, Ind., on the night of the 9th was an eastbound express passenger, and the engine and one baggage car were overturned. The engineer and fireman were killed and four passengers were injured. The derailment was caused by an open switch, misplaced, evidently, with malicious intent.

The train derailed at Titusville, Pa., on the 12th was southbound passenger No. 66, and the engineer, fireman and 25 passengers were injured. The engine was thrown off the track at a facing point switch at a mill and demolished a freight car and a part of the building. The dining-car was ditched. The engine room of the mill was wrecked and the building took fire, but the city fire department soon extinguished the flames.

The train which was derailed on the Coal River Railway, a branch of the Chesapeake & Ohio, at McCorkle, W. Va., on the 17th, was passenger No. 214 and the baggage car and smoking car were crushed. Four passengers were killed and eight others injured. The derailment was due to a broken rail; but the chief damage was caused by a fall of rocks from the roof of a tunnel through which the train was passing. The derailed cars knocked down the props supporting the roof. The Public Service Commission of West Virginia confirmed a report, made by E. E. Winters, the commission's inspector, holding the railroad company negligent in not laying guard rails through the tunnel. Guard rails, he says, would have guided the wheels of the derailed cars so that the timber lining of the tunnel would not have been knocked down. The inspector also recommended a better system of daily inspection of tracks.

The train derailed at Halleck, Nev., on the 19th was westbound passenger No. 1 and 25 passengers were injured, all but three of the injuries being slight. The train was running about 48 miles an hour and four cars were overturned. The cause of the derailment was not determined, but was believed to be a breakage in the forward truck of the baggage car.

The train derailed near Quanah, Tex., on the 20th was northbound passenger No. 3 and two passenger cars were overturned. Eight passengers were injured.

The train derailed at Swainsboro, Ga., on the 21st was northbound passenger No. 12 and the engine, tender and two cars were overturned. One passenger, who was leaning out of a window, was killed and six passengers and two employees were slightly injured. The cause of the derailment was a low spot in the track, due to heavy rain. The train was running at about 25 miles an hour, and the tender was the first vehicle to leave the rails. Most of the damage was due to the derailed truck striking the guard timbers on a bridge.

The train derailed at Date Creek, Ariz., on the 27th was a northbound passenger. Three passengers and one employee were killed and 17 persons were injured. The cause of the derailment was the weakening of a bridge by a flood, which was due to a cloudburst. The engine and first two cars fell through to the stream below.

The train derailed at Tibbee, Miss., on the 30th was a southbound freight and six cars were wrecked. One brakeman was killed. An officer of the road advises that the cause of the derailment was not ascertained.

The train derailed near Rush Hill, Mo., on the afternoon of the 30th was eastbound passenger No. 16, and 21 passengers were slightly injured. Only two cars left the rails. The tender was the first vehicle to run off; but what was the trouble with it has not been determined.

Traveling Engineers' Association Convention

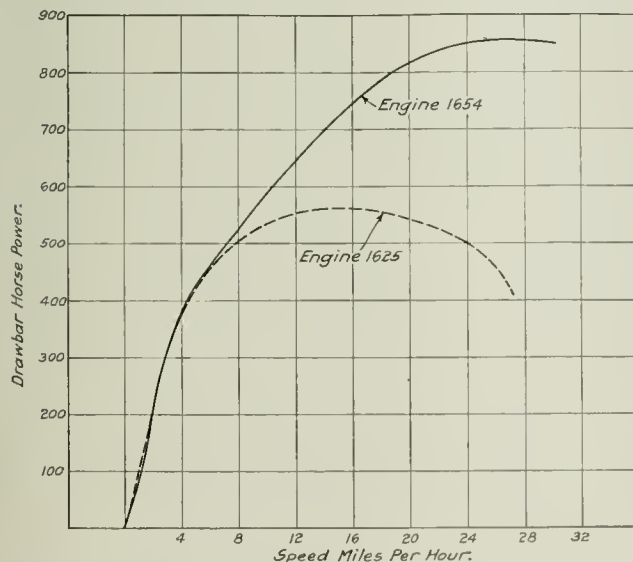
Continuation of the Proceedings Covering Papers on Tonnage Rating, Locomotive Appliances and Valve Gears

An account of the opening sessions of the twenty-third annual convention of the Traveling Engineers' Association, including abstracts of the committee reports on Smoke Prevention and Training New Men for Firemen was published in the *Railway Age Gazette* of September 10, page 473. Following is a report of the remainder of the convention:

MODERN APPLIANCES ON LARGE LOCOMOTIVES

Superheaters.—The fire-tube superheater has come to be almost universally considered as an essential part of the locomotive. The economy it affords is recognized, and it is, without doubt, one of the most important factors in the development of the locomotive, in that it has been largely responsible for the large locomotive of to-day. Two important changes that have been introduced since the last report of the committee on superheaters are a modified header design and a continuous pipe or torpedo unit. The construction of the header is such as to prevent the occurrence of stresses due to unequal expansion and contraction, by casting the saturated steam passage-ways free at one end. The continuous pipe unit is made by forging the return bends on the ends of the unit pipes. This unit reduces the restriction to the flow of gases.

The application of the superheater to the small locomotive raised the capacity limit 25 per cent to 30 per cent, and by the



(Engine 1654, superheated steam; Engine 1625, saturated steam)

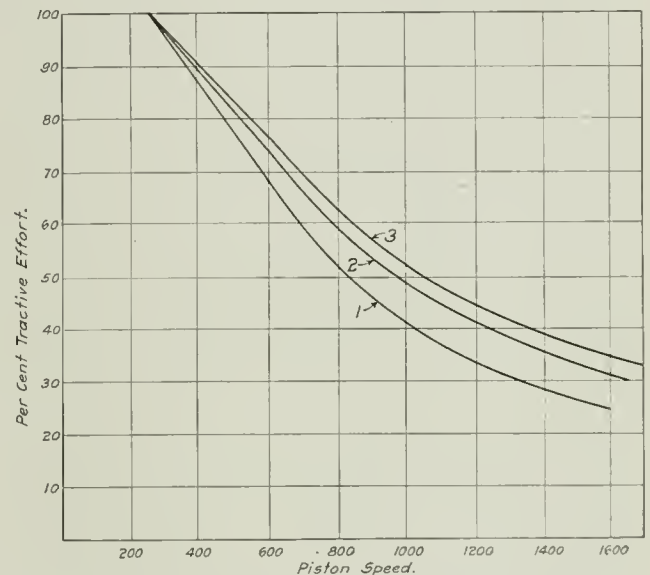
Average Drawbar Horsepower Developed by Superheated and Saturated Steam Locomotives at Different Speeds

adoption of the superheater, larger engines, greater train lengths and faster schedules have been made possible.

The superheater under actual operating conditions saves 20 per cent of the total fuel burned and from 30 per cent to 35 per cent of the water used over the saturated locomotives developing the same horsepower. The superheater locomotive may be worked at longer cut-offs and at higher speeds, making possible longer trains and faster schedules than is possible with identical saturated locomotives, under the same conditions. The comparative curves shown give the average draw-bar horsepower developed at corresponding speeds of two Class H-21 locomotives on the Erie Railroad—engine 1625 used saturated steam and engine 1654 superheated. These curves show one of the advantages of superheating a locomotive, whose ability to haul full tonnage train over a railroad on a faster schedule, is limited by

the capacity of the engine boiler to furnish steam to the cylinders.

Tests made on the Central of Georgia with a superheater and a saturated steam locomotive in passenger service under practically the same conditions showed that for the superheater locomotive the cost of fuel per hundred miles run was \$5.01, as against \$5.89 for the saturated steam engine. On a basis of the fuel used per 1,000-ton miles the performance of the saturated steam locomotive was only 80.28 per cent as good as the superheater locomotive. The Grand Trunk has applied superheaters to a good many saturated steam locomotives and the benefit derived as



Curves Showing Possibilities of Increased Capacity from Superheating

shown by tests has been so much in favor of the superheater locomotive that the management has decided to superheat all road engines as they pass through the general shops. The following is a comparative result of tests with two simple Consolidation locomotives, one (623) having been converted to a superheater:

	Engine 825 Simple Con- sol. Satu- rated Steam.	Engine 623 Simple Con- sol. Super- heat Steam.	Increase or Decrease of Superheated as compared with Saturated Locomotive. (per cent.)
Average number of cars in train...	51.88	38.	26.07 D.
Total gross wt. of train in tons...	2,065.18	2,153.07	4.02 I.
Average weight per loaded car....	39.62	57.79	45.08 I.
Total train miles.....	125.10	125.	.15 D.
Total car miles.....	6,497.	4,759.	26.07 D.
Total ton miles.....	258,964.	269,559.	4.09 I.
Coal consumed in pounds.....	21,307.	13,400.	31.01 D.
Coal cons'd in lbs. per train mile....	170.12	106.75	37.02 D.
Coal cons'd in lbs. per car mile....	3.27	2.95	9.08 D.
Coal cons'd in lbs. per ton mile....	.084	.050	30.04 D.
Total water evaporated in lbs.....	137,614.	98,213.	28.06 D.
Water evaporated per lb. of coal...	6.51	7.36	13.00 I.
Average boiler pressure.....	200.04	173.65	13.03 D.
Average speed in mile per hour....	22.31	26.00	16.05 I.
Miles run with one ton of coal....	11.82	18.76	58.07 I.
Actual running time.....	5 H. 30 M.	4 H. 49 M.	12.04 D.

The application of the superheater to the locomotive boiler, frequently inadequate as to heating surface, necessitates a reduction of about 15 per cent or 20 per cent in the tube heating surface. Notwithstanding this fact the use of superheaters has resulted in greater locomotive capacity. As an illustration of this fact, the accompanying diagram is presented. It shows cylinder tractive effort in per cent plotted against piston speed. The low-

est curve, No. 1, very fairly represents the speed factor for an average saturated steam locomotive. Curve No. 2 similarly represents the average modern superheated steam locomotive, using between 200 and 250 deg. of superheat. The greater tractive effort available is due to the fact that a longer cut-off is possible with the superheater engine than with saturated steam at the same speeds.

If the superheater designer were permitted to use a size of tube different from the two present standards, it is possible to obtain in a superheater boiler an evaporating surface practically as great as in the saturated steam boiler. With a boiler and superheater thus arranged, a greater capacity may reasonably be expected, and a curve approximately that shown as No. 3 may be confidently looked forward to in the near future. This curve is representative of locomotives using 350 to 400 deg. of superheat.

There have been several pyrometers put in service on superheater locomotives during the past year, and as the engineers become more familiar with the purpose and operation of the pyrometer, they realize more and more its importance. Those of the electrical type have been in service and operating continuously for a sufficient length of time to establish the fact that they may be depended upon in locomotive service. When the pyrometer fails to read 600 and 650 deg. when the engine is working steam, it is an indication to the engineer that he is not handling the locomotive so that the maximum saving which the superheater makes available is being obtained.

Grates.—Judging from the number of replies received there are a large number of different designs of grates, varying in air space from 25 per cent to 50 per cent of total grate area. The committee is not in a position at the present time to recommend any particular design, but special attention should be given to the amount of air opening in the grates, giving them as large a per cent of the total area as possible (40 per cent being a fair average).

Mechanical grate shakers are a decided advantage on heavy power and engines with large grate areas. They are of great assistance to the fireman in keeping the fire clean and in getting sufficient air through the grates, thus insuring thorough burning of the coal and gases. This can be accomplished without any excessive physical exertion. This device probably effects the greatest saving at the ash-pit when fires are being cleaned or dumped, as locomotives which were consuming 35 to 40 minutes from ash-pit to roundhouse are now consuming 10 to 20 minutes, and it only takes two men to handle the engine on the ash-pit, where it formerly took four with the hand shaker—a reduction of 50 per cent in labor.

Drifting Valves.—The committee believes that some means should be provided to admit a sufficient amount of steam to cylinders and valve chambers, not only on superheat locomotives, but on any locomotive having cylinders of a large diameter. This will not only prevent carbonization, but will cause the engine to drift much more smoothly. The rods will require less keying up and the maintenance of wedges and journal bearings will be easier and piston heads and cylinders will not wear as fast.

Brick Arches.—Several years ago the brick arch was looked upon and spoken of only as a fuel-saving device, but the constantly increasing demand for greater capacity has resulted in changing its recognized function from a fuel saver to a capacity increaser. The arch increases the boiler capacity directly by aiding combustion and by reducing the heat losses. Naturally this results in increasing boiler efficiency. The arch tubes which support the brick, add valuable heating surface and increase the circulation of water through the boiler. The brick arch separates the fuel bed from the tubes and forms a sort of combustion chamber in what would otherwise be a straight firebox. The efficiency of the arch increases as the rate of combustion or the amount of coal burned per square foot of grate area per hour increases. When burning 30 lb. of coal per hour per square foot grate area, we may expect an efficiency of 3 per cent; when burning 100 lb. per hour per square foot of grate area, we may expect an efficiency of 10 per cent., etc.

Tests indicate that at a rate of combustion of 100 lb. of coal

per square foot of grate area per hour, the arch will effect a reduction of 42 per cent in spark losses. This would mean an increase in boiler efficiency of 7 per cent, due to this one item. Reports from many roads indicate a smoke reduction of 50 per cent can be obtained by the use of the arch, and on most roads the brick arch, together with proper firing instructions, have proved sufficient to overcome objectionable smoke and to keep within the law.

Flange Oilers.—Ever since locomotives have been in use, the wear on the wheel flanges has been one of the, if not the greatest, sources of annoyance and expense in maintaining these powerful machines in service. The modern locomotive and high speed demanded has increased instead of decreased it. A very conservative estimate of the loss to one engine for one turning of tires on account of flange wear is \$219. The following is an estimate of the mileage a locomotive will make between turning of tires for flange wear, with and without a flange oiler:

FREIGHT		PASSENGER	
Miles Without Oiler	Miles With Oiler	Miles Without Oiler	Miles With Oiler
9,000 to 12,000	25,000 to 42,000	15,000 to 25,000	60,000 to 84,000

The rapid wear of the rails can be eliminated to a certain extent by the use of a flange oiler which positively delivers a jet of asphaltum oil against the flanges of the locomotive driving wheels. On one division of the Erie the rail saving on curves is 66 per cent. On the Delaware, Lackawanna & Western the saving on the rails on curves has warranted the equipping of locomotives with the flange oiler. While saving the rails on curves, the saving on the locomotive driving wheel tires on this road has been over 50 per cent. Positive proof is given by a number of roads that the flange oiler does prevent derailments.

It has been the impression that any crude oil would do to use with any system of flange oiling. Service tests have proven that results cannot be obtained unless the oil contains from 40 per cent to 60 per cent of asphaltum in solution and is low in grease and paraffine. All oils that are low in asphaltum and high in grease and paraffine will run down on the tread of the driving wheel, causing slipping and tending to defeat the purpose of the device.

Mechanical Stokers.—In answer to questions submitted to the membership, the following replies were received: The stoker engines burn more coal, but as the grade of coal stoker fired is usually inferior to the coal used for hand firing, this feature should not be criticised too severely. With the same quality of coal there is very little difference. The hopper sometimes becomes clogged, causing stoker engine to stop in wet and freezing weather, but this depends largely on the watchfulness of the fireman. When the stoker fails, it usually causes an engine failure, due to the light fire carried and the grade of coal used, making it impossible for a man to pick up the shovel and get the fire in condition without an engine failure, except in cases where the stoker is being worked very light.

In summing up, the advantages of the mechanical stoker are many. It is applied to heavy freight locomotives primarily to work the locomotive to its full capacity, regardless of the conditions under which it is operated, which, of course, means increased tonnage or increased average speed of freight trains under conditions where the tonnage is fixed—in other words, to increase the ton miles per hour over a division. Locomotives equipped with mechanical stokers carry a much lighter fire, which, of course, gives better combustion. A more uniform fire-box temperature is obtained, and correspondingly less flue and fire-box trouble. With the scatter system of firing a locomotive the smoke density will remain more uniform with the stoker-fired locomotive. The application of mechanical stokers to locomotives has made it possible for any fireman to handle any locomotive, regardless of the manner in which it is worked. By the use of the mechanical stoker the fireman is able to follow his engine more regularly, makes correspondingly more money, and, as a result, is better satisfied, a condition which makes it less difficult to keep a locomotive in service, especially on a division where the conditions of firing are particularly severe and the

overtime runs high, due to the relief of firemen in the hot summer months.

On a number of roads a cheap grade of fuel is purchased especially for stoker-fired locomotives, and on other lines where conditions are such that small run-of-mine coal is supplied, an economy is effected in that the run-of-mine coal is screened and the poor coal is set aside for stoker-fired locomotives, leaving a much better grade of fuel for the hand-fired locomotives.

The following is a list of number of stokers in active operation, of different types:

Street	593	Gee	1
Crawford	301	Ayres	1
Standard	28	Kincaid	1
Hanna	18		

Power Reverse Gear.—Judging from the replies received, the power reverse gear is the ideal gear and is a decided advantage in freight and switching service and will soon pay for installation, due to time saved in making up trains and switching. In some cases the power reverse gear has not given the results expected of it in fast passenger service, principally owing to the neglect of certain small but important items of maintenance. The use of the screw reverse gear is advocated by many roads for fast passenger service owing to the possibility of very fine adjustment, but its principal drawback is its slowness in reversing, making it difficult to take slack.

Coal Passer.—It has been the experience of the chairman of the committee on the railroad with which he is connected, that locomotive tenders equipped with coal passers are a valuable asset to modern power. This device places the coal within easy reach of the fireman and eliminates the furnishing of men at different points to shovel the coal ahead. It also allows the doubling of divisions without taking coal, thereby reducing the amount of coal which has to be handled to the farthest terminal. The cost of maintenance of the coal passer has been found to be very low.

Automatic Fire Door.—The butterfly type of the automatic fire door is generally preferred to either the horizontal or vertical types. It is the smoothest working door, gives the least trouble on the road, and requires less repairs at terminals. By the use of this type of door, single-shovel firing is accomplished, which prevents a large amount of cold air from entering the fire-box and materially reduces the amount of fuel required to keep up steam pressure.

The report is signed by J. E. Ingling (Erie), chairman; P. J. Miller (N. Y. C. West.); H. F. Henson (N. & W.); W. A. Buckbee (Loco. Sup. Co.), and A. G. Kinyon (S. A. L.).

DISCUSSION

Representatives from the Erie favored highly the use of pyrometers on superheater locomotives, calling attention to the fact that a loss of 20 deg. of superheat will affect the evaporation of water one pound per indicated horsepower. The pyrometer also serves to give the fireman a much closer check on the condition of the fire and shows the engineer whether or not he is getting the most out of the engine.

The graphite lubricator has been found by several roads to materially increase the life of the piston packing rings. Tests on the Delaware, Lackawanna & Western demonstrated that by its use the valve leakage was reduced 51 per cent.

The question of using superheater or perfection valve oil received considerable attention. In almost every case the superheater oil was believed to be unsatisfactory in the air compressors, some roads providing separate lubricators with perfection oil to serve these attachments, while other roads use perfection oil for both the compressors and the cylinders. A. G. Kinyon contended that if it were possible to eliminate the air from the cylinders while the engine is drifting better results can be obtained with perfection oil than with the superheater oil, inasmuch as in the manufacture of superheater oil with its higher flash point its lubricating qualities are affected. Some roads, in an endeavor to prevent air getting into the cylinders, have eliminated relief valves and substituted drifting valves with material success.

SCIENTIFIC TRAIN LOADING; TONNAGE RATING

By O. S. BEYER, JR.

Chicago, Rock Island & Pacific

Scientific train loading or tonnage rating takes into consideration, as far as may possibly be determined, every element affecting the economical movement of freight trains. These elements may be summarized as follows: Drawbar pull of locomotive; resistance of freight cars of all weights; grades; curves; condition of track; temperature, weather and wind; opposing traffic; length of division, and speed.

The object of a scientific tonnage rating system primarily is to give an engine the same amount of work to do regardless of whether a train is made up of heavy cars or light cars, or a mixture of them. Its further object is to load engines at all times in accordance with conditions of weather, temperature, wind, track, etc., so that freight will always be handled for the least expense possible per ton-mile.

The most scientific and simple system yet devised is the adjusted tonnage rating system. This system, when carried out to its logical conclusion, as its name implies, endeavors to adjust the loads of freight trains as exactly as possible to suit the conditions existing. In order to understand how the adjusted tonnage rating system accomplishes this object, its development for a division and application will be described.

The first element to be considered is the drawbar capacity of the locomotive used in hauling freight trains over the division, in conjunction, of course, with the grades and curves of the division and the desired speed of the train over the division. The sustained drawbar pull of an engine equals the sustained theoretical tractive effort of the engine less the effort of the engine lost to move itself and tender. The sustained theoretical tractive effort of the locomotive at a speed above 7 to 10 m.p.h. depends on the speed of the pistons at these higher speeds and the capacity of the boiler to furnish steam. This tractive effort, for a saturated or a superheated steam locomotive, is secured by the aid of the figures shown in Table I—first by calculating the piston speed of an engine in feet per minute at the speed at which the engine is to run over the ruling grade and then referring to Table I to determine what speed factor corresponds to the piston speed calculated. The product of the maximum theoretical tractive effort when multiplied by the speed factor will be the sustained tractive effort of the engine at the speed considered.

TABLE I
Speed Factors for Saturated Superheated Steam Locomotives at Various Piston Speeds

Piston Speeds Ft. per Min.	Speed Factor Saturated	Speed Factor Superheated
100	1.000	1.000
200	1.000	1.000
300 .....	.954	.954
400 .....	.863	.863
500 .....	.772	.772
600 .....	.680	.682
700 .....	.590	.605
800 .....	.517	.542
900 .....	.460	.490
1,000 .....	.412	.445
1,100 .....	.372	.405
1,200 .....	.337	.371
1,300 .....	.307	.342
1,400 .....	.283	.318
1,500 .....	.261	.297

Next, it is necessary to make allowance for the power lost by the engine moving itself. This depends principally upon the weight of the engine in tons. The power lost by the engine lifting itself up grade is equal to twenty times the total weight of the engine in tons times the grade in per cent. The power lost by the engine moving itself, i. e., rolling its own wheels on the rails, may be divided into three subdivisions:

Resistance of drivers in pounds
22.2 lb. times weight on drivers in tons.
Resistance of trucks in pounds
6 lb. times weight on trucks.
Resistance of tender in pounds
Resistance per ton of tender (see Table II) times weight of tender in tons.

If the locomotive is obliged to traverse a curve, then a further deduction of one pound per ton of locomotive per degree of curve should be made. Inasmuch as very high speeds do not enter into the consideration, it is not necessary to make allow-

ance for air resistance to the locomotive in determining its sustainable drawbar pull.

All those various resistances, namely, that due to grade, drivers, engine trucks, tender, and curvature, are then added together and subtracted from the sustained tractive effort which the engine is capable of maintaining at the speed at which it is to negotiate the ruling grade. Mathematically the foregoing statement may be expressed in the following formula:

$$S. D. B. = \frac{.8 F P d^2 S}{D} - W_G (20g + 1 C) - 22.2 W_D - 6 W_T - r$$

in which S. D. B. represents sustainable drawbar pull of engine in lbs.

- F — Speed factor of engine running at speed under consideration as determined from Table I.
P — Maximum boiler pressure of engine in lbs. per sq. in.
d — Diameter of engine cylinders in inches.
S — Stroke of engine cylinders in inches.
D — Diameter of engine drivers in inches.
W_G — Total weight of engine and tender, fully loaded, in tons.
g — Per cent of grade.
W_D — Weight in tons of engine on drivers.
W_T — Weight in tons of engine on trucks.
T — Weight of tender in tons, fully loaded.
r — Resistance in pounds per ton of engine tender considered as a car (determined from Table II).
C — Degree of curvature.

RESISTANCE OF TRAIN.

Having found the drawbar pull the engine will sustain negotiating the ruling grade, it next becomes necessary to determine the weight of train this amount of drawbar pull will move up the grade at the speed desired. The resistance of a freight train depends directly on weight of the train, average weight of cars composing train, grade, curvature, speed at which train is required to move up grade, temperature, and wind.

Train resistance may be classified, generally speaking, under two heads: Internal resistance and external resistance.

The internal resistance of a freight train is that resistance which arises principally from the friction of the car journals in their bearings, the rolling of the car wheels on the rails, the friction of the car wheel flanges on the rails, friction at side bearings and center bearings, etc.

The external resistance of a freight train is that which arises from sources outside of the train itself and is principally composed of the resistance due to grade, wind and curvature.

Internal Resistance of Freight Trains.—The internal resistance of a freight train, or, more simply speaking, of a freight car, does not vary directly in proportion to the weight of the car in tons. For this reason an engine can haul more tonnage in heavily loaded cars than in light or empty cars. And so in loading freight trains, the adjusted tonnage rating system recognizes this feature and makes it possible to load each engine with tonnage according to the number of light or heavy or both kinds of cars composing the train. By referring to Table II it will be noted exactly how the internal resistance varies per ton of cars weighing 15 to 75 tons for different speeds.

TABLE II

Value of Internal Resistance in Pounds per Ton Gross Weight of Freight Cars of Various Weights at Different Speeds

Weight of cars in tons	Pounds of Resistance per 5 m. p. h.	10 m. p. h.	15 m. p. h.	20 m. p. h.
15	7.62	8.19	8.82	9.56
20	6.77	7.29	7.88	8.53
25	6.02	5.50	7.01	7.60
30	5.38	5.80	6.28	6.82
35	4.82	5.20	5.64	6.11
40	4.39	4.69	5.06	5.50
45	4.01	4.28	4.60	5.00
50	3.72	3.96	4.24	4.60
55	3.49	3.69	3.94	4.27
60	3.30	3.49	3.73	4.04
65	3.16	3.34	3.57	3.88
70	3.05	3.24	3.48	3.79
75	3.00	3.18	3.41	3.71

The temperature of the atmosphere and the condition of the track affect this internal resistance. As the temperature decreases or when the condition of the track is poor, the internal resistance is greater. Consequently, when determining the proper tonnage for an engine, these facts must be taken into consideration largely according to judgment. The figures given

in Table II have been determined by a long series of tests at summer temperature on track which was in very good shape. Hence these figures should be used when determining the maximum train loads possible under ideal conditions.

External Resistance of Freight Trains.—The external resistance of freight trains or cars arises, as pointed out previously, from grade, curvature and wind. The grade resistance of freight cars is the same as that of locomotives, equaling per ton of car 20 times the per cent of grade. Curve resistance also is determined the same as curve resistance for locomotives. For purposes of tonnage rating under average conditions, an allowance of one pound resistance per ton of car for each degree of curvature has been found very nearly correct.

Wind resistance to freight cars is a variable quantity under usual railway operating conditions. Its effect is best determined as a matter of judgment in the use of the various classes of ratings established (to be described later) according to the actual conditions existing. For instance, on a windy day it would not be policy to rate trains as heavy as on a calm day.

External resistance is not affected by weather or temperature and does not vary practically except in direct proportion to the weight of the train. The length of the train, i. e., the number of cars, has a little to do with curve resistance and wind resistance, but this influence on the whole resistance is too remote to be determined accurately.

The total resistance of a freight train per ton of car weight, as explained in the foregoing, may be summarized and expressed by the following formula:

$$R = v_c + 20g + 1C.$$

in which *R* represents total resistance in pounds per ton of freight car, *v* represents internal or rolling resistance per ton of freight car, depending upon weight of freight car, as determined from Table II at speed under consideration; *g* represents grade, expressed in per cent and *C* represents degree of curvature.

DETERMINATION OF TRAIN WEIGHTS

The weight of train in tons which may be moved at a certain speed over a certain grade and curve is found by dividing the sustainable drawbar pull in pounds of the engine by the total resistance per ton of car. Mathematically expressed, this statement takes the following form:

$$\text{Weight of Train in Tons} = \frac{.8 F P d^2 S}{D} - W_G (20 + 1 C) - 22.2 W_D - 6 W_T - r \div \frac{v_c + 20g + 1C}{1}$$

In order to demonstrate just how the hauling capacity of a locomotive varies according to the different weight cars making up the train, the following example will be of interest. The conditions assumed are:

Consolidation locomotive.....	40,000 lb. maximum tractive effort
Grade	0.3 per cent
Average weight of light cars.....	20 tons
Average weight of heavy cars.....	70 tons
Speed of train up grade.....	10 m. p. h.

The sustainable drawbar pull of the engine at 10 m.p.h. on straight and level track, as determined by the method described, is 35,300 lb. Deducting for grade resistance on a 0.3 per cent grade, this sustainable drawbar pull becomes 34,220 lb.

The resistances per ton of a 20-ton and a 70-ton car at 10 m.p.h. going up a 0.3 per cent grade are as follows:

For a 20-ton car—	
Internal resistance (see Table II).....	7.29 lb.
Grade resistance (.3% × 20).....	6.00 lb.
Total resistance	13.29 lb.
For a 70-ton car—	
Internal resistance	3.24 lb.
Grade resistance (.3% × 20).....	6.00 lb.
Total resistance	9.24 lb.

Consequently the tonnages and number of cars which, under most ideal conditions this 40,000-lb. tractive power Consolidation locomotive can pull over a 0.3 per cent grade at 10 m.p.h. in

20-ton cars (all lights or empties) and in 70-ton cars (all heavies or loads) are respectively:

In 20-ton cars, i. e., lights or empties—		
Weight of train.....	34,220	
	13.29	= 2,575 tons.
Number of cars.....	2,575	
	20	= 129 cars.
In 70-ton cars, i. e., heavies or loads—		
Weight of train.....	34,220	
	9.24	= 3,706 tons.
Number of cars.....	3,706	
	70	= 53 cars.

Thus it is seen that on a 0.3 per cent grade a 40,000-lb. tractive power locomotive can pull 1,131 more tons in trains consisting of 70-ton cars than it can pull in trains consisting of 20-ton cars. When this fact is fully appreciated, the advantage of adjusting the tonnage of trains according to the average weight of all the cars making up the train is completely realized.

The more steep the grade becomes the less the difference in tonnages between the light car trains and heavy car trains. This is accounted for by the fact that as the grade increases the grade resistance, which is constant per ton for all cars, heavy or light, becomes a greater proportion of the total resistance and the rolling or internal resistance, which varies per ton inversely as the weight of the car varies, becomes less in proportion to the total resistance. This is another important fact and should be fully grasped so that it will be clearly understood why the adjustment for difference in car weights becomes less and less as the ruling grade increases.

CAR FACTOR METHOD OF TONNAGE ADJUSTMENT

Having determined, as far as possible, the hauling capacity of a locomotive or class of locomotives over a division, after taking into consideration mathematically all the items which affect the problem, namely, train speed, grade, theoretical drawbar pull of engine, average car weights, curvature, etc., the final problem remains to find the best method of making up trains in the yard so that their tonnage will be equalized or adjusted to suit the hauling capacity of the locomotive, everything considered. It is felt that the best method by which this end is reached is the car factor method of tonnage adjustment.

This method simply provides for the addition of a purely imaginary figure, known as the car factor, to the actual weight of each car, including the caboose, entering into the make-up of a train until the sum of all the actual car weights plus their car factors equals the adjusted tonnage rating over the division of the locomotive to be loaded or rated. Knowing what actual tonnages and how many cars an engine or class of engines may pull over the grades of a division both in light or empty cars and in heavy or loaded cars, as determined mathematically by the process previously explained, it becomes a very simple matter to establish the car factor and the adjusted tonnage rating for the engine and division under consideration. The car factor equals the difference in the tonnages of the heaviest car train and the lightest car train the engine can haul, divided by the difference in the number of cars between the heaviest and lightest car trains. The adjusted tonnage for the engine equals the sum of the actual tonnage of the lightest car train and the number of cars in this train multiplied by the car factor, or, which is the same thing, the sum of actual tonnage of the heaviest car train and the number of cars in this train multiplied by the car factor. To illustrate, take the figures of tonnages and number of cars determined as the hauling capacity of a 40,000-lb. tractive effort Consolidation locomotive on a 0.3 per cent grade:

Weight of 70-ton car train.....	3,706 tons.
Weight of 20-ton car train.....	2,575 tons.
Difference in tonnages.....	1,131 tons.
Number of cars, 20-ton car train.....	129
Number of cars, 70-ton car train.....	53
Difference in number of cars.....	76
	1,131
Hence car factor on 0.3 per cent grade.....	15
	76

And so the adjusted tonnage for 40,000-lb. tractive effort

engine under ideal conditions on 0.3 per cent grade, engine moving at 10 m.p.h., equals:

$$2,575 + (129 \times 15) \dots\dots\dots 4,510 \text{ adjusted tons.}$$

Or, which is practically the same thing:

$$3,706 + (53 \times 15) \dots\dots\dots 4,501 \text{ adjusted tons.}$$

This same theoretical analysis applies to any condition of grades and size of locomotive involved. If carried out for all grades varying from 0 to 2 per cent the car factors applying to each grade will be found as per Table III:

TABLE III Car Factor for Different Grades	
Grades in Per Cent	Car Factor
0.0	70
.1	31
.2	20
.3	15
.4	12
.5	10
.6	8
.7	7
.8	6.5
.9	5.5
1.0	5
1.25	4
1.50	3.5
1.75	3.0
2.00	2.8

Thus it is seen that the heavier the grade becomes, the less the car factor grows, while, of course, at the same time the less the adjusted tonnage rating becomes.

The significant fact to be gained from the method of tonnage adjustment is that the actual weight of trains varies indirectly in proportion to the number of cars composing the train, and directly in accordance with the average weight of all cars composing the train. This is more graphically illustrated by Table IV, which is based on the figures developed for the adjusted

TABLE IV
How Train Tonnage Varies for Different Average Car Weights Considering a 40,000-lb. T. P. Locomotive on a 0.3% Grade; Adjusted Tonnage, 4,500; Car Factor, 15

Average Car Weights in Tons	Actual Weight of Train in Tons	Number of Cars Composing Train
20	2,565	129
30	3,000	100
40	3,270	82
50	3,465	69
60	3,600	60
70	3,705	53

tonnage rating of a 40,000-lb. tractive power Consolidation locomotive on a 0.3 per cent grade.

REDUCTIONS FOR WEATHER AND OTHER CONDITIONS

Having determined theoretically and verified practically by previous locomotive performance records, special tonnage tests and dynamometer car runs, if possible, the maximum adjusted tonnage which can be hauled over a division, it finally becomes necessary to establish certain reduced ratings to guard against weather and other conditions which make reduced ratings necessary. It has been found most practical to provide four ratings for each class of engine between principal yard points or division terminals. These four ratings may best be designated by the letters A, B, C and D; the A rating being the maximum and the B, C and D ratings reductions from the maximum or A rating according to certain percentages dependent on the ruling grades encountered.

Inasmuch as the temperature has the greatest influence on the resistance of trains and hence the hauling capacity of locomotives, this is used as the basis on which to reduce the tonnage of trains from the maximum rating. Primarily a reduction in temperature only affects the internal resistance of trains, increasing it as the temperature drops. Consequently, the greater the proportion of internal resistance of a train, the greater is the effect of a reduction in temperature on the resistance of the train. In other words, the lower the ruling grade, the greater the proportional allowance must be from the maximum or A rating for a reduction in temperature.

What the exact allowance is that should be made for certain reductions in temperature under all conditions has never been proven exactly by experiment, and in reality hardly can be proven very accurately. Experience, however, determined in the light of reason, has shown the following temperature variations to be

satisfactory upon which to base reductions in tonnage from the maximum when making up trains:

Maximum rating—Temperature above 40 deg. F.
First reduction—Temperature below 40 and above 20 deg.
Second reduction—Temperature below 20 deg. and above zero.
Third reduction—All temperatures below zero.

For purposes of simplicity these various ratings may be designated as *A* or maximum and *B*, *C* and *D* respectively. Table V is given to show what has been found, in practice, to be satisfactory working reductions for temperature changes, based on increasing grades. It should be noted that as the grade increases,

TABLE V

Grade in Per Cent	Reductions in Per Cent to be Made From the Maximum or "A" Adjusted Rating for Decreases in Temperature			
	Reductions in Above 40°	% from Maximum 40° to 20°	or "A" Adjusted Ratings 20° to 0°	Below 0°
0.0	0	13.70	27.40	41.10
.1	0	11.20	22.40	33.60
.2	0	9.70	19.40	29.10
.3	0	8.70	17.40	26.10
.4	0	7.98	15.96	23.40
.5	0	7.45	14.90	22.35
.6	0	7.00	14.00	21.00
.7	0	6.70	13.40	20.10
.8	0	6.42	12.84	19.24
.9	0	6.20	12.40	18.60
1.0	0	6.00	12.00	18.00
1.25	0	5.63	11.26	16.89
1.50	0	5.37	10.74	16.11
1.75	0	5.20	10.40	15.60
2.00	0	5.00	10.00	15.00

the amount of reductions from the heaviest rating grows less and less. The reason for this has been pointed out before and is sound logic, borne out by experience.

PRACTICAL CONSIDERATIONS IN DETERMINING MAXIMUM ADJUSTED TONNAGE RATING

Inasmuch as the maximum or *A* adjusted tonnage rating for an engine is the rating from which all the others are determined—that is, forms the basis for the ratings over a division—it is quite essential that this be established as nearly accurate as possible. It will most always be found, however, that the highest rating which is considered possible by mathematical calculation is either too high (most usually too high) or too low for practical purposes. Consequently, after the theoretical determinations have been made, they should always be fully tested out by actual tonnage tests under practical conditions. If the service of a dynamometer car can be had for this purpose it will assist materially toward proving or disproving the accuracy of the calculation.

The element of train speed, necessity to get from terminal to terminal in a certain time to get the greatest number of ton-miles per year out of an engine, is another very important practical consideration. It is difficult to determine generally what the most economical speed is at which trains should move over the division. To establish this speed and demand that it be lived up to at all times is a mistake, for the many conditions on a division which affect it are changing continually. It has been found by experience that the provision of four ratings, *A*, *B*, *C* and *D*, gives the division superintendent or division chief dispatcher a sufficient number of ratings from which to choose for each day or each train, if necessary, in order to move the business best to suit the many influences which bear on this problem. And if the ratings are not sufficient, then special ones may quickly be established, according to the judgment of the official in authority, in order to meet special or emergency conditions.

The following brief explanations and instructions have been used with success by the author when he has had occasion to introduce the adjusted tonnage rating system on a railroad. They are repeated here by way of illustration:

The following two important facts and their effect on freight train operating economies will be appreciated from a study of the adjusted tonnage rating system. The first is the benefit resulting from making up trains so as to get as many loaded or heavy cars as possible into each one and thereby avoid running trains composed entirely of empty or light cars. This arrangement will often prevent the running of trains on which tonnage has had to be sacrificed on account of having reached the car limit before the train was filled out to the maximum adjusted tonnage.

The other fact which should be realized is the necessity of get-

ting actual car and thus train weights as accurate as possible. The entire benefit from the adjusted tonnage rating system will be lost unless great care is taken in determining the actual car and train weights. To this end such means and systems at yard offices and at stations where cars originate for shipment should be introduced which will result in the greatest possible accuracy in determining actual car and train weights.

INSTRUCTIONS

(1) All ratings are based on tons.

(2) To determine the proper tonnage for an engine, find first from the rating tables the adjusted tonnage in effect corresponding to the engine. Then add the car factor to the actual weight in tons of each car. Finally, add together the weights of all cars plus their car factor allowance until the total equals the adjusted rating in effect.

(3) To determine the proper tonnage for a pusher, double header, or three or more engine train, add together the adjusted ratings in effect for each one of the engines in question and proceed as outlined in paragraph 2.

(4) When rating an engine, yardmasters and conductors will consider the caboose as one of the cars of the train, adding the car factor to the actual weight in tons of the caboose and this to the adjusted tonnage of the balance of the train, the total to equal the adjusted rating in effect, exactly as outlined in paragraph 2.

(5) When dead engines are hauled in a train yardmasters and conductors will add four times the car factor to the actual weight of each dead engine, and this to the adjusted tonnage of the balance of the train, the total to equal the adjusted rating in effect, as outlined in paragraph 2.

(6) Yardmasters and conductors will add another light car to the train when the total adjusted tonnage of the train, including the caboose, adds up fifteen or more adjusted tons (that is a fraction of a car) less than the adjusted rating in effect.

(7) Dispatchers, yardmasters and conductors will place as many loaded or heavy cars as possible in every train and avoid running any trains consisting entirely of empty cars unless otherwise instructed.

(8) All classified freight trains as well as ordinary freight trains will be rated strictly on the adjusted tonnage basis.

(9) No reductions in tonnage on account of weather or other conditions are to be made unless authorized by the superintendent.

(10) Actual weights of empty or loaded cars must not be estimated or assumed when they are available from the car stencils or the way-bills.

(11) When actual weights cannot be determined, the following estimates for weight of contents and lights weights of cars are to be used, but not otherwise. Contents are to be estimated at the marked capacity of the car, except in case of light commodities, such as hay, cotton or bran, in which case the contents should be estimated at one-half the marked capacity. In the case of way freight (merchandise) cars, five tons will be used as the weight of the contents.

Light weights of cars to be estimated as follows:

Kind and Capacity of Cars	Light Weight (in Tons)
Box 40 ft., 80,000 lb. capacity.....	19
Box 34 ft. and 36 ft., 60,000 lb. capacity.....	16
Box 34 ft., 40,000 lb. capacity.....	13
Box 25 ft., 40,000 lb. capacity.....	10
Furniture 40 ft.	18
Furniture 50 ft.	21
Refrigerator	18
Refrigerator (meat)	21
Stock 30 ft., 30,000 lb. capacity.....	10
Stock 36 ft., 40,000 lb. capacity.....	11
Stock 36 ft., 60,000 lb. capacity.....	16
Double deck stock	16
Plain flat 30 ft.....	8
Plain flat 34 ft.....	12
Plain flat 40 ft.....	14
Plain flat 43 ft.....	17
Coal cars 34 ft.....	13
Coal cars 36 ft.....	16
Hopper bottom coal, 80,000 lb. capacity.....	18
Hopper bottom coal, 100,000 lb. capacity.....	21
Rodger ballast cars.....	16
Ingoldsby dump cars.....	18
Tank cars	14
Caboose	15

(12) When converting the actual weights of cars from pounds

into tons by dividing the actual weights in pounds by 2,000, yardmasters and conductors will in all cases neglect a remainder of 999 pounds or less, but will consider a remainder of 1,000 lb. or more as one ton.

DISCUSSION

J. M. Daly, formerly general superintendent of transportation of the Illinois Central, and an expert on tonnage rating, opened the discussion, speaking very highly of Mr. Beyer's paper. He believed that if in making up trains this system of adjusted tonnage were followed large economies in transportation costs would be made. He called particular attention to the fact that the resistance per ton of the loaded car is much less than that of the empty car. This of itself should justify the use of the adjusted tonnage rating system. He mentioned one road that had made a saving of 5 per cent by adopting this system. The overloading of locomotives was condemned as being more expensive than underloading. A solid and substantial roadbed and track are especially necessary where heavy car loads are handled. Mr. Daly stated that some of the new roads in Canada are establishing terminals at high points of land in order to obtain descending grades in both directions out of the terminal for the purpose of warming up the car and locomotive journals and thus saving fuel.

Several members had found by experience that the short trains with the heavy loads hauled much easier than the long trains of light cars, even though the actual tonnage was much greater. It was generally believed that while a dynamometer car was of considerable advantage in determining the rating of a locomotive the work can be very satisfactorily performed by men experienced in the performance of locomotives.

In helper service it is found to be much better practice to place the assisting locomotive at the rear of the train, especially if the grades are undulating and the curves are sharp. Mention was made by Prof. L. E. Endsley of the increase in train resistance due to badly worn wheel treads and loose trucks, the former being found, by test, to increase the resistance as much as 100 per cent.

ELECTRO-PNEUMATIC BRAKE

Walter V. Turner, assistant manager and chief engineer of the Westinghouse Air Brake Company, gave an illustrated lecture on the possibilities of the electro-pneumatic brake in the steam railway field. He called attention to the relation of the air brake to the power of the present day locomotive, showing how these powerful engines would be useless without the air brake to control them. The variable load brake has made possible to a still greater degree the heavier trains, the Virginian now operating trains of 8,000 tons with this type of brake. When considering the action of the air brake, the rail, the roadbed, the consist of the train and the foundation gear must all be taken into account, as they all have a definite bearing on how the brake will perform in service.

The piston travel is of prime importance, especially on long trains. It should be constant throughout the length of the train if "rough handling" is to be eliminated. Tests have shown that with an 8-lb. brake pipe reduction at the end of two seconds the cars with the proper piston travel (8 in.), will develop a braking power of 16 per cent, whereas those cars with a 6-in. travel of the piston will develop a braking power of 43 per cent, which naturally causes very rough handling of the train.

In speaking of the clasp brake, he gave as a rough and ready rule as to when this brake should be used, the condition where the side pressure of the shoe exceeds the downward pressure of the wheel.

The purpose of the electrically-operated brake is wholly and solely to permit the use of a more efficient air brake. With the electrical control it is possible to have the brakes on all the cars in the train operate simultaneously rather than consecutively, as in the brakes controlled by the reduction of pressure in the train line; because of this feature the surging or the running in of slack, with its attendant disastrous results, will be eliminated and, at the same time, it will be possible to make use of a greater

retarding force, thus materially decreasing the length of stop. Experiments have shown that the retarding force can be built up to 20 per cent with the electrically operated brake, whereas the best pneumatic brake will permit of only 8 per cent retarding force—good train operation being obtained in both cases.

At the present time the electro-pneumatic brake is only available for passenger trains with electrical equipment. The amount of current required for the operation of this brake practically prevents its being used on freight cars in long trains.

Mr. Turner showed various diagrammatical illustrations of the electro-pneumatic brake and pointed out the versatility of the entire system. As many and as small applications of the brake can be made as desired, and the entire system can be recharged with the brakes set. The danger of "stuck brakes" is eliminated, the service and quick-action parts being entirely separate from each other. By its use passenger trains hauled by modern locomotives that have taken 18,500 ft. to accelerate to 58 m.p.h. have been stopped in less than 1,000 ft.

VALVE GEAR DESIGN AND LOCOMOTIVE OPERATION

An interesting scientific paper on the effect of properly designed valve gear on locomotive fuel economy and operation was read by W. E. Preston, traveling engineer, Southern Railway, in which the theoretical indicator card was described and analyzed. He also presented formulae for horsepower, tractive effort and for determining the weight of steam used per hour (for constant speed).

In speaking of the relation of the valve gear to the indicator card he described the link motion diagram and the Zeuner diagram. Taking the dimensions of a Consolidation locomotive as a concrete example he showed how the ideal card could be obtained and the theoretical speeds at various points of cut-off. From these were calculated the horsepower at different speeds, and the steam and coal consumption. In speaking of the distorted indicator cards he said in part, as follows:

There are many things that go to distort an indicator card, but a defect in the valve gear, or the setting of the valve gear, will at once become evident in the indicator card.

Figs. 1, 2 and 3 illustrate some of the defects due to faulty valve gear.

- P = Wiredrawing.
- m = Too much lead.
- r = Too early exhaust closure.
- s = Too early exhaust opening.
- x = Insufficient compression.
- n = Not enough lead.
- t = Late exhaust.
- u = Loose motion and wiredrawing.
- P = Lack of lap.
- y = Excess back pressure due to late exhaust.
- w = Blow.

These are the common defects due to the valve motion. Other defects, such as excess condensation, restricted ports, leaky valves, etc., are shown by the indicator card, but as these are not the fault of the valve motion they have no place here.

The card shown in Fig. 4 was taken from an actual test on a Consolidation engine, having a Stephenson valve gear. It is a corner card, but the cut-off on this engine measured 87.5 per cent, whereas it should have been 85 per cent if properly set. The result of over-travel of the valve is clearly seen in the very late exhaust and lack of lead. From this card it is determined that 14.5 per cent more coal was being used than necessary at this point of cut-off. Moreover, the distorted motion reduces the maximum tractive effort of the engine some 3,000 lb.

Fig. 5 shows another card from the same engine hooked up to the sixth notch. Here the cut-off measured 73 per cent on the engine, while for this notch the ideal card gives 69 per cent. The straight line is the ideal card; the bent line showing the actual card. The valve still lacks lead and has too late exhaust opening, but the back pressure drops to normal at the admission end of the card. The effect of the slack in the valve motion is clearly shown at *a*. After the port gets fully open there seems to be very little throttling effect. This also applies to Fig. 4. Hence the port openings are ample.

The mean effective pressure for the ideal card is 167 lb., while

for the actual card it is 156 lb., the increase in cut-off not being quite enough to compensate for the effect of late admission and exhaust. In this case there is 11.4 per cent more coal being burned than necessary to develop the same horsepower, the tractive effort being reduced 2,800 lb.

As the lead increases as the reverse lever is hooked back toward the center of the quadrant, we would expect the card of Fig. 5 to be better than that of Fig. 4. All of the events being earlier in the stroke, we find that the earlier release somewhat reduces the back pressure.

Theoretically the back pressure line should be parallel to the atmospheric line, and about the same distance from it for all cut-offs. At high speeds and short cut-offs, of course, more exhausts take place per minute than at slow speed, but to offset this we have a very much less volume of steam exhausted per stroke at high speed than at low speed. Practically, it is found that the back pressure increases slightly as the speed increases, the amount of condensation not being exactly constant at all speeds. However, the back pressure should not be greater than

provide a brake that will give the best and most desirable results.

The road foreman of engines, due to his knowledge of the road, is also in an excellent position to give valuable information to the operating men regarding meeting points, and the location of sidings, signals, water tanks, etc. He also can be of great assistance in educating the enginemen in making proper engine inspections and reports. There is in the engine a tremendous power to damage and destroy equipment, unless it is carefully handled in starting and stopping, and the traveling engineer by his constant and careful instruction can do much to keep the rough handling of trains to a minimum.

The report is signed by C. M. Kidd (N. & W.) chairman; T. F. Lyons (N. Y. C. West); George Kleifgas; J. B. Hurley (Wab.), and C. P. Cass (W. A. B.).

DISCUSSION

Discussion.—It was believed to be the duty of the traveling engineers to see that the equipment was turned over to the enginemen in proper condition for handling and then to see that the

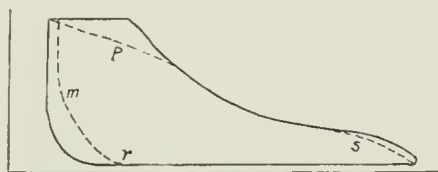


Fig. 1

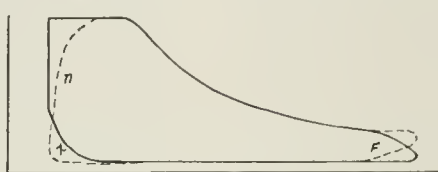


Fig. 2

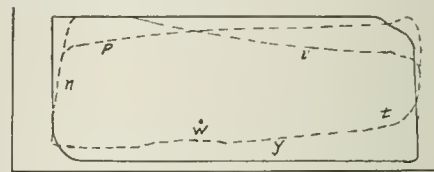


Fig. 3

10 lb. at 20 m.p.h., or 15 lb. at 15 m.p.h., according to the best authorities.

As another example of a very poor card Fig. 6 is shown. This card is a very common one for valves poorly set. The line *ed* shows a lack of lead, the line *dc* shows the wiredrawing and slack motion effect of the valve in opening the steam port, while *cb* shows this effect for the closing of this port or at cut-off. The cut-off and expansion are normal, while *gf* shows a late and

restricted exhaust, and *fa* shows that the exhaust port does not get fully open until the piston is at *a* on its return stroke—hence the high back pressure and resulting small compression.

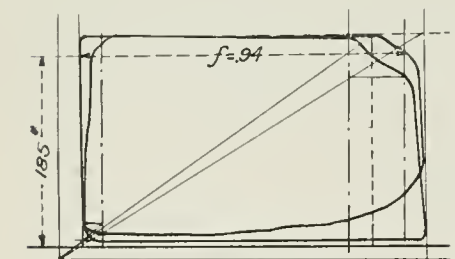


Fig. 4

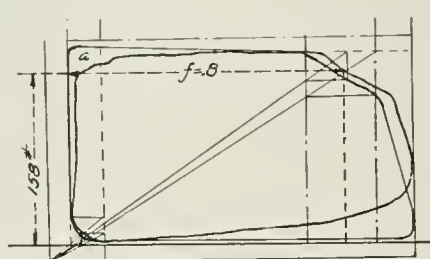


Fig. 5

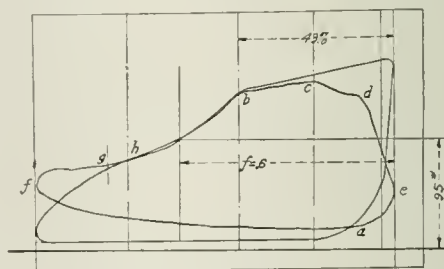


Fig. 6

restricted exhaust, and *fa* shows that the exhaust port does not get fully open until the piston is at *a* on its return stroke—hence the high back pressure and resulting small compression.

As the expansion line for the length *bh* is the same for the good and bad cards, the amount of steam and coal used is, of course, the same for both cards. The coal consumption per horsepower hour, however, is increased 14.5 per cent.

DISCUSSION

While the discussion did not bear particularly on the contents of the paper presented by Mr. Preston as above, a number of interesting points were brought out by the members. It was believed that the Stephenson valve gear would give as good results from the fuel consumption standpoint as any valve gear of the outside type. However, it was stated that with the elimination of the eccentric it was possible to better maintain the outside gear and thus insure a more constant steam distribution.

IMPROVING THE HANDLING OF AIR BRAKES

The air brake instruction card cannot be questioned for its value in detailed study of the air brake system, but the road foreman of engines can perform a great service in giving practical instruction on the road. He can pick out those engineers deficient in this work and give them individual instruction. He is also in a position to advise the shop forces as to what should be done to

SUBJECTS

The following subjects were recommended for consideration at the next convention:

What effect does the mechanical placing of fuel in fireboxes and the lubricating of locomotives have on the cost of operation?

The advantages of the use of superheaters, brick arches and other modern appliances on large locomotives, especially those of the Mallet type.

Smoke prevention.

Make up of freight trains for tangents and grades with reference to draft rigging and lading.

Assignment of power with a view of obtaining the most efficient service.

CLOSING EXERCISES

Warren S. Stone, grand chief, Brotherhood of Locomotive Engineers, made a brief address during the session Friday morning. He spoke of the traveling engineer as the intermediary between the engineer and the railway officers. Some roads are getting far better results from their enginemen than others, having obtained their implicit confidence by dealing with the men fairly and honestly. He called upon the traveling engineers to "play the game square" and to be sure and place the blame of an accident where it properly belongs, whether it be on the man, machine, roadbed, or wherever it may be.

Mr. Stone was elected an honorary member of the association.

The attendance was 404 members; the secretary reported a membership of 1,061, and the treasurer reported a cash balance of \$7,500. The following officers were elected for the ensuing year: J. R. Scott, president, St. L. & S. F.; B. J. Feeny, first vice-president, Illinois Central; H. F. Henson, second vice-president, N. & W.; W. L. Robinson, third vice-president, B. & O.; G. A. Kell, fourth vice-president, Grand Trunk; A. G. Kinyon, fifth vice-president, S. A. L.; David Meadows, treasurer, M. C., and W. O. Thompson, secretary, N. Y. C.

Chicago received the highest number of votes as the place for holding the next convention.

AMERICAN RAILWAY PERISHABLE FREIGHT ASSOCIATION

The semi-annual meeting of the American Railway Perishable Freight Association was held at the Great Northern Hotel, Chicago, on September 8. Over 100,000 miles of line were represented at the meeting.

The executive committee reported that it has continued active correspondence with traffic associations regarding the necessity and desirability of inserting in all tariffs reasonably uniform rules requiring shippers of perishable freight in carloads to give complete and definite instructions as to whether or not shipments are to be transported under refrigeration, icing, non-icing, ventilation or other authorized accessorial service, and that recommendations substantially to the same effect were made by the Freight Claims Association at its recent annual meeting. The question of securing greater uniformity of tariff rules regarding perishable freight and the possible publication of some joint issue to cover the same is being investigated by the committee, but further time is required. The committee also recommended that all member lines be requested to arrange with their respective law, traffic, operating and freight claim departments whereby they will furnish to the secretary of the association copies of all briefs, arguments and other forms of documents relating to claims, suits, cases or public hearings involving perishable freight service matters, to the end that the association files may not only be kept complete, but that results accomplished by carriers dealing with such matters in one section of the country may become a benefit and of direct practical use to carriers in other sections of the country. This plan would contemplate that the facilities of the association so far as practicable would be at the command of all member lines when they desire special information.

The report of the committee was adopted by the association.

The rules committee reported that it had been unable to proceed with the complete revision of association circular 27-C, containing standard service rules, because some of the important subjects are still under consideration by interested traffic associations, and the committee asked further time for the revision with a view to the revised rules being compiled and put into type before January 1, if possible, for submission to all members of the association. The committee also recommended that the association bring to the attention of all traffic associations the desirability of inserting in tariffs the complete legal definition of perishable freight. The committee also recommended that the association consider the printing of an illustrated poster to illustrate clearly but briefly the proper methods of icing and reicing cars, also tamping ice. Regarding a proposed rule that carriers make notations on billing of perishable freight to show date and hour of each previous reicing, the committee reaffirmed its previous recommendation that the association take no decided position on the question other than to state that if certain roads do consider the plan feasible and practicable it sees no objection to its adoption by such individual roads. The report was adopted.

The service committee reported that it has, in addition to its other work, given consideration to the analysis of various claims for alleged loss or damage to perishable freight which have been presented by member lines to the committee for that pur-

pose and suitable replies have been made to interested carriers. The committee is continuing its investigation of the theory of using ice in the winter to prevent freezing to fruits and vegetables and other perishable goods in transit, and has received some additional information, but requested that further time be granted by the association. The committee believes it will be desirable for the association to consider the question of carriers' non-liability for loss and damage by freezing carload shipments of fruits and vegetables or other perishable goods in transit, when the shipper has not only failed to install false floors to break the frost line or to provide other protection, but has also omitted to request the carriers to furnish any protective service. The report of the committee was adopted.

Other subjects discussed at the meeting were: The present status of carriers' rules and practices covering heated car service by shippers and carriers; the use of ice in packages in the body of cars; damage to deciduous and citrus fruit due to sampling in transit; rules to govern ventilation of cars interchanged with Canadian railroads.

The officers of the American Railway Perishable Freight Association are: Chairman, J. S. Leeds, manager, Santa Fe Refrigerator Despatch, Chicago, Ill., and secretary, E. F. McPike, perishable freight service manager, Illinois Central, Chicago, Ill.

PERFORMANCE OF PENNSYLVANIA ELECTRIC LOCOMOTIVES

Electric locomotives have now been in use for about four and one-half years on the Manhattan division of the Pennsylvania Railroad, operating passenger trains through the tunnels entering New York city under the Hudson river. These locomotives* were designed to start and accelerate a train of 550 tons, in addition to the locomotive, on a 1.93 per cent grade in the tunnels. In actual operation trains of 850 tons are frequently started on this grade and 14 all-steel car trains, weighing over 1,000 tons, are handled without difficulty.

Each locomotive in service passes over an inspection pit once every 24 hours for a running inspection of the machinery, slight repairs being made where necessary. This inspection requires an average time of about ten minutes. After a locomotive has made 3,000 miles, it is taken into the shop for a general or periodic inspection, when all electrical apparatus is thoroughly inspected, tested, cleaned and the necessary adjustments and renewals made to all electrical and mechanical parts.

The shopping for general repairs is governed by tire wear, and a number of locomotives have run from 90,000 to 112,000 miles before it became necessary to turn the tires or do other general repair work. The general overhauling is handled in one of the regular steam locomotive repair shops.

In November, 1914, 33 electric locomotives had completed four years' service, and during that period had made the following mileage and detention record:

Locomotive miles	3,974,746
Total engine failures	45
Total minutes detention to trains	271
Locomotive miles per detention	88,328
Locomotive miles per minute detention	14,667

During this period 463,558 train movements were made, thus giving an average of about 1,300 movements per detention.

The change from steam to electric locomotives and *vice versa*, is made at Manhattan Transfer, four minutes being allowed by schedule for this operation, including the necessary testing of the air brakes. The entire operation, however, may be performed in three minutes and is said to have been done in two minutes.

MILITARY CONTROL OF RUMANIAN RAILWAYS.—Rumanian railways are said to have been ordered to place all rolling stock at the disposal of the war ministry by September 14.

*For a complete description of these locomotives see *Railway Age Gazette*, November 5, 1909, page 881.

NATIONAL INDUSTRIAL TRAFFIC LEAGUE

At the meeting of the National Industrial Traffic League held in Toledo, Ohio, on September 9 and 10, the following resolutions were adopted regarding the railway mail pay controversy:

Whereas, There is a controversy existing between the common carriers of our country and the postoffice department over the compensation due said carriers for transporting the mails, and

Whereas, In various rate advance cases the carriers have insisted that their total net income is insufficient, and their claim has been an important factor in such cases, and

Whereas, If the carriers' compensation for transporting the mails be not adequate, the burden necessarily falls upon the shipping public to make up the deficiency through higher freight and passenger rates, and

Whereas, The honor and dignity of our government demand that said controversy be brought to a speedy conclusion, therefore be it

Resolved, That it is the sense of the National Industrial Traffic League that the fact should be speedily ascertained as to whether our common carriers are receiving adequate compensation, and be it further

Resolved, That our president be instructed to memorialize the proper committees of the senate and house of representatives suggesting that the Interstate Commerce Commission is the proper body to assist in ascertaining the facts and that it be directed to investigate the entire question and report as speedily as possible its findings and recommendations for the guidance of congress in bringing said controversy to a prompt and proper conclusion.

The report of the executive committee discussed a plan for establishing league headquarters at Washington, D. C., but this subject was put over until the next meeting.

In connection with the report of the legislative committee there was a discussion of the subject of codification of the interstate commerce law as to mutual rights of shippers and carriers, and it was decided to co-operate with the American Bar Association in its tentative codification and its movement to have congress take up the subject. On the right of appeal from negative orders of the Interstate Commerce Commission the committee reported that while the shippers ought to have the same right in this respect as the carriers, a change in the law might work to their disadvantage, and it was decided to have the committee study the subject further and recommend some suggestions for a revision of the law without interfering with its present provisions in other respects.

The proposed reorganization of the Interstate Commerce Commission was discussed but no action was taken. The subject of legislation as to uniform classification was discussed but no change was made in the previous position of the league, that the initiative should rest with the carriers and that there should be no legislation on this subject. A resolution was adopted urging an amendment of the Cummins law as to limitation of liability by common carriers to eliminate express and baggage from its application. A resolution was also adopted urging an amendment to the fourth section of the commerce act so that through rates may not exceed the combination of lawful rates, even though one factor is a state rate which has not been enjoined or set aside by competent authority.

In connection with the report of the tariffs committee, the subject of consolidation of individual tariffs in Official Classification territory into association issues, which had been proposed at the last meeting, was discussed and the subject was dropped for the reason that it was believed that no economy would result. The subject of disposition of fractions in the establishment of freight rates will be given further consideration by the committee, which reported that the Interstate Commerce Commission is inclined to look with favor on a plan for

stating rates with no smaller fraction than $\frac{1}{2}$ cent, if the carriers and shippers can agree.

In connection with the report of the freight claims committee, the subject of handling of freight, packing, marking, etc., was discussed and the committee was instructed to begin work on a manual of instruction on this subject to be placed in the hands of shipping clerks.

The subject of duplicate charges on prepaid shipments was discussed, and the league complimented the action of the American Association of Railway Accounting Officers and the American Railway Association on their recommendations for the extension of through interline billing as one means of preventing duplicate charges.

In connection with the report of the bill of lading committee, the league went on record in favor of a "clean" bill of lading, to constitute a plain receipt of freight without the various contract provisions now included in the bill of lading, which it was believed are now not required since the enactment of the Cummins law. It was stated that the export millers will file a complaint with the Interstate Commerce Commission against the export bill of lading and the league also authorized the filing of a complaint on behalf of all lines of business.

A resolution submitted by the weighing committee was adopted, stating that tariffs have been filed with the Interstate Commerce Commission which do not conform to the code of rules regarding weighing agreed to by the league and the American Railway Association and approved by the Interstate Commerce Commission. The weighing committee was instructed to continue conferences with the American Railway Association, or if necessary to ask the Interstate Commerce Commission to reopen the weighing case for final settlement. This referred to a rule of the Central Freight Association lines providing for a charge for light-weighting empty cars.

Edward E. Clark, of the Interstate Commerce Commission, addressed the league at a dinner on Thursday evening at the Toledo Club. Commissioner Clark's address is published elsewhere in this issue.

OUTLOOK FOR COAL CAR SUPPLY FOR COMING SEASON

By ARTHUR HALE

The surplus of coal and gondola cars reported by the American Railway Association for September 1, 1915, was nearly 41,000. This is not far from last year's figures for September 1, (46,000), but the shortage of coal cars this year is over 2,300, while last year it was only 66.

There was no large surplus of coal and gondola cars prior to 1914 until we get back to 1909. There we find on August 18 a surplus of about 42,000.

In 1908 the surpluses were much larger until the middle of October.

It is, of course, difficult to judge from those figures what the situation in coal cars will be in October and November, but in 1909 there was quite a marked shortage of coal cars, which ran up to nearly 12,000 in the middle of November.

There is one point in which the record this year is similar to that of 1909; that is, the surplus decreased very rapidly in August, while in 1914 it came down very slowly. This would seem to point to the possibility of some little coal car shortage in the months of October and November of this year.

On the other hand, the drop this year seems to be about two weeks later than it was in 1909. Here again it is difficult to compare, because this year we have figures only for the first of the months, while in 1908 we had them for the middle of the months as well.

About all that can be said in the matter is that if we can judge this year's showing by that of 1909 there will be a shortage of perhaps 8,000 or even 10,000 coal cars on November 1.

Maintenance of Way Section

The Maintenance of Way Section for October will be delayed one week to enable a complete report of the convention of the American Railway Bridge & Building Association, which will be held in Detroit from October 19 to 21, inclusive, to be included. This section will, therefore, appear in the issue of October 22, rather than in the regular third issue of the month.

The economy of tie preservation and the importance of conserving the timber supply have been emphasized so frequently that they are generally realized. But in discussing such subjects in the abstract, or in large figures for the country as a whole, one is not impressed with their significance so strongly as by more definite statements, such as those made by F. J. Angier, in an article in another column in this issue, in which he shows that the amount expended for ties on the Baltimore & Ohio constitutes the largest single item of material cost with the exception of fuel, and that this expense amounted to \$250 per mile of track maintained in 1913, an increase of 109 per cent in ten years. Entirely aside from the significance of this rapid increase, the actual amount expended is of special significance as an illustration of the importance of careful supervision in the use of this material. The handling of ties is entrusted almost entirely to the track foremen. It is important that as full life as is consistent with safety be secured from all ties. To accomplish this the foreman must be instructed carefully regarding the limits of service and be made to realize the value of the material he is handling. In spite of the attention which has been given this subject in the past, there is still room for improvement, which is made all the more necessary by the continual increase in this item of expenditure.

One of the first railway divisions in this country to be equipped throughout with motor cars was the Illinois division of the Chicago, Milwaukee & St. Paul between Chicago and Savanna. Motor cars entirely superseded handcars on this line in 1909 and the results which have been secured from their continued operation,

as well as the methods adopted for their care, described in another column, are of special interest. One reason for their success here has been that the roadmaster has made himself at all times conversant with the motor cars, and therefore able to instruct the men regarding their operation. This has not always been done by roadmasters, as is illustrated by the fact that an Italian section foreman on a Western road recently received a motor car direct from the shops, crated, without any instructions for setting it up or running it. It is not surprising that this car proved a failure. Thorough instruction of the men is necessary in handling any new device, and a road owes it to itself to see that any new equipment for which it expends its money be used so as to secure the most favorable results. The motor car is no longer regarded as experimental. It has proved its economy to such a point that many roads are making it standard in place of the handcar. One large road is equipping one-third of the sections on each division with motor cars each year for three years. Another busy double-track Eastern road, with very dense traffic, has discontinued the use of handcars entirely and is using motor cars on all its lines, finding that even on the heavy traffic lines the number of cars hit has been reduced owing to the care exercised by the foremen.

One of the most serious obstacles to the economical management of a large corporation such as a railroad is the lack of direct

An Object Lesson in Economy

financial interest on the part of minor officers. As a rule these men are truly conscientious and have the interests of the company at heart, but many of them are prone to criticize because the company fails to supply equipment and material, which to them seems indispensable to the attainment of certain economies in operation and maintenance. They overlook entirely the interest and depreciation charges which the additional investments involve and which might very largely neutralize the savings which they expected to make. One of the Eastern railroads has adopted a practice which will tend to overcome this tendency on the part of track foremen. Each foreman is supplied with a price-list covering all equipment used by the track forces, with instructions to enter the cost of each item on all his requisitions for supplies. This serves as an object lesson in several ways. It calls frequent attention to the number of section gangs on the road, thereby enabling the foreman by only the simplest mental calculation to obtain a definite idea of what it will cost the company to supply one additional tool to each section. An appreciation of the money value of the equipment with which he is supplied will give the foreman a greater sense of responsibility for the contents of the tool house. He will guard against losses and be quicker to note improper and careless use of the tools. Taken together, there is no more faithful class of employees on the railroads to-day than the section foremen, and they offer, therefore, a fertile field for demonstrations as to the best ways in which the company's interests may be served.

THE ROADMASTERS' CONVENTION

THE convention of the Roadmasters' Association, held in Chicago last week, was the most successful in the history of this organization. While the attendance did not exceed that of last year, the reports and especially the discussions were of a higher grade than in previous years. After a long period of difficulties this association has made rapid strides during the past three or four years, so that it is now taking an important place among the maintenance of way associations and deserves the support of the railways.

Few railway associations have more important fields than this, and there is no conflict between it and the American Railway Engineering Association, as each has a sufficient number of problems coming within the special province of its members to occupy its entire time. The Roadmasters' Association should include division engineers and others directly in charge of maintenance of way work and confronted with it in its details as well as the roadmasters not now identified with it. The association confines its activities strictly to problems connected with the maintenance of track. From its very nature the American Railway Engineering Association can devote only a small amount of attention to these subjects, for it must also consider problems of design and those of interest to the bridge engineer, engineer of water service, construction engineer and other branches of the engineering department.

The membership of the Roadmasters' Association is at present confined almost exclusively to roadmasters and track supervisors. It is to the mutual interest of this organization and of the engineers that more engineers interested in maintenance problems become affiliated with this association. In this way it can be strengthened materially and its activities broadened and it can become of more real service to the railroads.

THE SELECTION OF CONCRETE MATERIALS

CONCRETE has become so thoroughly established as a construction material that its application to various uses does not call for the amount of discussion of its merits that characterized the earlier years of its development. It is true that investigations are being carried on with no less zeal, and even along much more systematic lines than formerly, and the cement industry is performing a commendable service in giving publicity to the latest developments. Still, these matters do not excite the attention that was given to concrete in its infancy. In other words, we have reached the point where we are taking things for granted as we do in regard to long-established practices in the use of lumber. Because of this there is a possibility that we are overlooking considerations of great importance in the use of concrete in much the same way that, as has been shown, the details of our use of lumber have long been faulty.

In all classes of concrete work scrupulous care is exercised to insure a good quality of cement, attainment of this object being aided by the general acceptance of well known standard specifications and the simple and tangible character of the tests and their results. On the other hand, there seems to be a general impression that almost any kind of sand or larger aggregate is good enough. Specifications for sand to the effect that it shall be clean and sharp, backed up by a casual glance by way of inspection, are ordinarily considered all that is necessary to secure a good quality of concrete, provided the cement has passed rigid tests. More careful consideration is usually given to the stone or gravel, but even in these a far greater variation in the quality of the materials is permitted than would be allowed for cement.

The influence of variations in the characteristics of sands and gravels upon the strength of mortar and concrete has been generally appreciated by students of this subject. In general, it may be said that the effects of variations in the size and grading of particles and the influences of the presence of loam, clay and vegetable matter, are fairly well understood by the users of concrete. But these things seem to be lost sight of when it comes to the selection of the materials for actual use. All too frequently we see a structure of excellent design and workmanship marred by evidence of the use of dirty aggregate, or one which suffers from porosity because of a failure to study proportions.

The importance of these considerations has recently been emphasized by C. C. Wiley, in Bulletin No. 70 of the Illinois Experiment Station, entitled, "Mortar Making Qualities of Illinois Sand." The extensive tests recorded in this paper demonstrate clearly the need of a careful selection of the sand. It points to the importance of the mineralogical composition as indicating the strength and durability of the particles and demonstrates the futility of specifying a sharp sand. Tests of a large number of samples of commercial sand indicated a variation in the strength of mortar briquettes of 300 per cent.

Construction work on a certain railroad in the Middle West was carried on at one time with gravel and sand, hauled an average distance of 300 miles, when subsequent investigation disclosed a superior material on the company's lines less than 50 miles from the work. This state of affairs would not have existed if proper study had been made of all the materials tributary to the construction district.

The use of sand cement in certain sections of this country directs attention to another phase of the economics of concrete. Sand or silica cement is a mechanical mixture of Portland cement with a pure, clean sand, very finely ground together in a tube mill or similar machine. For the best grade of Portland cement, the proportions of cement to sand are 1:1, although as lean a mixture as 1:6 has been made to compete with natural cement.

In standard Portland cement 80 per cent must pass a 200-mesh sieve and probably not more than 40 per cent of the par-

ticles of cement are chemically active. On the other hand, a blend of Portland cement and sand has shown from 90 to 95 per cent passing a 200-mesh sieve. Because of this extremely fine grinding it is probable that much more than 40 per cent of the particles in the original standard cement will be chemically active. If standard Portland cement could be so ground that 90 to 95 per cent would pass through a 200-mesh sieve, a barrel should make as much concrete as two barrels of blended cement, the ultimate strength of the concrete being the same in both cases. A sand cement should make a concrete equal in every way to that made from standard cement, no matter where used.

In the southwestern part of the United States there is a zone about 500 miles wide, extending from the center of the state of Texas through New Mexico and Arizona, and then turning to the north through the center of Nevada into Oregon, in all a total length of 1,400 miles, in which no cement is manufactured. The price of cement, at the mills, tributary to this district, except such as would come from the Kansas, Oklahoma and Texas districts, is materially higher than in the rest of the country. In 1914 the average price in the Rocky Mountain district, as given by the report of the Department of the Interior, was 40 per cent higher than in the entire country. Taking this into consideration, together with the great length of the haul to most points in the district, it would seem that the use of the sand cement would be a matter for serious consideration.

COMPARATIVE PUMPING COSTS

AN article in this issue discusses the necessity for the use of a unit adequately expressing power in any comparison of pumping costs. Special attention is directed to the error of reporting these costs in units expressing only the amount of water delivered. That the futility of such a report of pumping is readily appreciated by many who have no definite understanding of the principles of hydraulics, is evidenced by the fact that reports in terms of water pumped are frequently supplemented by statements of the difference in the elevation of the water at the source and at the point of delivery, ignoring entirely, however, the friction head which may constitute the major portion of the pumping resistance. On the other hand, the office man may set out to determine the static and friction head and calculate the cost of pumping in terms of gallons pumped against a one-foot head, perhaps reducing this finally to horsepower. This gives, without question, the best comparison of pumps that can be made without actual observation of the water horsepower, but it may be widely in error because of the opportunity for discrepancies between the assumed friction factor and the actual resistance of the pipe lines. Old pipes are rough and may be clogged with scale and sediment, the actual arrangement and size of the pipes may be different from those given in the record, and there may be other conditions, concerning which the office man has no knowledge that will seriously affect his results. The conditions outlined point to the need of a more thorough supervision of water service matters, combining practical experience with a thorough knowledge of hydraulics and allied subjects. Such a supervision will not only make for the correct determination of pumping costs, but will tend to secure better results in all phases of water service. The consumption of water at a given station may be increased threefold, yet the water is still pumped through a long pipe line, once adequate, but now entirely too small, necessitating excessive velocity and consequently a wasteful friction. Cases have been discovered where the saving in pumping in one year would pay for a new pipe line of proper size. A long neglected check of the displacement of the pump against the actual volume delivered at the tank may disclose a discrepancy which the condition of the pump valves will not permit of explanation as slip, with the result that a leak of years standing is discovered. Many other examples could be given showing the economies to be obtained by a proper attention to this important department.

The Roadmasters' Thirty-third Annual Convention

An Abstract of the Committee Reports and Discussions Presented at the Meeting Held Last Week in Chicago

The thirty-third annual convention of the Roadmasters' and Maintenance of Way Association of America was held at the Auditorium Hotel, Chicago, September 7-10, inclusive. About 200 members were in attendance. The convention was one of the most successful in the history of the association, particularly in point of interest displayed in the committee reports and in the character of the discussions. The exhibits of the Track Supply Association were also up to the usual standard.

The convention was called to order by President P. J. McAndrews (C. & N. W.) at 10:30 Tuesday morning. The association was welcomed to Chicago by Harry E. Miller, city prosecuting attorney; by W. J. Towne, assistant general manager, Chicago & North Western, and by F. A. Preston, vice-president of the Track Supply Association. In his remarks Mr. Towne particularly emphasized the increased responsibility of the roadmaster in recent years and the growing importance of developing economical methods of working, stating that it is becoming absolutely necessary to make every dollar go as far as possible, consistent with safety. Past Presidents T. Hickey (M. C.), A. E. Hansen (A. T. & S. F.), James Sweeney (C. & E. I.), T. Thompson (A. T. & S. F.), A. M. Clough (N. Y. C.), and W. Shea (C. M. & St. P.), also spoke concerning the various phases of the work of the association. In his opening address President P. J. McAndrews reviewed the activities of the association in the past year and commented upon its future.

The officers of the association for the past year were: President, P. J. McAndrews, roadmaster, Chicago & North Western, Belle Plaine, Ia.; first vice-president, Colman King, supervisor, Long Island, Jamaica, N. Y.; second vice-president, M. Burke, roadmaster, Chicago, Milwaukee & St. Paul, Chicago; secretary-treasurer, L. C. Ryan, roadmaster, Chicago & North Western, Sterling, Ill. The report of the secretary-treasurer showed that 120 new members had been received during the past year and that there is a balance of \$685 in the treasury.

THE PROPER ORGANIZATION OF SECTION FORCES AND METHODS FOR MAINTAINING AND POLICING TRACK

FOR HIGH SPEED HEAVY TRAFFIC ROADS

General Make-up of Track

Width of Subgrade.—Single track, 21 ft.; two tracks, 33 ft.

Drainage.—All cuts in clay soil or in a mixture of clay and sand should be tiled on one or both sides of the track, depending on the amount of moisture encountered. On multiple tracks in wet districts a line of tile should be placed between each set of two tracks. All tile should be laid below frost line on a level to permit proper drainage and should be covered by some porous material. The size should be governed by the amount of moisture. Surface ditches should be a standard distance from rails. In deep cuts, where the surface slopes toward the track, ditches of sufficient depth should be made on top of the cut at least 40 ft. from the track to prevent flood waters running on to the tracks and from washing down the slopes of the cut.

Ballast.—The best ballast available should be used. We recommend crusher run stone ballast of hard limestone, with a maximum size of 2 in. and a minimum size of $\frac{1}{2}$ in., free from clay and dust when received from the crusher. Ballast should be placed to a depth of not less than 8 in. under the ties, and dressed even with the top of the ties in the center, with a slight slope to about 2 in. below the tops of the ties at the ends and sloping $1\frac{1}{2}$ to 1 from a point 6 in. outside the ends of the ties to the base of the ballast line.

Rail.—The best quality of rail of not less than 100 lb. to the yard should be used. Rail in this class of track should at all times be in an almost perfect condition. It should not be left in track for any length of time after it becomes battered or curve worn to any extent, as in this condition it is nearly impossible to maintain good riding track, and, if left in too long, may cause accidents.

Joints.—Joints should be of substantial plain type, with no portion protruding below the base of rail. Oil-treated steel is preferred.

Bolts.—One-inch oil-treated bolts are specified.

Frogs.—No. 12 frogs are desired for slow-speed crossovers and passing-track movements, and No. 20 frog for high-speed crossovers operated by interlocking.

Track Ties.—Ties 7 in. by 9 in. by 8 ft. 6 in. shall be placed in the track so there will be 4 in. more outside of the outer rails on double track than outside of the inner rails. For single track ties should be laid so they will extend equally outside of each rail except on curves in excess of 2 deg., where they should be placed so that 4 in. more is on the outside of the low rail than outside of the high rail. Twenty ties should be used per 33 ft. rail-length, making slightly more than 11 in. spacing between each. White oak is recommended and we believe it economical to use tie plates on each tie, such tie plates to be of the anti-creeping type.

Tie Plates.—Shoulder tie plates should be not less than $\frac{5}{8}$ in. thick.

Anti-Creepers.—Enough should be used to hold the rails from creeping of a type easy to apply, simple in construction and that stay on.

Switch Ties.—Use 7 in. by 9 in. of various lengths of hardwood.

Make-up of Passing Tracks.—Main passing tracks should be provided with a fair quality of ties and rail of a section approximating main-track rail. It is often found economical to use the lighter sections taken from main tracks when they are being relayed with a heavier rail. The ties in passing tracks and important side tracks should never be of such inferior quality as to require labor being expended unnecessarily in frequent renewals or an element of danger to employees by derailment being involved.

Work Equipment Recommended to be Available, Possibly to be Used on More than One Sub-division

Steam ditchers, power-rail loaders and unloaders, center-dump ballast cars, a few air-dump ballast cars to use with a steam ditcher, a clam shell, ballast spreaders, ballast shapers of the most modern type, for widening and shaping the subshoulder and ballast shoulder, rail-laying machines, power subshoulder weed-mowers, snowplows and flanger cars.

The above power-driven machinery and labor-saving devices have been recommended because we think them necessary to offset the constant deterioration in quality of available track laborers. All labor-saving machinery should be given careful consideration and made use of where possible. The saving that may be made by the use of bank-widening, ballast-shaping, rail-loading, rail-laying, weed-mowing and other machinery is so apparent that we are at a loss to understand the tardiness of some railway managements in their general adoption of this practice.

Weed-killing by the application of chemicals has been proven a great labor and money-saving process. The use of air-driven rail saws and drills should be gone into and advantage taken of them as a means to attain efficiency.

A Roadmaster's or Supervisor's Subdivision Organization, the Length of Subdivision and the Length of Section

Roadmaster or supervisor—1

Length of division—100 miles of double track or its equivalent

Assistants—2

Chief Clerk—1

General Timekeeper—1

General Material Clerk—1

Foremen—34

Length of section—3 miles of double track or its equivalent

One extra foreman and from 8 to 20 laborers

One assistant foreman and track-walker combined for each section, to be paid 25 cents a day more than laborers

Blacksmith—1

Carpenters—2

Section men—1½ man per single-track mile in season when ballast can be worked and ties put in—1 man per mile in seasons when ballast cannot be worked or ties put in in climates where rail renewals can be made and fences can be rebuilt and repaired.

We recommend this subdivision organization on subdivisions of 100 miles in length because more supervision of the right kind is necessary to secure the maximum results in safety and efficiency.

Only a small percentage of the foremen are quick to discover and put into practice simpler and easier methods for bringing about required results. It is amazing to observe the various methods of performing each particular operation by different foremen on one division and especially to note the variation in costs for the same kind of work.

We recommend a clerk for every roadmaster or supervisor because the duties he can perform will enable the head of the subdivision to spend more of his time where he is needed, *on the road*, where he can do the most good. A general timekeeper is needed on divisions where the roadmaster or supervisor handles the time of his men. He should in no way relieve the foreman or road timekeeper from keeping the time of his men, but rather should keep a check on them, insuring correct timekeeping and proper charges being made to various operations.

A general material clerk should in no way relieve foremen from the responsibility of caring and accounting for all material under their charge, but should keep a correct record of all material handled on divisions where used, where stored, etc. He should do this by constant checking on the ground on the various sections.

We recommend a subdivision floating-gang foreman and crew of varying size, composed of picked men whose compensation should be slightly more than the regular section men. This gang should be equipped with a portable camp and tools for various track work. This crew should be employed to do various special jobs, such as building new side tracks, transferring cars, handling snow and various other jobs. At times when special work is slack it should assist some foreman in doing heavy work and give assistance to the foreman who is behind in his work.

The above section forces should be employed the year around because the practice of reducing forces to the minimum in the early fall does not appear to be the best. With certain limitations a force more nearly uniform throughout the year is most economical, for a better grade of laborers will enter and remain in service and be satisfied with a lesser wage if assured of work all the year round. In a climate that will permit, such work as relaying rail, gaging track and rebuilding fences can be done in the late fall and early spring and much other miscellaneous necessary work can be carried on throughout the entire winter. *There is much less work to be done during the summer than in cases where the force is reduced below a reasonable number early in the fall*, and consequently a less number of men may accomplish the season's work, thus greatly reducing the necessity for large extra gangs and so-called floating gangs during the summer months, if not altogether eliminating them.

We recommend a blacksmith on each subdivision to repair tools, make light repairs to section cars, etc., because such a man, working under the direction of the roadmaster, will more nearly secure the full life out of each tool, as he will be getting suggestions from the men who use them. We recommend two carpenters to relieve the section men from doing many tinkering jobs such as repairing planked crossings, wing fences, bunk cars, etc.

Recommended Methods for Doing Heavy Work

Ballasting work should be started as early in the spring as track conditions will permit and closed up early enough in the fall to permit the section men to get over the new stone, leaving it in first-class condition for winter. Old material should be removed to the bottom of the ties and spread out for widening embankments, leaving the subgrade in a rounding shape. All ditches should be cleaned and embankments strengthened where necessary in advance of ballasting operation.

All necessary tie renewals should be made and ties properly spaced. Track should then be lifted to the proper grade making the first lift to the top of the grade stakes and only tamping by filling under the ties at the ends and under the full width of the rail, using round-pointed shovels or spades for this work. After the track has been given at least a few days' settling under traffic, a second and final lift should be made and the track tamped carefully with diamond-pointed tamping bars or tamping picks from the outside ends of the ties to a point fully inside of the rail base. Center-dump ballast cars and center-ballast spreaders are recommended for handling the new ballast.

From reports coming under our observation we believe slot spiking at joints or the spacing of ties immediately under the joints is unnecessary and constitutes a waste of labor. Uniform spacing of ties and anchoring of the track by the use of anchor tie plates or anti-creepers is more economical from every standpoint. However, if some railways insist on spacing ties to conform to the angle bar slots, rail laid during the winter months, if properly anchored by anti-creepers, can wait until the condition of roadbed will permit tie spacing with no detrimental results to rail or surface.

The committee recommends that as much rail as possible be laid in the early fall, winter and early spring.

In making renewals of rail the basic principles of this work should never be sacrificed to the sometimes too insistent demand of railway managements for fast work. In other words, rail should be laid from the practical rather than from the theoretical standpoint. To lay rail right, the work must be done so that the new rails have proper bearing on each tie. This means in most cases a careful adzing of all the ties. Proper expansion is the other essential of good rail laying, while the items of careful application of joint material, immediate and continued tightening of bolts, the proper driving of spikes, immediate anchoring to prevent creeping and destruction of uniform expansion and replacing of the ties for uniform support under each rail, are so important that the neglect of any means waste.

Sufficient supervision should be provided to insure competent men overseeing all features of the work. The number of men in one rail laying gang is a factor that should be considered carefully, bearing in mind that large gangs with insufficient supervision or small gangs with frequent waste of time walking back and forth, are elements of loss that should be considered and kept to the minimum.

Handling Material

On each division of 100 miles a small, well arranged and well equipped material yard should be maintained, and if possible equipped with air or other power to operate a drill, rail saw and crane for handling rail, ties and other heavy material.

If ties for annual renewal are received in the fall and winter preceding their use, they should be distributed along the track where needed and piled in small neat piles with an aim to keep

the maximum distance of truckage from pile to place of installation, below 66 ft. Where this cannot be done, they should be piled in a material yard and distributed where needed when ready to install.

As a general rule rail is rolled only a short time preceding its installation, but if it is not to be used within a reasonable time after being received, it should be stored in a yard rather than distributed along the track. Switch ties, fence posts, crossing plank and fence lumber should be sorted and stored in a yard and only distributed as required for immediate use.

Scrap, as well as usable materials, should be cleaned up regularly and assembled until disposition is given.

At a designated time, say, once every two months or oftener, the roadmaster or his assistant should attach sufficient suitable cars to the way freight if he has no regular work train and gather up all scrap, usable rails partly scrap (accumulated by repairs), defective rails and in fact everything but a minimum allowance of emergency material such as rails on rest, a few angle bars, spike, bolts, etc., leaving anything of course that will be used immediately.

Renewal of Track Ties

This work should be commenced as early in the season as roadbed conditions will permit and continued with as few interruptions as possible until the season's requirements are all in. When track is being re-surfaced ties can be renewed at the least cost. To keep stone ballasted track in the best possible riding condition it should be surfaced out of face at least once every three years. Therefore, we recommend that, in so far as possible, tie renewals be made only in such portions of the track as are surfaced out of face each year. The matter of inspecting and indicating the ties that should come out of main track, the manner of applying new ones and the number furnished, are items of importance and should be given a great deal of attention by supervising officers.

L. C. RYAN (C. & N. W.) Acting Chairman.

DISCUSSION

In discussing the width of subgrade the committee replied to a question that it had in mind 13 ft. between track centers in placing the width of subgrade on double track at 33 ft. After attention had been called to the fact that the laws in some states require a minimum distance between track centers on new construction of 14 ft., the report was amended to provide that the minimum width of subgrade should be 21 ft. for single track and 20 ft. greater than the distance between track centers for double track.

In discussing drainage, J. O'Connor (M. St. P. & S. S. M.), opposed laying tile lower than 4 ft. below the bottom of the surface ditch even in cold climates, as he had found that running water does not freeze in these drains. It is his practice to use 8 in. bell tile and to backfill the ditch to the top with cinders or coarse gravel. With this construction he reported no difficulty with heaving. W. Shea (C. M. & St. P.), described a recent examination of a number of drains in northern Missouri. These drains have been laid 4 ft. deep and 3 ft. beyond the ends of the ties and have been backfilled with cinders. As they were not carrying off the water an examination was made, and it was found that the heavy power recently installed had forced a stratum of blue clay through the cinders above the tile, shutting off the access of the water into the tile. Under these conditions he had secured the greatest success by digging a deep ditch either with teams or ditchers and then filling it with cinders. M. Connerton (Q. & C.), emphasized the importance of making the depth at which tile is laid dependent on local conditions, being sure to go below all pockets of water in the roadbed. A. E. Hansen (A. T. & S. F.), described his practice of laying 6 in. vitrified bell-end tile below the track ditches with tees and 4 in. laterals extending 1 ft. inside the rail at intervals of about 6 ft. When laying this tile he re-

moved all the old material on the shoulder and backfilled with cinders to enable the water to reach the drains. This construction cost \$0.50 per lin. ft. of track, and has drained the roadbed as well as the ditches.

In discussing the sizes of crusher run ballast, L. C. Ryan stated that he has found very little trouble with ballast between the limits recommended by the committee. J. P. Corcoran (C. & A.), uses stone ranging from 1 in. to 2 in. in size. He has found crusher run stone too fine, the finer particles disintegrating and permitting the track to churn. T. Hickey (M. C.), stated that he had secured satisfactory results from stone ranging in size from $\frac{3}{4}$ in. to 2 in. A. M. Van Auken called attention to the fact that the proportions of stone of the various sizes varies from day to day. H. Van Gorder (C. & N. W.), thought this was caused by using stone from strata too near the surface.

There was an extended discussion regarding the point at which curve worn rail should be removed from the track. T. Hickey considered rail safe until the wheels begin to strike the angle bars. M. J. Connerton disapproved of this guide, as the dimensions of the angle bars vary on different roads. T. Thompson (A. T. & S. F.), advocated the removal of rail when worn $\frac{1}{2}$ in. on the head. W. Shea has prepared three templets for each section foreman for use with A. R. A 90-lb. rail with a $2\frac{3}{4}$ in. head. When templet No. 1 (showing a head of $2\frac{3}{16}$ in.) fits the rail, the foreman notifies him. When the rail is worn to correspond with templet No. 2 ($2\frac{1}{2}$ in. head) he inspects the rail and orders other rail to replace it. When templet No. 3 (with a head of 2 in.) fits the rail, it is taken out at once. On motion of J. Buel (Ark. Cen.), this paragraph was amended to provide that rail on the high side of curves should be removed when the head was worn $\frac{1}{2}$ in.

The recommendation of the committee specifying joints, no portion of which should protrude below the base of the rail, created a great deal of discussion. The committee stated that it had in mind the laying of rail without the spacing of ties in making its recommendation, and while there was no opposition to the practice, it was felt that the recommendation of the committee was too broad, and it was amended to recommend "joints of substantial type, no portion of which protrudes below the top of the tie to permit laying rail in the winter, oil treated steel preferred."

The first half of the paragraph relating to track ties was amended to show that this was offered experimentally and was not to be recommended as standard practice at this time.

While discussing the paragraph regarding anti-creepers, the committee stated this provision was designed to overcome the need for slot spiking joint ties.

In the discussion of switch ties, J. Buel said that in his opinion such ties should be wider than track ties, and with the size of the latter established as 7 in. by 9 in., he believed that the switch ties should be 7 in. by 10 in. J. W. Powers (N. Y. C.), said that he believed additional width was necessary only for the frog ties because of the greater impact to which they were subjected and because of the notching necessary. On the other hand, it was the experience of L. C. Ryan that more switch ties were renewed on account of cutting or decay around spike holes than because of breaking, owing to insufficient strength. With a plate covering the full width of the tie he believed that a 9 in. width is entirely sufficient.

In the discussion of work equipment recommended, J. O'Connor stated that he believed a weed burner was one of the most economical and efficient devices for getting rid of weed. His method of procedure is to make one run with the burner to kill or dry up the weeds. After an interval of two or three weeks the weeds are thoroughly dry and a second run then burns them completely. In answer to inquiries concerning trouble with fires in ties he stated that this danger was very slight. In crossing a pile trestle or a deck bridge it is not even necessary to put out the fire on the burner, but the burner is simply raised until the bridge has been crossed. Two section

hands following with a barrel of water on a push car can readily put out any fires that start in the ties.

J. Buel reported adversely regarding the use of chemical weed killers, stating that weeds were killed temporarily, but came up again. The chemical he had used was poisonous and resulted in the death of stock. L. C. Ryan stated that he had made one application on 100 miles of double track late in July, 1914, which killed all of the weeds for the rest of the season at a cost of between \$35 and \$48 per single track mile. Another application made earlier in the season this year cost only \$23 per single track mile. The cost includes the cost of fluid, labor and train service. Last year 90 gal. of the chemical was required per mile, while this year only 60 gal. was necessary. He recommends two applications of 40 gal. each per season. The chemical is diluted 1 to 25. The outfit he used covered 60 miles per day, although greater distance could have been covered if more water tanks had been available. A. E. Hansen objected to the use of chemicals to eliminate weeds from rock ballast. In his opinion it would be better practice to clean the ballast with forks. He had used chemicals to kill weeds on the sub shoulders, using a chemical prepared by the railway company consisting of creosote, potash and arsenic and making one application each season. This cost \$52 to \$53 per mile and gave good results.

In a discussion of organization and particularly of the need of interpreters, C. King stated that the Long Island and the Pennsylvania have started campaigns of education among their track forces, three-quarters of which are Italians. Most of these men can talk English, but not all of them can read and write it. Most of them are enthusiastic about the plan, which is largely of a correspondence character, although the instructor comes in personal contact with the men occasionally. The course covers the use of track terms and matters closely allied with track work and also includes the principles of "safety first."

J. O'Connor objected to the prevailing tendency to increase the size of roadmasters' or supervisors' districts, stating that with the grade of men now obtained for section foremen, much of the roadmaster's time is taken up in directing such work as the placing of a turnout or crossing which the foreman had previously been able to do without his assistance.

The recommendations of the committee regarding the laying of rail in winter and eliminating the slot spiking of joints created a great deal of discussion. The practices of the different roads which have tried this method were related. One or two members told of difficulties in anchoring light rail carrying heavy power. The consensus of opinion strongly favored the application of sufficient anchors to hold the rail from creeping without slot spiking the joints.

In discussing the method recommended for relaying rail and particularly the statement regarding the adzing of ties, the question was raised as to the merits of the canting of rails. D. O'Hern (E. J. & E.), advocated this practice based on extended experience with it. Other members opposed it. To get the question before the convention, L. C. Ryan moved that it be recommended that rail be laid vertical, which motion carried.

PROPER ORGANIZATION OF SECTION FORCES AND METHODS FOR MAINTAINING AND POLICING TRACK. FOR LIGHT CONSTRUCTED RAILROADS CARRYING HEAVY TRAFFIC

There is no item of more vital importance than the proper construction and care of the roadbed. When it becomes necessary to remove the cap soil in perfecting the grade, it should be replaced, as it will stand up and shed the water much better than earth beneath the surface. The roadbed should be reinforced at every point permissible and properly drained. No water should be allowed to stand in borrow pits or in pockets near the roadbed. The top width of roadbed should be 18 ft. for main track and 16 ft. for side track. The shoulders of fills and the lines of ditches in cuts should be regular and parallel with the track. Ditches at the ends of the cuts should be curved away

from the fills so that the slopes of the ditches will not be washed away.

Earth taken from ditches should not be thrown on the slopes or tops of cuts but should be distributed evenly on the slopes of fills. When ditching, care should be taken to keep material from falling on the ballast or at the ends of ties. Cross drains should be put in where necessary. All ditches and culverts and the ditches leading to them should be kept clear of mud, drift or other obstructions. Where water is beginning to undermine culverts or other masonry, prompt steps should be taken to stop the damage by the use of rip-rap or by some other means. Surface ditches should be cut above the upper slope of side hill cuts when the natural material is unlikely to slide on account of surface ditches. These ditches should be at least 10 ft. from the top of the slope of cuts. A 6-ft. beam should be left between the foot of embankment and the edge of borrow pit or ditch. Ditches should have sufficient slope to carry the water off rapidly but the depth should not be sufficient to weaken the roadbed.

Live cap soil makes the best ballast, if obtainable. In absence of this we would recommend the use of gravel or cinders, especially for soft, rotten spots in the roadbed.

Cross ties should be 6 in. by 8 in., by 8 ft. preferably of hard wood, uniform in size and thickness; no less than 18 ties to a 30-ft. rail in main track and 16 to a 30-ft. rail in side track. Soft wood ties should be treated with a suitable preservative. Tie plates should be used when practicable.

In laying steel, rails should be laid joints evenly broken in order to space the ties properly. The allowance for temperature variation should be from $\frac{1}{8}$ in. to $\frac{3}{8}$ in.

When center stakes are given the track should be lined accurately to them. Center stakes should be preserved. Track should be lined before it is surfaced; then when surfacing is completed the finishing should be given. Curves should be approached with uniform elevations of the outer rail on regular curves and with the elevation varying with the curvature on spiral curves. The level-board should always be used when surfacing or smoothing track.

No curve should be elevated more than 5 in. Elevation must be governed by the location, degree of curvature and speed of trains. Easements should be to 40 ft., except on reverse curves. The elevation should be proportioned according to the location and degree of curvature. The gage on curves sharper than 4 deg. should be widened from $\frac{1}{8}$ in. to 1 in., according to the degree of the curve.

Tightening Bolts

Joints should be full bolted and kept uniformly tight. In general, bolts should not be tightened in extremely hot or cold weather.

When rails creep so as to close the expansion spaces at joints along one stretch of track and open them at another, the rails should be drifted back when these spaces exceed $\frac{3}{8}$ in. To offset this, large select ties should be placed under joints and spiked in slots; good rail anchors or rail anti-creepers installed.

Sections should not be longer than 6 miles for single track. Foremen should be allowed one man for each mile eight months in the year and sufficient force during winter months with extra allowance for handling snow. When practicable, section crews should be located at the center of their sections.

Every fifth telegraph pole should be numbered. During the last months of the calendar year the track should be gone over carefully, estimating the number of defective ties located between these poles to the end that ties may be distributed where they are needed, thus saving expense of trucking as much as possible. Ties should be distributed not later than February. March, April and May are the three principal months for tie renewals. In the meantime, right-of-way fences, cattle guards and wings and crossing planks should be looked after so as not to interfere with spring work. Following the tie renewals comes the spotting up and resurfacing, cutting weeds and grass

on the track and right-of-way and then ditching and general cleaning come in order.

Section motor cars should be furnished as far as practicable.
J. BUEL (Ark. Cen.) Chairman.

DISCUSSION

At the suggestion of J. Sweeney (C. & E. I.), the paragraph on ties was amended to add after soft wood ties, "And such hard wood ties as will take treatment should be treated, etc." In the discussion of the paragraph on maximum elevation, M. Burke (C. M. & St. P.), did not think that 5 in. was sufficient elevation for all speeds. J. Buel explained that it was the opinion of the committee that the speed on light constructed railroads such as are under consideration in the report of this committee, would necessarily be restricted by such amounts as would permit safe operation around all curves at elevations not exceeding 5 in. He explained that it was his experience that mud ballast would not permit of greater elevation, that the tracks would slip, or that the ties would settle under the low rail and give excessive elevation if the track is not watched very closely. This opinion was confirmed by other members. On a motion by W. Shea (C. M. & St. P.), this section was amended to read "That the maximum speed on the class of roads covered by the title of this report shall be 40 miles per hour, and that the maximum superelevation of curves shall be 5 in."

The recommendation of the committee that the gage on curves sharper than 4 deg. should be widened, created extended discussion. The practices of several roads were described, showing that there has been a tendency during recent years to maintain the track to standard gage on curves up to 8 and even to 10 deg. A number of the members opposed the recommendation of the committee and it was finally voted down.

In discussing the recommendation regarding the length of sections, W. Kofmehl (C. M. & St. P.), stated that it was entirely practical to handle sections 7 to 8 miles long with motor cars. J. O'Connor emphasized the importance of the density of traffic on the allotments of section forces and the difficulty of establishing any uniform allowance. He favored sections with a maximum length of 6 to 7 miles on heavy traffic single-track lines, equipping such sections with motor cars. Over 500 sections on his road are now equipped with such cars.

PROPER ORGANIZATION OF SECTION FORCES AND METHODS FOR MAINTAINING AND POLICING TRACK FOR LARGE TERMINALS

We have taken as our basis for the report a terminal consisting of approximately 150 miles of track which handles on an average the following traffic each 24 hours: Freight trains, 102; passenger trains, 111; light engines, 87; passenger cars, 888; freight car loads, 2,206; freight car empties, 405.

Working on the basis of a man to the equivalent mile of main track we recommend for a summer force—0.75 man and for a winter force—0.50 man. Equivalent mileage is to be computed on the following equivalents for 1 mile of main track: 1½ miles of siding, 15 switches, 20 interlocking derails, 7 single-track diamond or right-angle crossings, 5 movable-point crossings or double slip switches, 20 single track plank crossings, 24 ft. in length.

Four miles of main line and 12 miles of side track or its equivalent is a normal section for one foreman. Each section crew should be organized to consist of 1 foreman, 1 assistant foreman, 1 track walker, 1 lamp man and yard cleaner combined and enough laborers to make the gang equivalent to 0.75 man per mile in summer and 0.50 man per mile in winter. The foreman should be allowed to employ the laborers in his own gang if it is possible. The assistant foreman should be picked from the laborers by the foreman, roadmaster or supervisor.

Each section crew should make all tie, rail, frog and switch renewals until such time as it becomes necessary to relay a cer-

tain track out of face or to relay a lead out of face when the section foreman should be given an additional allotment of men.

Cleaning Tracks

Yard cleaners should keep rubbish, coal, etc., picked up from the tracks and right-of-way and piled in places where it can be picked up at stated intervals. Team tracks and freight-house tracks should also be kept clean at all times by one or more regular men.

A sufficient amount of emergency material should be kept at one or two convenient places where it can be easily reached and quickly loaded when needed. Power derricks should be used when electricity or air is available. Rails and ties for the season's requirements should be piled in a yard so that a work train could easily and quickly load each section crew's daily requirements. This material should only be distributed the day it is to be used if it is along a track or where switchmen and trainmen have to walk.

Rail in heavy switching leads should not be lighter than 80-lb. section. Switch ties should be 7 in. by 9 in., white oak preferred and tie plated. Nothing shorter than a No. 9 frog should be used in leads or other yard tracks where frequent heavy switching is performed. Frogs should be so constructed that ordinary angle bars can be applied at either end without difficulty. Guard rails should be at least 10 ft. long and securely fastened to the main-track rails. Nothing shorter than a 15-ft. switch point should be used and a cast-steel filler should be placed in the heel of each switch point.

When making tie and rail renewals on an entire track through the yard, the track should be taken out of service. Rail, ties and other material needed should be distributed by work trains and the old material taken out should be picked up by the trains before the track is put back into service.

In a terminal as above mentioned the roadmaster or supervisor should have a regular work train. Each supervisor or roadmaster should also have one blacksmith and helper. One or more carpenters should be assigned to each roadmaster or supervisor to repair fences and gates, plank street crossings and do other miscellaneous work. Track walkers do not relieve the section foreman of the duty of personally policing his own territory.

C. S. BROOKS (T. R. R. A. of St. L.), Chairman.

DISCUSSION

In discussing the equivalent mile classification M. Burke (C. M. & St. P.), objected to 1½ miles of siding as equivalent to 1 mile of main track, as in his opinion the cost of maintaining a mile of main track is much more than for that amount of siding. On the other hand, he objected to 15 as the equivalent in railroad crossings of a mile of main track, stating that on that basis he would much prefer to maintain the latter. D. McCooe (G. T.), stated that in his experience with a terminal including 150 miles of track, a large part of the mileage classed as sidings would be subject to frequent train movements—much more than would be received by the ordinary standing track. This explanation was extended by L. C. Ryan (C. & N. W.), who called attention to the fact that the term sidings in this classification included all tracks other than main tracks. A suggestion by A. M. Van Auker that the classification should be further subdivided met with disfavor. A question by J. B. Kelly (M. St. P. & S. S. M.) as to whether traffic was to be taken into account in this classification was answered in the negative. D. McCooe made reference to the equivalent-mileage basis proposed by the American Railway Engineering Association and said that it was applied to sections on his districts with the result that one section including only 1½ miles of main track was found to be equivalent to 16 miles on the equated basis. After extended discussion regarding the number of railroad crossings equivalent to a mile of main track, the report was amended to read 7 cross-

ings instead of 15. The rest of the report was accepted as information without further comment.

NEW AND EXPERIMENTAL TRACK ACCESSORIES AND TOOLS

Miscellaneous

The gasoline motor car has been perfected so that it will now perform satisfactory work under the most severe conditions. What we mean by severe conditions are heavy grades, heavy loads, strong head winds, etc.

Rail benders have been improved so that rail can be bent or curved nearer the end than with the old style Jim Crow, making a much more desired tool.

Rail-laying machines for relaying steel are still being improved and are warranting the support they have been given.

The tool grinders now on the market with their different attachments for holding the different tools properly on the face of the stone are a decided improvement over the old grinding stones and flat files formerly used.

Track drills have been improved so that they are much more substantial. They can be released from the rail and set up with much greater ease than formerly.

The mechanical percussion tamper is now being used and perfected. This fills a long-felt want of the track department and should be encouraged by all roadmasters, especially in yards and terminals, where the machines can be operated from pneumatic signal lines without the expense of additional power.

A material improvement in steel fence posts has been made in the last year or two. There are now on the market concrete fence post machines which mold eight posts at a time. Such machines can be furnished section gangs and they can make cement posts at such times as the weather will not permit outside work. A good concrete fence post can be made for about 18 cents each, not figuring labor and sand. As timber posts are advancing in price each year we recommend the more liberal use of steel and concrete posts.

It is of the utmost importance that the railroads should use the very best tools they can secure, as they are scattered over many hundred miles of road and unless very carefully watched, the service is lost sight of. If tools fail outright they are very apt to be reported, but where they do only 25 to 40 per cent of the work they should, the chances are that the roadmasters will not hear of it. A cutting tool made from cheap carbon steel will cost less than one made from tool steel. It would, however, be ridiculous to consider it more economical.

We have not progressed in the matter of rail joints so far as some people think, even with the many new ideas presented in the last 35 years. We find many trackmen complaining that a certain kind of joint does not keep the track in good line around the joint and they lay the blame on the joint. Similar conditions, however, arise with almost any make of joints. We find that in 95 per cent of the cases the kinks are due to the improper sawing of the rails. We find such conditions exist when the rail is laid with the minimum amount of expansion. Some members of this committee have found 100-lb. rail sawed so short on top that it would cause a $\frac{1}{4}$ to $\frac{1}{2}$ -in. depression of the joint in hot weather. A crooked sawing occurs sideways also and causes 90 per cent of the line kinks. This occurs whether or not joints are spaced. New rail is sawed at the mill before it is gaged. Therefore, if the rail is sawed through a kink and afterwards straightened it becomes noticeable when rail is laid tight as many now practice.

W. SHEA (C. M. & St. P.), Chairman.

THE BANQUET

The fourth annual banquet of the Track Supply Association for the Roadmasters' & Maintenance of Way Association was held in the Auditorium Hotel on Thursday evening, with a total attendance of 271. F. A. Preston, vice-president of the Track Supply Association, acted as toastmaster. In his opening address he stated that his regard for the roadmasters could be expressed

no better than by reading an editorial taken from the Los Angeles Evening Express of November 14, 1900, upon the occasion of the Roadmasters' convention in that city. This tribute to the track men called attention to the greater publicity given to the other departments and other officers of the railways and pointed out the importance of the roadmasters and the debt which the public owes to them.

H. R. Safford, chief engineer, Grand Trunk, Montreal, Que., said that the railroads of the United States owe much to the Roadmasters' Association, a debt which he believed they appreciated because of the encouragement which the roads have been giving their roadmasters to attend the annual conventions. Track maintenance involved a great many difficult problems, not all of which can be solved by the use of mathematics or the other exact sciences, but that they all require the exercise of common sense. Although some were wont to feel that this association overlapped another, he believed that this association had a distinct field and that there should be no feeling of competition.

The next speaker was E. T. Howson, engineering editor of the *Railway Age Gazette*, who discussed the track-labor problem.

James Burke, superintendent of terminals, Erie Railroad, Chicago, called attention to the fact that the Roadmasters' Association was one of the few organizations of railway men which did not feel called upon to encourage legislation for the benefit of its own members to the disadvantage of the roads. Instead their efforts collectively and as individuals were characterized by hard work, long hours each day in an effort to do for the railroads all that is possible with the funds placed at their disposal. He urged the older roadmasters to keep in step with the recent progress in the conduct of track maintenance, believing it would be only a few years before almost all operations would be performed by mechanical means, and that this would result in great improvement, in the intelligence of the forces and the rate of pay.

P. J. McAndrews, president of the Roadmasters' Association, said that with the opportunities existing the desire for work, and the encouragement of the higher maintenance officers, the Roadmasters' Association has a future before it which should be highly encouraging to those who have long had the success of this organization at heart, stating that the most important purpose of the organization was for the mutual assistance of the members.

The next speaker was Coleman King, president-elect of the association, who paid a tribute to the section foreman, characterizing them as the most reliable and faithful employees in railway service.

The last speaker of the evening was W. C. Kidd, secretary of the Track Supply Association, who urged all members of the two associations to assist in making the next convention a success.

THE TRACK LABOR PROBLEM

By E. T. Howson

From its very nature the maintenance-of-way department of a railroad is a spending organization. It creates no revenue, but it is responsible for the expenditure of about 14 per cent of the gross income. Its problem is, therefore, to spend this large sum as economically as possible and its efficiency is measured by the extent to which it secures full value for every dollar expended. There has never been a time in the history of railroading when the demand for ability of this nature has been greater than in the past few years of declining railway revenues and continually increasing expenses. As a result it may be stated confidently that our railways are more efficiently managed today than at any other period in their history.

The average roadmaster is responsible for the expenditure of from \$150,000 to \$200,000 annually, of which approximately 60 per cent goes for labor and 40 per cent for materials. One would, therefore, naturally expect to find the largest amount of attention paid to the organization and handling of labor and secondary attention given to the selection of materials. On the

other hand a search through the proceedings of this and allied associations and through the pages of the technical journals will show that a very large part of the matter published therein relates to materials and to their use, and a relatively small part of the most complicated problem of all—that presented by the human element. Because of this lack of proportion, it is not surprising that those materials comprising the various units of our track construction have reached a high state of development, and that at the same time we have a labor problem of serious proportions confronting us.

The labor problem has never been studied scientifically from the standpoint of the maintenance-of-way department to the extent it deserves or to the extent that it has in other departments of our railway organization and in outside industries. Take the question of wages alone. The pay of section foremen is not based on any comparison with that in other kinds of skilled labor. The experienced track foreman receives considerably less than a green brakeman on his first run, and much less than the conductor, with whom he compares in responsibility and experience. Also, consider the application of discipline. A conductor or brakeman is given demerits for a minor offense and kept in service, while a foreman is laid off for an offense no more serious, although it takes just as long to train a good section foreman as a conductor and he cannot be spared from the service any more readily than the conductor. The tendency toward the organization of track men into unions is increasing, and unless adequate relief is granted soon, we shall soon have to deal with organized labor in the track department with all the difficulties that this implies.

No one will dispute the statement that there has been a radical change in the personnel of our track forces in recent years. We are all aware of the fact that the English-speaking or north European laborer is drifting into other pursuits, and that his place is being filled by the Italian and Slav of southern Europe. However, this does not in itself explain the problem confronting us.

An economic development has been and still is taking place in this country, affecting the railways and other large industries alike. In this rapid development it is only natural and proper that the men already here and familiar with our language and customs should prosper and move up to positions of more importance. It is to be conceded that the failure of the railway managements to recognize the importance of the track men in matters such as wages and working conditions has hastened the departure of the English-speaking laborer, but it has only hastened and has not caused this change. Any concessions which the managements could reasonably have offered would have served only to delay this transition, for it was inevitable if the country was to develop. Those of you who because of your remoteness from industrial centers are still able to secure native labor are fortunate, but you will soon be confronted with the same conditions. As an indication of the extent to which foreign labor is now employed on the railroads, attention is directed to the fact that over 11,000 Italians alone are employed on the Pennsylvania Railroad east of Pittsburgh and Erie, most of whom are in the maintenance-of-way department. On several eastern roads practically 100 per cent of the track laborers are foreign.

This is the condition to-day. These men have different racial characteristics from those who preceded them, and for this reason we must adapt our methods somewhat to their customs if we are to secure satisfactory results, just as we handle manganese steel differently from open hearth. The foreign laborer is here to stay and the efficiency of the roadmaster of the future will be measured by the extent to which he is able to secure the full results from this labor. The track laborers of today come to this country very largely from southern Europe. They are the raw material from which we must create our track men and our foremen of the future as well. One of the most serious handicaps of foreign laborers is their inability to understand and speak our language. As long as they remain in this con-

dition they can be only partially efficient. To aid them in this regard the Pennsylvania has prepared an Italian-English track course whereby they may be taught the elements of English and of track work at the same time. The Union Pacific prepared a similar course a few years ago for its Japanese track laborers. The Central Railroad of New Jersey and other roads conduct night schools for their men at various terminals.

Having acquired the elements of our language it is self-evident that they will make better and more efficient workmen. This educational work is not confined to the instruction of foreign laborers alone, for several roads are now placing similar courses at the disposal of their native track laborers and foremen as a means of instructing them in track work, increasing their efficiency and preparing them for promotion.

Another aid in the solution of the labor problem is the increased attention which is being given to the physical welfare of these employees. The day is passing rapidly when any vermin-infested old box car with a leaky roof is considered suitable to house track laborers. Even though these men may not be used to our scale of living, they appreciate care and attention, and measures taken for their physical comfort are a material aid in holding them in the service. I have in mind one supervisor, known to all of you, who fumigates and paints all of his camp cars thoroughly inside and out every spring, making them as attractive and sanitary as possible. I was not surprised when he told me that a large proportion of his floating gang laborers return to him year after year. While wages are an important consideration in holding laborers, they are not the only one. I know one road that is paying its track laborers 2½ cents an hour less than its neighbors and holding all the men it needs, largely because of such measures. This is a very good dividend in itself.

The wage problem is one on which there is a wide divergence of opinion. Most discussions of this subject have ignored the fact that labor is a marketable commodity the same as wheat and that it fluctuates according to the same law of supply and demand. For this reason, while I advocate educating and caring for labor to secure an ample amount of it and to increase its efficiency, I do not believe in paying above the prevailing market rates for temporary or floating gang laborers. While theoretically a higher rate enables the better men to be secured, in these days of large organizations when men are hired in gangs this benefit is seldom realized. Although it is true that gangs differ in ability, one will find some good and some poor men in almost every gang. Even in times of labor shortage the act of one road in paying higher than the market rates to secure labor only demoralizes the forces on all roads without increasing the supply of labor.

So much for the floating gang laborer. With the regular laborer conditions are somewhat different. A wage rate must be sufficient to encourage men to remain in the service, for the constant employment of inexperienced men is expensive. At the same time, with the prospect of steady work throughout the year, the better class of men are willing to work for less than the highest market rates. The most important single step which can be taken today for the development of an efficient organization is the adoption of permanent employment throughout the year for as large a proportion of the force as possible. When we could recruit all the track laborers we required from among the farmer boys along the line who were not dependent upon such work for their entire livelihood it was advisable to do as much work as possible during the more favorable summer season. Now, when good labor is scarce at any season, we still continue to crowd as much track work as possible in the three months from July to September, inclusive. It does not require any knowledge of mathematics to demonstrate that if this season is extended from April to September, inclusive, only half the force is required, and many roads have so extended their seasons. If this was extended further over the entire year, the forces necessary would again be reduced. You may say that this is impractical, and I will grant you that this is true in a

measure, particularly for the northern roads, but not to the extent commonly considered. The reorganization of track work, as carried out on the Long Island and the Frisco, whereby uniform section forces are employed throughout the year, may not be feasible in its entirety on the more northern roads, but they are all crowding much more work into the busy summer season than is necessary.

Another measure which will assist in holding the efficient laborer in the service is the establishment of a graded rate of pay. In its simplest form this consists in the selection of a leading laborer in each gang, perhaps with the title of assistant foreman, who receives a cent or two per hour more than the regular laborers. It has been suggested seriously that this be carried still further and that three or four scales of pay with minor gradations be established to reward men for increased length of service and efficiency. If the higher rates are awarded because of merit, they form an excellent incentive for a man to endeavor to improve his work, but if the men are selected because of favoritism or simply in order that the positions may be filled, the purpose of the plan is defeated. Its success depends almost entirely on the manner in which it is administered.

The condition as respects the foreman is more serious than as respects the laborer. The faithful and capable foreman of the old school is fast disappearing, and because of the lack of attention given the laborer, suitable material is not being developed to fill the vacancies. With the native laborer entirely gone or rapidly disappearing, it is evident that we must look to the foreigner for our future supply of foremen as well as laborers. That the foreigner has demonstrated his ability to make good as a foreman is shown by a recent census taken on the Pennsylvania Railroad east of Pittsburgh and Erie, as a result of which it was found that there were 75 Italian section foremen and 187 assistant foremen on the road.

Whether the foreign foremen will be content to remain in track work or will go into other industries which offer greater rewards when they have acquired a knowledge of our language and customs is a question. Profiting by the experiences of the past, many of the roads are adopting measures of one kind or another which will delay the repetition of any such transition. In the first place, the wages of section foremen have been raised quite generally during the past five years, but they are still considerably below what they should be. The section foreman is an officer on the railroad, responsible for the expenditure of \$5,000 or more annually, and he should receive a salary sufficient to create a desire to retain his position. Based on a comparison with other branches of the service, I believe a section foreman on a main line should receive at least \$90 a month. I do not mean that all men now filling this position are worth this amount, but that with a salary fixed at this figure men should and can be secured who are.

The section foreman should also be given an annual vacation with pay. I believe that every man should be paid for all time he works and that he should be allowed overtime. It is a hardship to ask any man to get up in the middle of the night to patrol his track during a storm when he knows he will receive nothing for this, and it is surprising that the foremen do this as faithfully as they do. If overtime is not paid, a vacation of ten days or two weeks with transportation and full pay, customarily allowed salaried employees, would compensate him for this extra work, would give him a standing in the eyes of his men and the community, and would make of him a better and broader employee. I am not suggesting an idle theory, for at least one eastern road gives its men such a vacation each year.

Another means of securing and holding good foremen is to insure them tenure of position as long as they handle their work properly. Too frequently a foreman is discharged hurriedly without a full investigation of all the facts. This not only affects the foreman directly concerned, but the news spreads along the line and serves to demoralize the entire organization. To prevent rash acts of this kind, one road requires that no man shall be taken out of service except for drunkenness and equally seri-

ous offenses, until a full report has been made to the superior officer and the recommendation of the supervisor approved.

With the continued industrial development of this country the measures outlined above will materially aid, but will not permanently solve the track-labor problem. The railways are a tremendous factor in our industrial life, requiring over 400,000 men for track work alone. The surest way to avoid a labor shortage is to reduce the number of men required by the substitution of labor-saving equipment wherever practicable. If one will compare the manner of performing work in our leading industrial establishments with that on the track, he cannot but be impressed with the fact that in their track work the railways are backward in the development of labor-saving appliances. This condition can be explained only partially by the statement that track work is varied in character. A further explanation is the inertia surrounding railway track work and the lack of really concentrated study of the possibilities of mechanical development. There is a definite field for the use of labor-saving devices which will not only reduce the number of laborers required, but will effect material economies in the cost of maintenance. I believe we are now on the threshold of a new era in track work in which there will be great improvements if we, railway men and manufacturers alike, will co-operate and give these new developments our sympathetic support.

The motor car is rapidly replacing the old hand car on main and branch lines alike. The usefulness of the tie-tamping machine has been demonstrated to you, and I believe it is still in the first stages of its development. One road has developed a machine for drilling rails and has reduced materially the cost of putting on bolted rail anchors in this way. This same road is endeavoring to perfect a device to saw the battered ends from the rails without removing them from the track. It is not a long step from the construction of a pneumatic tie-peeling machine to the construction of one that will adz ties. The Lehigh Valley has substituted locomotive cranes for tong men when relaying rails with excellent results. These are only a few of the possibilities in this direction. I, personally, believe that the present section motor car furnishes the power unit about which many of these various attachments will be grouped, and that instead of providing separate equipment for each class of work our section gangs of the future will be given motor cars with attachments to tamp ties, drill rails, etc., thereby using the motor all day instead of only for a short time at morning and night. When this time comes the amount of labor required will be reduced greatly, and that which will be employed will be of the skilled mechanic class, drawing better wages and doing more constructive work.

These various measures can be brought about primarily through the active interest and co-operation of all concerned. In many ways, the care of his men rests directly on the supervisor and the successful man is successful in this regard. It is not a special dispensation from the general office that enables one supervisor I have in mind still to retain all his native foremen, while neighboring supervisors on the same and adjacent roads have been forced to hire foreign foremen largely. In other matters such as the establishment of wage rates and the purchase of special equipment, authority must come from higher officers, but here as well the roadmaster has a very important part. It is his duty to study these problems at first hand, and having reached his conclusions to present them to his superior officers with sufficient data to prove his case. If he fails to convince them the first time, it is his duty to bring this matter up again on an opportune occasion, being sure in every instance that he is correct. It is only in this way that progress may be made; and the part to be played by the supervisor is most important.

INSPECTION TRIP

Wednesday was spent in an inspection of the railway terminals of Chicago. About 350 members and guests of the association left the North Western terminal on a special train at 9 o'clock going direct to the Stock Yards, where visits were made to the

Armour and Libby, McNeill & Libby packing houses. Lunch was served at the Stock Yards Inn, after which the train proceeded over the tracks of the Chicago & Western Indiana to the new clearing yard, where a short time was spent watching the operation of this terminal. The party returned to the North Western station late in the afternoon over the Belt Railway.

CLOSING BUSINESS

The selection of a location and date for the 1916 convention resulted in an extended discussion. New York was finally selected with a vote of 108 as compared with 26 for Chicago, and the date was fixed at September 19-22, 1916, inclusive.

The following officers were elected: President, Coleman King, Long Island, Jamaica, N. Y.; First Vice-President, M. Burke, Chicago, Milwaukee & St. Paul, Chicago; Second Vice-President, Abel Grills, Grand Trunk, St. Thomas, Ont.; L. C. Ryan, Chicago & North Western, Sterling, Ill., Secretary; W. H. Kofmehl, Chicago, Milwaukee & St. Paul, Elgin, Ill., Treasurer. Members of executive committee: James Sweeney, Chicago & Eastern Illinois, Danville, Ill.; W. Shea, Chicago, Milwaukee & St. Paul, Ottumwa Junction, Ia., and J. B. Kelly, Minneapolis, St. Paul & Sault Ste. Marie, Minneapolis, Minn.

THE TRACK SUPPLY ASSOCIATION

The annual meeting of the Track Supply Association was held on Friday morning. The officers for the past year were: President, E. M. Fisher, Fairbanks, Morse & Co.; Vice-President, F. A. Preston, P. & M. Company; Secretary-Treasurer, W. C. Kidd, Ramapo Iron Works. The reports of these officers showed the association to be in a healthy condition.

The following officers were elected for the ensuing year: President, F. A. Preston, P. & M. Company; Vice-President, R. A. Van Houten, Sellers Manufacturing Co.; Secretary-Treasurer, W. C. Kidd, Ramapo Iron Works; director for two years, E. T. Howson, *Railway Age Gazette*; director for one year, J. J. Cozzins, Union Switch & Signal Company.

EXHIBITS

The following companies had exhibits at the convention:

The Acme Supply Co., Chicago—Exhibiting the Gosos bed. Represented by P. J. Burke.

American Flexible Bolt Co., Pittsburgh, Pa.—U. S. track bolts. Represented by C. A. Seley.

American Guard Rail Fastener Co., Philadelphia—Guard rail clamps. Represented by D. L. Vaughan and L. P. Burwell.

American Hoist & Derrick Co., St. Paul, Minn.—Photographs of American railroad ditcher. Represented by Edward Coleman and C. C. Austin.

American Steel & Wire Co., Chicago—Woven wire fence and galvanized steel fence posts. Represented by L. P. Shanahan, C. J. Boon, A. Alexander, J. W. Collins and F. B. Fraude.

The American Valve & Meter Co., Cincinnati, Ohio—Economy switch stands, Anderson interlocking safety switch stands and safety switch locks. Represented by F. C. Anderson.

The Anchor Co., Chicago—Exhibiting the Efficiency Rail Anchor. Represented by T. B. Bowman and C. P. Williams.

Ajax Rail Anchor Co., Chicago—Exhibiting rail anchors. Represented by F. B. Bradley, P. Hoffman and G. Holmberg.

The Buda Co., Chicago—Exhibiting the Buda fly-duty Grinder. Represented by Emil Johnson and Wm. Krause.

Carnegie Steel Co., Pittsburgh, Pa.—Steel rails. Represented by Norman Hench and George Landers.

The Chicago Malleable Castings Co., Chicago—Exhibiting the Thomas rail anchor, tieplate, and Thomas guard rail. Represented by J. W. Thomas.

Commercial Acetylene Railway Light & Signal Co., New York City—Flashlight signals and acetylene signal lights. Represented by H. C. Doran and F. S. Dickinson.

The Crepecheek Company, New York—Exhibiting Dinklage crepecheek rail anchors. Represented by W. S. Schmaltz.

Crerar, Adams Co., Chicago—Exhibiting track drills, binding drills, track jacks, flare lights, guy starters, shovels, pumps and tools. Represented by R. W. Wallace, Geo. Bassett, Arthur Martin, Tom Barrett and W. I. Clock.

Daniels Safety Device Co., Chicago—Exhibiting bull dog and bull pup nuts. Represented by F. M. Daniels, A. G. Wood and C. F. Ames.

The Duff Mfg. Co., Pittsburgh, Pa.—Exhibiting genuine Barrett jacks, Duff ball-bearing screw jacks and Duff Bethlehem hydraulic jacks. Represented by C. N. Thulin.

Fairbanks, Morse & Co., Chicago—Section and inspection motor cars. Represented by F. M. Condit, K. P. Brown, D. J. Higgins and L. H. Matthews.

Fairmont Gas Engine & Railway Motor Car Co., Fairmont, Minn.—Exhibiting the Fairmont hand car, gasoline engine and parts and photographs of motor cars and wood cutters. Represented by H. E. Wade and W. P. Kasper.

The Frictionless Rail, Boston, Mass. Represented by T. F. Dwyer, Jr., and G. H. Bryant.

The Hatfield Rail Joint Co., Macon, Ga.—Exhibiting Hatfield rail joints. Represented by T. B. Bowman and C. P. Williams.

Hayes Track Appliance Co., Richmond, Ind.—Hayes derailleurs. Represented by S. W. Hayes, E. L. Ruby and E. W. Brown.

The Indianapolis Switch & Frog Co., Indianapolis, Ind.—Exhibiting the Eymon continuous crossing and manganese frogs. Represented by J. C. Jameson.

Keystone Grinder & Manufacturing Co., Pittsburgh, Pa.—Grinders and attachments. Represented by H. C. Holloway, D. L. Braine and W. H. Davis.

Lackawanna Steel Co., Buffalo, N. Y.—Abbott joint plates, hook shoulder tie plates and improved angle bars. Represented by A. H. Weston.

The Madden Company, Chicago—Three-man track layer, Richter blue flag derails, the Blair tie spacer and Wagner switch point straightener. Represented by H. C. Holloway and T. D. Crowley.

Mudge & Co., Chicago—Exhibiting Mudge motor cars and Mudge engine equipment for hand cars. Represented by Burton W. Mudge, R. D. Sinclair, Geo. W. Bender and Sherman C. Amsden.

M. W. Supply Co., Philadelphia—Vaughan rail anchors, track indicators and splice straighteners. Represented by D. L. Vaughan and L. P. Burwell.

The National Lock Washer Co., Newark, N. J.—Exhibiting nut locks and Hi-power nut locks. Represented by John B. Seymour, Jesse Hough, L. Van Thompson and John Patterson.

The National Malleable Castings Co., Cleveland, Ohio—Exhibiting malleable rail braces and tieplates, and malleable washers and rail anchors. Represented by J. J. Byers, T. W. Aishton, J. S. Slater and L. S. Wright.

Northwestern Motor Co., Eau Claire, Wis.—Hand car gasoline engines and motor cars. Represented by R. R. Rosholt and F. W. Anderson.

The P. & M. Company, Chicago—Exhibiting anti-rail creepers, Betts anti creepers, tieplates. Represented by F. A. Preston, A. R. Sutter, W. W. Glosser, D. T. Hallberg, R. W. J. Harris, J. E. Mahoney and G. E. Johnson.

The Pennsylvania Steel Co., Steelton, Pa.—New Century switch stands, Positive switch stands, Mayari heat treated bolts, adjustable rail braces and never-slip switch plates. Represented by W. H. Allen and S. H. Smith.

Positive Rail Anchor Co., Louisville, Ky.—Exhibiting Positive rail anchors, Betts tieplates, Betts guard rail holders, Economy separable switch points. Represented by W. M. Mitchell, F. M. Robbins, L. C. Ferguson, J. A. Schoutly, B. B. Betts and W. A. Wallace.

The Q. & C. Company, New York—Vaughan rail anchors, Bonzano joints, Bonzano step joints, guard rail clamps, insulated joints, tieplates, derails. Represented by A. Robertson, A. R. Horne, J. V. Westcott and Henry Hawes.

The Rail Joint Co., New York City—Continuous frog and switch girder, step high tee, Weber, Standard and insulated and 100 per cent. standard rail joints. Represented by L. F. Braine, V. C. Armstrong, G. C. Isbester, F. C. Webb, G. H. Larson, F. M. Hill, W. S. Boyce, C. B. Griffith, H. C. Hickey, Charles Jenkinson, C. J. Webb, F. S. Webb, George T. Willard, J. L. Terry and J. N. Meade.

Railroad Supply Co., Chicago—Exhibiting derailleurs and tieplates. Represented by H. G. Van Nostrand and E. H. Bell.

Ramapo Iron Works, Hillburn, N. Y.—Automatic switch standard, guard rail clamps and rolled steel slide plates. Represented by W. C. Kidd, Thomas E. Akers, Arthur Germunder and E. P. Bigelow.

Reading Specialties Company, Reading, Pa.—Exhibiting derailleurs, step joints and rail benders. Represented by B. J. Buell.

Sellers Mfg. Co., Chicago—Exhibiting anchor bottom wrought iron tieplates. Represented by Geo. Sellers.

Templeton, Kenley & Co., Ltd., Chicago—Exhibiting Simplex jacks. Represented by A. E. Barron, W. B. Templeton and John F. Stevens.

Track Specialties Co., New York—Exhibiting insulated joints, Superior rail joints, guard rail braces and clamps, rail benders and derailleurs. Represented by W. B. Lee and W. H. Lee.

The Union Switch & Signal Co., Swissvale, Pa.—Exhibiting Keystone insulated rail joints. Represented by J. J. Cozzens and J. D. Roett.

Verona Tool Works, Pittsburgh, Pa.—Track jacks, tools, nut locks, levels and gages. Represented by H. Fischer, E. Woodings, H. Mull and W. D. Achuff.

Wm. Wharton, Jr., & Co., Inc., Philadelphia, Pa.—Exhibiting W. J. switch stands and Wharton-O'Brien insulated switch rods. Represented by Thos. O'Brien, H. F. McDermott and A. S. Partridge.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since August 20, 1915:

Building Concrete Caissons in the Platte River.—The Chicago, Burlington & Quincy has used this form of construction in a long-deck girder bridge at Ashland, Neb. This work was described in an illustrated article in the issue of August 27, page 383.

Flood Damage to Railroads in the Middle West.—On August 16 a severe storm visited Galveston, but property damage was limited almost entirely to the Galveston Causeway. During the week this storm reached St. Louis, Mo., causing damage which seriously interrupted railroad traffic. The effect of this storm upon the railroads is described in an illustrated article in the issue of August 27, page 393.

A Car Dumping Machine with Improved Features.—The Pittsburgh & Conneaut Dock Company has installed a modern car dumping machine at Conneaut Harbor, Ohio, which is used to handle the coal traffic of the Bessemer & Lake Erie. A description of the plant which is designed to unload 100-ton capacity cars at the rate of one a minute, was described in an illustrated article in the issue of August 27, page 390.

Construction of the New York Connecting Railroad.—Material progress is being made on the four-track railroad to connect the New York, New Haven & Hartford with the Pennsylvania in greater New York. This project includes the Hell Gate bridge, which will be the longest span steel arch in the world. The work is unusual in other respects, particularly as to the magnitude. This article which was devoted principally to a record of the progress being made on the various portions of the work, appeared in the issue of September 3, page 421.

The Licensing of Engineers.—At the last session of the state legislature of Illinois, a law was passed providing for the licensing of structural engineers. The effect of this law upon the design and con-

struction of railway structures within the state of Illinois was discussed in an editorial in the issue of September 10, page 452.

Important Realignment Problem on the Pennsylvania.—This road has recently completed the construction of three tunnels on the Allegheny division which eliminates 12.23 miles of line and a large amount of curvature. The work on the tunnel near East Brady, Pa., is of special interest because of difficulty experienced with falling rock. A complete account of this was given in an illustrated article in the issue of September 10, page 456.

An Interesting Structure Over the Buffalo River.—The Delaware, Lackawanna & Western is building a Strauss bascule span at Buffalo which involves complicated foundation problems. These were solved by the use of open reinforced concrete caissons with interesting details. This was described in an illustrated article in the issue of September 10, page 465.

RENEWING BRIDGE TIES ON THE LEHIGH VALLEY WITH A LOCOMOTIVE CRANE

An unusual record in the renewal of bridge ties has just been made by the maintenance of way department of the Lehigh Valley on its bridge across the Susquehanna river at Towanda, Pa. Two main tracks are carried over the river on a steel bridge consisting of 14 deck plate girder spans, 13 of which are 129 ft. 6 in. long over all, and one 125 ft. 3 in.; the total length of the structure is 1,808 ft. 5 in. The five spans nearest the center are on a tangent, but the remaining spans at either end are on 3-deg. 30-min. curves of reversing direction. There are 1,522 8-in. x 12-in. x 12-ft. ties on each track. Together with the elevation blocks, amounting to 14,500 ft. B.M., there is a total of 160,612 ft. B.M. of timber in each track. The track is of 100-lb. rail, with 90-lb. guard rails. The ties had been previously framed and the superelevation blocks were attached.

All of the timber in the eastbound track on this bridge was renewed in an actual working time of 12 hours.

It had been the plan to complete the work in every detail in one day—between 6 a. m. and 7 p. m., but at 1:30 on the day selected a terrific wind and rain storm arose, which came so suddenly and raged with such fury that the gangs were unable to work. In fact, for a while the men had to hold on or lay down to keep from being blown off the bridge. Later it was necessary to send portions of the forces on motor cars in both

metal guard rails, had been completed. Between the old bridge ties the tops of the girders had been cleaned and painted previously, and as the old ties were removed the portions of the tops of the girders uncovered were treated similarly. During the progress of the work temporary crossovers were installed at each end of the bridge to provide for single track operation while one track was out of service, the pilot using a motor car.

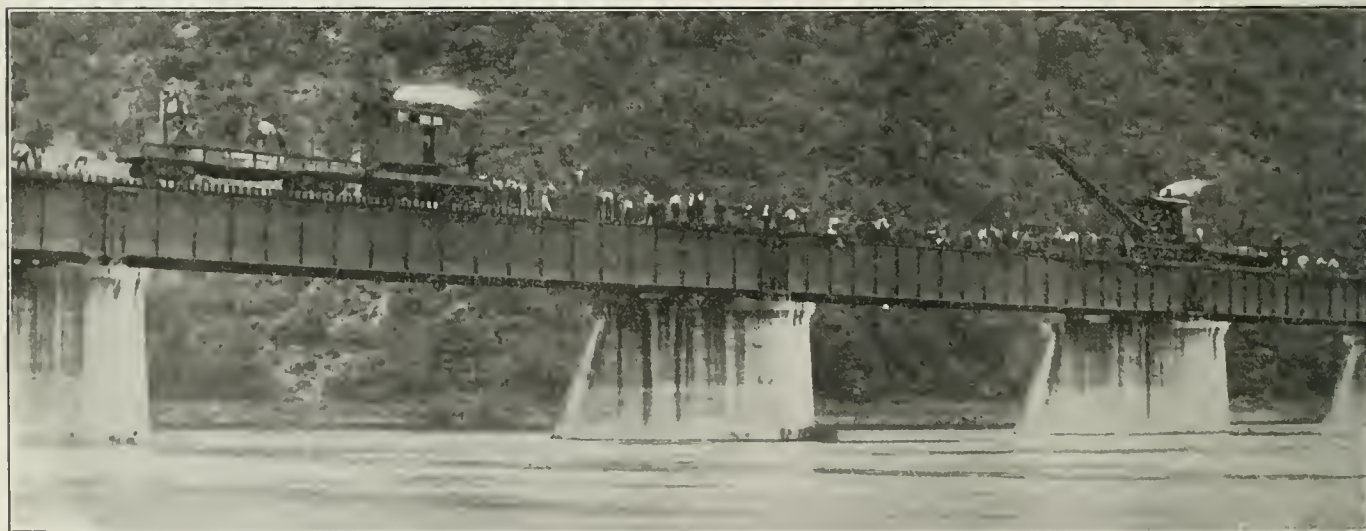


Renewing Ties on a Branch Line Viaduct

Locomotive cranes were used to remove the old ties, to place the new ties and to handle all the rail. The new ties were on 12 cars, arranged in piles in order, each tie being numbered, so when each sling of ties was placed on the girders, each tie was within a few inches of its designated location. The cars of new ties were attached to the locomotive cranes, and the old ties were loaded on them as the new ties were unloaded. The result was that when the job was completed there were no old ties and timbers to pick up.

The total cost of the work, including the installation and removal of the temporary crossovers was \$708.90, or 46 cents per tie. Had it not been for the storm this cost would have been reduced to 31 cents per tie.

Working on a single track branch line recently the same



Renewing Ties on the Bridge Over the Susquehanna River at Towanda, Pa.

directions to look after points where trees had been uprooted, and wires blown down where the tracks were under water and where small slides had occurred.

Work was resumed about 5:30 p. m., but half an hour later the storm broke again with such violence that no more work could be accomplished that day. At 8 o'clock the following morning work was resumed and by 1 o'clock every detail, including full tie-plating and spiking and the installation of the

department renewed some of the ties on a 1,279-ft. bridge at a cost of 20.4 cents per tie, but no temporary switches had to be installed in this case. The easterly end of the bridge was on a tangent, and the westerly end on a 7-deg. curve. Using a locomotive crane to handle both the old and new ties, 359 8-in. x 12-in. x 11-ft. ties, and 6 8-in. x 12-in. x 14-ft. ties were renewed. The new ties were in rotation piles, ten being placed on the girder at one time.

The Efficiency of Motor Cars for Section Forces^{*}

Advantages Gained by the Use of Motor Cars on the St. Paul's Illinois Division; Proper Care of These Cars

By G. R. MORRISON

Superintendent C. M. & St. P., Savanna, Ill.

The evolution from the old section handcar to a motor car was accomplished in a day on the Illinois division, 27 cars being put in service at one time in 1909. When the question first arose as to the practicability of motor handcars several tests were made on the Illinois division and it was decided that the car weighing about 700 lb. and producing $7\frac{1}{2}$ horsepower could be made to render satisfactory and economical service.

Under the old arrangement we were using 37 handcars with that number of foremen, while under the new plan with motor cars, 27 cars were employed, dispensing with 9 section gangs and lengthening the sections from 8 to approximately 12 miles per section, an increase of about one-third. Results attained so far indicate a saving and more efficient service in every respect. Although opposed at first, the foremen are now greatly in favor of their use.

An increase in pay much encouraged the men and brought out their best efforts. Foremen are expected to keep cars and machinery in good order on their own time, looking after the machinery and knowing that it is in proper working order before going out on their sections in the morning.

We find that one of the most necessary requirements for successful operation is for the roadmasters to study the mechanism and to be prepared to instruct the foremen. Roadmasters and section foremen in a short time become so conversant with the operation of a car that they are able to take care of it at all times and overcome trouble without calling on our experts.

Since the beginning, the per cent of delays altogether, including breakage of chains to flooded carbureters, etc., has amounted to only 0.4 per cent. This is more than offset by the time gained over the old method of transportation. We figured before putting the cars into service that at least one hour per day per man would be gain in time alone. The actual service quite clearly demonstrates that this was a very conservative estimate and that the gain is nearer an hour and 20 minutes per man per day.

At first a daily report from the section foremen of the service was required, showing the section number, location, foreman, miles run, gasoline used, valve oil used and delays. Later on this was made a weekly, and finally a monthly report. Reports received so far indicate that the cars are making at the rate of 29 miles per gallon of gasoline and about 80 miles per pint of valve oil.

At first the instruction of the men was done by the agents of the manufacturers, who remained with each foreman for a few hours, but not long enough to cover all or even a small portion of the points necessary to a full understanding of the cars, hence the necessity for foremen and roadmasters giving the matter careful study.

It was thought that there might be danger attendant upon the operation of these cars, especially on a fast traffic line like the Illinois division. In order to reduce this element a bulletin was issued instructing enginemen to sound one long blast of the whistle when running against the current of the traffic, and in addition the roadmasters instructed section foremen that the average speed should not exceed 10 to 12 miles per hour, and a speed limit of 20 miles per hour on straight track was ordered. In addition enginemen were advised that the chance of accident would be greatly reduced if the instructions in regard to sounding the whistle for all crossings and obscure places were complied with literally. Section foremen were also instructed that no matter in what direction they were traveling, at obscure places or against the current of traffic, on double track they must handle the car so that accidents would not occur. It has

been demonstrated that a car moving at 25 miles per hour can be stopped in 45 ft.; and at 30 miles per hour in 60 ft. Two men can remove a car from the track without trouble and expeditiously.

At first the cars were not furnished with any tools. We found that if section foremen were furnished with a certain number of appliances it would minimize delays and upon our recommendation, 1 spark plug wrench, 1 socket wrench, 1 monkey wrench (small), 1 pair pliers, 1 screwdriver, 1 gas plier, 1 small squirt can, 1 ammeter for testing batteries, 1 extra mica spark plug, 1 small coil spring and a piece of chamois skin for straining the oil were ordered for each section. It is also recommended that roadmasters carry a stock of supplies, such as batteries, spark plugs, etc., and that requisitions be made on them by section foremen for such articles as require too much time to get in the usual manner by requisition. Each foreman was furnished with a list showing the various parts of the machinery. The ammeter is very essential, as if foremen do not have this, batteries are likely to be thrown away long before they are entirely exhausted.

Wherever sections are located at or near pumping stations operated by gasoline power they receive their supply from those sources. For the balance, 60-gal. iron tanks are located at certain places along the division, where as many foremen as consistent can be supplied. These cans are kept filled by the oil companies who run wagons through the country. Tickets in triplicate are furnished for such supplies and handled through the agent, and the purchasing agent's office.

To facilitate train movement after severe rain storms or when trackmen are to go over the line preceding trains after a storm, instructions were issued to various foremen, telling them what portion of the division to cover. For instance, if one section extended both ways from a telegraph station, instead of covering such sections much time would be saved by running direct from one station to the next, and this plan was adopted. Thus we get very quick reports from foremen. One night recently, during a severe rain storm extending from Chicago to Savanna, just before important passenger trains were due, the entire division was patrolled and inspected in 30 min., and delays to passenger service on that particular night were nominal.

With the old handcar it took the section crew at Savanna one hour to go four miles eastward up grade. The distance is now covered in 15 min. It is expected with the present power that these cars will handle 10 men and a push car ahead with several men on it everywhere except on heavy grades. The cars will accommodate 14 men without tools, and 10 men with all tools.

These cars are equipped with $7\frac{1}{2}$ -hp. twin cylinder engines, 4 in. in diameter, of $5\frac{1}{2}$ -in. stroke, and a driving range between three miles and 30 miles per hour. The arrangement of the cars is such that the engine can be reversed without the use of any special device. At night in order to prevent cars being disturbed by outside persons the foremen remove what is known as the commutator bar. This is but the work of a moment and prevents anyone, no matter how expert, from running the car. During rainy weather unless the vibrators are covered the operation of the car will be affected, but if the foremen will merely cover those parts with a rubber coat or canvas the trouble is nicely overcome.

It is found that a foreman can inspect track very much better with the new cars than with the old, because of being able to give the track his entire attention. During dry weather,

^{*}Abstracted from C. M. & St. P. Employees Magazine, August, 1915.

damage done by fire is greatly decreased because of the facilities with which the men can reach a fire after it has started.

The supervision of the entire motor car service on all divisions is under C. B. Skelton, motor car inspector, Milwaukee shops. Many delays will be avoided if the following suggestions relating to the care of cars suggested by Mr. Skelton are adopted:

See that the working parts of engines are kept clean at all times, especially the timer, contact points, chains, spark plugs, valves and piston rings. The latter may be cleaned easily by using kerosene in the engines. In addition, see that all wires are fastened securely at the terminals and that insulation is in good shape.

A great many times a foreman will have the spark plugs cleaned and will not test them before having them replaced in the cylinders. This should always be done. There is but one way to test a plug properly, viz., attach the plug to high tension cable, laying the plug on some part of the engine so that only the threads are on the switch and move the car so that the right contact is made, working the spark coil vibrator which leads to the plug being tested, then see that the spark jumps across the gap between the two points on the plug.

If a spark is not perceptible something is wrong. Either the plug is grounded through the porcelain member or insulation, or possibly the current is jumping through the wiring at some point and not reaching the plug. In a case of this kind another plug should be tried, to make sure just where the trouble lies.

Spark coil boxes should be protected from rain and snow by covering them with oil-cloth or some other covering that will keep the moisture out.

Spark coils are often damaged by connecting up too many batteries to the coil. Most coils are built for six volts on the battery circuit, or the equivalent of four cells when batteries are new, and if more batteries are added, the voltage runs over six volts, not only wearing out the vibrator points very rapidly, but very often burning coil insulation, putting it out of service.

When coils become worn out or it is found that they do not work properly, foremen should not undertake to make the repairs themselves, as these instruments are very delicate, but should send the coils to the general storekeeper, under registered baggage for repairs, and in each case the roadmaster should make requisition for the repairs and show the registered tag number on the requisition.

Carburetors should also be handled in this way, and should never be shipped to the general storekeeper by freight, for these parts cost considerable money and are often lost or stolen when shipped in this way. Under no circumstances should foremen keep extra spark coils or carburetors in tool houses for emergencies, but on receipt of a new carburetor coil should immediately ship the old one to the general storekeeper under registered baggage and advise him so he will know where it is from.

When it is found necessary to order new parts for motor cars, the foreman should first go through his catalogue and obtain the correct symbol number of the part he desires, then advise the roadmaster the part number of the motor car. If foremen will follow these instructions, it will save the storekeeper and others a great deal of trouble and will eliminate a great many delays which are caused by the wrong part being ordered.

A CORRECTION

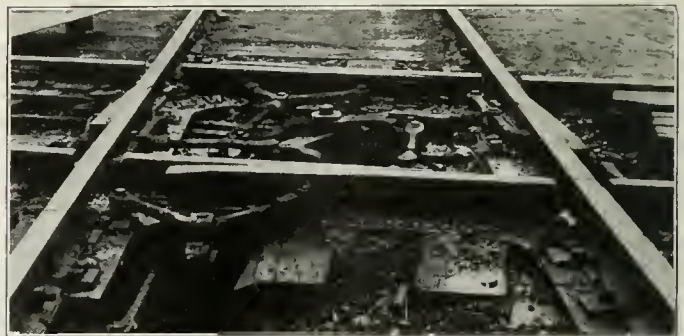
In describing the method of laying rail with locomotive cranes on the Lehigh Valley, in the issue of August 20, the statement was made that 4.7 track miles of rail was relaid on the Buffalo division. This should have read 4.07 track miles on the Seneca division.

A CONTINUOUS RAIL CROSSING

The Hollinger & Daily continuous rail crossing, as its name designates, is a new device to provide a continuous rail at crossings. As applied to the crossing of two railroads, the rails are made continuous for whichever track is given the crossing, while the rails of the other tracks are broken to provide the necessary flangeway. For the crossing of an electric line and a steam line, the steam line tracks are not broken, but the rails of the electric line are made to form a temporary continuous line over the top of the steam road rails whenever it is necessary to pass any electric trains.

For the crossing of two steam railroads the rails of each track are cut off outside of the crossing a sufficient distance to permit the rails of the other track with full bases to pass by in front of them, as shown in the accompanying photograph. Between these cut ends, each rail is replaced by a combination of a stock and split rail designed to line up when their butt ends are in contact with the cut ends of the track rails, thus making continuous rails over the crossing. The stock and split rails are also arranged to pass by each other so that their butt ends may be drawn away from the cut rails a sufficient distance to permit the stock and split rails of the other track to be brought up in line behind them. All four sets of stock and split rails are operated by levers arranged to line up either set while the other set is drawn in to clear.

The arrangement for the crossing of a steam line and an electric line is similar, except that the steam line rails are left undisturbed while the electric line rails are raised sufficiently to bring the under side of their heads even with the top of the



Continuous Crossing for Two Steam Roads

steam line rails, the electric line rails being cut to fit the contour of the outside of the head and web of the steam rail, while the head of the former is cut back a sufficient distance to give the standard clearance for the wheel treads of steam line equipment. Inside of the crossing the electric line is provided with a stock and split rail combination, placed so that the tops of the rails are normally at a level with the tops of the steam line rails. An inclined plane is provided adjacent to the railroad rails, so that when the stock and split rails of the electric line are backed into position their butt ends are raised to the level of the electric line rail outside, these butt ends being cut to fit the inside of the web and head of the steam road rails and the head extending a sufficient amount to pass entirely over the latter and join with the head of the electric line rail outside.

In place of an interlocking plant the operating lever may be connected directly to a derail on the electric line, while, as a protection for the steam road, the operating lever may be enclosed in a cabin, so arranged that the lever cannot be moved from the position giving clear track for the steam line without closing and locking the door. Thus the motorman or conductor of the electric car is locked in until he again clears the track for the steam line.

A crossing of the type suitable for two steam lines was in use on the Wheeling & Lake Erie for 21 months under a traffic amounting to 25 or 30 movements in 24 hours. During this time the crossing was subjected to very severe treatment, includ-

ing the running of cars over, with the crossing set for use in the other direction. Another rigid test was given it by placing a heavy locomotive on the crossing, so that one pair of driving wheels would be directly over the center. The brakes on its train were then set, cutting out driving brakes, and the engine was slipped in an effort to dislodge or move the slip rails. These tests are said to have caused no serious injury to the crossing. The crossings are manufactured by the Canton Frog & Crossing Company, Canton, Ohio.

A NEW FIVE-PLACE COMPUTER

A new calculator for engineers, which gives results to an accuracy of five significant figures, has been placed on the market recently. The length of the scale is 120 times as great as that of the A and B scales in the ordinary 10-in. slide-rule, and the system of graduations is uniform throughout. Provision is made also for obtaining approximate results, directly and simply, where that accuracy is sufficient.

This calculation, too, is known as the Ross Precision Computer, and consists of a graduated dial rotating under a slotted cover, a floating guide and a slide mounted at the right of the slot. The slide carries a miniature of the dial scale, and may be used alone to obtain an accuracy of three figures; it



The Ross Precision Computer

co-operates with the dial to check and point out the precise answer, and to locate its decimal point.

To multiply and divide any series of numbers it is only necessary to set each number in succession under the reading line in the slot; the answer is then read, also under the slot-line. The manipulations for setting the given numbers on the dial are simple; concise directions are given on the face of the computer.

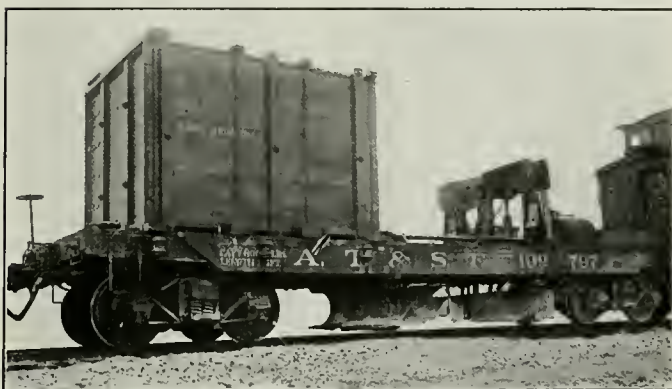
It may be used to read five-place logarithms and anti-logarithms of all numbers directly. Powers, roots and other complex operations may be carried out either approximately, or to a higher degree of precision, as desired. Trigonometric calculations made by the computer give an accuracy of from 3 to 5 seconds of arc.

The Precision Computer is made of metal throughout; the graduations are engraved on silvered metal surfaces, and it is

packed in a flexible case. It was invented by Louis Ross, and is manufactured by the Computer Manufacturing Company, San Francisco.

RESULTS GAINED WITH A BALLAST DRESSER

The Cafferty & Markle ballast dresser, described briefly in the *Railway Age Gazette* of February 21, 1913, has been used for some time on the Santa Fe with encouraging results. The spreader is essentially a plow suspended on the under side of a flat car. A middle portion 8 ft. wide is provided with notches where it crosses the rail to permit the lower edge to extend down almost to the top of the ties. Two wings extending



The Car Ready for Transit with the Plow and Middle Portion of Dresser Drawn Up and the Wings Raised

4 ft. beyond the ends of the ties are equipped with movable plates to permit adjustment to the contour of the desired ballast cross-section. The middle portion is raised or lowered by means of rods connected to air cylinders located directly above on the car platform. The wings are also connected to the cylinders by a train of levers and bell-cranks such that the travel of the cylinders necessary to raise the middle part clear of the rails will swing the wings up over the top of the car. Thus they are disposed of conveniently when not in use.

It will be seen in the accompanying photographs that an ordinary plow is used in conjunction with the spreader. It is not necessary to use the plow, but the spreader in question was



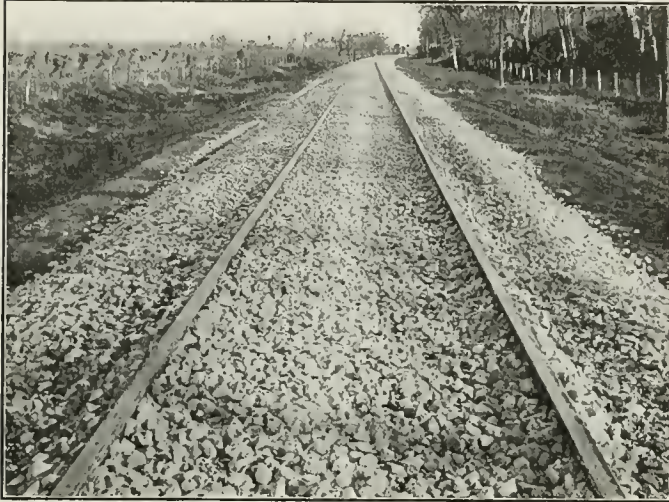
The Ballast Dresser and Sprinkler in Operation

so equipped originally, and it was found that the combination was very desirable.

When ballast is unloaded for track surfacing, it is not desired that it be removed to a greater extent than is necessary to render the track safely passable, and there is, therefore, no occasion to use the spreader. However, where track is ready for dressing, and only sufficient rock is to be unloaded to do this, the plow can be used to advantage to level off the ballast above the surface of the rails. As it is effective in disposing of most of

it and decreasing the stress on the spreading board, it is also an important auxiliary for the reason that it renders it possible to spread ballast over grade crossings, cattle guards, guard rails and switches, where it is necessary to raise the spreader to clear such obstructions.

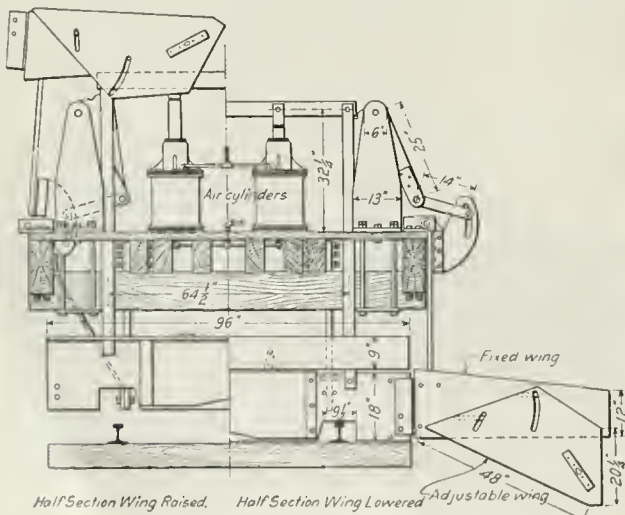
One photograph shows the spreading board pushing an accumulation of rock, of approximately $2\frac{1}{2}$ cu. yd., which has been gathered from between the rails, and is being worked outward on each side of the plow. The ballast thus pushed along drops into sags in the shoulder where there is a deficiency of dressing material, thereby eliminating the necessity of performing the



Appearance of the Track After the Dresser Has Gone By

work by hand labor. The principal function of the wings is to shape the rock forced out by the spreading board into shoulder formation. This occurs simultaneously with the ejection of the ballast by the spreading board. The economy of this feature is determined by the fact that were an ordinary plow utilized it would be necessary to form the shoulder with hand labor.

In dressing ballast on double track it is merely necessary to adjust the wings to obtain the desired result. On curves where the sub-grade is canted to correspond with the elevation of



Cafferty-Markle Spreader

the track no difficulty is encountered because of the wings digging into the sub-grade, but where the sub-grade is not in conformity with the elevation, the difficulty can be easily overcome by adjustment of the wings.

A train consisting of 22 cars and carrying approximately 1,000 yd. of ballast was unloaded and spread in 48 min., leaving it as shown in the photograph of the track. It will be noted that the shoulder was fairly regular at the toe and that there was very

little rock scattered. A gang of 17 men following the ballast dresser was able to dress the track to required form. This would ordinarily have taken at least 50 men. The results to be obtained in gravel are said to be even better than in rock.

The water tank seen in the photographs was installed primarily for the purpose of loading down the forward end of the car while the dresser was in use. At a later period it was developed into a device to sprinkle the ballast as the dresser passed over it. This is especially desirable on gravel ballast, as it eliminates a source of annoyance that almost always occurs in this work. The capacity of the tank is 4,000 gal., although 2,000 gal. is sufficient to sprinkle 1,000 cu. yd. of ballast. When the car is in transit the tank should never be more than half full. To obtain the best results in spreading, the ballast dresser should not be moved at a speed to exceed five miles per hour. The track on which the work referred to in this article was performed parallels the Kaw river, where there are numerous curves, many of which have considerable elevation, and many cuts and fills. We are indebted for the above information to R. J. Parker, general superintendent, Atchison, Topeka & Santa Fe, Topeka, Kan., under whose direction this spreader has been used.

A NEW STEEL TIE

A new steel tie is being put on the market by the Standard Steel Tie Company, Dallas, Tex. It consists of a rolled channel section $\frac{3}{8}$ in. thick, 8 in. wide and 5 in. deep, and 8 ft. long, placed in the ballast trough side up with creosoted wood bearing blocks $7\frac{1}{4}$ in. by 7 in. by 18 in., each secured in place in the trough of the channel by two $\frac{3}{4}$ -in. bolts and a 2-in. by 2-in. lug, sheared from the web of the channel and bent up to bear against the block. Four holes $2\frac{1}{2}$ in. in diameter punched in the bottom of the tie near the center provide drainage and hold it in line.

Since the rail is supported on and secured to the creosoted blocks, the manner of handling these ties in track corresponds



Standard Steel Ties in the Pennsylvania Tracks Near Parkesburg, Pa.

very closely to the operation with the ordinary ties. They permit shimming, change of rail base and gage, and any ordinary track fastenings may be used. Since there is no metal connection between the rail and the channel, perfect insulation is afforded. Furthermore, the blocks, being 18 in. long and firmly secured in the channel, reinforce the tie under the rail where it has to meet the heaviest stresses.

A number of these ties were put in the tracks of the Pittsburgh & Lake Erie, near Pittsburgh, a year ago, and others have been recently installed in the Pennsylvania Railroad tracks near Parkesburg, Pa., as shown in the accompanying photograph.

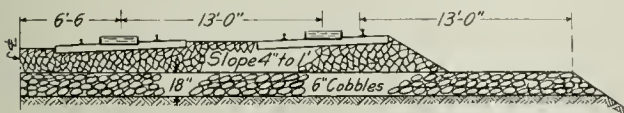
PUTTING IN SERVICE A NEW LINE WITH DENSE TRAFFIC

By W. F. RENCH

Supervisor, Pennsylvania Railroad, Perryville, Md.

It is the rule for restricted operation to continue upon new lines of road for many months after service is begun. This is, of course, an entirely proper precaution during the time the roadbed is becoming fully settled; but the interference with passenger and freight schedules, especially upon lines of intensive operation, renders desirable the early removal of this restriction. The trend of modern practice in making up time tables is to use the highest rate of speed consistent with safe movement, and schedules, once established, must be maintained thereafter. It has heretofore been considered that an extended period of slow passage over new work was a necessary evil imposed by safety considerations; but upon a careful study of the question it will be found that the required period may be greatly shortened without any risk being incurred. This cannot better be shown than by a careful analysis of a concrete example; the Bristol new line of the Pennsylvania between Philadelphia and New York.

Although the fill averaged 22 ft. in height for more than three miles, service was inaugurated at a speed of 30 miles per hour which was increased after 36 hours to 50 miles per hour, and after one month to 70 miles per hour. The operation of connecting up this new four-track line presented incidental points of interest which will be sketched briefly. The new line lies to the north of the old one, and No. 4 is the most northerly



Section Through New Embankment Under Track Tanks

of the tracks. The longest interval between scheduled trains in any daylight hour at this point was 35 min., and it was necessary as a preliminary to connecting up each track to draw it as closely to the existing tracks as possible. This effected a great saving in time not only because there was less track to be shifted, but the maximum lateral throw was greatly reduced.

In order to establish complete unity of action at the two ends of the work, which were separated about $3\frac{1}{2}$ miles, a telephone line was installed having besides these two connections only one other which communicated with the signalmen at the nearest cabin. When it is known that the necessary extension of No. 1 track at the west end was 1,500 ft. and that the extreme depth of fill necessary in building it was 4 ft., it will be seen that unflinching execution of the prearranged plan was essential, and this required close co-operation between the operating department and the track forces.

The new passenger station was a mile distant from the old one, and as will be inferred readily, the operating impracticability of having a separate station for the eastward and westward travel was avoided by using No. 3 westward freight track for such eastward passenger trains as were scheduled to stop at this station, these being run against the current of traffic by train order.

There was nothing in the construction of the road to cause its early settlement excepting that the material of the fill was a homogeneous gravel and that the various features of the work were performed with the utmost fidelity. The filling was not deposited in layers, but was dumped from trestles built to the height of the sub-grade. The tracks were back filled with stone, but the cushion beneath the ties was no deeper than 2 in.

The maintenance question was greatly complicated by the presence at the point of highest fill of track tanks 1,600 ft. long in the four main tracks, which were on a 30 min. curve with 2 in. superelevation. The care of this feature formed one of the important elements of the solution. It is a well known fact that given a set of men used to daily manipulation of a locomotive

at high speed there will be many who will violate the rules for reduction at specified points. This is particularly true at places where speed restriction is laid on account of scooping water. If high speed is used while this occurs there necessarily results a large waste of water, and careful observation showed that engine tanks were being overflowed frequently through one-third the length of the tank tanks. The considerable volume of water that entered the roadbed through this practice introduced a grave element of danger to the stability of the new embankment. This was early recognized and partly met by a general notice limiting the conditions under which engines might take water at that station. But there still remained a rather heavy burden, and to meet this a special construction had been adopted for the sub-bed at the tanks and an extremely generous width of embankment was also provided. The former consisted of a carefully laid bed of cobbles 18 in. deep beneath the entire sub-grade throughout the length of the tanks, and for 400 ft. either way from the ends which alone cost the sum of \$15,000. The widening which was done with the heaviest material obtainable, principally dirt from the cleaning of the center ditches and containing much old ballast, extended the shoulders on both sides to a distance of 13 ft. from the gage of the rail. This construction has also been followed in other similar installations. A cross-section of the roadway is introduced as information concerning a quite effective practise.

There were nine bridges throughout the extent of the deepest fill, which limited the amount the track might safely be allowed to settle. Without the presence of these structures it would have been permissible to assign only a sufficient force to the maintenance that safe and comfortable passage at moderate speed required. But the subsidence had to be met daily as it occurred. The settlement during the night amounted to no more than 2 in., and through the cantilever support provided at the ends of the several bridges by both the service rails and the iron guard rails there was always a comfortable run-off. The total settlement of the tracks was attained at the end of six months and amounted to 18 in. The wisdom of having placed this new line in stone ballast at the start was therein fully shown since the standard depth of stone ballast was thus naturally secured.

There was assigned to the maintenance of this new railroad a force of 450 men, and this force was continued during the first ten days of service. The cost was thus \$8,000 for lining and surfacing a three-mile stretch of road for this short period. The force was gradually reduced as the embankment was compacted, and on January 1 a regular progressive decline in maintenance began. The excess cost of lining and surfacing in January was \$2,500, and this diminished uniformly \$500 per month thereafter until on June 1 the expense of maintenance was on a par with that of other main tracks.

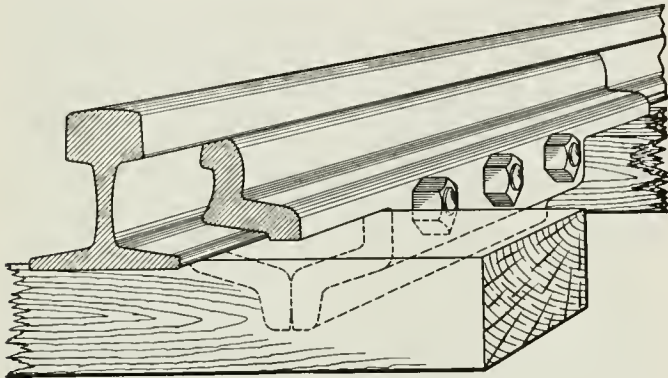
The pertinent fact developed by this somewhat unusual case is that the plentiful labor expended upon the maintenance in the early period of its use greatly hastened the final settlement of the new roadbed. In any construction a definite amount of settlement is inevitable, and as track stresses are known to be higher at fast speed it unquestionably is an advantage to fix the speed as high as practicable and then provide the necessary force to safely maintain the road. The benefit derived from an early establishing of full service upon this line of road, which carries a daily traffic of more than 200 trains, fully justified the considerable expense that was necessary to attain it.

THE PEAT DEPOSITS OF RUSSIA.—The area covered by peat deposits in Russia is about 177,000 square miles. The deposits belonging to the government have been examined and are found to run about 260,000 cu. ft. per acre, equivalent to 2,300 tons air-dried. If the same ratio holds over the country as for the government lands, the total reserve is about 100,000 million tons of peat. This compares with coal reserves of about 80,000 million tons. The peat is constantly growing, and taking its heating value at half that of coal, it is evident that the peat reserves are about equal to those of coal. Around Petrograd half of the country is covered with peat bogs.

AN EMERGENCY RAIL JOINT

An emergency rail joint has been recently developed and placed in service for emergency use on the Pennsylvania Railroad. In general it consists of two heavy splice bars with depending flanges which are provided with three bolt holes so placed that the two bars may be connected by bolts passing underneath the base of rail. The two flanges come to bearing below the bolts and the fulcrum thus afforded makes it possible to bring the bars to tight bearing against the rail by tightening the bolts. By this device two rails may therefore be held together for a time with reasonable security without the necessity for drilling bolt holes through the web.

One purpose for which this joint is designed is the quick relief in the case of a broken rail, which can be reinforced with this



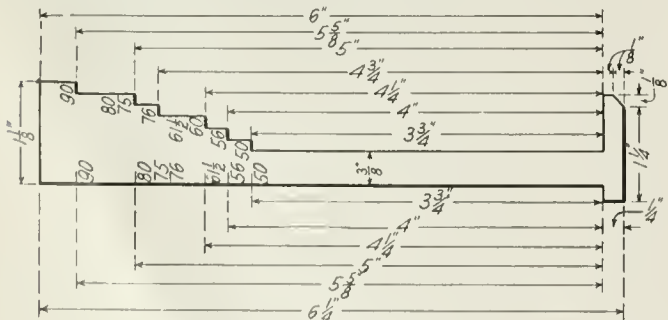
An Emergency Rail Joint Devised for Use on the Pennsylvania Railroad.

device without taking time to drill holes. A second use is to facilitate the replacing of rails in main running tracks. Frequently after several new lengths of rails have been spliced together and shifted into the opening made by removing the old rails, trouble is experienced in lining up the bolt holes in the splices at each end. In such a case the emergency splice would enable a firm, temporary joint to be secured quickly to permit the passage of trains.

The joints are made in lengths varying from 10 to 30 in., the shorter lengths not extending over the cross ties. The weight varies from 40 to 80 lbs. per pair, according to size. This joint was designed by Edwin W. Hankele, of the engineering department of the Pennsylvania Railroad, Pittsburgh.

A RAIL SCALE

The rail scale illustrated in the accompanying drawing is used on Morgan's Louisiana & Texas Railroad. The scale is cut out of brass 1/16 in. thick, notched at one side for the height of the various sections of rails used on that road and graduated on the



Rail Scale Made of 1-8 Inch Brass

opposite side for the width of the base of the rails. We are indebted to W. E. Mielly, assistant engineer, Louisiana Lines, Southern Pacific.

ANOTHER VIEW OF THE SECTION FOREMAN PROBLEM

By J. T. BOWSER

Maintenance of Way Department, Queen & Crescent, Danville, Ky.

Much has been said and written in the last few years about the increasing difficulty of obtaining capable section foremen, perhaps to the neglect of the question of retaining the men we have at present and getting the best results from them. Men with years of experience are dropping from the ranks for one cause or another, and others are being discharged on account of unsatisfactory service. Can not some of the conditions be remedied which cause these men to resign or to become incompetent? Many a good foreman is lost to the service on account of the lack of proper treatment, proper understanding or appreciation. Many a foreman is discharged for incompetence or for other causes who would give entirely satisfactory service under more favorable conditions.

Section foremen, as much as anyone else, are appreciative of personal interest. A little judicious praise by a road supervisor or division officer, a comment on a favorable showing made along some particular line, are just as necessary to secure the proper results as reproof and condemnation for errors or inattention to business. Many men are not located on sections to which they are best suited. Conditions under which some men thrive and do their best work are fatal to the efficiency of others. The man who is not making a good showing should not be "scrapped," with his years of experience, if his failure is due simply to the fact that he does not fit a certain condition. A man who fails on a difficult section may make a valuable man on an easier section. The sluggish, indifferent man on an easy section may require the difficulties and worries of a hard section to wake him up and bring out his real qualities. The difficulties that crush one man may be the incentive that another needs. It is often the case that the longer a foreman stays on one section, the more efficient he becomes, but it is true perhaps oftener that he gets into the rut of the same conditions, the same old soft spots, the same old curves, and his best service is lost. Nothing kills initiative and promotes dissatisfaction like the monotony of routine.

A good man is often lost to the service because he must give consideration to the needs of his family. The schools at the point at which he must live may not be what he wants for his children; or their health may not be good in a certain locality. If he were changed to a section where better conditions could be found, his appreciation would show itself in better service. Certainly a man will do better work if he is satisfied that he is doing his best for his family. A fruitful source of trouble that may be eliminated is the foreman's loss of control over his men through familiarity with them. This error should be pointed out to him and, as a last resort, he should be changed to another location. He may avoid this trouble with a new set of men. Probably the most potent cause of poor work and of resignations is discouragement. There are some sections on which the best foreman could never take a premium. Year after year he may try his best and see it go to a less competent man more favorably situated. Men so located should be made to know that their difficulties are understood and that their efforts to make the best of them are thoroughly appreciated.

In short, consideration and intelligent personal interest will do much toward retaining and making effective the foremen we have, and to that extent will lessen the pressure of the need for new men.

PERUVIAN RAILWAY OCCUPIES HIGH POSITION.—The Central of Peru is said to cross the Andes at the highest point reached by any standard gage railroad in the world. One short branch reaches an altitude of 15,586 ft., which is higher than Mount Blanc, the highest of the Alps. The railroad cost \$200,000 and the lives of 7,500 men.

Placing a Concrete Lining in the Sandy Ridge Tunnel

The Carolina, Clinchfield & Ohio Is Using an Efficient Plant, with a Hopper Car for a Pneumatic Mixer

The Carolina, Clinchfield & Ohio has recently completed and placed in operation that portion of its line known as the Elkhorn extension, thus extending the line from Dante, Va., to Elkhorn City, Ky., the terminus of the Big Sandy division of the Chesapeake & Ohio (described in the *Railway Age Gazette*, November 7, 1913). Where the above extension passes under the divide known as "Sandy Ridge," just north of Dante, Va., there is a tunnel 7,804 ft. long. This tunnel passes for about one-half its length through slate and shale formations, which disintegrate upon exposure to air, and for the remaining half through sandstone badly seamed and broken. In view of these conditions, it was decided to begin the lining of the entire tunnel with concrete at once. This work requires the placing of between 50,000 and 60,000 cu. yd. of concrete while traffic is passing through the tunnel.

In addition to Sandy Ridge there are a number of other tunnels on the above extension as well as on other portions of the road which may require lining in the future under similar conditions of traffic. With this in mind the railway engineers made a special study of various plans for the above work by which it could be done with economy and rapidity, also holding in mind that much of the plant would be used for similar work after this particular job is finished.

The result of these studies was the determination to use the compressed-air method of mixing and placing the concrete, and to provide for this a plant consisting of a self-propelled concreting car, a loading and storage trestle, a compressed-air plant and pipe line through the tunnel and concrete forms, which are quickly and easily movable.

THE CONCRETE CAR

On account of the great length of the tunnel it was deemed

that a car carrying the ingredients would be the proper solution. It also appeared most desirable, if not absolutely necessary, to handle the car without filling the tunnel with smoke. These premises led to the idea of a self-propelled concreting car, and finally to the gasoline engine as most nearly fulfilling all conditions for the propelling device. A gasoline engine will emit only a small amount of smoke or gas while moving and can be shut off entirely when in position for use. It occupies but small space, can be operated by one man, and contrary to general belief, is very reliable. To obtain capacity, gravity flow of materials and a convenient and desirable arrangement, the car was made as large as the standard clearance of the road would permit after allowing room for concrete forms. The dimensions are 40 ft. long over end sills, 10 ft. 4½ in. wide over braces and 17 ft. 9 in. from top of rail to top of car. It was built of steel as the material bins are high above the rail and the weight is considerable.

The principal features of the car, as shown in the accompanying drawing and photographs, are a central chamber, open on the sides, 8½ ft. long, 9 ft. 8 in. wide and 10 ft. 3 in. high, in which on one side is located the pneumatic concrete mixer and on the other side the charging skip. Over this chamber is a water tank of 1,850-gal. capacity, which furnishes water for the concrete and is also connected with the cooling system for the gasoline engine. On one end of the car facing the central chamber is a stone bin of 30 cu. yd. capacity. On the other is a sand bin of 12 cu. yd. capacity. Each bin has a chute 20 in. wide leading to the charging skip, and each chute is controlled by an under-cut gate. Under the stone bin is a space occupied by a 96 cu. ft. air receiver, standing vertically, and the storage of the cement in bags. Under the sand bin is the gasoline engine and its auxiliary equipment completely



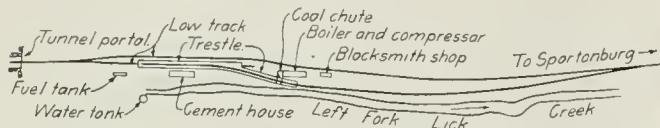
Loading and Storage Trestle from the South, with the Entrance to the Tunnel in the Background

impracticable to furnish the concrete from a mixer located at either portal of the tunnel, as too much time would be consumed in transporting the wet concrete. It was concluded at the outset that the mixing could be done inside the tunnel, where the concrete was to be deposited, and the conclusion was reached

housed from water and dust. The charging skip in its lower position stands with its top rim about 1 ft. 3 in. above the floor and travels on inclined guide rails to its upper position over the mixer, being hoisted by a compressed-air cylinder 9¼ in. in diameter. The gate of the skip works automatically by

means of a guide rail. The mixer is for a two-bag batch (0.4 cu. yd.) and has an 8-in. outlet pipe at the bottom running horizontally and curving to the outside of the rear truck, and thence vertically to near the top of the car, where it branches by means of a wye into two lines, one a 180-deg. bend to the rear for "shooting" into foundations and sidewalls, and the other going to the roof for "shooting" into the arch. The wye is a special patented device with a sliding plate controlling the movement of material into either arm. The arrangement of the pipe, traveling with the car and being in position at all times for "shooting" concrete, results in a material saving of time and expense.

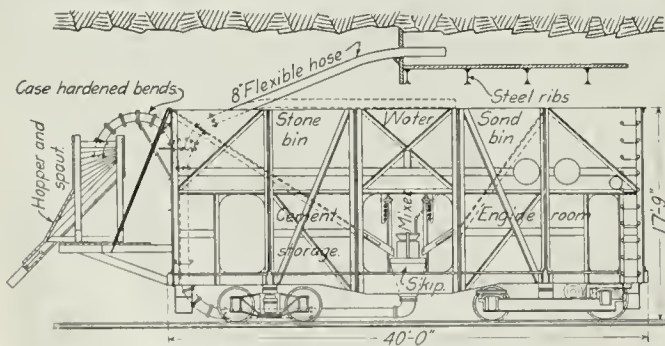
Along one side of the car, level with the main floors, is a folding platform 2 ft. wide, used by the men carrying cement and to gain access to the engine room. During the ordinary



Layout of Material Plant at the South Portal

work of the car this platform remains down. The entire arrangement is compact and arranged with a view to save manual labor. One man controls the hoisting of the skip, the injection of water and the mixing and discharge of the batch. One man is placed at each chute and two men carry, open and empty the cement bags.

The gasoline engine is of the six-cylinder, four-cycle tee-head type and is rated 200 hp. at 350 r. p. m. It can be throttled to 125 r. p. m. The motor and its frame constitute one of the trucks of the car. The cylinders stand in a row at right angles to the track and the whole construction is compact but accessible. The engine is started by admitting compressed air into three cylinders, then the explosion of the gasoline takes place in the other cylinders and continues the motion. The transmission is by means of a Morse chain on to the driven axle (one only being used) and the control is through a friction clutch of special design. The general principle employed is much the same as in the ordinary automobile. The car and gasoline en-



Elevation of the Concreting Car

gine were built by the McKeen Motor Car Company, Omaha, Neb. It was sent knocked down, was erected at the railway shops at Erwin, Tenn., and was moved to the work (105 miles) under its own power at a speed at times as high as 25 miles an hour.

LOADING AND STORAGE TRESTLE

The loading and storage trestle is of special design and so arranged that the concrete car goes under it and receives crusher-run stone, sand, bag cement and water by gravity. The sand and stone is drawn from overhead bins by means of under-cut gates. Cement is conveyed into the car by a chute. The trestle has a track over its deck upon which stone and sand in hopper cars are stored or unloaded into the bins below. There is a continuous row of 27 bins with an aggregate capacity of 324 cu. yd. and a total length of 162 ft., and five loaded cars can be stored over these bins to give an additional storage ca-

capacity of 200 cu. yd. The general arrangement is shown in the track layout and in two of the photographs.

COMPRESSOR PLANT AND PIPE LINE

The compressor plant is exceptional for a temporary outfit. To save money on foundations and at the same time to increase the space, the floor level of the boilers and compressors was fixed 4½ ft. above sub-grade, the concrete foundations and walls were built up to this height and the cellular space under-



Central or Working Chamber of the Car Showing the Skip in the Foreground, the Mixer in the Rear and the Chutes on the Sides

neath was utilized for water tanks and ash pit. The building was built of 1-in. boards covered with tar paper. The arrangement chosen permits coal to be dumped from cars on the trestle to a pile in front of the boilers. There are two boilers, both locomotive type, one new, one of 150 hp., and one old one of 70 hp. The piping connections are such that either one can be cut in or out of service for cleaning or repairs. Two compressors are installed, but an extra foundation for another unit is provided, for reasons which appear elsewhere. The compres-



General View of Loading Trestle from the South Portal of the Tunnel

sors are alike and of the Ingersoll-Rand F. R. I. Rogler valve class, a high speed, single stage type with a steam cylinder 12 in. by 12 in., an air cylinder 12 in. by 14 in., a piston displacement at 250 r. p. m. equal to 528 cu. ft., an actual output of about 375 cu. ft. of free air per min. each. They work under 125 lb. steam pressure and compress air to 115 lb. They are

cooled by water brought by gravity from the mouth of an old coal mine. From the compressor a 6-in. pipe leads to a 150-cu. ft. air receiver, from which a 4-in. pipe line goes on a steady 0.5 per cent down grade entirely through the tunnel. At the lower end is a pet cock to draw off any water. In order to provide for expansion and contraction, the pipe line is laid alternately on the east and west sides of the track in lengths of about 1,000 ft. connected by curves of 2 ft. radius. The bottom of the pipe is at the level of the bottom of the ties and 1 ft. out from their end. About every 100 ft. a long radius tee is placed and about 20 mine cocks of 4-in. size are provided; these can be shifted to the various tees as the progress of the work demands. From the mine cock a 3-in. hose 60 ft. long connects with the 96-cu. ft. air receiver on the car, which can thus be connected to the 4-in. pipe line from any position in the tunnel.

GENERAL

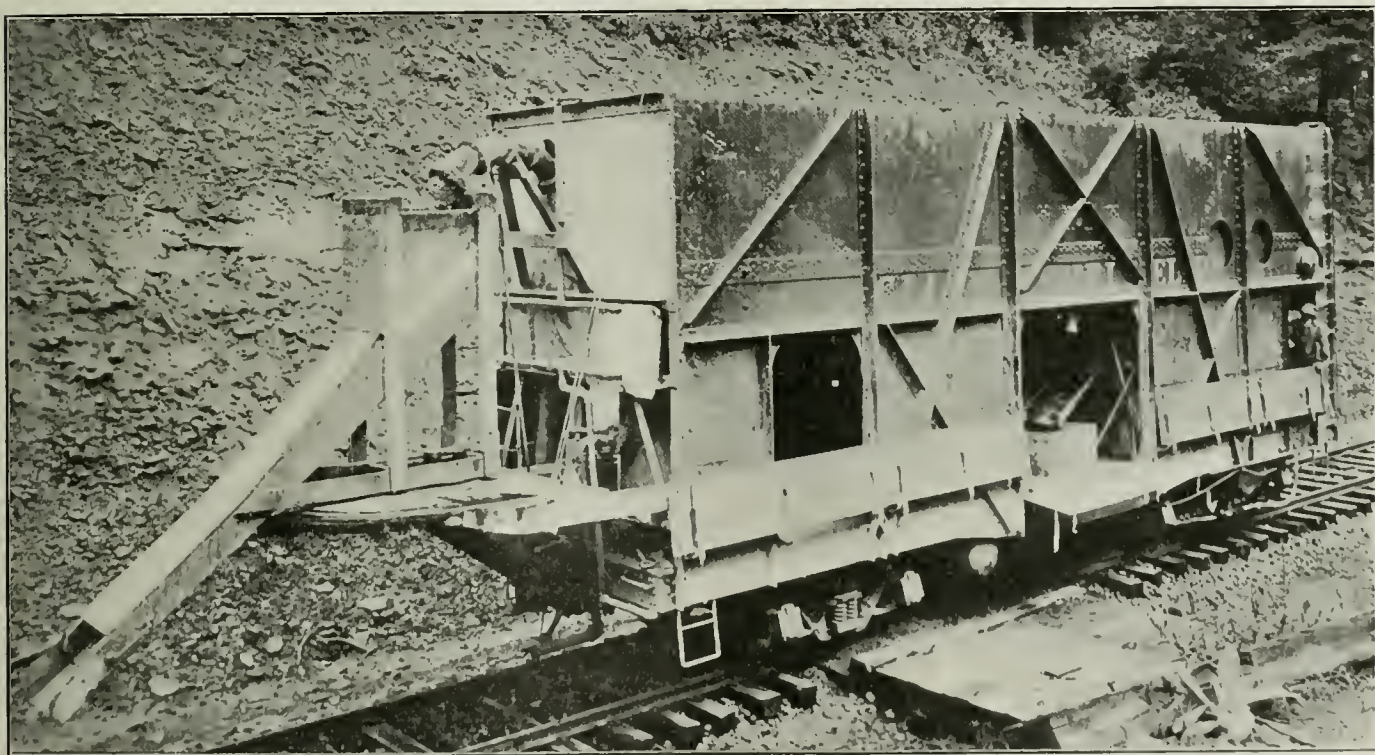
The forms are of steel except the arch ring, which is 3-in. hard pine on steel ribs. They are of the Blaw collapsible type, but of exceptionally stiff design. They are held by anchor bolts to the walls of the tunnel and are without interior bracing, so that the concreting car as well as trains may pass without interruption. They are collapsed by inserting temporary rods, which are removed when not in use. Five 30-ft. sections are provided, and it is expected that the car will fill at least one section each

in the foundation and the initial lift of bench wall 4 ft. 4 in. high, which involves moving the car more than will be necessary when "shooting" into the arch form. The performance is, however, largely dependent upon interference from trains passing through the tunnel.

Another feature of this plant is the short pipe through which the charge moves. Generally speaking, it has been held that at least 50 ft. of pipe was necessary to get a good mixture of concrete. In this case it goes through 41 ft. of pipe and 10 ft. of chute and the mixture is good. In several installations concrete has been placed through 1,200 ft. of pipe and the record for distance to date is 2,805 ft. One of the difficult problems confronting the designer is to place the charges of ingredients into the mixer fast enough to work it to its capacity. The mixer can shoot a batch every 15 sec., provided sufficient air is furnished, but to give it a charge of material every 15 sec. seems to be an unsolved problem. Time records of the device given below show the speed at which batches are discharged, giving the actual time the car is coupled to the hose and working inside the tunnel:

Aug. 17, 1915,	423 batches in 381 min.,	average 54.0 sec. per batch.
Aug. 18, 1915,	323 batches in 302 min.,	average 56.1 sec. per batch.
Aug. 19, 1915,	448 batches in 340 min.,	average 45.5 sec. per batch.
Aug. 20, 1915,	325 batches in 250 min.,	average 46.1 sec. per batch.
Aug. 21, 1915,	309 batches in 280 min.,	average 54.3 sec. per batch.

The variation is due to the condition of the material, whether wet or dry, which affects the rapidity with which it flows in



General View of the Concreting Car

day and lose no time waiting for the moving of forms or for the concrete to take its set. For the foundations and initial bench wall, wooden forms are in use. They are made in sections of 12 ft., are braced from the track, and are taken down, carried ahead and reused as required.

The car began regular operation in the tunnel on July 9, 1915, and has worked every day since, Sundays excepted. It has steadily increased its output as the men become more used to the work and better organized, as shown by the following record:

Week ended July 17, 1915,	261 cu. yd.
Week ended July 24, 1915,	379 cu. yd.
Week ended July 31, 1915,	516 cu. yd.
Week ended Aug. 7, 1915,	822 cu. yd.
Week ended Aug. 14, 1915,	928 cu. yd.

Several runs of 180 cu. yd. per day and one run of 201 cu. yd. have been made. The work so far has consisted of putting

the chutes and skip. It is believed that the operation can be speeded up to an average of about 35 to 40 sec. per batch with dry material. One should observe that the door of the skip automatically opens as the skip reaches to position and closes as it is lowered away, also that the door serves as a chute while open, and that the side slopes are steep and unbroken, so that the skip clears quickly. The material when damp has a decided tendency to arch either vertically or horizontally, and frequently this arch must be broken by hand. The hoisting of the skip, the placing of the water and the discharge of the batch are all controlled by one operator. The inside of the car is lighted by carbide lights, and the outside work by hand torches and carbide lights.

A great diversity of opinion exists among those familiar with the compressed air method of mixing and placing concrete as

to the quantities of air required. So far it appears that for the present plant a capacity of 750 cu. ft. of free air per min. is ample, but on account of this difference of opinion space has been provided in the compressor house for an extra compressor. It has been found that one compressor slowed the work down to a batch about every 1¼ min.

The plant was designed by O. K. Morgan, office engineer, under the general direction of Ward Crosby, chief engineer, of the C., C. & O., to whom we are indebted for the above.

BRIDGE AND BUILDING CONVENTION

The twenty-fifth annual convention of the American Railway Bridge and Building Association will be held at the Hotel Statler, Detroit, October 19-21. From present indications a large attendance is expected. Among the reports which will be presented are the following: Railway Water Tanks; Pile and Timber Trestle Bridges; The Protection of Grade Crossings; Coaling Stations; Costs of Structures; Efficient Methods of Handling Work and Men; Warnings for Overhead and Side Obstructions; Reinforced Concrete Bridge Work; Station Buildings for Passenger Service; Concrete Culvert Pipe and Concrete Piles.

The Bridge and Building Supply Men's Association is also planning a meeting and an exhibit at the same place coincident with this convention.

WATER SERVICE TESTS

By PAUL M. LA BACH.

Assistant Engineer, Chicago, Rock Island & Pacific, Chicago.

The customary unit of cost of pumping water for locomotive and similar uses is the cost per thousand gallons. While this unit is useful for many purposes, it has little value when one desires to compare the efficiency of one plant with that of another. The costs of the same plant may be compared from month to month, but even then, false conclusions may be drawn as the plants are apt to deteriorate with age, or the conditions may be altered. The most accurate way of comparing costs, exclusive of the pumper's wages, is by using the water horse power hour or some multiple thereof as a unit; the water horse power hour in this case being the overall horse power hour. This will not give the relative efficiency of each unit of the plant, but when once determined, plants of different design may be compared and tests made of the different parts at the same time.

Those responsible for the design of such plants are frequently called upon to decide which is the most economical, a steam plant with a direct-acting steam pump, an oil engine, with a power pump, or a power pump with motor drive. About the only known quantity is the price of coal, oil or electric current. From this point the designer must work with percentages which are supposed to indicate average efficiencies for each of the different units, such as the boiler, pump, pipe line, etc. The present state of the art is such that not enough is known of the actual performances of these parts for anyone to form very accurate conclusions. There is great need for a series of plants, taken as a whole, which may also be divided into their component parts. This will bring out the points of good design and also show up many bad ones.

Probably one of the principal reasons why more tests are not made showing fuel consumption on a horse power hour basis is the popular impression that it is a complicated process requiring much time. If indicators are used and cards made this is relatively true, but even then it is worth the trouble. However, another method may be used which is sufficiently accurate for the purpose. All that is necessary is to install a water pressure gage in the discharge line at the pump, a vacuum gage in the suction line, and an automatic counter to record the number of revolutions of the pump. The fuel must be weighed or measured as the case may be.

All the data required is found by reading the two gages and the counter four times an hour and recording the amount of fuel used. These data are then utilized in the following formula:

$$\text{Water horse power} = \frac{P \cdot L \cdot A \cdot N}{33000}$$

33000

P = Mean effective pressure in pounds per sq. in. in discharge line while working, plus the reading of the vacuum gage divided by 2.035, plus the vertical distance in feet between the vacuum and pressure gages multiplied by 0.434.

L = Length of stroke in feet *a*.

Multiply *a* by 1 for a single-acting simplex pump.

Multiply *a* by 2 for a double-acting simplex pump.

Multiply *a* by 2 for a single-acting duplex pump.

Multiply *a* by 4 for a double-acting duplex pump.

Multiply *a* by 3 for a single-acting triplex pump.

Multiply *a* by 6 for a double-acting triplex pump.

A = Area of piston in sq. in. This is the effective water area and the area of the piston rod should be subtracted.

N = Number of revolutions per minute.

In case it is difficult to install a vacuum gage take the difference in elevation between the water level at the suction end of the intake and the pressure gage, in feet, and multiply this by 0.434. This may be corrected for friction, but where the pipe is short it is not necessary.

A log for an hour's run will be as follows:

Pressure gage, 100 lb.

Vacuum gage, 10 in.

Revolutions, 2,400.

Pump, 6 in. by 12 in. triplex, single-acting. Area, 28.27 sq. in.

Difference in elevation between gages = 3 ft.

$$P = 100 \times 4.9 + 13 = 106.2$$

$$L = 3.0 \text{ ft.}$$

$$A = 28.27 \text{ sq. in.}$$

$$N = 40.$$

$$106.2 \times 3.0 \times 28.27 \times 40$$

33000

$$= 10.91 \text{ water horse power.}$$

The amount of work done in 10 hours is 109 h.p. If 20 gal. of kerosene is used during the period the fuel efficiency is 0.192 gal. per water horse power hour. It will be noted that the taking of water from the storage tank by locomotives during the test does not introduce a number of unknown quantities. The pressure gage should be in view constantly and any changes in head recorded with the time.

While the test is going on it is sometimes of considerable interest to know just how much water has been put in the tank. Where possible tank measurements should be made in order to compare the displacement of the pump with the amount actually delivered. Any excessive slippage would indicate as a rule that the valves of the pump needed overhauling.

The importance of making actual tests under service conditions cannot be too strongly insisted upon. A variety of uses will be found for the data collected, which will lead to more economical operation.

MR. TAFT AND THE RAILROADS.—Mr. Taft says that we must grant increased rates to the railroads and do it quickly; that their prosperity is important to the prosperity of the country, because their expenditures create a very large part of the demand for our manufactured goods. He calls it outrageous injustice to make the railroads carry the enormous burden of the parcel post for nothing. He says the full-crew bills should be repealed because they impose the burden of employing unnecessary labor. The plight of the railroads today is largely due to Mr. Taft's action in 1910. He is fair enough to admit that he made a mistake. It was a terrible mistake, and has materially helped to keep the business of the country at low mark for five years. Mr. Taft should appear before the interstate commerce commissioners, the majority of whom he appointed, and who are still fumbling around in darkness.—*The Bache Review*.

CORRUGATED SHEET ASBESTOS CONCRETE

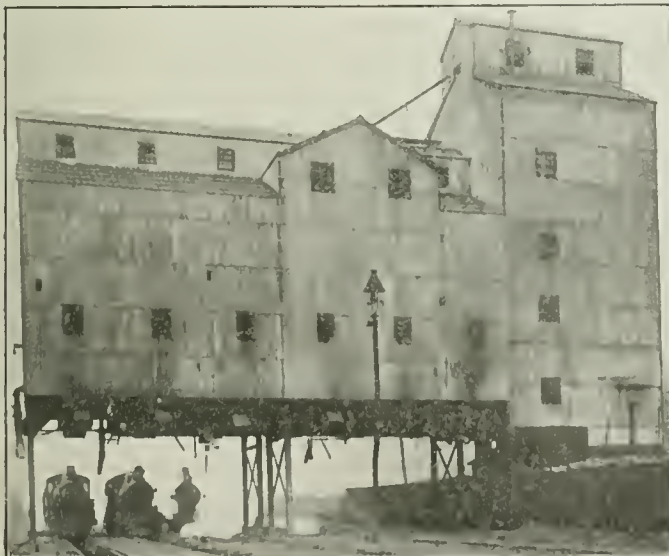
A building material of recent introduction is the Ambler corrugated roofing and sheathing, manufactured by the Keasbey & Mattison Company, Ambler, Pa. It consists of the combination of cement and asbestos fibers, known commonly as asbestos board, in the form of corrugated sheets, and is applied like corrugated iron. Its particular value is in its resistance to the action of air, water and temperature changes and its incombustibility. It possesses all the advantages of corrugated iron as to ease of erection, lightness and adaptability.

The incorporation of the asbestos fibers with the cement to form a dense, tough concrete, demands special treatment. The process may be described briefly as follows: Hydraulic cement



New York Central Sheep Sheds at Buffalo Covered with Corrugated Asbestos Sheets

is first mixed with water and asbestos fiber of the chrysolite variety, in a heating engine similar to that employed in the manufacture of paper pulp. The material then passes to the vat of a modified mill-board or paper machine, wherein it is kept in a state of agitation until picked up in thin coatings by a fine wire screen on a revolving cylinder, from which it is passed by an endless felt belt to a second rotating cylinder, upon



Corrugated Asbestos Sheets on the Coaling Station of the Terminal Railroad Association, St. Louis

which it accumulates in layers until the desired thickness has been attained. The material is then cut across and removed in the form of sheets which are piled one upon another and placed between corrugated metallic plates. The latter are then subjected to heavy pressure to compact the material, drive out excess water, eliminate all voids and fissures and give it the corrugated form, after which time is given for proper seasoning to allow for the setting of the cement.

Corrugated asbestos sheets for roofing and siding purposes are made of a uniform width of $27\frac{1}{2}$ in., comprising eleven complete corrugations, and in lengths of 4, 5, 6, 7, 8, 9 and 10 ft. The corrugations are $2\frac{1}{2}$ in. wide and 1 in. deep from top to bottom of corrugations. The material varies in thickness from $\frac{3}{16}$ in. to $\frac{5}{16}$ in. and weighs from 2.8 lb. to 3 lb. per sq. ft.

The best device for attaching roofing to steel and iron frame work has been found to be aluminum tie wires. Two holes are drilled through the asbestos, one just above and one just below the purlin. The outer end of each tie wire is provided with a head similar to that of a wire nail and holds a soft lead washer. The inner ends of the two wires are then twisted together around the purlin. In applying the material to wooden purlins, wire nails with lead washers take the place of the aluminum tie wires just described. The fastening for siding consists of a galvanized iron clip, bent so that the inner end rests over the purlin or other horizontal iron support. The clip is fastened to the corrugated material by two $\frac{1}{4}$ -in. stove bolts. The siding is secured to the wooden frame work by means of nails, as in the case of roofing. For the protection of corners and ridges, rolls of the same material as the roofing and siding are used.

This material is used as a substitute for corrugated iron on railroad buildings, as illustrated in the accompanying photographs.

TIE PRESERVATION*

By F. J. ANGIER

Superintendent Timber Preservation, Baltimore & Ohio, Baltimore, Md.

On the Baltimore & Ohio, ties cost \$121 per mile of track maintained in 1904. By 1912 this cost had increased 70 per cent and in 1913 109 per cent. In other words, the cost of the ties in a mile of track had more than doubled in less than ten years. The amount of money involved is large, for next to fuel, ties constitute the largest single item of material cost on the railroad. The amount spent on the Baltimore & Ohio for ties in 1913 was over \$2,200,000. This does not include ties for construction work, or the cost of labor putting them in track.

In the campaign for the conservation of the nation's resources, the railroads can materially assist because the cheaper, inferior and more plentiful woods, such as red oak, beech, elm, etc., can be so protected by treatment to last as long as, or longer in some locations, than the best white oak. This makes it feasible to use woods otherwise not easily marketable, and prolongs the existence of white oak timber, a species which, if there were no tie-treating plants, would soon cease to exist, resulting in loss to those trades that use it.

Further, this movement which encourages the purchase of beech, maple, elm and the inferior oaks, opens up a market for such timber along the tracks of the Baltimore & Ohio, which will bring millions of dollars into circulation among persons who in turn will spend a portion of this money with this railroad for the transportation of merchandise and passengers.

The wood preserving industry in the United States has been built up largely on crossties and other railroad material. In 1913, out of a total of approximately 150,000,000 cu. ft. of wood treated, nearly 80 per cent was railroad ties, and probably another 10 per cent other railroad material.

While nearly 30 per cent of all crossties used annually received a preservative treatment, less than one-half of one per cent of the total consumption of manufactured lumber is treated. Future developments should be in the direction of more extensive treatment of all timber exposed to decay. If the crossties and the ten billion feet of lumber which fail from decay annually were properly treated, it would effect a saving of at least one hundred million dollars each year.

Chemical treatment of timber in this country, on what might

* Abstract of a paper presented before the Baltimore & Ohio Operating Officers' Association, Deer Park, Md., June 26, 1915.

be considered an extensive scale, was first undertaken by the Atchison, Topeka & Santa Fe in 1885. Up to that time there were only 3 pressure plants in existence. At the close of 1890 there were 8 plants; in 1900, 15 plants; in 1905, 34 plants; in 1910, 74 plants and in 1914, 96 plants.

The first recorded use of treated crossties was in Maryland in 1838, and the first treating plant, which was in the form of open wooden tanks, was built in Lowell, Mass., in 1848. The preservative used at this and several of the other earlier plants was bichloride of mercury. The first permanent railroad plant using creosote was built by the Louisville & Nashville at West Pascagoula, Miss., in 1876.

The total number of ties treated in the year 1885 was about 120,000, which was approximately one-quarter of one per cent of the estimated number of ties used during that year by all the railroads in the United States. The number treated annually increased amazingly, and in the year 1913, 40,260,000 ties received preservative treatment, being about 28 per cent of the entire number purchased by the steam and electric railroads during that year.

The number of ties treated in 1914 exceeded the total of 1913 by over 3,000,000. The hewed ties treated comprised about 70 per cent of the total, or about 30,000,000, while approximately 14,000,000 were sawed. Ties of the red oak family lead in the number treated, followed by southern yellow pine, then in order of importance come Douglas fir, western pine, beech, gum, tamarack, maple, birch and elm.

When we consider wood preservation in its broadest aspect we include the prevention of loss by reason of using an expensive wood, or special costly sizes, where cheaper kinds would serve equally well.

W. H. Clifton, lumber agent, in a paper read at the railway storekeepers' convention, this year, brought this out very clearly. He said: "As in other lines of industry, there are certain practices which are followed in the use of lumber in railroad shop and building work today, which have been unchanged for many years, regardless of the decrease in the supply and increase in the cost of the lumber used, or in fact that other kinds of lumber, equally well adapted to the purpose, are more easily and cheaply obtained."

After citing various incidents showing the prevalence of such practices, he concludes:

"A remedy is not hard to find or difficult to administer. Usually a little educating of the consuming forces in the possibilities of substituting, with a view of economy, brings the desired result, for the average mechanic on a railroad is not averse to saving money for the company if some one will show him how to do it and co-operate with him in accomplishing the desired result."

Ties are purchased by the purchasing department. They are inspected by the timber preservation department and put in track by the maintenance of way department. Ties for treatment are shipped direct to the treating plant, and those to be used without treatment are distributed along the right-of-way and used in track as required. Ties received at the treating plants are cribbed in piles seven and one for seasoning. The seasoning period varies from 4 to 12 months, depending on the kind of wood.

White oak is rapidly increasing in price, and within a few years will doubtless be as little used for crossties as black walnut or other expensive woods. Chestnut and cedar are too soft for crossties, except under comparatively light traffic. The alternative is to utilize the inferior woods, such as the red oak family, beech, elm, etc. These woods decay rapidly when in contact with the ground. Preservative treatment makes them as good as or even better than the more costly woods.

One naturally wants to know what is really saved by going to all of this expense and trouble to treat crossties. A number of tables have been prepared and as many different estimates made to show the enormous saving in treating timber. There are so many factors to be taken into consideration that it is difficult to show what the average saving will be on a large railroad like

the Baltimore & Ohio, which has upwards of 8,000 miles of track.

Mr. Emerson has kindly submitted the following, showing the total and annual cost of treated ties compared with untreated white oak ties:

	Treated, each	Untreated, each
Purchase price.....	\$0.547	\$0.717
Inspection.....	.015	.015
Treatment.....	.23	.....
Freight.....	.112	.067
Unload and pile.....	.02	.02
	\$0.924	\$0.819
(a)		
Truck to point of use.....	.01	.01
Install in track.....	.28	.28
Truck and burn old tie.....	.01	.01
Two tie plates.....	.24	.08 **
Four spikes.....	.05	.05
Interest on (a).....	.056	.025
(6 months on untreated, 12 months on treated.)		
	\$1.570	\$1.274
(b)		
Supervision on (b) 5½ per cent.....	.086	.070
	\$1.656	\$1.344
Credit salvage, one-third value tie plates and spikes.	.097	.043
	\$1.559	\$1.301

** Cost of one-third of two tie plates, assuming that one-third of the untreated ties are tie plated.

Annual cost per year including 6 per cent interest with assumed life of 14 years, treated each \$0.20; of eight years, untreated each \$0.24.

Annual saving: On each treated tie over white oak untreated, \$0.04.

Assume the production of treated ties to continue at its present rate, viz.:

1,000,000 per annum from Green Spring.	
200,000 per annum from commercial plants.	
Total...1,200,000 per annum.	
Saving the first year 1,200,000 at \$0.04.....	\$48,000
Saving the second year 1,200,000 at \$0.04 continues and there are also introduced another lot of 1,200,000, the total annual saving then being, at \$0.04.....	96,000
Third year.....	144,000
Fourth year.....	192,000
Fifth year.....	240,000
Sixth year.....	288,000
Seventh year.....	336,000
Eighth year.....	384,000
Ninth year.....	432,000
Tenth year.....	480,000
Eleventh year.....	528,000
Twelfth year.....	576,000
Thirteenth year.....	624,000
Fourteenth year.....	672,000
From fourteenth year on, this annual saving is continuous at....	\$672,000

The Baltimore & Ohio uses more than 2,000,000 ties annually for renewals. It would not be proper to treat all of our ties because many are destroyed by mechanical abrasion, and for some years to come more or less white oak, cedar and chestnut ties will be purchased, which we use untreated. If we estimate that the number of treated ties that could be used to advantage on the Baltimore & Ohio is 1,700,000 a year, and if the saving on this number is placed at the lowest estimate, viz.: four cents per tie, the total net saving would be \$68,000 for the first year, increasing a like amount each year until all ties put in track are treated ties.

As there are approximately 25,000,000 ties in track, and if we estimate 21,000,000 are treated, the net annual saving would be \$840,000.

To centralize the tie business this department has been instructed not only to treat ties, but also inspect them before purchase, and when proper methods have been devised, it will also distribute the ties in accordance with orders from the maintenance of way department. As a further safeguard to insure the full life of ties after they are put in track this department will have inspectors travel over the road to note the condition of the ties taken out of track and determine whether or not they have been removed before their full life has been attained.

THE RAILWAYS OF CHILE.—More than half the railroads of Chile are owned and operated by the government, which has undertaken an ambitious scheme of extension. The feature of these additions is the "Longitudinal Railway." This line, from extreme north to extreme south, will be 2,132 miles long, of which 1,960 miles is already built.

General News Department

Of the 175,465 regular passenger trains run by the Southern Railway during the fiscal year ended June 30 last 155,536, or 89 per cent, made schedule time.

The members of the Russian Imperial Railways Commission, who have been in this country for some time on business for the government-owned railways of Russia, are this week making a tour over the main line of the Pennsylvania Railroad. The commission is composed of Count S. I. Schulenburg, president; Max N. Groten, Nicolas P. Kemmer, Alphons I. Lipetz and Arkadi S. Martynoff. The principal stop will be at Altoona.

The life insurance scheme, for the benefit of employees, an-

an aggregate premium of a little over \$56,000 yearly. One-half of this is paid by the employees and one-half by the company.

Summary of Revenues and Expenses of Large Steam Roads

The following figures were compiled by the Interstate Commerce Commission from monthly reports of operating revenues and expenses of large steam roads for June, 1915. No reports are included for roads whose operating revenues for the year ended June 30, 1915, did not reach \$1,000,000.

Item	FOR THE MONTH OF JUNE.											
	United States			Eastern District			Southern District			Western District		
	Per Mile of Road Operated		Amount	Per Mile of Road Operated		Amount	Per Mile of Road Operated		Amount	Per Mile of Road Operated		Amount
	1915	1914*		1915	1914*		1915	1914*		1915	1914*	
Average number of miles operated..	228,827.46	...	...	58,884.14	...	...	42,371.16	...	...	127,572.16	...	...
Revenues:												
Freight	\$169,003,036	\$739	\$730	\$79,860,381	\$1,355	\$1,266	\$24,888,278	\$587	\$610	\$64,254,377	\$504	\$520
Passenger	56,279,708	246	259	24,479,780	416	441	6,787,977	160	185	25,011,951	196	198
Mail	4,714,921	20	...	1,719,738	29	...	627,157	15	15	2,368,226	18	...
Express	6,380,693	28	82	2,845,613	48	146	874,935	21	23	2,660,145	21	62
All other transportation	7,584,629	33	...	4,177,285	71	...	655,071	15	16	2,752,273	21	...
Incidental	5,339,642	23	25	2,704,103	46	49	632,552	15	15	2,002,987	16	17
Joint Facility-Cr.	280,488	1	1	137,148	2	3	58,561	1	1	84,779	1	1
Joint Facility-Dr.	93,663	...	...	38,378	1	...	10,000	...	...	25,287	...	...
Railway operating revenues	\$249,489,452	\$1,090	\$1,097	\$115,865,470	\$1,967	\$1,905	\$34,514,531	\$814	\$865	\$99,109,451	\$777	\$798
Expenses:												
Maintenance of way and structures	\$34,310,293	\$150	\$169	\$14,469,458	\$246	\$285	\$5,239,615	\$123	\$120	\$14,601,220	\$114	\$131
Maintenance of equipment	40,115,948	175	184	18,960,128	322	336	6,548,150	155	170	14,607,670	115	117
Traffic	5,155,806	23	23	1,932,147	33	34	885,059	21	23	2,338,600	18	19
Transportation	79,744,754	348	374	37,398,925	635	674	11,240,577	265	308	31,105,252	244	256
Miscellaneous operations	2,003,984	9	10	867,096	14	22	172,168	4	5	964,720	8	6
General	6,631,693	29	30	2,890,731	49	52	1,047,203	25	27	2,693,759	21	21
Transportation for Inv'tment-Cr.	814,922	4	1	58,284	1	...	121,273	3	2	635,365	5	1
Railway operating expenses	\$167,147,556	\$730	\$789	\$76,460,201	\$1,298	\$1,403	\$25,011,499	\$590	\$651	\$65,675,856	\$515	\$549
Net revenue from railway operations	\$82,341,896	\$360	\$308	\$39,405,269	\$669	\$502	\$9,503,032	\$224	\$214	\$33,433,595	\$262	\$249
Railway tax accruals	\$11,345,126	\$49	\$52	\$4,795,205	\$82	\$80	\$1,519,551	\$36	\$39	\$5,030,370	\$39	\$44
Uncollectible railway revenues	135,817	1	...	27,065	...	...	25,707	...	...	83,045	1	...
Railway operating income	\$70,860,953	\$310	\$256	\$34,582,999	\$587	\$422	\$7,957,774	\$188	\$175	\$28,320,180	\$222	\$205

*Because of changes in accounting classifications, consolidations of companies, etc., comparative averages are approximate only.

Item	FOR THE TWELVE MONTHS ENDING WITH JUNE.											
	United States			Eastern District			Southern District			Western District		
	Per Mile of Road Operated		Amount	Per Mile of Road Operated		Amount	Per Mile of Road Operated		Amount	Per Mile of Road Operated		Amount
	1915	1914*		1915	1914*		1915	1914*		1915	1914*	
Average number of miles operated..	228,554.14	...	...	58,874.35	...	...	42,320.00	...	...	127,359.70	...	...
Revenues:												
Freight	\$1,988,594,599	\$8,701	\$9,200	\$877,495,957	\$14,905	\$15,580	\$305,614,735	\$7,222	\$7,973	\$805,483,907	\$6,324	\$6,621
Passenger	630,177,652	2,757	3,038	276,394,861	4,695	5,029	85,771,256	2,027	2,369	268,011,535	2,104	2,330
Mail	57,021,857	249	...	20,745,455	352	...	7,524,233	178	177	28,752,179	226	...
Express	69,043,509	302	960	30,887,883	525	1,755	10,326,534	244	276	27,829,072	219	697
All other transportation	83,532,412	366	...	46,447,136	789	...	6,893,495	163	181	30,191,781	237	...
Incidental	58,416,906	256	274	30,116,433	511	535	7,322,472	173	191	20,978,001	165	179
Joint Facility-Cr.	3,458,071	15	16	1,579,727	26	26	695,403	16	17	1,182,941	9	11
Joint Facility-Dr.	1,215,531	5	5	765,613	13	9	158,569	4	3	291,340	2	2
Railway operating revenues	\$2,889,029,475	\$12,461	\$13,483	\$1,282,901,830	\$21,790	\$22,916	\$423,989,569	\$10,019	\$11,181	\$1,182,138,067	\$9,282	\$9,836
Expenses:												
Maintenance of way and structures	\$365,968,225	\$1,601	\$1,810	\$154,213,392	\$2,619	\$3,023	\$58,762,689	\$1,389	\$1,490	\$152,992,144	\$1,201	\$1,349
Maintenance of equipment	498,871,462	2,183	2,360	235,876,536	4,007	4,370	80,789,856	1,909	2,122	182,205,070	1,431	1,497
Traffic	59,464,699	260	277	22,565,047	383	415	10,966,243	259	269	25,933,400	204	215
Transportation	1,017,797,060	4,453	4,902	473,874,689	8,049	8,904	146,602,307	3,464	3,907	397,320,064	3,120	3,361
Miscellaneous operations	22,902,287	100	128	10,605,090	180	252	2,190,847	52	59	10,106,344	79	93
General	74,646,461	327	337	31,883,072	542	552	11,950,944	282	299	30,812,445	212	251
Transportation for investment-Cr.	6,960,300	30	13	756,094	13	...	1,367,871	32	5	4,336,335	38	22
Railway operating expenses	\$2,032,689,894	\$8,894	\$9,801	\$928,261,738	\$15,767	\$17,516	\$309,895,015	\$7,323	\$8,141	\$794,533,141	\$6,239	\$6,744
Net revenue from railway operations	\$856,339,581	\$3,747	\$3,682	\$354,640,101	\$6,023	\$5,400	\$114,094,554	\$2,696	\$3,040	\$387,604,926	\$3,043	\$3,092
Railway tax accruals	\$133,993,519	\$586	\$604	\$55,422,186	\$941	\$959	\$18,624,412	\$440	\$452	\$59,946,921	\$470	\$489
Uncollectible railway revenues	640,345	3	...	193,151	3	...	114,958	3	...	332,236	3	...
Railway operating income	\$721,705,717	\$3,158	\$3,078	\$299,024,764	\$5,079	\$4,441	\$95,355,184	\$2,253	\$2,588	\$327,325,760	\$2,570	\$2,603

*Because of changes in accounting classifications, consolidations of companies, etc., comparative averages are approximate only.

noticed recently by the Brooklyn Rapid Transit Company, Brooklyn, N. Y. (August 20, page 361), that over 5,200 employees have applied for insurance under the plan. A notice has been sent to all employees that the insurance will go into effect, as to all those who have applied for it, at noon, September 15. The applications, which had been received up to the 15th, and which constitute, therefore, the initial group, involve

Santa Fe Invites Suggestions from Stockholders

The Atchison, Topeka & Santa Fe, in sending out its September dividend checks and notices of the annual meeting to be held on October 28, in addition to asking for the usual proxy, has included the following paragraph:

"The fact that stockholders of the large corporations of the country seldom attend meetings or exercise their right to criti-

cize the management, or otherwise express opinion, is often commented on unfavorably and is sometimes claimed to be responsible for instances of mismanagement resulting in disaster. Your directors, in soliciting your proxy, do so because it is necessary that a quorum be present either by representation or in person. Any stockholder has the right, and is hereby requested, to make either at the meeting or in writing such suggestions or criticisms as may appear to him for the advantage of the company."

Texas Railways Urge Laws Against Trespassing

The Texas railways are conducting a campaign in the interest of adequate laws to prohibit trespassing. As a part of this campaign the Central Safety First Committee of the International & Great Northern has issued a bulletin calling attention to the large number of trespassers killed on the railways every year, and urging school teachers, employers of labor, ministers, parents and others to do everything in their power to educate those within their sphere of influence regarding the evils of trespassing. The circular states that during the last 13 years the International & Great Northern has carried on its trains nearly 20,000,000 passengers without killing or even maiming a single passenger in train accidents, "which proves that the International & Great Northern is a very safe road for passengers"; but that during the same period its trains killed or seriously injured over 500 people while trespassing on its yards and along the right of way, "which proves that the I. & G. N., like other railways, is a very unsafe place to walk upon."

Vice-President W. A. Webb, of the Missouri, Kansas & Texas, has issued a similar circular to all employees of the operating department, in which he says that more lives would be saved by the enforcement of laws against trespassing than by providing steel cars, installing block signals and abolishing grade crossings.

Pan-American Scientific Congress

The second Pan-American Scientific Congress is to be held at the office of the Pan-American Union, Washington, D. C., December 27, 1915, to January 8, 1916. The program is divided into nine main sections. The engineering section will be presided over by Gen. W. H. Bixby, formerly chief of the United States Army Engineers, as chairman, and the section on transportation, commerce, finance and taxation by L. S. Rowe, as chairman. The meetings of the engineering section will be devoted to such subjects as relate to water and land transportation and various problems of interest in the engineering sciences. The engineering committee has proposed for the series of special Pan-American conferences to be discussed by all of the participating countries the following topic: "Desirability and practicability of establishing a uniform railroad gage in Pan-America, and especially in Central and South America."

Railway Fire Protection Association

The second annual meeting of the Railway Fire Protection Association will be held October 5, 6 and 7, 1915, in the east room of Hotel La Salle, Chicago. The program of the convention follows:

TUESDAY, OCTOBER 5.

Morning Session, 10 A.M.

Roll call; Reading of minutes of last meeting; address of president; report of executive committee; address by T. C. Powell, vice-president, Alabama Great Southern.

Afternoon Session, 2 P.M.

Report on rules and regulations for the prevention of fire and protection of property. Robert Scott (A. C. L.) chairman.

WEDNESDAY, OCTOBER 6.

Morning Session, 10 A.M.

Report on fire prevention and protection in coaling stations. A. D. Brooks (I. C.) chairman.

Report on fire prevention and protection in grain elevators. Anson Murphy (A. G. S.) chairman.

Report on fire prevention and protection in terminal, classification and storage yards. G. A. Hays (U. S. Steel Corp.) chairman.

Afternoon Session, 2 P.M.

Report on cotton hazards. E. B. Berry (So. Ry.) chairman.

Report on oil burning appliances. J. S. Richards (Sunset Central) chairman.

Report on hand fire extinguishing apparatus. N. Searle (So. Pac.) chairman.

Visit to Illinois Central shops at Burnside.

THURSDAY, OCTOBER 7.

Morning Session, 10 A.M.

Report on statistics and forms. F. R. Auston (C. & E. I.) chairman.

Report on electric hazards. T. S. Potts (C., H. & D.) chairman.

Address by F. A. Silcox, district forester of the United States Forest Service, at Missoula, Mont., entitled, "The Railroads and Forest Fires."

Report on locomotive spark and ash pan hazard. H. W. Colson (A., B. & A.) chairman.

Afternoon Session, 2 P.M.

Report on fire prevention and protection of stations, freight depots and warehouses. W. S. Maryon (So. Ry.) chairman.

Unfinished business, new business; election of officers and executive committee.

Chief Interchange Car Inspectors' and Car Foremen's Convention

The seventeenth annual convention of the Chief Interchange Car Inspectors' and Car Foremen's Association was held at Murphy's Hotel, Richmond, Va., September 14 to 16, 1915, F. H. Hanson, assistant master car builder, New York Central, presiding. The meeting was opened with an invocation by the Rev. J. J. Scherer, and the association was welcomed on behalf of the state of Virginia by Attorney-General John G. Pollard, representing Governor Stuart, and on behalf of the city of Richmond by Mayor Geo. Ainslie. T. J. O'Donnell, arbitrator, Niagara Frontier Car Inspection Association, Buffalo, N. Y., responded for the association. President Hanson then delivered an address, calling attention to the greater uniformity of interpretation and improved enforcement of the rules of interchange resulting from the work of the association and laying stress on a number of conditions where further improvement is needed. H. Boutet, chief interchange car inspector, Cincinnati, Ohio, briefly sketched the development of the association and brought out the fact that a gain of 61 had been made in membership during the past year. After the reading of a number of communications the association took up the discussion of the revised rules of interchange.

The following supply companies had exhibits at the convention:

Boss Nut Company, Chicago and New York.—Boss nuts. Represented by J. W. Fogg.

Duff Manufacturing Company, Pittsburgh, Pa.—No. 119 Barrett jack; 50-ton high-speed ball-bearing jack with Cyclone lowering device; 25-ton journal jack. Represented by E. A. Johnson and C. A. Methfessel.

Grip Nut Company, Chicago.—Several types of Grip nuts; Riehle testing machine demonstrating their holding power and durability under repeated reapplications. Represented by H. E. Passmore.

Hale & Kilburn, Philadelphia, Pa.—Passenger car seats. Represented by R. H. Pilson.

McCord & Co., Chicago.—Pressed steel journal boxes. Represented by H. E. Creer.

Norton, A. O., Inc., Boston, Mass. High-speed self-lowering jack. Represented by H. J. Wilson.

Standard Heat & Ventilating Company, Richmond, Va.—Unitherm steam heat equipment, Standard end train line valve and steam heat hose couplers; Standard ventilator. Represented by L. B. Rhodes.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the *Railway Age Gazette* for each month.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hohenok, N. J. Next meeting, October 21-23, 1915, Boston, Mass.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 8 W. 40th St. New York. Annual convention, October 4-8, 1915, San Francisco, Cal.

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

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, Chicago.

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

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

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.

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

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

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

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

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

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

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

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

MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.

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

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

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

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

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May. Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

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

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.

RAILWAY REAL ESTATE ASSOCIATION.—F. C. Irvine, 1125 Penn. St., Pittsburgh, Pa. Next meeting, October 13, 1915, Chicago.

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

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

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

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, October 19-21, Colorado Springs, Colo.

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

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

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

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

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

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.

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

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-19, 1915, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

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

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

Traffic News

The Chicago, Milwaukee & St. Paul, on September 15, added an observation car service to all of its through trains between Chicago and the Pacific coast.

Numerous facts which are of interest in connection with the movement to secure South American trade for industries in this country have been made the subject of a letter which the Pennsylvania Railroad has sent to the boards of trade of 70 cities and towns along its lines.

The Canadian Pacific has issued a new tariff covering shipments of fruits and vegetables from British Columbia to eastern points, making a number of important reductions in rates to enable the producers to reach eastern markets in an extensive territory. Many of through rates are provided to stations off the lines of the Canadian Pacific.

The Northern Pacific has notified the Public Service Commission of Washington of its decision not to make a reduction of rates asked by eastern Washington and Oregon farmers for the shipment of wheat eastbound for export. The officers of the road do not believe that any rate it could afford to make would divert the crop from the Puget sound ports.

The Pennsylvania Railroad has issued a new and enlarged edition of its directory of fruit, vegetable and produce growers. It will contain the names of more than 10,000 farmers, truckmen and orchardists in New York, New Jersey, Pennsylvania, Delaware, Maryland and Virginia. The directory will classify each grower according to the principal character of his produce, and there will be six classes, namely: Apples, white potatoes, sweet potatoes, cabbages, onions and general produce.

An involuntary petition in bankruptcy against the Chicago, St. Louis & Gulf Transportation Company, operating a steamboat line between LaSalle, Ill., and New Orleans, La., via the Illinois and Mississippi rivers, was filed in the United States district court at Chicago last week, and a receiver was appointed. This company began service a few months ago after making many announcements of its intention to operate a fast service at rates far below those of the railroads.

The western roads presented at Washington this week, Wednesday, their petition to reopen the freight rate case. They ask the commission to vacate its order permitting certain advances and to allow the carriers to submit arguments to show that the increases which have been allowed are not sufficient to afford reasonable compensation. Another petition was submitted by W. E. Lamb, attorney for the Illinois Coal Operators' Association and others, which recited that the order entered by the commission had resulted in making rates on coal from points in Illinois south of Chicago relatively higher than from lake points.

Traffic—Evening Classes in Traffic Work

The LaSalle Extension University of Chicago, which for several years has conducted correspondence courses in railway traffic work, announces the inauguration of a plan of resident class work in specialized courses relating to railway traffic matters, to begin on September 28. The instruction will take up, among other subjects, railway organization and management, government regulation, the legal aspect and liability of common carriers, classification and rate-making methods and principles, ocean traffic and trade, foreign commerce, railway accounting and industrial traffic organization. The class work will be conducted in the evenings at the Lake View building, 102 Michigan avenue, Chicago, where commodious class rooms have been established. In addition to the university officers and instructors the class room work will be presided over by practical traffic men in railway and industrial service. The traffic work of the LaSalle Extension University is in charge of John P. Curran, who has been connected with the Central Freight Association for six years, and a large number of prominent railway officers and industrial traffic men constitute the advisory board. Several railways have arranged to pay for courses for their employees.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The New Orleans Joint Traffic Bureau has filed a complaint with the Interstate Commerce Commission against the rates on beet and cane sugar from New Orleans to points in the south-east, which are alleged to be discriminatory in comparison with the rates on similar commodities from New York and Philadelphia to the same destinations in the southeast.

Complaints of merchants of Charleston, S. C., against the principal railroads for alleged discrimination in freight rates in favor of Wilmington, N. C., were the subject of hearings by George N. Brown, representing the Interstate Commerce Commission at Charleston, September 10 and 11. The hearing was adjourned to a date, to be named, in the latter part of October, at Washington.

Free Storage of Coal at Perth Amboy, N. J.

Plymouth Coal Company v. Lehigh Valley. Opinion by Commissioner Hall:

For more than 25 years prior to June 1, 1913, defendant's tariffs provided that cars containing anthracite coal forwarded to Perth Amboy for transshipment by boat and held at that port would not be subject to car-service charges. It was further provided that limited free storage at Perth Amboy was available to shippers and that space there would be allotted to them on the basis of the tonnage for the previous year of their respective shipments over the piers. Such free storage was limited in time to a period of two years. After the expiration of that time a charge of 15 cents per gross ton per month or fraction thereof was assessed.

Effective June 1, 1913, defendant filed tariffs canceling the provisions outlined above and providing, first, that the privilege of storing coal in bins at Perth Amboy had been withdrawn and that anthracite coal which was unloaded by defendant for the purpose of releasing needed car equipment would be subject to storage charge in the same amount as would have accrued under its car demurrage rules and regulations; and, second, that cars containing anthracite coal consigned to and held at Perth Amboy and various other points for transshipment by water would be subject to demurrage at the rate of \$1 per car per day, computed on the average plan, allowing an average detention of five days per car free of charge.

The commission finds that the carrier has justified these charges, and also holds that the demurrage regulations on coal awaiting transshipment at this point are reasonable (36, I. C. C., 140).

Joint Rates with the East Jersey Railroad & Terminal Co.

East Jersey Railroad & Terminal Company v. Central of New Jersey, et al. Opinion by Commissioner Hall:

The East Jersey Railroad is a corporation operating a short narrow gage railway from a junction with the Central of New Jersey in Bayonne, N. J., south to a pier on the Kill von Kull, and in conjunction therewith, a fleet of tugs and barges in New York harbor. The Southern Cotton Oil Company, the complainant, and the Edible Products Company, each of which has a plant on the line of the terminal company, are principally interested. They contribute about one-third of the rail revenue of the terminal company, but do not control it.

For a number of years prior to April, 1914, the defendants participated with the terminal company in joint rates between various points and New York, including points in New York harbor within the established lighterage limits. Joint rates to New York, which are generally the same as to Bayonne, included lighterage to points in New York harbor within the lighterage limits or on board vessels for export. Under those tariffs certain transit services were available to industries at Bayonne, N. J., on the line of the terminal company. The commission finds that the carriers have not justified a cancellation of these joint rates made April, 1914, and a proposal to assess on traffic from points on the terminal company's rails

that company's local rail rate of one cent a 100 lb., and its lighterage charge of three cents a 100 lb., in addition to the rate to Bayonne (36 I. C. C., 146).

STATE COMMISSIONS

The Public Service Commission of West Virginia has dismissed a petition asking for regulation of jitney carriages in Charleston, holding that the question is a local one which can be dealt with more appropriately by the city.

The Texas Railroad Commission, which has been holding hearings on the application of the railroads of the state for a general advance of 15 per cent. in freight rates, has disapproved the recommendation of attorneys for the commission calling for an indefinite postponement of the final hearing, pending the settlement of questions arising from the decision of the Interstate Commerce Commission in the Shreveport rate case. During the past week witnesses for the state commission have introduced evidence based on their examinations of the carriers' books, for the purpose of showing that lines in Texas have been "milked" by parent corporations outside the state.

PERSONNEL OF COMMISSIONS

Charles A. Russell, of Gloucester, has been appointed a member of the Massachusetts Public Service Commission, taking the place of Clinton White, who retired several months ago.

COURT NEWS

Excessive Damages

The New York Appellate Division holds that a verdict of \$22,750 for the death of a foreman engaged in repairing electrical appliances on a railroad, who earned \$105 a month, and paid to his wife \$90 to \$95 monthly, was excessive, and a reduction to \$15,000 was within the trial court's discretion (*Millette v. N. Y. W. & B.*, 154 N. Y. Supp., 792).

Liability for Taxes as Between Lessor and Lessee

In 1871 a New York railroad leased its property to another corporation, which agreed to pay to the lessor a small cash rental and 8 per cent dividends on the lessor's capital stock directly to the lessor's stockholders. The lease also required the lessee to pay all taxes levied on the property demised and on the business done by the railroad, but provided that it should not be required to pay the present income tax on the dividends, or any tax thereon imposed or thereafter to be imposed by whatever name it might be called. The Federal officers, in levying the income tax under the act of congress of October 3, 1913, treated the income from the dividends as part of the lessor's income and levied the tax accordingly, thereby exempting the stockholders from any liability for an income tax on such dividends. The lessor sued to compel the lessee to repay to it the amount of this tax. The New York Appellate Division holds that the present income tax clearly came within the spirit of the clause exempting the lessee from paying the "income tax," and could not be considered a tax on the property or business, and the lessor's complaint was accordingly dismissed (*Rensselaer & Saratoga v. Delaware & Hudson*, 154 N. Y. Supp., 739).

Excise Tax on Corporations—"Engaged in Business"

During the greater part of 1910 the Snake River Valley Company owned a line, which it leased to the Oregon Railroad & Navigation Co. for five years. The O., R. & N. operated the line, and was obligated by the lease to pay all expense of maintenance and renewal taxes on the property, and other incidental expenses, but was entitled to retain from the rental the cost of certain permanent improvements made. For the greater part of 1910, while the lease was in force, the lessor maintained its offices, transferred stock, collected and deposited the rental, and expended such sums as were necessary, in maintaining its corporate existence, including the state corporation tax. Before the end of the year the lease was canceled by mutual consent, and the lessor immediately sold and transferred all of the property, and from the proceeds paid its bonded and other indebtedness. The

Circuit Court of Appeals, Ninth Circuit, holds that the lessor was not "engaged in business" during the year, within the meaning of the corporation tax act, and that it was not subject to the excise tax imposed thereby (*Miller v. Snake River Valley, C. C. A., 223 Fed., 946*).

Limitation of Liability—Authority of Shipper's Agent

An interstate carrier's tariffs provided two rates on household goods, the lower being based on a declared value. Unknown to the railroad, a shipper's agent had no authority to declare value, but he signed a release, declaring the value of goods to be not above that on which the rate was based. Part of the shipment was never delivered. In an action for its loss the Federal court (Michigan) holds that the railroad was justified in relying on the authority of the agent tendering the shipment to sign such a contract, and the shipper was bound by it (*American Brake S. & F. Co. v. Pere Marquette, 223 Fed., 1018*).

Claims Under Workmen's Compensation Act

A lineman in the employ of an interstate railroad was engaged in erecting a new telegraph line when a violent rainstorm arose. The railroad provided no shelter for such an emergency, though it made no deduction of wages for interference with the work. The lineman, with others, took shelter under some cars on a side track. An engine of another railroad moved these cars and the lineman was badly injured. In proceedings under the New York Workmen's Compensation Act, the New York Appellate Division holds that the injury was "accidental" within the meaning of the act and arose "out of and in the course of his employment," so that an award of compensation was properly made (*Moore v. Lehigh Valley, 154 N. Y. Supp., 620*).

The Illinois Central has filed in the United States District Court at Danville, Ill., a petition for an order restraining the Interstate Commerce Commission from continuing an investigation growing out of complaints of Illinois coal operators, asking the commission to assess damages against the railroad for failure to furnish cars. The railroad asks that the commission's investigation be stopped and the case be tried in the courts at once.

Injuries to Trespassers and Employees

The Circuit Court of Appeals, Ninth Circuit, holds that a railroad employee who was killed while constructing a temporary bridge over which the railroad intended to move interstate trains, was employed in interstate commerce, within the Federal Employees' Liability Act, since that work was not independent of the interstate commerce in which the railroad was engaged (*Columbia & P. S. v. Sauter, C. C. A., 223 Fed., 604*).

The Texas Supreme Court holds that a railroad yard clerk required to check up cars in trains and take their numbers to make a proper report thereof, is not, while walking through the yard, engaged in interstate commerce within the Federal Employees' Liability Act, in the absence of anything to show his connection with an interstate freight train in the yard or anything to show his purpose in walking through the yard, or the character of the work done by him (*Pecos & N. T. v. Rosenbloom, Tex., 177 S. W., 952*).

A Quebec, M. & S. car left a point in Pennsylvania for a point in Maine, and then came empty to a point in New York, where it was taken to the Delaware & Hudson's car shop. While it was being repaired the head of a nail flew up and struck an employee's eye. When it left the shop the car was taken empty to a point in New York state and loaded for an interstate trip. The New York Appellate division holds that the actual work on the car at the time of the injury determined whether it was interstate or intrastate work, and that the employee had no remedy under the Federal Employees' Liability Act, but only under the State Workmen's Compensation Act (*Parsons v. Delaware & Hudson, 153 N. Y. Supp., 179*).

In an action for personal injuries it appeared that the plaintiff, a minor, was injured by the fall of a bank of earth forming a cave, near the defendant's right of way in a cut formed by the right of way. The plaintiff had taken refuge in the cave to escape a shower, and after the shower remained there with some companions at play. The wires of the railroad fence in the vicinity were down, and the railroad was chargeable with notice

of trespass of boys on the track, and might, by reasonable diligence, have acquired knowledge of the cave, which was attractive to children. It was held by the Oregon Supreme Court that negligence being the infraction of a legal obligation due from one person to another, and the defendant, owing no duty to the plaintiff, who was a trespasser, except not to negligently or recklessly injure him, it was not liable (*Haynes v. Oregon-Washington R. & U., Ore., 150 Pac., 286*).

A section foreman of a railroad engaged in interstate commerce, went out with a crew to repair a broken joint in the track. While returning he assisted his crew to lift their hand-car from the track to clear it for a freight train made up of cars destined both to intrastate and interstate points. One of the crew gave out and this threw an extra weight on the foreman, whose back was injured. The Texas Court of Civil Appeals held that he was "engaged in interstate commerce" within the Federal Employees' Liability Act. It also held that he assumed the risk incidental to helping his crew to lift their car from the track, and could not recover, since the Federal Act leaves the defense of assumed risk open to the employer (except where the employer's violation of any statute enacted for the safety of the employees contributed to the injury) notwithstanding that the defense of assumed risk does not obtain under the state statutes (*Texas & P. v. White, Tex., 177 S. W., 1185*).

Crossing Accident—Insufficient Proof of Negligence

In an action against a railroad for injury to an automobile at a crossing, it appeared that the plaintiff, on a dark night, was driving a touring car toward the defendant's crossing at a speed of from 12 to 13 miles an hour. He was familiar with the road and knew that the tracks were there. His automobile had lighted headlights of ordinary brilliancy. When about 20 feet away he saw something on the crossing. He could have stopped in from 12 to 15 feet. He did not stop or slacken speed, but attempted to go around the obstruction. When he had gone five or six feet further he put on his brakes, but nevertheless hit a freight car which was momentarily standing on the crossing, and the automobile was damaged. The New Jersey Supreme Court held that the railroad had the right, in the reasonable and safe operation of the railroad, to stop its car for a reasonable length of time on the crossing. There was no evidence of unreasonable operation of the train. There was, therefore, no proof of negligence of the railroad forming the proximate cause of the injury and motions for nonsuit and for a direction of a verdict for the defendant should have been sustained (*Jacobson v. N. Y., S. & W. (N. J.), 94 Atl., 577*).

Measure of Damages to Valuable Goods

A bill of lading for a shipment of raw silk provided that "the amount of any loss or damage for which any carrier is liable shall be computed on the basis of the value of the property, * * * unless a lower value has been represented in writing by the shipper or has been agreed upon, * * * in any of which events such lower value shall be the maximum amount to govern such computation." The following clause was stamped on the bill: "Liability limited to one dollar per pound. The consignor of this property has the option of shipping same at a higher rate without limitation as to value in case of loss or damage from causes which would make the carrier liable, but agrees to the specified valuation named in case of loss or damage * * * because of the lower rate thereby accorded for transportation." The silk was damaged by being knocked from the car in a collision for which the railroad was liable. Claim was made based on the theory that the rule to be applied in calculating loss was the same as would be applied when computing a particular average loss under a policy of marine insurance. The Circuit Court of Appeals, Second Circuit, held that the case was not one of insurance; but the question was, what was the meaning of the two clauses? They were consistent and should be construed together. The court, therefore, held that the specified sum of one dollar a pound was not a limitation of the carrier's liability, but an agreed conventional valuation, which, under these provisions, was to be taken as the real value of the goods for the purpose of computing the amount of the carrier's liability; and that the measure of such liability was only the difference between the damaged value of the goods and their value at one dollar a pound. (*Duplan Silk Co. v. Lehigh Valley, C. C. A., 223 Fed., 600*).

Railway Officers

Executive, Financial, Legal and Accounting

B. A. Worthington, receiver of the Cincinnati, Indianapolis & Western, has been appointed vice-president and general manager. See item in Financial News.

E. N. Heigho, president, general manager and traffic manager of the Pacific & Idaho Northern, has been appointed receiver, and will also act as general manager, traffic manager, treasurer and purchasing agent. W. P. Briggs continues as general attorney. T. Cox, formerly acting auditor, is now auditor. F. D. Stover, formerly assistant secretary and assistant treasurer, is now assistant treasurer. E. D. Perkins continues as assistant traffic manager. A. H. O'Leary continues as superintendent, and L. L. Collier, acting master mechanic, is now master mechanic. All with headquarters at New Meadows, Idaho.

Operating

Ben B. Johnson has been appointed chief despatcher and division operator of the Pasco division of the Northern Pacific, with headquarters at Pasco, Wash., vice E. J. Moran, promoted.

J. P. Walker, assistant engineer of the valuation department of the Atlantic Coast Line, at Petersburg, Va., has been appointed assistant superintendent of the Charleston district, with office at Charleston, S. C.

J. Kirk, superintendent of the Gary division of the Elgin, Joliet & Eastern, has been granted leave of absence on account of ill health. C. H. Doorley, superintendent of terminals at Joliet, Ill., has been appointed acting superintendent of the Gary division. The office of superintendent of Joliet terminals has been abolished. Effective September 15.

Kepler Johnson, trainmaster on the Southern division of the Chicago, Rock Island & Gulf, at Ft. Worth, Texas, has been appointed trainmaster on the Arkansas division of the Chicago, Rock Island & Pacific, with headquarters at Little Rock, Ark., vice W. A. Hyde, who has been transferred as trainmaster to the Southern division of the Chicago, Rock Island & Gulf, with headquarters at Ft. Worth, Tex.

John J. Pelley, superintendent of the Tennessee division of the Illinois Central, has been appointed superintendent of the Memphis division of the Yazoo & Mississippi Valley, with headquarters at Memphis, vice Bess A. Porter, transferred. John M. Egan has been appointed to succeed Mr. Pelley as superintendent of the Tennessee division of the I. C., with headquarters at Fulton, Ky. Effective September 15.

E. Wilson, superintendent of the Ft. Worth division of the International & Great Northern, has been appointed trainmaster on the San Antonio division with headquarters at San Antonio, Tex., vice J. L. Otis, resigned. J. C. Resch, assistant superintendent of the Gulf division, with headquarters at Palestine, Tex., has been appointed superintendent of the Fort Worth division, with headquarters at Mart, Tex., vice E. Wilson, transferred. G. P. Wolf has been appointed assistant superintendent of the Gulf division, with headquarters at Palestine, vice J. C. Resch, promoted. Effective September 1.

Traffic

J. L. Harris has been appointed general live stock agent of the Chicago & Alton with headquarters at Chicago, Ill.

P. A. Powers has been appointed general agent of the Chicago & Eastern Illinois, with headquarters at Lennox, Ill.

F. M. Miller, commercial agent of the Toledo, St. Louis & Western, at Los Angeles, Cal., has been appointed general agent with headquarters at the same place. Effective September 1.

George H. Kummer, whose appointment as assistant general freight agent of the Chicago & Eastern Illinois, has been announced, was born in Keokuk, Iowa, on March 6, 1870. He was educated in the common and high schools and in 1886 entered railway service as an office boy in the office of the superintendent

and division freight agent of the Chicago, Rock Island & Pacific at Keokuk. In 1887 he was appointed clerk in the same office, and in 1890 was promoted to chief clerk of the joint local office of the Rock Island and the Pittsburgh, Cincinnati, Chicago & St. Louis at Washington Heights, Ill. In 1891 he went to Topeka, Kan., to become a clerk in the auditor's office of the Atchison, Topeka & Santa Fe. In 1892 he was clerk in the freight auditor's office of the Rock Island in Chicago. In 1893 he was appointed traffic clerk in the general freight office of the same road; in 1894 soliciting freight agent, headquarters in Chicago; in 1896 clerk in the Chicago office of the P., C., C. & St. L.; in 1898 assistant to the traffic manager of the Glucose Sugar Refining Company, Chicago; in 1899 contracting freight agent of the Frisco Lines in Chicago; in 1902 traveling freight agent, Frisco Lines, Chicago; in 1904 division freight agent of the Chicago & Eastern Illinois, at Salem, Ill.; 1911, general agent, Frisco Lines, Chicago; from December 9, 1912, to September 1, 1915, coal freight agent of the C. & E. I., with headquarters in Chicago; September 1, 1915, assistant general freight agent of C. & E. I., Chicago.

J. A. Simmons, division freight agent of the Cincinnati Hamilton & Dayton, at Indianapolis, Ind., has been appointed general freight and passenger agent of the Cincinnati, Indianapolis & Western.

Theron O. Jennings, whose appointment as freight traffic manager of the Chicago & Eastern Illinois was announced in our issue of two weeks ago, was born in Wauke, Iowa, on October



T. O. Jennings

9, 1873. He received a high school education and entered railway service in 1892 as a clerk in the local freight office of the Des Moines Union Railway, at Des Moines, Iowa. In 1895 he was appointed freight solicitor of the Chicago, Rock Island & Pacific, with headquarters at Des Moines. Since that time he has been appointed to the following positions: Freight solicitor of the Rock Island at Kansas City, Mo., 1898; traveling freight agent of the Rock Island, with headquarters at Kansas City, Mo., 1900; division freight agent of the Rock Island at Chicago, Ill.,

1902; general agent of the same road at Milwaukee, Wis., 1903; freight claim agent of the Chicago & Eastern Illinois, with headquarters at Chicago, 1907; general agent of the same road at Chicago, 1908; assistant general freight agent at Chicago, 1910; general freight agent, Chicago, 1912; and freight traffic manager, with headquarters at Chicago, September 1, 1915.

Engineering and Rolling Stock

F. K. Bennett, supervisor of the Minneapolis & St. Louis, at Monmouth, Ill., has been appointed valuation engineer, with office at Minneapolis, Minn.

James P. Nelson, member of the valuation committee of the Chesapeake & Ohio, and the Chesapeake & Ohio of Indiana, has been placed in charge of the engineering work of the committee.

E. J. Harris, master mechanic of the Chicago, Rock Island & Pacific at Trenton, Mo., has been appointed acting mechanical superintendent of the Second district with headquarters at Topeka, Kan., succeeding G. W. Lillie, resigned, and P. Linthicum, assistant superintendent of shops at Silvis, Ill., has been appointed acting master mechanic of the Missouri division with headquarters at Trenton, Mo., vice Mr. Harris. Effective September 15.

W. O. Thompson, district master car builder of the New York Central at East Buffalo, N. Y., has been appointed to the office

of superintendent rolling stock for the lines west of Buffalo with headquarters at Cleveland, Ohio. The car department thus becomes entirely separated from the motive power department, this condition now existing on all the New York Central Lines, with the exception of the Boston & Albany and the Pittsburgh & Lake Erie. R. L. Chandler, general piece work inspector, has been appointed district master car builder of operating district No. 2, to succeed W. O. Thompson, promoted.

T. A. Albright, foreman engineer of the Texas & Pacific, has been appointed road master mechanic, with headquarters at Marshall, Texas. J. J. Carey, master mechanic at Marshall, has been appointed superintendent of shops in that city. F. W. Boardman has been appointed assistant to the mechanical superintendent, with headquarters at Marshall. W. M. Schmalzreid has been appointed general inspector of passenger and freight cars for the system, with headquarters also at Marshall, Texas. J. S. Schneider, machine shop foreman, has been promoted to general foreman in charge of the erecting and machine shop at Marshall.

OBITUARY

J. B. Rishel, division freight agent of the Chicago, Rock Island & Pacific at Hutchinson, Kan., died in that city on September 10.

William L. White, general agent of the Pere Marquette, at Milwaukee, Wis., died on September 6, after 18 years of service with the road.

James E. Stagg, vice-president of the Durham & Southern, with headquarters at Durham, N. C., died in that city on September 10.

Colin Studds, assistant general passenger agent of the Pennsylvania Railroad, with office at Philadelphia, Pa., died on September 11, at his home in Wayne, at the age of 54.

Winfield S. Tinsman, chairman of the General Managers' Association of Chicago, and chairman of the Association of Western Railways, died at Rochester, Minn., on Wednesday of this week after an operation on his throat.



Winfield S. Tinsman

Mr. Tinsman had been in bad health for over two years. He was born September 8, 1867, at Berryville, N. Y. He graduated from the public schools in May, 1882, and began railway work in the same year with the Chicago, Rock Island & Pacific. He was consecutively messenger for three years; telegraph operator from 1885 to 1887; train dispatcher from March, 1888, to August, 1890; chief train dispatcher for the next seven years, all at Trenton, Mo., and trainmaster at Horton, Kan., from October, 1897, to May, 1901. He

was then made superintendent of Chicago terminals, and from May, 1902, to June, 1905, was superintendent, first of the Oklahoma and later of the Missouri divisions, and from 1905 to 1906 was general superintendent of the Choctaw district. He was then appointed general superintendent of the Southwestern district, then was assistant general manager for a year from April, 1907, and was then manager of the Southern and Choctaw districts until December, 1909. In the latter month he was made general manager of the entire system. From February, 1911, to February, 1912, he was general manager of the First district, and then to October, 1912, was assistant to the president, all with the Rock Island. Mr. Tinsman then was appointed chairman of the General Managers' Association of Chicago, and later chairman of the Association of Western Railways.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE ANN ARBOR has ordered 3 Mikado type locomotives, with 27 by 30-in. cylinders, from the Lima Locomotive Corporation.

THE TEXAS & PACIFIC, reported in the *Railway Age Gazette* of last week as having ordered a number of locomotives from the Baldwin Locomotive Works, has ordered 13 locomotives from that company.

THE ERIE, which was reported in the *Railway Age Gazette* of September 3 as having ordered 5 Santa Fe type locomotives from the American Locomotive Company, has placed additional orders for 28 locomotives of the same type. The total order for 33 locomotives has been divided as follows: American Locomotive Company, 18; Baldwin Locomotive Works, 10, and Lima Locomotive Corporation, 5.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA was reported in the *Railway Age Gazette* of last week as having ordered 4 Pacific type and 6 Mikado type locomotives from the American Locomotive Company. The Pacific type locomotives will have 25 by 28-in. cylinders, 75-in. driving wheels and a total weight in working order of 260,000 lb. The Mikado type locomotives will have 27 by 32-in. cylinders, 61-in. driving wheels and a total weight in working order of 302,000 lb.

THE CHICAGO & NORTH WESTERN was reported in an unconfirmed item in the *Railway Age Gazette* of September 10 as having ordered 12 Pacific type, 12 Mikado type, 10 switching and one narrow-gage locomotives from the American Locomotive Company. This order has now been confirmed. Six of the Pacific type locomotives will have 25 by 28-in. cylinders, 75-in. driving wheels and a total weight in working order of 260,000 lb. and 6 will have 22 by 26-in. cylinders, 69-in. driving wheels and a total weight in working order of 302,000 lb. The 12 Mikado type locomotives will have 27 by 32-in. cylinders, 61-in. driving wheels and a total weight in working order of 165,000 lb. The 10 six-wheel switching locomotives will have 21 by 28-in. cylinders, 51-in. driving wheels and a total weight in working order of 165,000 lb. The narrow-gage Mogul type locomotive will have 12 by 18-in. cylinders, 43-in. driving wheels and a total weight in working order of 55,000 lb.

CAR BUILDING

THE MINNEAPOLIS & ST. LOUIS is in the market for 100 box cars.

THE CHICAGO & NORTH WESTERN is in the market for 500 ore cars.

THE ERIE has ordered 300 all-steel drop-end gondola cars from the Standard Steel Car Company.

THE BUTTE, ANACONDA & PACIFIC has ordered 100 50-ton ore cars from the Western Steel Car & Foundry Company.

THE ILLINOIS CENTRAL is in the market for 1,000 refrigerator cars. It is also inquiring for 500 fruit cars and 500 box cars for the Central of Georgia.

THE WHEELING & LAKE ERIE, W. M. Duncan, receiver, has been granted permission by the federal court to issue certificates for the purchase of new cars. The petition asked for the issuance of \$2,000,000 in certificates, but only one-half of this amount was granted.

IRON AND STEEL

THE HAVANA CENTRAL has ordered 1,500 tons of rails from the Bethlehem Steel Company.

THE LOUISVILLE & NASHVILLE has ordered 13,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

THE ATLANTIC COAST LINE has ordered 20,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

THE ATCHISON, TOPEKA & SANTA FE has ordered 35,000 tons of 90-lb. rails from the Colorado Fuel & Iron Company.

Supply Trade News

W. H. P. Fisher has been appointed sales manager of the L. M. Booth Company of New York, manufacturers of the Booth water softeners. Mr. Fisher has been selling water softening plants to railroads for 12 years. He will make his headquarters at the engineering department of the company in Jersey City, N. J.

The Hydraulic Press Manufacturing Company, Mount Gilead, Ohio, has been awarded two prizes by the International Jury of Awards at the Panama-Pacific International Exhibition. They are the grand prize from the department of agriculture for press machines and a gold medal from the department of machinery for forcing presses and equipment.

Walter H. Evans, of Chicago, has been appointed western railroad department manager of the U. S. Metal & Manufacturing Company, New York. Mr. Evans was recently manager of the motor gear department of the Edgar Allen American Manganese Steel Company, Chicago, and previous to his connection with this company was connected with several electric and steam roads in the capacity of master mechanic and superintendent of motive power. Mr. Evans will make his headquarters in the McCormick Building, Chicago.

The Roberts & Schaefer Company, Chicago, engineers and contractors, has been awarded a contract by the Louisville & Nashville for a large automatic electric coal-handling equipment for Pensacola, Fla., using duplicate hoist, having an elevating capacity of 400 tons an hour. The same company has also been awarded a contract by the Canadian Northern Pacific for a large standard counterbalanced bucket locomotive coaling plant with automatic elevating equipment for immediate installation at Kamloops Junction, B. C. The contract price was \$12,000.

In reply to a request on the part of the Iron Age for a statement as to the operations at Eddystone, Pa., in which the Baldwin Locomotive Works is interested, S. M. Vaclain, vice-president of the company, has briefly recounted the various activities as follows: The Baldwin Locomotive Works is engaged in filling large export orders for locomotives and their parts, including wheels, tires, axles and various forgings. The company now has 11,500 men on its payroll. The Remington Arms Company of Delaware has leased a number of buildings which the Baldwin Locomotive Works has erected, suitable for the manufacture by the Remington Company of a large number of military rifles which are to be exported. This plant when running full will probably employ 15,000 men. The Eddystone Munitions Company has leased from the Baldwin Locomotive Works buildings which the latter has erected on its property at Eddystone. The manufacture of munitions by the company will probably employ 10,000 men. The Baldwin Works contemplates building on the river front at Eddystone a pier or bulkhead so that shipments of all classes of products made by the companies mentioned may be made direct, without transshipment at New York or any other port.

Among the 23 members of the Naval Advisory Board of Inventions selected by Josephus Daniels, Secretary of the Navy, on the advice of eleven of the engineering and scientific societies, there are a number of appointments of special interest to the railway supply field. The appointments included among others: W. R. Whitney, Schenectady, N. Y., director of the research laboratory of the General Electric Company, selected by the American Chemical Society; Frank Julian Sprague, New York, consulting engineer for the Sprague Electric Works, the Otis Elevator Company, and the General Electric Company, and founder of the Sprague Electric Railway Motor Company, selected by the American Institute of Electrical Engineers; Benjamin G. Lamme, Pittsburgh, Pa., chief engineer of the Westinghouse Electric & Manufacturing Company, a leader in the development of alternating current apparatus and a pioneer in the development of direct current apparatus for railway lighting and power work, selected also by the Institute of Electrical Engineers; Peter Cooper Hewitt, New York, inventor of the electric lamp, selected by the Inventors' Guild; William Lau-

rence Saunders, New York, chairman of the board, Ingersoll-Rand Company, New York, selected by the American Institute of Mining Engineers, and William Leroy Emmet, Schenectady, N. Y., engineer, General Electric Company, who designed and directed the development of the Curtis turbine, selected by the American Society of Mechanical Engineers. Arthur Craven, chief engineer of the New York Public Service Commission, First District, is also one of the members, having been selected on the advice of the American Society of Civil Engineers.

American Locomotive Company

The recently issued annual report of the American Locomotive Company for the fiscal year ended June 30, 1915, shows that in that period the company experienced the worst depression of business of the 14 years of its existence. The gross earnings totaled but \$9,303,298, or \$20,684,140 less than the \$29,987,438 of 1914. The 1915 gross earnings, in addition, were about 17 per cent of the gross earnings of \$54,868,175 for 1913, and were less than one-half of the gross earnings of \$19,008,634 for 1909, which was the worst previous year.

The gross earnings for the year just closed lacked \$451,297 of meeting the manufacturing, administrative, and other expenditures incurred in operations, and as there was charged off for depreciation \$1,040,684, the total loss for the year was \$1,491,980 as compared with a profit of \$2,076,127 in the previous year. The 7 per cent preferred dividend of \$1,750,000 was paid from surplus and the total reduction in that account was \$3,241,980, leaving a balance on June 30, 1915, of \$8,293,678.

The report says that the productive operations of the company as a whole averaged about 17 per cent of capacity and at times ran as low as 8 per cent. The Schenectady and Cooke plants were the only ones of the company's eight plants which were not closed entirely or for a large part of the year. The company should expect a better year in 1916. It has secured large foreign orders for both shells and locomotives and on June 30, 1915, it had \$5,838,235 of locomotive orders on its books as compared with \$4,162,356 on June 30, 1914.

The combined balance sheet for the American Locomotive Company and the Montreal Locomotive Works, Ltd., on June 30, was as follows:

ASSETS.	
Cost of property	\$52,209,638
Securities owned	748,499
Convertible assets—	
Cash assets	\$15,409,479
Accounts collectible	6,160,137
Bills receivable	1,646,567
Accrued interest	40,145
Material and supplies	2,440,714
Contract work in course of construction	1,738,651
Locomotives, snow plows, etc., in stock	269,232
	27,704,926
Sundry deferred charges	61,135
Notes discounted (per contra)	148,031
	\$80,872,228
LIABILITIES.	
Capital stock—	
Preferred	\$25,000,000
Common	25,000,000
	\$50,000,000
Bonded debt of constituent companies	1,932,000
Current Liabilities—	
Gold notes outstanding	3,666,000
Accounts payable	14,156,918
Income tax withheld at source	818
Accrued interest	26,480
Unclaimed interest	997
Dividend on preferred stock payable July 21, 1915	437,500
	\$18,288,713
Endorsements (per contra)	148,031
Depreciation reserve	1,005,307
Reserve for loss in liquidation of automobile business	964,858
Reserve for additions and betterments	239,641
Profit and loss surplus, June 30, 1915	8,293,678
	\$80,872,228

TRADE PUBLICATIONS

ARMCO IRON.—The American Rolling Mill Company, Middletown, Ohio, has issued a booklet describing the products made from Armco iron. This gives in some detail the various forms in which this material is produced and the manner of application in various forms of construction.

VERTICAL OIL ENGINES.—This is the title of Bulletin No. 501, recently issued by the National Transit Company, Department of Machinery, Oil City, Pa. The booklet deals particularly with the type VT-13, two-cycle, single-cylinder, vertical oil engines, made by this company, and it contains detailed descriptions of the machine itself and its parts.

Railway Construction

ATCHISON, TOPEKA & SANTA FE.—This company will build a branch, it is said, from Seligman, Ariz., south into the Bagdad country and the Hillside mining district. The Bagdad Copper Company has been carrying on extensive development work in the Hillside district and the new branch is to be built to provide an outlet for ore from the company's mines.

BALTIMORE & OHIO.—An officer writes regarding the report that the Baltimore & Ohio will build a line from its Hagerstown branch, Maryland, to the plant of the Security Cement Company, about four miles, that the plans have not yet been completed, but the company expects to decide upon this work soon.

CANADIAN NORTHERN.—This company is building two miles of additional tracks in the yards at Port Arthur, Ont., and at Fort William, and is also putting in new sidings and extending the yards at various points on the line between Port Arthur and Winnipeg, Man. The line from Winnipeg, Man., to Grand Marais is being extended to Victoria Beach, 15 miles, and it is expected that the grading, bridging and track laying will be completed this year. The Thunderhill branch, which extends from Thunderhill Junction, Man., west to Preeceville, Sask., 72 miles, is being extended beyond that place. Grading work on a 24-mile line from Canora north to connect with the Thunderhill branch at Sturgis, two miles east of Preeceville, was completed in 1914, and it is expected that the track laying and ballasting will be finished this year. Grading was also finished during 1914 on a branch from Wroxton, Sask., west via the Neepawa-Russell-Ross Junction line into Yorkton, Sask., 26 miles, and the track laying and ballasting will be completed this year. An extension of the line now in operation from Delisle, Sask., south to Tichfield, and from Tichfield west to Elrose, is projected southeast from Tichfield to Findlater on the Regina branch. An extension is also projected from Elrose west towards Edmonton, about 250 miles, on which grading has been finished to Eston, 35 miles, and track laying and ballasting on this section will be completed this year. The Cowan Construction Company is grading an additional section of 30 miles. The company also expects to complete this year the ballasting work and track laying on the extension from Bienfait, Sask., west to Estevan, 9 miles. Grading work is now under way by the Northern Construction Company on a line from Calgary, Alta., south to MacLeod, 103 miles, and is expected to be finished this year. A section of about 17 miles has already been graded.

CANADIAN PACIFIC.—On the Weyburn-Lethbridge branch from Weyburn, Sask., to Lethbridge, Alta., the line is now in operation at the west end from Lethbridge to Stirling, 18.9 miles, and from Stirling east to Foremost, 49.2 miles, a total of 68.1 miles. Grading was finished last year easterly from Foremost to Pakowki, 25 miles, and track laying on this section will be carried out at once. It is expected that this work will be finished by October 1.

CLEVELAND & OHIO CENTRAL ELECTRIC.—This road has let the contract for its first 55 miles of track from Cleveland, Ohio, to Wooster, to the Lathrop-Shea & Henwood Company, Buffalo, N. Y.

DOVER, MILLERSBURG & WESTERN (Electric).—Plans are being made to start work, it is said, on a line from Canal Dover, Ohio, west via Sugar Creek to Millersburg, about 25 miles. F. F. Phillips, Canal Dover, is said to be interested.

ELECTRIC SHORT LINE.—This company has awarded the contract for building the extension from Winsted, Minn., west to Hutchinson, 45 miles, to H. F. Balch & Co., Minneapolis (September 10, p. 487).

GREAT FALLS & SOUTHWESTERN.—Incorporated to construct a railroad 60 miles long from Ulm, Mont., 11 miles east of Great Falls, on the Great Northern, to Hound creek.

HOUSTON & RICHMOND INTERURBAN.—See Houston, Richmond & San Antonio Interurban.

HOUSTON, RICHMOND & SAN ANTONIO INTERURBAN.—The charter of the Houston & Richmond Interurban is to be amended,

it is said, to change the name of the Houston, Richmond & San Antonio, and to increase its capital to \$250,000. A preliminary survey has been made over two routes for a line from Houston west to San Antonio, about 215 miles. One of the surveys is via Richmond, Rosenberg, Gonzales and Seguin to San Antonio, and the other survey is via Richmond, Wharton and Yoakum. E. Kennedy, of Houston, and residents of that city are back of the project.

MONONGAHELA VALLEY TRACTION.—A preliminary survey has been made for a line, it is said from Weston, W. Va., southwest to Glenville, about 25 miles, but the company has not yet decided to carry out the work. Between Clarksburg and Salem, W. Va., surveys have been completed and location made for a 6-mile extension of the line now in operation on about 6 miles from Clarksburg west via O'Neil.

NORTH CAROLINA ROADS.—Work on a lumber road has been finished by the Kinston Manufacturing Company, it is said, from a connection with the Kinston Carolina Railroad, at Pink Hill, N. C., south to Beulaville, 10 miles. An extension of the line may be built south to Chinquapin, 8 miles, or to Maple Hill, about 20 miles. J. T. Deal or J. H. Canady, president, Chamber of Commerce, Kinston, may be addressed.

NORFOLK & WESTERN.—The report of this company for the year ended June 30, 1915, shows that on the Virginia-Carolina Railway, the North Carolina division was completed and was put in operation in May to Elkland on the Ashe-Watauga county Line, N. C., 48.64 miles. The New River, Holston & Western built an extension from Rocky Gap, Va., to Suitars in Bland county, Va., 13.87 miles, which was completed and put in operation in September, 1914. The Tug River & Kentucky bridge over Tug river in Kentucky, was built and track was laid on 0.89 miles to Blackberry creek, and grading work on the line up Blackberry creek to the mouth of Peters Fork, 1.38 miles, has been completed. The Williamson & Pond Creek is building at Leckie, W. Va., a spur 1.03 miles long, with a Y connection 0.15 miles to reach operations of the Leckie Collieries Company, and the Burkeville to Pamplin low grade connecting line is under construction from Pamplin, Va., to Burkeville, 36.93 miles. The Jacobs Fork branch is under construction from its junction with the Dry Fork branch at Rift, W. Va., to the operation of the New River & Pocahontas Consolidated Coal Company, 3.93 miles, and the grading work is about 75 per cent completed. The Cucumber branch of Jacobs Fork branch, 1.28 miles long, to other operations of the same company, is also under construction, and the grading work is 90 per cent completed.

OREGON SHORT LINE.—This road has completed the so-called "Loop" line, which circles the valley from Idaho Falls, Idaho, to St. Anthony. For the present the line will be used only for freight.

POND FORK RAILWAY.—Incorporated in West Virginia with \$26,000 capital and headquarters at Huntington. The plans call for building a line from Madison, W. Va., up Pond Fork of Coal river to the headwaters of Pond Fork, about 25 miles. The incorporators include R. M. Baker, H. Fitzpatrick, J. William A. Read & Co., New York, are reported to have signed, W. Va.

SOUTHWESTERN POWER, LIGHT & RAILWAY.—Under this name a company was recently organized in Texas with a capital of \$12,000,000, it is said, to build an interurban electric line between Denison, Tex., and Oklahoma City, Okla., about 150 miles. Power for the operation of the line will be provided by a group of hydro-electric plants which the company proposes to construct in southern Oklahoma. W. T. Croslen, president, Denison.

TENNESSEE RAILWAY.—Work is now under way building an extension of eight miles from Charley's Branch, Tenn., up New river, to a point about 45 miles south of Oneida, and about three miles air line from Petros. The extension to Petros will be considerably longer than three miles by the route the railroad will follow. J. E. Rodes, Nashville, Tenn., and the Harriman Construction Company, Harriman, Tenn., are the contractors. The work involves handling about 10,000 cu. yd. to the mile. The maximum grade on the main line will be 1.4 per cent, and the maximum curvature 14 deg. On branch lines to be built the maximum grade will be 3 per cent and the maximum curvature 16 deg. There will be several timber bridges on the line of from 10 to 40 ft. high and from 10 ft. to 600 ft. long.

RAILWAY STRUCTURES

ALBERTA, CANADA.—The Edmonton, Dunvegan & British Columbia has awarded the contract for constructing a bridge over Smoky river to the Dominion Bridge Company, Ltd., Winnipeg, Man. The structure will consist of two 85-ft. deck plate girder approach spans, six 128-ft. deck truss spans, and one 125-ft. through truss span. Approximately 1,100 tons of steel will be required.

AMARILLO, TEX.—F. M. Bisbee, chief engineer, western lines of the Atchison, Topeka & Santa Fe, is receiving bids for the construction of an addition to the Santa Fe office building here. The improvements will approximate \$35,000.

BALTIMORE, MD.—The Baltimore & Ohio has completed plans for a new coal pier to be built on Curtis Bay, Baltimore, but the work has not yet been authorized.

CHARLESTON, S. C.—Contracts have been let by the Charleston Southern, it is said, for building trestles and foundations for drawbridges as follows: For one bridge over Stono river to the Charleston Engineering & Contracting Company, Charleston, S. C., and for another bridge over the same river to the Simons-Mayrant Company, Charleston; over the Edisto river to the Dawson Engineering Company, Charleston, and over Ashley river near Hampton Park to the Jefferson Construction Company, New Orleans, La. The railroad company plans to build a total of eight drawbridges in connection with the line to be built from Charleston southwest to Savannah, Ga.

CHICAGO, ILL.—The Chicago & Western Indiana has awarded the contract for placing concrete piling for abutments and piers at Eightieth street and Eighty-first street subways to the Raymond Concrete Pile Company of New York and Chicago.

Great Lakes Dredge & Dock Company has the contract for the substructure for the bridge which the Chicago & North Western plans to build over the North branch of the Chicago river. It will be a three-track, 180-ft., single-leaf bascule structure.

COFFEYVILLE, KAN.—Clements & Lavery have been awarded a contract for the construction of the terminal building of the Union Traction Company in this city. It will be a two-story 96-ft. by 143-ft. brick and steel structure and will cost about \$40,000.

THE DALLES, ORE.—Nettleton, Bruce & Eschbach, of Seattle, Wash., have the contract for the construction of a roundhouse, machine shop and power plant for the Oregon-Washington Railroad & Navigation Company. Estimated cost \$50,000.

JOPLIN, MO.—The city has voted a bond issue of \$13,000 to pay its share of the cost of a viaduct over the tracks of the Kansas City Southern. The municipality bears one-third of the cost, and the Kansas City Southern and the Missouri, Kansas & Texas the remainder. Plans have been prepared by the railroads.

MACON, GA.—Plans have been filed with the Railroad Commission of Georgia for the new union passenger station to be built in Macon. It is expected that the plans will be approved and that bids will be asked for the work in the near future. The main structure will consist of a center building about 84 ft. wide and about 245 ft. long. In addition to the main building there will be a baggage and mail room about 72 ft. by 109 ft., and an express room about 72 ft. by 147 ft. The buildings will be of brick construction or other fireproof material.

MYAKKA CITY, FLA.—The East & West Coast has given a contract to T. R. Bryant, Myakka City, it is said, for putting up a new station at that place.

QUINCY JUNCTION, CAL.—The Western Pacific has let a contract for 630 tons of steel for a viaduct here to the American Bridge Company.

WATERLOO, IOWA.—The Illinois Central roundhouse here is being remodeled to accommodate larger motive power and equipment. T. S. Leake & Co. of Chicago have the contract.

WEST TULSA, OKLA.—Fairbanks, Morse & Co. have been awarded the contract for the new coaling station of the St. Louis & San Francisco to be built here. The plant will be a reinforced concrete structure of the "V" bucket type, with 300 tons capacity. The station will include a steam sand drier with a capacity of one cubic yard per hour.

Railway Financial News

BUFFALO & SUSQUEHANNA RAILWAY.—Morgan G. Bogue, representing the bondholders, has bought this railroad at a receivers' sale for \$300,000. At the sale the electric railway interests recently reported as likely to buy the property were conspicuous by their absence.

CHICAGO, ROCK ISLAND & PACIFIC.—N. L. Amster, chairman of the committee representing minority stockholders, on September 14, arranged for the payment of \$410,000 interest on bonds and issued the following statement:

"Our committee has succeeded in getting stockholders whom it represents to take \$410,000 receivers' certificates. The court, among its friends in Chicago, has disposed of the remaining \$90,000. The court will authorize the certificates and has been informed as to the institutions in New York and Chicago in which the money that has been pledged for the certificates has been or will be deposited.

"The company will have plenty of money out of earnings to pay the interest due October 1, and I believe that the same will be true with respect to the January 1 obligations. The court and the stockholders whom I represent were unwilling to see further inconveniences and loss to the stockholders as a result of the principal of the \$20,000,000 debentures being declared due at this time because of default on the interest. We shall now have six months within which to work out a readjustment plan."

Judge George A. Carpenter, in the United States District Court at Chicago, on September 15, ordered the receivers to bring action in the Federal Court at New York against present and former directors of the company for the recovery of \$6,000,000, alleged to have been wrongfully expended in the acquisition and subsequent divorcing of the Frisco lines. The defendants to be named are Daniel G. Reid, R. A. Jackson, W. H. Graham, Ogden Mills, E. S. Moore, William H. Moore, F. L. Hine, George G. McMurtry and G. T. Boggs. The action of Judge Carpenter is based on a report by William Howard Taft, who had been engaged as special counsel.

CINCINNATI, HAMILTON & DAYTON.—See Cincinnati, Indianapolis & Western.

CINCINNATI, INDIANAPOLIS & WESTERN.—This company, a subsidiary of the Cincinnati, Hamilton & Dayton, owning that part of its system west of Hamilton, Ohio, aggregating 361 miles of line, has been sold at foreclosure to the joint reorganization committee representing the bondholders of the company at the upset price of \$3,500,000, representing the two mortgages of \$2,100,000 and \$1,400,000, respectively, held against the road.

William A. Read & Co., New York, are reported to have obtained the support of a large proportion of the bondholders in a plan of reorganization which involves replacing the present bond issues with stock and raising new capital. The plan contemplates the operation of the road independently of the Cincinnati, Hamilton & Dayton.

B. A. Worthington is vice-president and general manager.

MAINE CENTRAL.—At the annual meeting, October 20, stockholders will be asked to vote on retiring \$10,000,000 of the road's outstanding stock and the issuance in place thereof of \$3,000,000 of preferred stock, to receive 5 per cent. per annum in dividends and to have no voting power, and \$7,000,000 25-year first mortgage bonds bearing interest at a rate of not exceeding 5 per cent.

PACIFIC & IDAHO NORTHERN.—E. M. Heigho, president, has been appointed receiver of this company on a voluntary petition for receivership.

THE RAILWAYS OF BRAZIL.—Although larger in area than the United States, Great Britain, Holland, Belgium, Portugal and Spain combined, Brazil ranks twelfth among the nations of the world in extent of railroad mileage. This may help to explain why Brazil has only 23,000,000 inhabitants. A considerable percentage of the Brazilian railroads is owned and operated by the government.—*The South American*.

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In the design of all-steel equipment for both passenger and freight service the engineer has of necessity carefully considered the details from a practical construction standpoint. The painter whose most important duty is to protect the steel equipment from corrosion, in addition to providing a neat and pleasing appearance, finds by sad experience that he is severely handicapped by details of construction that had proved entirely satisfactory in the wooden equipment. This was clearly brought out during the recent convention of the Master Car and Locomotive Painters' Association, a report of which is printed elsewhere in this issue. Attention was called to many details that should receive

more careful attention in this respect. Every effort should be made to secure maximum life from the steel equipment, and here the master painter with his knowledge and experience can be of material assistance to steel car designers.

The drastic economies to which the railways have been driven recently are clearly reflected in the Interstate Commerce Commission's compilation of the returns for

Railway Returns for the Fiscal Year

Class I roads for the fiscal year, which were reported in last week's issue, page 539. These are roads earning \$1,000,000 gross or more. Their total operating revenues were \$163,404,055 less than for the year 1914, which also showed a decrease of \$65,691,076 as compared with 1913. The managements were able, however, to reduce operating expenses by \$186,244,099, and taxes declined \$2,765,192, leaving a net gain of \$24,991,787, or 2.6 per cent per mile in (net) operating income. It should be noted that this gain is to be compared with the results of a year in which there was a decrease of \$118,657,668 in (net) operating income. Reduced to a mileage basis, the decrease in total revenues was 6.3 per cent, while operating expenses were reduced 9.3 per cent, and the increase of net operating revenues was 1.8 per cent. Freight earnings per mile were reduced from \$9,200, in 1914, to \$8,701, in 1915; passenger earnings from \$3,038 to \$2,757, and express earnings from \$960 to \$302. The reduction in operating expenses per mile was from \$9,801 to \$8,894, or \$907, of which \$449 was in transportation expenses, \$209 in maintenance of way and structures and \$177 in maintenance of equipment. The saving in transportation is, of course, a real saving, but as nearly half of the total reduction in expenses was effected in the maintenance accounts it is to be feared that much of the small improvement in net for the year was gained only by deferring many needed expenditures on roadway and equipment to some future date. The increases in net operating revenue are entirely attributable to the more favorable showing of the Eastern roads in 1915 than in 1914. The Western and Southern groups of lines show decreases both in total and in net operating revenues in spite of reductions in operating expenses. The relatively more favorable showing of the gross and net earnings of the Eastern roads was partly due to the fact that the advances in freight rates allowed by the Interstate Commerce Commission in the five per cent case were in effect a part of the year.

In a recent issue the *Railway Age Gazette* called attention to the fact that while the number of passengers and employees killed by our railways is showing a very gratifying reduction in recent years, the number of trespassers killed, which for the last 25 years has averaged 53 per cent of all persons killed by railways, continues to increase. The accident bulletin just issued by the Interstate Commerce Commission for January, February and March of this year, and the bulletin for the preceding quarter, show that during the last six months for which the figures are available the proportion of trespassers killed was even greater than it has been in the past. For the six months the two bulletins report a total of 3,662 persons killed in all kinds of accidents, exclusive of industrial accidents; and of these 2,165, or nearly 60 per cent, were trespassers. During the same time only 79 passengers and 908 employees were killed, and only 424 persons other than trespassers were killed at grade crossings. In train accidents only 14 passengers and 106 employees were killed, while only one passenger in each quarter was killed in a collision, making only two in six months. During this period the number of passengers carried one mile was approximately 17,629,000,000. Collision accidents are those the public hears most about; but at this rate the average passenger could travel continuously at a speed of 60 miles an hour for 16,770 years before meeting death

Steel Car Design from the Painter's Viewpoint

in a collision! Our statute books contain a mass of legislation designed to prevent accidents to passengers and employees, and at grade crossings, but the railways cannot secure the enforcement of what meager laws there are to prevent trespassing, although in six months 32 times as many trespassers as passengers, over twice as many trespassers as employees, and five times as many trespassers as persons at grade crossings, were killed. Most of our safety legislation is directed against train accidents or defects of equipment. It seems to take little cognizance of the human element. Yet in six months only 143 persons were killed in train accidents, while no less than 3,262, or 89 per cent of the total, were killed by falling from cars or engines, while getting on or off cars or engines, or by being struck or run over by engines or cars at stations, yards, highway grade crossings or at other places. In other words, these accidents were largely attributable to carelessness or willingness to take a chance on the part of the victims themselves.

INTERMINABLE LITIGATION AND HAIR-SPLITTING

Woe unto you—! for ye tithe mint and anise and cummin, and have left undone the weightier matters of the law; justice, mercy, . . .—Matthew, chap. 23, verse 23.

IT is some little time now since the editorial matter in the *Railway Age Gazette* has been so distinctively scriptural as to call for the introduction of this old custom of putting a text, verbatim, at the head of the column; but the appositeness of these words of the Son of God appears nowadays with such painful frequency in the court news column, and elsewhere in railway transactions, that we make no apology for thus reverting to fundamental truth.

One question alone, that of whether, in a given freight-car movement, an employee is or is not engaged in interstate commerce is the cause of an immense amount of hair-splitting. It must have afforded hundreds of days' work for the lawyers and the judges during the past few years; and this question, in relation to the hours of service law, is now being superseded, as a main item on the daily menu of legal news, by the same question as related to the law concerning liability for damages for bodily injury. And in connection with this last feature the liability laws of individual states are undergoing such an interminable succession of changes that the crop of lawsuits seems likely to keep up forever.

In our issue of August 27, page 406, the records tell how the courts of three states, New Jersey, Illinois and Kentucky, wrestled with such vital questions as whether a man going to repair a whistle rod on a switching engine is engaged in interstate commerce; the same question as to a boy who built fires in engines, but who assisted in moving an engine for the purpose of getting a barrel of oil, which was to undergo the very irregular process of being transported in interstate commerce on a locomotive; and a third question which is of similar character, but which we should not want to try to repeat here without the aid of a blackboard and an algebraic framework. In another case (August 20, page 365) a court was called on to decide whether the Southern Pacific Company operated a railroad in New York City! Readers interested in these things will have noticed the case reported August 13, page 298, wherein the law forbidding the running of freight trains with chain couplings and without air brakes was rigidly enforced by the court, although the railroad company had secured substantial safety by moving the train at very low speed.

It is true, of course, that, in these litigated cases, the sin referred to in the Scripture which we have cited is not committed by the same authority that does the hair-splitting. The courts do the hair-splitting, and in the majority of cases, no doubt, believe that the course taken is unavoidable. For the neglect of the weightier matters, the blame rests not on the courts but on congress, or a legislature or (sometimes) on the executive department of the government. The Interstate Commerce Commission itself is not free from criticism in the direc-

tion here referred to. Its members frequently find themselves responsible for a series of acts affecting a given person, or a given city or a given railroad, which embody both of the two elements constituting the offense here condemned in Scripture. However, the citizen who himself suffers injustice in the transportation field or who feels the burdens that weigh on his community or his line of business cannot blame the commission alone; nor congress, nor the President, nor the courts, nor the state legislatures; no one branch can be singled out. It is government as a whole. The railroads are ruled by the government, and the government has not learned its business. Putting it another way, and speaking the language of democracy, it might be said that the people are trying to govern themselves wisely, but do not know how.

There is another phase of this question of incompetent government, namely, the inability of the judges to understand the technicalities of the railway service. It is a case of this kind, a decision in the Circuit Court of Appeals, Seventh circuit, handed down August 6, interpreting the hours of service law as related to railway employees who transmit information by telephone, which has led to the foregoing reflections. The report was printed in last week's issue. It is scarcely to be wondered at that the judges nod now and then. They can see what utterly fantastic and futile ideas must have prevailed in the legislative bodies where these grotesque statutes were adopted, and it must often be that only by the sternest devotion to duty can the judge keep himself awake during the tedious arguments of the lawyers over shades of meaning so fine that only some chemico-photographic process—no faculty of the human brain—can distinguish them.

In the case referred to the decision hinges on the meaning of the term "orders" as relating to train orders. Every railroad man knows that this term, "train orders," commonly shortened to "orders," means those orders of the train despatcher, always put in writing, which direct some person either to move or to restrain a train, *with relation to the right to the use of the track*. But one train can occupy a given piece of track at a given time, and a main function of train orders is to prevent everybody from doing anything that may tend to violate this axiom. If an engineman makes any move toward violation he is risking lives and valuable property, and hence "orders" have special importance. Every order is repeated by the recipient, word for word, in the hearing of the one who gives it. Any communication to an engineman which deals with matters less grave is not classed as "orders." The distinction between "orders" and all lesser writings is defined by the superintendent with great care and particularity. The labor-union philanthropists who drafted this law tried to recognize the true character of orders—they had no hope of getting the law passed unless they restricted this clause to communications ostensibly important—but in trying to make it sufficiently inclusive they went too far, and included all orders "affecting" train movements. A telegram ordering a quart of ice cream for the president's private car might "affect" the movement of a train, if the boy delivering the ice cream should be a few minutes late. Finding no solid ground on which strictly to define "orders," Judge Mack, in this case, allows the term to apply to the sending of information by telephone to guide a signalman at a crossing as to which of two roads should be given the preference in a given situation where trains of both are ready to cross. It cannot be that the Supreme Court, if appealed to, will support this decision. The railroad, in its claim that the switch tender in the shanty only imparted information, was on solid ground.

If the report, as printed, gives the whole of the argument, the railroad, in the words that we have italicized, conceded too much. The towerman was not bound to obey; was not bound, finally, to deal with the rival trains in accordance with the information given five minutes before the trains arrived. In three minutes' time conditions might be so changed as to change his decision. His real authority as to movement of trains over

the crossing, came from another source, not from the man who telephoned from the shanty.

But none of these technicalities weighed with Judges Baker, Kohlsaet and Mack. In the sentences which we have italicized they approve as an "order," affecting the safety of the public, a telephone message, conveying information which, so far as concerns any definite relation to safety, might have been wholly ignored, without harm; and which at most would tend to prevent a few minutes' delay to a passenger train.

If this decision holds, and if this is a wise and beneficent law, the provision for a nine-hour day can be almost indefinitely extended. We may expect the labor leaders next to "organize" the office boys so as to espouse the cause of the messenger whom the superintendent sends to ask a question of the train despatcher. The telephone girls in the hotels ought to come next; they ask questions which may "affect" the movement of trains. In the meantime these wise law-givers permit trainmen—with whom the danger from mental inefficiency is as great as with telephone operators—to work 16 hours.

And if Judge Mack is correct, in a case like this, in taking into consideration all the remote influences which may affect the safety of a train movement—"regularity of service at one point might well prevent an accident at another point"—he is at liberty to go on and justify the most fantastic legislative restrictions on railway operation. The wife of the ticket agent who asks him to stop on the way to the office to give an order to the grocer, or who impairs his mental balance or his financial integrity by spending too much money at the milliner's, may find herself guilty of blocking the wheels of interstate commerce and impairing the safety of passenger travel!

A GOVERNMENT VIEW OF GOVERNMENT MANAGEMENT

WHEN the campaign for the establishment of the parcel post was going on, its advocates claimed that it would confer numerous benefits on the people, and especially the common people, of the United States. The service rendered by it would be much better than that of the express companies. The rates charged would be much lower. The function performed by the middleman in the interchange of commodities between urban and rural communities would be eliminated. For this and various other reasons the cost of living would be reduced. The superiority of public-spirited government management over greedy private management would be clearly demonstrated.

The parcel post has now been in operation for three years. It is time to inquire whether its management and results have been as good as predicted. Inquiry into this matter is worth while, not only because it is desirable to know how the parcel post is working, but also because of the light which the way it is being managed must throw on the way larger business undertakings would be managed under government ownership. Some persons advocate government ownership and management of telegraphs and telephones, and even of railways, making claims as to the way they would be run similar to those which were made as to the way the parcel post would be run.

At this interesting juncture information as to the way the parcel post actually has been managed and as to its results is at hand. It has been furnished by an investigating committee representing congress, the body which created the parcel post, and composed of both senators and representatives. Its chairman was J. L. Bristow, then a senator from Kansas. While this report is most significant and instructive, very much less publicity has been given to its contents than was received by the claims made before it was established as to what the parcel post would do.

The parcel post was to serve and benefit all classes. The report of the Bristow committee shows that the service it has rendered to, and the benefits it has conferred on, the large mail order houses have been vastly greater than the service it has rendered to, and the benefits it has conferred on, all of the rest

of the public together. The committee received reports regarding the parcel post business handled during six consecutive weeks by 37,745 postoffices out of a total of 56,974. The postoffices which did not report are nearly all small, and therefore the data collected cover practically all the business done. "It is a significant fact," says the committee, "that only 697 postoffices reported outgoing parcel post business in excess of their incoming business. In other words, 98.15 per cent received more parcel matter than they sent out, and only 1.85 per cent despatched a greater number of parcels than they received from other offices." "Even more illuminating," in the committee's language, is the fact that 46,514,699, or 60 per cent of the 77,539,521 parcels despatched, were sent from New York City (not including Brooklyn) and Chicago.

"The tremendous amount of merchandise sent out by the mail order houses of these cities is," it adds, "of course, the explanation of this condition. The amount, moreover, of the parcel post business which originates in these two cities is greatly in excess of that shown by the reports of the postmasters, because large houses in these cities ship by freight their catalogues and great quantities of their merchandise to many distributing centers, such as Jacksonville, Fla.; Little Rock, Ark.; Evansville, Ind.; Cedar Rapids, Iowa; Salina, Kan.; Augusta, Me.; Hattiesburg, Miss.; Jefferson City, Mo., and Billings, Mont., and the catalogues and merchandise are then distributed through the mail by these smaller offices and are reported to the committee and to the department as mail originating in these offices. * * * It appears, indeed, that the volume of parcel post business from these (mail order) sources exceeds that received from all other sources combined."

One of the ways in which it was confidently predicted that the parcel post would be utilized was by farmers sending their products direct to consumers in cities. The committee says that by the data compiled by it "the failure of the parcel post thus far to justify the predictions made for it as a means of direct transportation from the farmer to the consumer of farm products is, in fact, clearly indicated." As compared with the total parcel post business the amount originating on the farms has been negligible.

The service of the parcel post was not only to benefit all, but was to be far superior to that of the express companies. The Bristow committee finds that thus far its service has been very unsatisfactory. When the mail consisted almost entirely of letters and papers it was the practice to use sacks as containers for mail in transit. Government departments have never been notable for adapting their methods to new conditions and requirements; and the postoffice department has been shipping parcel post matter in the same sacks as other mail. The postmaster general in his report for the year ending June 30, 1914, said, "From actual count it has been found that the damage loss to ordinary parcels while in the mails is one-tenth of one per cent of the entire number handled. Damage loss has been due to improper packing rather than to the method of handling." The Bristow committee declares that information obtained by it from postmasters "does not confirm either of these statements."

* * * The experience of postmasters demonstrated that the percentage of damage is unnecessarily high, as the direct result of crude methods of handling employed by the department. * * * These things are related not as isolated instances, but as the common practice in the handling of the mails, and it is stated that even when parcels are conspicuously marked 'fragile' they are often inclosed in the same sack with heavy hardware."

The committee criticizes the department for throwing sacks of mail containing parcel post matter from moving trains. It appeared to it "self-evident that fourth-class mail matter, even when well packed and heavily wrapped, cannot with safety be thrown to the ground from a rapidly moving train. * * * The express companies have not found it necessary to adopt the policy of throwing merchandise off moving trains for the sake of expediting delivery." The committee found evidence of many

other kinds of inefficiency, and reports that the failure of postal employees to exercise proper care in handling the mails is a weakness of the parcel post system which it certainly "lies within the power of the department to remedy speedily and effectively; but there is abundant evidence that the weakness exists to a marked degree. Sacks of mail are thrown into and out of vehicles used by mail messengers; they are thrown and kicked from mail cars to station platforms; they are trampled upon by postal employees and other persons; they are exposed to rain and snow without protection. Not all railway mail clerks and mail messengers are guilty of these practices; but the practices are common in the service, and were made the subject of comment by hundreds of postmasters."

Those who oppose government ownership and management of different kinds of business repeatedly are met with the argument that the service rendered by the postoffice department is efficient. The foregoing statements of fact can hardly be denied to be authoritative, and they hardly indicate that degree of superiority often attributed to the postal service.

Since the inauguration of the parcel post the postoffice department has greatly developed the system of concentrating mails for sorting and rehandling at terminal postoffices, thereby reducing the amount of this work done on trains. The Postmaster General has declared that this system is of value because it promotes economy and furthers the expeditious handling of the mails. The investigating committee declares, however, that the information it gathered "is sufficient to make it clear that whatever economy is now being effected by the use of this method is effected at the expense of the efficiency of the service in the expeditious delivery of parcel mail. * * * The public," it adds, "is vitally interested in securing, and has a right to expect, transportation service that offers expeditious delivery as well as reasonable security from damage to parcels in transit. It is the claim of the express companies that they are giving a service that is superior to the parcel post in both these respects, and in so far as the use of the terminal railway postoffice plan is contributing to delay in the delivery of fourth class mail matter, it is working to the detriment of the postal service."

One of the ways in which the express companies allege that their service is superior to that of the postoffice department is in their facilities for tracing parcels which fail to arrive at destination. With the exception of insured and C. O. D. parcels, no record is kept of the receipt or delivery of fourth-class mail, and it is impossible to trace an ordinary piece of parcel mail. The express companies, on the other hand, use a system of way-billing all parcels. The department handles millions of extremely small packages, the average revenue from which is small, and "under these conditions," the committee concludes, "it will not be possible for the postoffice department to give as complete and reliable a service for all parcels as is possible for express companies."

Even when parcel post matter is insured and a record of it is kept, the results of attempts to recover lost packages are very unsatisfactory. The department estimates that 800,000,000 parcels are handled annually by mail. Only approximately 13,000,000, or 1.63 per cent, of these are insured. "In the case of 98.37 per cent of the present parcel post business, therefore, the public is without indemnity against loss and without means for tracing parcels which fail to reach the addressees. * * * The fact that many persons prefer to intrust their valuable parcels to express shipments and are using the parcel post only for the transportation of articles of slight value undoubtedly accounts to some degree for this condition. Reports received from postmasters, however, indicate that a further reason for this lack of general patronage of the insurance system is to be found in the fact that experience with the department's operation of the insurance plan has not tended to create confidence in it. The general criticism is that the system in use in the adjudication of claims for loss or damage is so complicated and involves such delay in settlement that much dissatisfaction has resulted among patrons." And yet, advocates of government ownership com-

plain that private railways are slow about settling claims!

The foregoing are some of the principal criticisms made by the joint committee of the parcel post service. The committee also had much fault to find with the very radical changes in rates and weight limits which have been made by orders of the postmaster general. One of these orders practically abolished the first zone on which rates were based, thereby making the rates for the first zone cover also the second zone. It is, as the committee says, a well known principle of transportation that the through rate ordinarily should not be more than the sum of the local rates. In fact, this principle has been specifically enforced against the railways of the United States by its embodiment in a provision of the act to regulate commerce. While the railways are required to observe this principle, the postoffice department, as a result of the order of the postmaster general practically abolishing the first zone, flagrantly violates it. For instance, if a package weighing 20 lb. is sent from St. Louis to Emporia, Kan., through Kansas City without stopping, the rate is 83 cents. If, however, the package goes from St. Louis to Kansas City, is delivered there and then remailed to Emporia, Kan., the rate is, St. Louis to Kansas City, 44 cents; Kansas City to Emporia, 24 cents; total, 68 cents. "That," says the committee, "is repeated all over the United States. * * * Rates which make possible such a practice cannot be defended. They violate one of the cardinal principles of transportation." The unfair discrimination involved is obvious. If a railroad president should order rates to be made as the postmaster general has done, he could be indicted by a federal grand jury and put in jail for violating the act to regulate commerce.

The Moon bill to regulate the compensation of the railways for carrying the mail, which was introduced in congress at the last session, would give the postmaster general practically arbitrary power to fix the mail pay of the railways. There are persons who express confidence that he would exercise this power wisely and fairly. The postmaster general has already the power to make changes in the parcel service and rates, and the Bristow committee says of the way he exercised it: "The committee's study of the effects of these orders convinces it that the exercise thus far made of the power lodged in the postmaster general to change rates and weight limits has been, in several respects, unfortunate for the service. * * * No other change made by departmental order has been so inequitable as the one which practically merges the first and second zones."

The advocates of the parcel post controverted the argument made against it that it would help the mail order houses at the expense of the country merchants. With reference to this zone order, however, the Bristow committee says, "Its effect is to benefit especially the mail order houses by giving them an undue advantage over the local dealers in transportation service. Under the zone scheme now in effect, a mail order house can establish a branch agency in the territory which the concern seeks to reach, and within a radial distance of 150 miles from the location of such agency, the mail order house gets exactly the same rate as the government charges the local merchant, who ships only a few miles, notwithstanding the marked difference in the cost of the transportation service rendered." For example, if a mail order house ships a 50 lb. parcel from Kansas City to Bavaria, Kan., which is 193 miles by rail, but within a radial distance of 150 miles, it pays 54 cents. If a merchant at Salina, Kan., ships a parcel to Bavaria, a distance of seven miles, he likewise pays 54 cents. The Bristow committee adds that "this example stated could be duplicated in every part of the United States."

This is the way the government of the United States conducts its parcel post business. And at the same time it passes laws and maintains an Interstate Commerce Commission to prevent railways from discriminating in favor of big concerns and against little concerns! Consistency is a jewel, but apparently one which Uncle Sam does not prize.

The accounts of the postoffice department always have been kept in such a way that it has been difficult to make even an intelligent guess as to the expense incurred in rendering any class

of service. This is true as to the parcel post service and, furthermore, nobody knows how much revenue is being derived from it. The Bristow committee says: "The law originally made provision for a special stamp by which the receipts could, with some accuracy, be obtained, but the refusal of the department to use the special stamp as the law provided that it should, and the further merging of third and fourth class postage has thrown the whole accounting system into complete confusion." This sounds like accusing the department of being a law-breaker. And in spite of the fact that it is absolutely impossible for anybody to find out either what the parcel post earns or what it costs, there are many silly people who talk about it being a "success," and who even tell you that it is profitable!

The government by the inauguration of the parcel post engaged in the business of transporting commodities in competition with the express companies and the railways. The foregoing from the report of the Bristow committee shows how remarkably efficient a manager of a transportation concern the government has thus far shown itself to be. It started out to establish an agency which would benefit the entire public, but it has so run it as to benefit almost nobody but a few wealthy mail order houses in the large cities. It was going to use this agency to reduce the cost of living, but the cost of living has not been affected. It was going to render a much better service than the express companies, but a congressional investigating committee is forced repeatedly to contrast government methods unfavorably with those of the express companies. The government prohibits unfair discrimination by railways, but in the service and rates of its own parcel post it commits discriminations which, if committed by the railways, would cause them and their officers to be indicted. Through the Interstate Commerce Commission the government prescribes the accounts which must be kept by the railways; and then it keeps the books of its parcel post in such a way as to cause a congressional committee to say that "it has thrown the whole accounting system (of the postal department) into complete confusion."

We commend this excellent example of government management of a transportation system to the consideration of all those who want the government to own and manage the railways. If the government manages a comparatively small and trifling business like that of the parcel post in this way, upon what ground can it be contended by any rational human being that it would wisely and efficiently manage the enormously larger and more complex business of our railways?

NEW BOOKS

The Railway Library for 1914. Compiled by Slason Thompson, director of the Bureau of Railway News and Statistics, Chicago, Ill. 465 pages. 5 in. by 8 in. Bound in cloth. Published by the author, 1529 Railway Exchange, Chicago. Price \$1.

This is the sixth edition of Mr. Thompson's annual compilation of noteworthy addresses and papers delivered during the year on railway subjects. It contains 47 articles and addresses, mostly dealing with the railway problems of the present day by some of the most prominent railway officers and students of railway questions. To form a background the volume opens with a chapter from Seymour Dunbar's "History of Travel in America," which deals with stage-coaching in the days just before the railway came. Then follows a series of addresses and a series of papers on railway valuation and taxation, railway mail pay, parcel post and express rates. These include articles from various publications, including several which have appeared in the *Railway Age Gazette*. The subject of government ownership is treated in articles by Seth Low, W. M. Acworth and former Senator Jonathan Bourne, Jr. Several articles are devoted to the part the railway companies are playing in the European war. The concluding chapter of the volume consists of the annual statistical report of the Bureau of Railway News and Statistics.

Letters to the Editor

DOESN'T LIKE THE GROSS TON

MONTREAL

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

That we are creatures of habit no one will attempt to deny. But when we admit this, we generally mean that it is our own habits to which we are slaves. As a matter of fact, however, we are as much the slaves of habits handed down to us as of our own.

For instance, what is the gross ton but a habit handed down to us from the Lord knows who? And can anyone say why we should continue to use it?

What is the use of it? Did you ever stop to think what it costs us in clerical work, taking the country as a whole?

It is cumbersome, costly and useless. It leads to many errors, wicked thoughts and cuss words. Why not throw it overboard, as the other Jonah was thrown over. If a whale wants to swallow it to use in making up his books, let him. He is all gross, anyway.

Seriously, I believe there are a great number of people who would be glad to get away from it, but they want a lead. Won't you be the one to give it to them?

E. J. McVEIGH

General Storekeeper, Grand Trunk Railway

STATISTICS THAT ARE WORTH WHILE IN RAILROAD MANAGEMENT

DETROIT, Mich.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Railroad statistics are of two kinds—one represents the tabulation of data setting forth facts applying to the details of railroad operation, the result of much labor and painstaking elaboration, compiled for the purpose of showing *what has been done*. This class of statistics belongs to the realm of the schoolmaster who performs endless duties day by day regardless of how much benefit results from his labor aside from the presentation of facts. The other kind of statistics represents tabulations having for their purpose constructive efficiency and showing *what should be done*. The difference between these two kinds of statistics is the difference between an acceptance of what seems to be the inevitable on the one hand and what is believed to be intrinsically beneficial on the other hand.

Successful railroad operation is elusive. It is so complicated under established regulations, and its ramifications are so far reaching, that the strongest and most efficient manager will readily confess that there is still something for him to learn. Managerial duties as well as the duties of other officers are so engrossing that specialists will henceforth become an important factor in maintaining the equilibrium of a well-poised management.

A certain railroad in Central Classification territory has been burdened with a repetition of receiverships. Its name in the past has been a by-word for all that was hopeless. Upon recent reorganization a study was made of its operating cost and fixed charges as compared with its revenues. From this study was deduced certain facts clearly established as to costs prevailing and *actually accruing*, both as to anticipated upkeep, or maintenance, operation and administration, with due regard for the elimination of all waste and needless expense. These units of results of actual operating cost were applied to other units of fixed charges and maturities. The result produced the unit that had to be maintained for a livelihood *bare of profit*. From this stage it was easy to proceed to reach units of revenues which were required to produce *profitable results*.

This analysis or study constituted the premises or basis upon which was built a comprehensive statistical system by which is

determined within five days after the handling of freight the average ton-mile revenue rate applying. This ton-mile rate is carried along cumulatively for the fiscal year as it progresses, and thus is made the barometer as to profit within quick hailing distance of the watchful manager and traffic official. A detail of the business of each station as to commodities and ton-mile rates applicable thereto, together with the unprofitable tonnage carried, separately stated, is a part of the tabulation, also available within five days after the close of each week. Freight constitutes 85 per cent of the revenues of the railroad referred to, and is the prime factor in its earnings.

These statistics are not only constructively efficient, but are vital in the profitable operation of the road, and will serve to illustrate what is meant in the caption, "Statistics That Are Worth While in Railroad Management."

T. D. HINCHCLIFFE
General Auditor, Detroit, Toledo & Ironton.

REPLYING TO "A CLERK'S PLEA"

WASHINGTON, D. C.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The article entitled "A Clerk's Plea," written by M. S., on page 459 of your September 10 issue, is certainly a very strong plea for better education of the railroad clerk. I must, however, take exception to that paragraph reading:

"It is an irony of life to neglect the greatest things. Take the greatest industry of the country—agriculture—and it is surprising to learn how few are the institutions teaching us to be good farmers. Step to the next largest field, the railroad field, and you will find no school at all."

In writing the above paragraph, I fear that M. S. has overlooked the various state agricultural colleges and the Department of Agriculture of the United States, which maintains various experimental farms and issues farm bulletins with all of the advantages, ideas and experiments. And stepping to the next largest field, the railroad, that there is no school in which a clerk may acquire knowledge. There are several institutions throughout the country that make a specialty of this particular branch of education.

But before we speak of the school, let us first investigate to what extent the clerk employed in the railroad office has used the means which are at his elbow. If he is a clerk in the traffic department he must know something of tariffs, the adjustment of rates, and the construction of the tariffs. Has the clerk ever read Interstate Commerce Commission Circular 18-A, which describes the form of tariff? Does he know how many forms of concurrence are issued, and the application of each? Has he ever taken a tariff and read it through from cover to cover, or does he only use it as a reference? Has he ever read a bill of lading? Does he know that the "Official Guide" carries mileage of railroads in the front part of the book? Does he know that it gives stations and distances between depots as well as carrying time tables? Has he ever read the Act to Regulate Commerce, with its amendments? Has he ever read the Conference Bulletin No. 6, giving interpretations of the commission, and certain administrative rulings?

These are commonplace publications. My long experience in railroad offices prompts these many questions. It does look queer for a tariff man who constructs a freight tariff to go ahead without consulting his specifications which are included in circular 18-A. You would think it queer if a builder put up a building without reading his specifications—but it is done every day with tariffs.

What I have said about the traffic man, may be said of the accounting department clerk. I dare say that few of them have read the various accounting department circulars, issued by the Interstate Commerce Commission, but depend entirely on their chief clerks and others for guidance in the various accounts chargeable.

The trouble is that there are not enough men who have read Elbert Hubbard's little book about "Delivering a Message to Garcia." I believe that there is just as much chance for promo-

tion and advancement among clerks as in any department of commerce. I believe that there is just as much chance for recognition of ability and merit as there would be in any commercial organization. And if the clerks would apply themselves to the means at hand, their advancement would be more rapid than it is at the present time. I know of good clerks who are conscientious, and as loyal to the company as any set of men, but they are not loyal to themselves, by seeking every avenue of opinion and grasping every opportunity to acquire greater knowledge about their particular work.

I remember a newspaper that stated that in its Sunday edition it was going to give the name and picture of the smartest man in the town; in the Sunday edition it published a picture of a very insignificant looking man, who was the "Answers to Correspondence" editor of the paper. His entire knowledge consisted of knowing where to go to get information. If the railroad clerk would examine the various circulars, pamphlets, tariffs, newspapers, etc., that come under his observation, not to memorize them, but to know where to go for certain kinds of information, and if he would make that his maxim, he would soon be recognized in the office as the man who could "deliver a message to Garcia."

G. B. GUTHRIE
Agent Official Freight Traffic Directory.

THE RAILWAYS OF CHILI

NEW YORK

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

A map has been compiled and issued recently by the government of Chili, which shows all the railways, with profiles, lengths of steamship routes between ports and to the principal ports of the world, and considerable detailed data regarding the length and gage of the lines, which differs somewhat from that hitherto available. The length given includes all branches and all lines actually under construction in 1914. There is a total length of 130 kilometers of double track of the 5 ft. 6 in. gage.

Gage Feet	Meters	Length Kilometers
5 ft. 6 in.	1.676	2,577*
4 " 0 "	1.445**	29
4 " 8 1/2 "	1.435	725
4 " 2 "	1.270	184
3 " 0 "	1.067	451
3 " 3 3/8 "	1.000	3,561***
2 " 6 "	0.762	648
2 " 5 1/2 "	0.750	10
2 " 0 "	0.600	317
Total		8,502 Kms

- * Electric lines.
- ** Length of main line track, 2,707 kms.
- *** Includes Antofagasta 657 kms. changing from 2 ft. 6 in. to meter.

Definite studies (final locations) have been made of the last link in the Longitudinal Railway, from Arica to Zapiga, 278 kms., which is not included in the above. Most of the lines are owned and operated by the Government, the distribution being as follows:

Government	5,502
Private	3,000
	8,502

There are 160 kms. of rack railway, and two sections of mixed gage, from Ovalle to Coquimbo and La Serena (5 ft. 6 in. and meter gage), and from Toledo to Paipote (4 ft. 8 1/2 in. and meter gage).

F. LAVIS
Consulting Engineer.

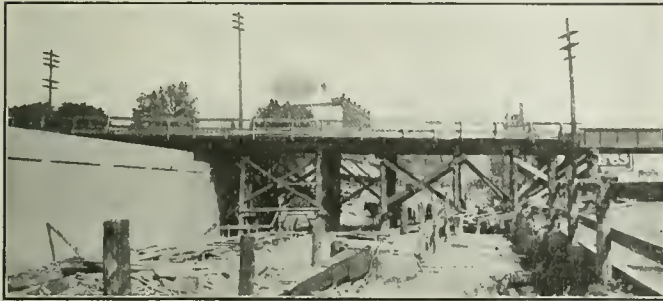
THE SUEZ CANAL.—During the first six months of the current year, 1,750 ships passed through the Suez Canal, paying passenger and transit dues to the amount of about \$8,750,000. The corresponding movement in the first half of 1914 was 2,571 ships, and the amount paid was in the neighborhood of \$13,000,000. If one deducts the number of German, Austrian and Turkish ships which passed through the canal in the first half of 1914, and also allow for the dues paid by them, the figures for 1915 are little below what has come to be regarded as the normal level.

Grade Crossing Elimination in North Toronto, Ontario

The Canadian Pacific Is Completing the Elevation of Its Track for 2½ Miles at a Cost of \$2,750,000

The Canadian Pacific is completing the elevation of its tracks in North Toronto for a distance of about 2½ miles, which involves the building of a new passenger station at North Toronto and the rebuilding of two local freight yards. This line of the Canadian Pacific is the original main line and crosses the highland a little more than two miles back from the lake front in the northern part of Toronto, and is about four miles shorter than the line which makes a detour south through the business district of the city. This line also avoids the grades necessary to reach the lower ground at the lake front. The traffic at the present time consists of two passenger trains and an average of five freight trains in each direction, and while this is relatively light, it promises to be much greater in the future. The line had been double tracked previously as far as the viaduct 80 ft. high over the Don valley, which at this point is a part of Reservoir Park.

The presence of the railroad has made an industrial district



Yonge Street Showing Excavation for Street Depression

of the territory immediately adjacent to the tracks, but outside of this it is entirely a high-class residence district, particularly the St. Clair avenue district, of relatively recent development, two blocks north on a ridge overlooking the tracks. It was largely the presence of this rapidly developing residential district, accessible from the business center of Toronto only by streets crossing the railroad, which was really responsible for the movement for the elimination of the grade crossings.

The project starts on the west at a grade crossing at Dufferin street with a 0.4 per cent ascending grade for a distance of 1,700 ft. to the first subway at Dovercourt road. From there east the grade is level, or nearly so, as far as Avenue road, a distance of 1¾ miles, where a 0.4 per cent grade rises eastward for 1,000 ft. to the Yonge street subway. From Yonge street there is a 0.5 per cent descending grade which brings the track to the original grade 1,800 ft. farther east at the west end of the Don valley bridge. Summerhill avenue, just west of this bridge, will continue to be a grade crossing for the present. There are tentative plans to divert this street to a location under the end of the ravine bridge, a scheme which the topography of the site will readily permit.

Subways have been provided at Dovercourt road, Ossington avenue, Shaw street, Christie street, Bathhurst street, Howland avenue, Spadina road, Davenport road, Avenue road and Yonge street. Albany avenue and Huron streets have been closed. A number of other streets which did not cross the railroad previous to the track elevation continue closed at present. Bridge-man street was extended from Albany street to Bathhurst street so that the former might have an outlet through the Howland avenue subway. Davenport road and Poplar Plain road, which previously intersected just south of the tracks, have been relocated between Dupont street and McPherson

avenue to provide for a single square subway instead of two skew subways.

The Canadian Northern Ontario, desiring to obtain access to North Toronto, has arranged with the Canadian Pacific for the joint use of two tracks from a junction near Dovercourt road to Avenue road. These joint tracks are at 13 ft. centers and occupy equal portions of the Canadian Pacific right of way and of the lands acquired by the Canadian Northern Ontario immediately to the north. A service track is being provided to the north of the joint tracks for the Canadian Northern Ontario and a similar track for the Canadian Pacific on the south. The latter track, however, is placed 26 ft. southerly of the nearest joint track, in order to permit the construction of an additional main line track when this becomes necessary. It is understood the cost of this section of the work will be borne equally by the two railway companies and that the Canadian Northern Ontario will acquire the use, conjointly with the Canadian Pacific, of the Union Station and facilities which the latter is constructing between Avenue road and Summerhill avenue.

The city of Toronto bears 25 per cent of the estimated cost of grade separation based upon the elevation of two tracks only, including the property damages. The street car company pays 10 per cent of the cost of the Avenue road subway which they occupy with two tracks, also on the basis of the elevation of two tracks. The cost of the Yonge street subway is subdivided somewhat differently. When the line was built in 1880 the railway company agreed to provide a subway having



Christie Street Subway

a head-room of 14 ft. at its own expense whenever the city so desired.

In this grade separation consideration was given to the large industrial development alongside the railway tracks, and as a means to facilitate further development in this direction, the tracks were raised to such a height only as would permit the existing sidings, some 21 in all, to be retained at their original level for loading purposes, and to be brought up to the south service track on grades of not more than 2 per cent. With few exceptions this has been obtained without the use of retaining walls or trestles, and was further facilitated by dropping the service track between subways on 0.4 per cent grades, as shown on the profile.

At the inception of the project, the Canadian Pacific had two team yards, one east and one west of Yonge street. No change was required in the yard west of Yonge street, which also includes a small freight station, other than to provide a 2 per cent approach grade descending from the west. The

yard east of Yonge street, however, was entirely rearranged. As now complete, the yard west of Yonge street has a capacity of about 80 cars, and that east of Yonge street will have a capacity of about 54 cars when completed.

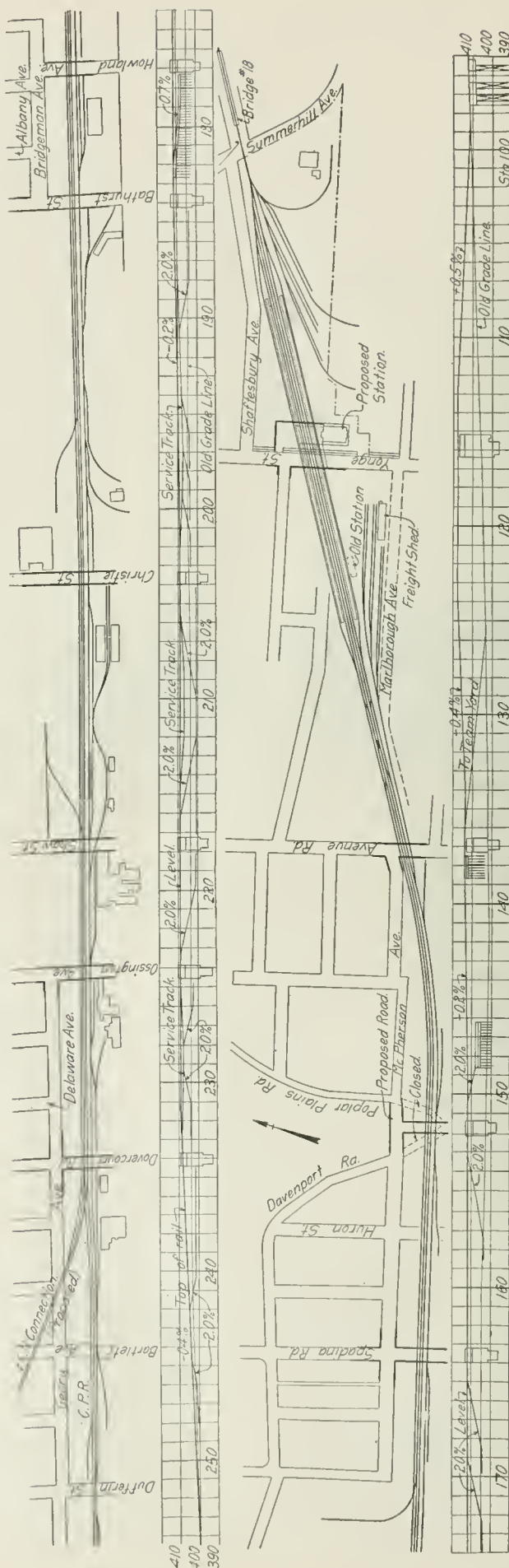
SUBWAYS

All of the subways consist of steel through plate girder spans on masonry abutments with supports at the center lines of the streets and at the curb lines except for Christie street, which has supports at the curb lines only. As previously mentioned, the depression of the roadway of most of the streets is considerable. The sidewalks, however, have in most cases been depressed only enough to give a head room of about eight ft. and hand railings have been provided along the high curb walls for the safety of the pedestrians. Depression of the streets is accomplished by 5 per cent approach grades which involve not only the streets passing under the subways, but in a number of instances include also some east and west streets which intersect the subway streets just north of the tracks. While 5 per cent grades for the streets are somewhat in excess of those used on track elevation projects in some other cities, they are entirely justified in Toronto, where the topography is such that many streets have steeper grades, the maximum being about 10 per cent. By the use of the shorter approaches possible with the steeper grades, it has been possible to reduce materially the number of potential damage claims. The streets are paved with brick on a concrete base, this being the type of pavement in use on a number of the streets before construction was started. The selection was governed largely, however, by the adaptability of this type of pavement to steep grades.

The head room provided in the roadway is greater than that usually provided in track elevation projects. In all subways save two it is 14 ft., no distinction being made between streets used by car lines and those not so used. At Yonge street the head room is 18 ft. The city pays all the expenses incidental to increasing this head room to 18 ft. from 14 ft., as provided by the Board of Railway Commissioners. The city was prompted in this action by a desire to provide for future use of double deck motor buses.

The substructures of all of the subways are of mass concrete except at Yonge street, where reinforced concrete, counterfort type abutments were used. The exposed faces of the abutments and retaining walls were not given the same treatment in all cases. As seen in the accompanying photographs, the abutments of the Yonge street subway have paneled faces, while the faces of the walls and abutments at Christie street are divided into horizontal courses about 18 in. wide by the use of one-inch V-molds. All concrete work was done by contract. This consisted almost entirely of the substructure for the subways, as very few retaining walls were necessary. Wells & Gray, Limited, engineers and contractors, Toronto, had the contract for five of the subways. Jennings & Ross, Limited, Toronto, had one, and McFarland, Pratt & Hanley, Toronto, built the other four. The concrete for the Avenue road subway was handled by a spout and tower. On all of the other structures the concrete was delivered in wheelbarrows and buggies. The total quantity of the concrete was 30,000 cu. yd., exclusive of that required for paving.

On all of the subways except that for Avenue road, which was built first, transverse I-beam floors of the ballast type were provided which give the unusually small depth from base of rail to low iron of only 24 $\frac{3}{4}$ in. This has been accomplished by the use of 10 in. by 9 in., 44-lb. Bethlehem sections, spaced 1 ft. 3 in. center to center. The I-beams were embedded in concrete finished flush with the top and bottom faces of the beams and carried up the sides of the girders to the under sides of the top flanges. Unlike most other track elevation subways of more than one track, the steel structure for each track is independent. Two single-strength girders were used for each track, spaced 11 ft. 8 in. center to center,



so that with a 13-ft. spacing of tracks, the adjacent girders of adjoining tracks are 1 ft. 4 in. center to center, connected at intervals by diaphragms. In the same way, no double-strength columns are used, as there is an independent bent for each track made up of two single-strength columns connected by cross bracing. In all, 6,400,000 lb. of structural steel were used in the subways. The Dominion Bridge Company fabricated and erected all of the subways except that for Avenue road, which was furnished complete by the Canadian Bridge Company.

All of the subway floors are protected by a membrane waterproofing which was made by Simes & Brother, Toronto. It consists of a layer of building paper followed by three layers of burlap and two layers of tar felt, all mopped down with pure rock asphalt and covered with another layer of building paper. The membrane was protected by an asphalt mastic of varying thickness graded to provide drainage. The backs of all abutments and retaining walls are covered with a waterproof membrane but without the mastic protection.

NORTH TORONTO PASSENGER STATION

The North Toronto passenger station of the Canadian Pacific, located south of the tracks, some 500 ft. west of Yonge street, will be replaced by a new station in a more convenient



Replacing Tie Cribs with Pile Trestle at Subway

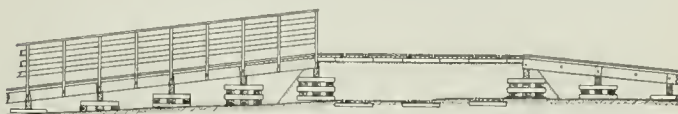
location on the east side of Yonge street, south of the tracks. This will consist of a building 80 ft. by 120 ft., separate from the track structure, with a baggage room to the north under the tracks which will be served by a driveway, also under the tracks east of the Yonge street subway. Three baggage truck elevators will be provided to give access to the platform overhead. From the station building a passage way east of the baggage room will lead to two passenger stairways for access to the platforms. The track layout at the station includes six tracks. There will be two freight tracks in the center with two westbound passenger tracks on the north and two eastbound passenger tracks on the south side. Each pair of passenger tracks is spaced 31 ft. center to center, with an island platform 1,100 ft. long between. On the south side, next to the station, there will be a baggage platform 260 ft. long, to serve the southernmost passenger tracks only. In connection with the new work, Yonge street has been increased in width 20 ft. between Marlborough and Shaftesbury avenues, a distance of about 750 ft.

GRADING

From Dufferin street to Avenue road the tracks were raised in place, the raise in the streets being made in an interesting manner by the use of tie cribs. The first operation was to place the tracks at the street crossings on stringers and mud sills, restricting this operation to one-half of the street at a

time while traffic was permitted on the other half. As fast as the tracks were raised on the filling, corresponding raises were made at the street crossings by jacking up these tracks on the stringers and building cribs of cross ties to support them. To facilitate the work the tracks were raised about 8 in. at a time, corresponding approximately to the thickness of the ties used in the cribs. When the tracks had been raised to the full elevation the tie cribs were replaced by pile bents, as illustrated in the accompanying photograph, which supported the tracks during the excavation for the street depression, the construction of the masonry substructures and until the steel work could be erected.

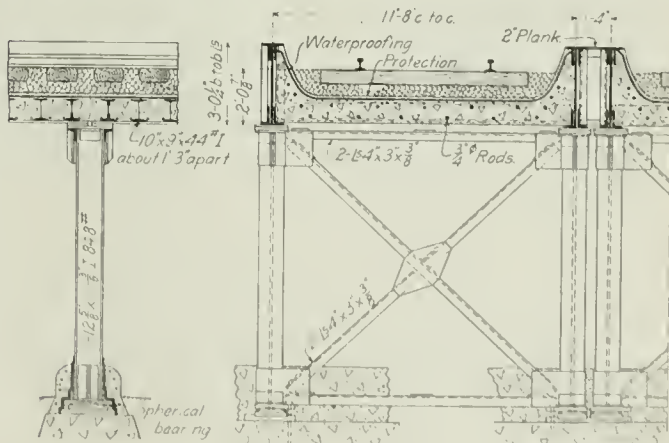
From Avenue road to Yonge street the situation did not permit of this method, necessitating the use of a single track



Temporary Grade Crossings—Blocked Up as Tracks Were Raised

restle for that distance. Filling material was unloaded from this while trains were operated over a single track on the lower level. As soon as the embankment had been placed to a sufficient width to permit laying a track on the new grade to one side of the track on the trestle, trains were transferred to this new track, and the rest of the fill completed.

The use of tie cribs for raising the tracks interrupted the street traffic as soon as the initial lift was made. For this reason temporary crossings were provided at Huron street, Albany avenue and Delaware avenue, which were not to be provided with subways. To accomplish this with the least number of changes the tracks were humped up at these points as much as possible without disturbing the adjacent streets on either side or resorting to excessive grades. Temporary crossing planks were put down, supporting the approaches to either side of the new embankment on tie cribs similar to those used for raising the tracks at the other streets. These were raised from time to time as additional lifts were made on the tracks. All of the filling for the track elevation came from a shovel cut adjacent to the main track at Leaside two miles east. In all, 350,000 cu. yd. of filling were used.



Details of Subway Steel Work

Work was started in the fall of 1912, and continued to date except for a delay of six months in the spring of 1913, when an appeal was made to the Privy Council to have the tracks raised to a higher level than that authorized by the Railway Commission, thus reducing the depression of the streets. This objection, however, was not sustained. The work will be complete by the end of this year. The tracks have been elevated and the last work will be the completion of the passenger station and the Yonge street subway.

The work has been handled by the engineering department of

the Canadian Pacific under the direction of J. M. R. Fairbairn, assistant chief engineer, and A. L. Hertzberg, division engineer, with B. Ripley, assistant engineer in immediate charge. The structures were designed under the direction of P. B. Motley, bridge engineer.

WASHING LOCOMOTIVE SMOKE*

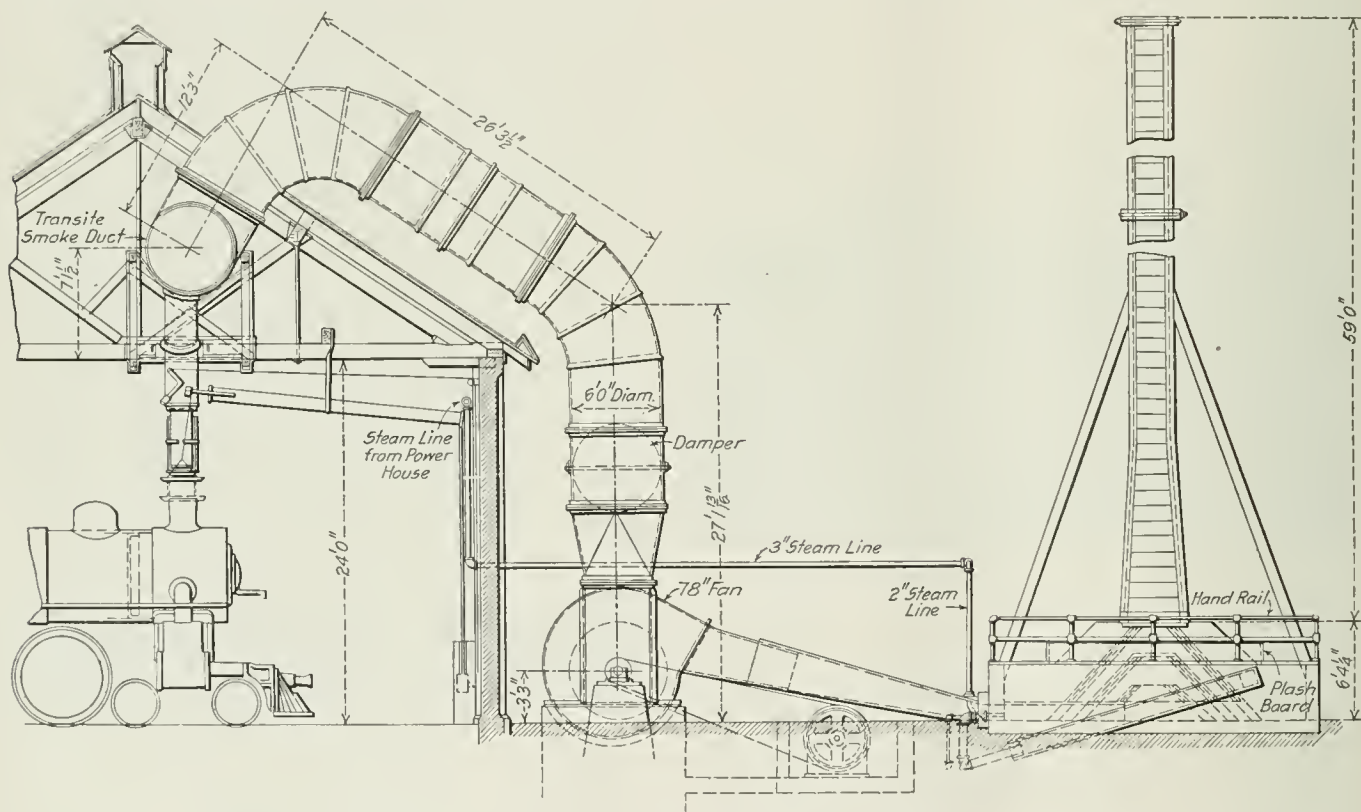
By M. D. FRANEY

Master Mechanic, New York Central, Elkhart, Ind.

The New York Central engine house in Chicago is located at Englewood station, near Indiana avenue and 63d street. It is adjacent to the White City, a popular amusement park, and surrounded by a very desirable residential district. The citizens are very insistent on the abatement of smoke, and object to the excessive use of the blower which is sometimes necessary for this purpose. While the New York Central locomotives west of Buffalo are equipped with the steam jet smoke consumer, which induces a flow of air above the fire and under the brick arch, and large blower capacity consisting of two 1¼-in. blowers, one on the right and one on the left side, it is found that these

plant was built at Elkhart, Ind., capable of taking care of one locomotive, which gave results beyond expectation. To more thoroughly test the device, an experimental plant was built at Collinwood, Ohio, to take care of several locomotives. With the data collected from this experimental plant, the present smoke washer at Englewood was designed and constructed. The only drawback was in securing material that would withstand the powerful action of the various acids resulting from the combination of the gases, the solids and water.

The Englewood engine house has 30 stalls, in which from 80 to 100 locomotives are handled every 24 hours. It is built without a single smoke jack leading direct to the atmosphere. In washing the smoke, a large concrete tank is used, 22 ft. by 32 ft. This is subdivided by separating walls into three basins, each of which is lined on the interior with dressed lumber set in about 1½ in. from the concrete. The space between the concrete and the lining is filled with tar. Wooden pins, instead of nails, are used for fastening the lining, in order to resist the action of the acids. The drawings show the plan and elevation of the tank, the stack, the three hoods, the three ducts connecting the fan with the concrete basin, the fan and motor and the elbow



Locomotive Smoke-washing Plant at the Englewood Engine House

appliances are of little assistance in the elimination of smoke when building a new fire in a cold locomotive. This was the great problem which confronted the mechanical officers of the New York Central in 1910, when it was found necessary to build a new engine house and terminal facilities at the Englewood station.

O. M. Foster, master mechanic in this territory at that time, after a careful study of smoke-washing devices which had been tried at other places with partial success, conceived the idea of forcing the smoke through a large body of water, by means of a fan separating the unconsumed carbon from the gas, permitting the latter to escape through a high stack and holding the carbon and other solids in suspension in the water. D. R. MacBain, superintendent of motive power, who had made a life-long study of smoke-abatement devices, approved of the plan. A small

connecting the fan with the large smoke duct in the engine house to which the smoke jacks connect.

A large smoke duct, 60 in. in diameter at the center and tapering to 36 in. at the ends, extends around the engine house just under the roof and directly above the smoke stacks of the locomotives when the latter are headed in and standing in normal position. This smoke duct was built of transite material, and is connected with drop pipes leading down to each pit. In each of these drop pipes is a damper which is closed when the jack is not in use. Leading from each drop pipe is a telescopic jack made of cast iron and supported from the roof. These telescopic jacks have vertical, lateral and longitudinal movement to accommodate different positions of the locomotive stack. They are raised and lowered by a walking beam, counterbalanced with a weight and operated from the wall of the engine house. The damper is opened and closed from this same point.

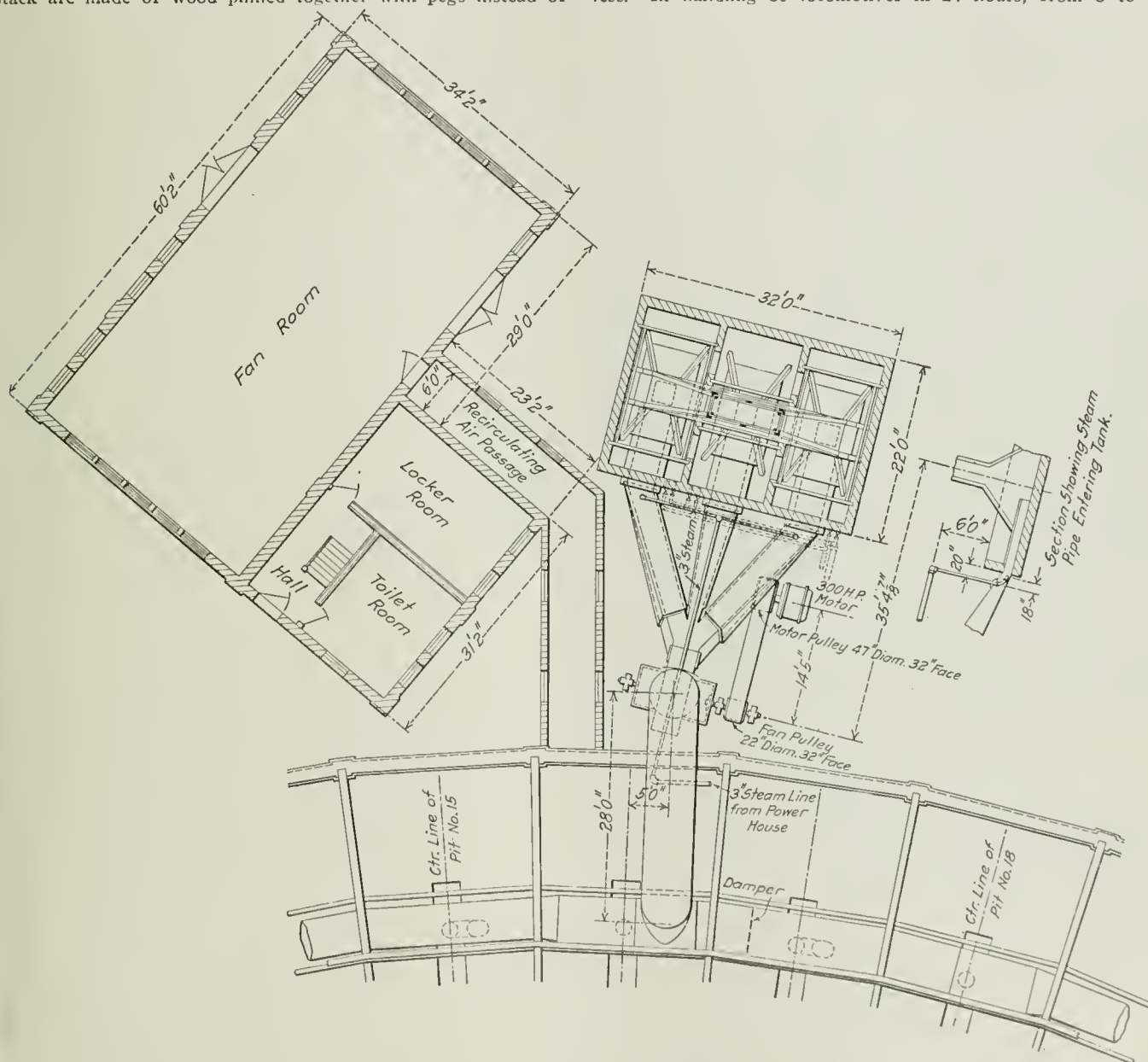
Near the center of the house a large elbow connects into the

* Abstract of a paper presented at the tenth annual convention of the International Association for the Prevention of Smoke.

top of the 60-in. transite duct and leads down to a 78-in. steel plate, double-inlet fan, capable of handling 68,000 cu. ft. of gases at 500 deg. per minute, at a total static pressure of 14 in. at the fan outlet, and at a speed of 950 r.p.m. The fan is belt-driven by a 300 hp. constant speed, 300-400 r.p.m. motor. A smoke duct leads from the fan to each of the three concrete basins, the outlet to each duct coming directly under the hoods referred to above. There are three hoods in each tank. The top of the interior hood is open, while the top of the second hood is closed similar to a bell; the top of the third or outer hood is open and connects with the stack, which is approximately 60 ft. high. The three smoke ducts leading from the fan, the hoods and the stack are made of wood pinned together with pegs instead of

gases are forced from the fan through the three smoke ducts into the water, passing out into the first hood. The water being thoroughly agitated at this point by the steam jets referred to, the gases are engulfed by the spray and wave action of the water and pass out through the top of the first hood into the second hood or bell, which, it will be remembered, has a closed top. They are forced down below the lower edge of this hood and pass to the third hood, and out of the water into the stack.

The carbons and solids are separated from the gases as they are forced through the water and rise to the top of the water in the tank in the form of a black, foamy scum. The gases pass out through the stack as a white vapor, practically odorless. In handling 80 locomotives in 24 hours, from 8 to 10



Plan of Locomotive Smoke-washing Plant at the Englewood (Chicago) Engine House of the New York Central

nails. The lower portions of the three hoods extend down in the concrete basin and are submerged in the water.

An 8-in. hole is provided in each of the separating walls to insure a uniform level of water in the three basins. A special overflow pipe is provided to maintain 14 in. of water in the tanks and to prevent the carbon from escaping into the sewer. A 1¼-in. high-pressure steam jet, with proper elbow and nozzle pointing towards the outlet, is located in each of the three ducts and close to the concrete tank. The purpose of these steam jets is to accelerate and thoroughly mix the gases with the water and prevent them passing through the water in large bubbles. The

barrels of carbon are obtained from the smoke washer. This has the appearance of lampblack, and is thoroughly steam-dried after it is taken from the smoke washer. An analysis of this material is as follows:

Moisture	3.0 per cent
Carbon	87.6 per cent
Sulphur	2.6 per cent
Iron oxide	8.1 per cent
Silica	1.8 per cent
Calcium oxide	trace

The sulphur and sulphuric acids are retained in the water. The city smoke department of Chicago and the nearby residents

are well pleased with the results obtained and on numerous occasions have complimented the plant very highly.

The estimated cost of making such an installation is from \$15,000 to \$18,000, where the property conditions are favorable. Owing to the property conditions and to the fact that the Englewood plant is an experimental one, the actual cost was somewhat greater. We made an investigation some time ago as to the cost of operation:

COST OF OPERATION PER DAY OF 24 HOURS

Water, 18,255 gallons, @ 7 cents per M.....	\$1.28
Coal, 10.86 tons, @ \$1.75 per ton.....	19.00
Electricity, 3,360 kilowatt hrs., @ \$0.0129.....	43.34

Total \$63.62

SAVING EFFECTED BY THE USE OF WASHER PER DAY OF 24 HOURS

Fires maintained	\$40.80
New fires built	7.11
Reduced electrical cost due to sliding scale rate.....	8.52

Total \$56.43

This makes the net cost of operating the washer \$7.19 per day of 24 hours (\$63.62 less \$56.43). It is expected that we will be able to find a profitable use for the lampblack reclaimed by the smoke washer. This would, of course, result in still further decreasing the net cost of operation and might possibly show a profit.

We have found that where the fires are properly started the draft from the fan is sufficient to draw off the gases from the locomotive without the use of the blower. This means a decided reduction in the amount of water used, due to not using the steam blower, and also means a decided saving in coal consumption, due to the reduced draft. While we have quoted the results of some tests, it is difficult to obtain a set figure as to the amount of coal and water consumed by an engine at a terminal, due to varying conditions, such as smoke restrictions, temperature of the weather, and the human element or fire-up men. However, the tests showed to our entire satisfaction that the coal and water consumption is materially reduced on engines stored under the smoke jack and influenced by the draft of the smoke washer fan. The temperature of the firebox is more even and the fire-up man is able to handle a larger number of locomotives.

This smoke washer is operated under patents controlled by the American Smoke Washing Company, incorporated in Illinois, of which S. K. Dickerson, 5120 Greenwood avenue, Chicago, is secretary.

ACCIDENT BULLETIN No. 55

The Interstate Commerce Commission has issued Accident Bulletin No. 55, containing the record of railway accidents in the United States during January, February and March, 1915. The number of persons killed in train accidents was 65, and of injured 1,972. The total number of casualties of all classes reported, including industrial accidents, was 37,078; or 1,650 killed and 35,428 injured. The accidents are summarized as follows:

TABLE No. 1.—Casualties to persons—Steam railways.

Causes	Passengers		Employees (including employees not on duty)		Other persons (trespassers and non-trespassers)		Total persons	
	In-	Killed	In-	Killed	In-	Killed	In-	Killed
<i>Train accidents.</i>								
Collisions	1	478	13	364	2	26	16	868
Derailments	5	589	35	329	1	23	41	941
Miscellaneous, train accidents, including boiler explosions....	..	4	6	157	2	2	8	163
Total	6	1,071	54	850	5	51	65	1,972
<i>Other than train accidents.</i>								
Accidents (212) to roadway or bridges not causing derailment								
Other accidents (classes C3 to C12, inclusive)	36	1,560	363	8,156	1,118	2,158	1,517	11,874
Total	42	2,631	417	9,006	1,123	2,209	1,582	13,846

Industrial accidents to employees.

While working on tracks or bridges....	***	***	28	4,769	***	***	28	4,769
At stations, freight houses, engine-houses, etc.....	***	***	15	5,453	***	***	15	5,453
In and around shops.....	***	***	16	10,064	***	***	16	10,064
On boats and wharves.....	***	***	2	361	***	***	2	361
At other places.....	***	***	7	935	***	***	7	935
Total	***	***	68	21,582	***	***	68	21,582
Grand total	42	2,631	485	30,588	1,123	2,209	1,650	35,428

Table No. 1A, following, presents comparison with the quarterly bulletin next preceding and with the bulletin covering the corresponding quarter of the previous year:

TABLE No. 1A.—Condensed summary of fatalities.

Item	Bulletin No. 55	Bulletin No. 54	Bulletin No. 51
1 Passengers killed in train accidents.....	6	8	13
2 Passengers killed, all causes.....	42	37	52
3 Employees (on duty) killed in train accidents.....	54	48	99
4 Employees (on duty) killed in coupling.....	26	14	44
5 Employees (on duty) killed, total.....	374	426	608
6 Total passengers and employees (items 2 and 5, above)	416	463	660
7 Other persons killed (including trespassers, non-trespassers, and employees not on duty), all causes	1,166	1,617	1,369
8 Employees killed in industrial accidents.....	68	82	79
Grand total (items 6, 7, and 8)....	1,650	2,162	2,108

The total number of collisions and derailments reported was 2,391 (763 collisions and 1,628 derailments), of which 100 collisions and 149 derailments affected passenger trains.

TABLE No. 2.—Collisions and derailments.

Classes.	Number	Killed	Injured	Damage to road and equipment
<i>Collisions:</i>				
Rear	101	4	333	\$119,543
Butting	62	4	212	84,037
Train separating	55	..	11	24,432
Miscellaneous	545	8	312	239,831
Total	763	16	868	467,843
<i>Derailment due to—</i>				
Defects of roadway.....	423	10	474	347,906
Defects of equipment.....	762	4	174	562,751
Negligence	66	6	52	44,373
Unforeseen obstruction	74	9	89	63,361
Malicious obstruction	17	6	28	20,267
Miscellaneous causes	286	6	124	257,786
Total	1,628	41	941	1,296,444
Total collisions and derailments	2,391	57	1,809	1,764,287
Total for same quarter of—				
1914	3,185	112	2,165	2,343,957
1913	3,982	143	3,338	3,019,409
1912	3,903	217	4,251	3,368,125

The usual tables are given, classifying certain kinds of accidents in detail. Twenty accidents during this quarter were investigated by the inspectors. The accidents occurred as follows:

Chic., Burl. & Quincy...	Liberty, Mo.....	Jan. 1,	Butting collision
St. Louis & S. F.....	Olathe, Kans.....	Jan. 3,	Derailment
Minn. & St. Louis.....	Emmons, Minn.....	Jan. 4,	Derailment
Wabash	Runnells, Iowa.....	Jan. 15,	Derailment
Seaboard Air Line.....	Osgood, N. C.....	Jan. 19,	Derailment
Erie	Glen Eyre, Pa.....	Jan. 23,	Derailment
Pennsylvania	Sizerville, Pa.....	Jan. 30,	Side collision
Atlantic Coast Line.....	Callahan, Fla.....	Jan. 30,	Derailment
Cin., Georgetown & Port.,	Fair Oak, Ohio.....	Feb. 1,	Butting collision
Pennsylvania	Irving, N. Y.....	Feb. 2,	Rear collision
Oregon Short Line.....	American Falls, Idaho.....	Feb. 5,	Derailment
Balt. & Ohio.....	Youngstown, Ohio.....	Feb. 19,	Derailment
Denver & Rio G.....	Fountain, Colo.....	Feb. 22,	Derailment
Nevada-Cal-Oregon	Horse Lake, Cal.....	Feb. 23,	Rear collision
Denver & Rio G.....	Glenwood Springs, Colo.....	Mar. 2,	Derailment
Chic. & East Ill.....	Shelburn, Ind.....	Mar. 4,	Derailment
A. T. & S. Fe.....	Elsinore In, Cal.....	Mar. 5,	Derailment
Wabash	Garher, Ill.....	Mar. 5,	Butting collision
Wabash	Strahan, Iowa.....	Mar. 16,	Derailment
Ahnapee & West.....	Forestville, Wis.....	Mar. 29,	Derailment

Electric railways reporting to the commission (not included in the foregoing statistics) had 76 persons killed during the quarter, and 1,023 injured; and there were 32 collisions and 14 derailments. Train accidents are charged with four fatalities. The total number of passengers killed from all causes was 4; and of employees 8 (3 in industrial accidents). The number of trespassers struck or run over by cars was 83 (20 killed and 63 injured).

Annual Meeting of the Railway Signal Association

Review of Committee Reports, Discussions and Other Business at the Convention Held in Salt Lake City Last Week

The twentieth annual convention of the Railway Signal Association was held in the Hotel Utah, Salt Lake City, Utah, September 14, 15 and 16, President T. S. Stevens, signal engineer of the Atchison, Topeka & Santa Fe, in the chair. The attendance was particularly representative of the western signal men, the total registration being 238.

After an invocation and an address of welcome by S. C. Park, mayor of Salt Lake City, President Stevens read his annual address. He emphasized particularly the responsibility of the individual members in the conduct of the association's affairs, urging careful attention to the selection of the very best available men for the officers and to the casting of individual votes on propositions submitted to letter ballot. He also emphasized the need of the members co-operating with the managing officers of the association to increase its practical value by adopting the conclusions of the Board of Direction as a guide for actual practice whenever possible; and if the result of the association's efforts cannot be adopted, constructive criticism should be submitted as a help in correcting errors.

The report of the secretary-treasurer showed a membership of 1,257, an increase of 20 during the past year, and a very satisfactory financial condition.

SIGNALING PRACTICE

The report of Committee I covered switch indicators, economics of signal maintenance, capacity of single-track and a reference to the A. R. A. clearance diagram. The adopted clause covering the requisites of installation for switch indicators, specifically relates to the use of such indicators on roads of two or more tracks. After a careful study of the conditions obtaining on single-track, the committee presented the following statements of practice, with the recommendation that they be submitted to letter ballot for adoption, and if passed, be inserted in the Manual following the requisites of installation for switch indicators.

(1) Where there are signals governing movements in both directions located so near a switch that trainmen at the switch can observe their indications, such signals will give the necessary information and switch indicators are unnecessary.

(2) Where a signal governing in one direction is located as above and a signal governing in the opposite direction is not so located, a switch indicator may be used to give the information not obtainable from a signal.

(3) Where signals governing in both directions are not located as above, two switch indicators may be used, one for each direction.

(4) Each switch indicator may, as to trains in one direction, serve the same purposes and be controlled in the same way as on lines of two or more tracks.

(5) In the case of a system in which a train moving beyond one passing siding controls signals governing movements between that passing siding and the next, a switch indicator may be so controlled as to indicate the approach of a train at and from the signal located adjacent to the next passing siding.

A final report on the economics of signal maintenance was submitted, containing the following conclusions: Because the main controlling power of signal apparatus is electrical and because the special training required is so different, a combination of signal and track forces is not recommended as a means of obtaining economy and efficiency in signal maintenance. Occasionally it will be found practicable and economical to combine forces engaged in maintaining electrical features on a railroad with those maintaining signals; but as a general proposition economy and efficiency will be produced to a higher degree by co-operation than by combination, and this rests entirely with the officer in charge, in the arrangement of the forces available.

A monograph by F. L. Dodgson, consulting engineer of the General Railway Signal Company, was presented in connection with the report on the capacity of single-track. This paper

analyzed the effect of passing siding location on the capacity of single-track and developed formulae for determining the theoretically correct locations of a given number of passing sidings on a given piece of single-track road to secure the maximum capacity in trains per day and for determining the theoretical number of trains that can be run with a given number and arrangement of sidings.

The committee recommended that a statement be inserted in the Manual to the effect that the recommended standard for limiting clearance lines for third rail and permanent way structures and rolling equipment, adopted by the American Railway Association, may be found in the latest issue of the Proceedings of that association. This action was considered preferable to reproducing the diagram in the Manual, because it is subject to revision by the A. R. A., and in case of revision a period of many months might elapse before the correct diagram could be placed in the Manual.

Discussion.—R. M. Phinney (C. & N. W.) presented, by letter, several suggestions on the proposed additional requisites for switch indicators, including a revision of the previously adopted clause, a combination of the first three paragraphs into one, and an alternative revision of the wording in paragraph 1, to cover the objection that, under certain conditions, the signals referred to do not give the necessary information. In view of the apparent merit in the suggestion the chairman, C. C. Anthony (P. R. R.), suggested that the subject be referred back to the committee and a motion to that effect was carried. In a brief discussion on the study of the relation of passing track location and line capacity, Mr. Dodgson said that further investigation led him to believe that lap sidings increase the capacity of a railway line three-fourths of a train per high speed train run, as compared with the capacity of the line when single sidings are provided.

MECHANICAL INTERLOCKING

Committee II presented a code of specifications for electro-mechanical interlocking. The discussion brought out a number of points in which the proposed specifications differ from the mechanical interlocking specifications, and for this reason the subject was referred back to the committee.

POWER INTERLOCKING

Committee III, on Power Interlocking, submitted specifications for fiber conduit, incandescent lamps and electro-pneumatic interlocking, which were recommended for submission to letter ballot.

The specifications for fiber conduit were referred back to the committee following numerous suggestions by Mr. Anthony based on quotations from the specifications of the Pennsylvania Railroad. The other two specifications were accepted with minor connections brought out in the discussion.

AUTOMATIC BLOCK

Committee IV submitted revised specifications for crystallized copper sulphate with a recommendation for its acceptance and submission to letter ballot. These specifications, as now revised, cover, in the opinion of the committee, a product which can be furnished by the manufacturers without an increase over present prices, and which will give the railroads a satisfactory article.

The specifications were accepted practically without change.

MANUAL BLOCK

Committee V submitted for consideration and submission to letter ballot the following codes of instructions: Testing and maintaining dry cells, maintaining gravity cells and maintaining

caustic soda cells. The report was accepted for submission to letter ballot.

STANDARD DESIGNS

Committee VI submitted 21 revised drawings and 6 new drawings, as follows:

No.	Title	Journal Reference
1010	Crank and Jaw Pins (New).....	March, page 67
1015	One-inch Signal Pipe and Coupling.....	March, page 68
1020	Guide Clamps, Brackets and Caps, etc.....	March, page 69
1021	Guide Clamps for Vertical Connections.....	March, page 70
1022	Guide Supports and Caps for, etc.....	March, page 71
1023	Guides for Vertical Connections on Signals.....	March, page 72
1024	Crank Bracket Fittings for Pipe Post.....	March, page 73
1025	Crank Bracket Fittings for Pipe Post.....	March, page 74
1026	Ladders for Mechanical Ground Masts.....	March, page 75
1027	Ladder Parts.....	March, page 76
1028	Ladders for Bracket Posts, etc.....	March, page 77
1029	Ladder Clamps and Slays.....	March, page 77
1043	One-arm Mechanical Ground Signal (New).....	
1044	Two-arm Mechanical Ground Signal (New).....	
1045	Three-arm Mechanical Ground Signal (New).....	
1056	Terminal Blocks.....	May, page 145
1059	Clamp for Base of Ground Masts.....	May, page 146
1065	Blade for Upper-Quadrant Signals.....	May, page 147
1070	Binding Post.....	May, page 148
1196	Guides for Vertical Connection on Bracket Posts.....	March, page 78
1197	Two-lever Wall Machine (New).....	
1198	Crank Brackets and Bracket Posts.....	March, page 79
1233	Mechanical Dwarf Signal Spectacle, etc.....	Sept. 14, page 538
1360	Tang Ends and Screw Jaws.....	May, page 149
1361	Adjusting Crank and Assembly.....	May, page 150
1397	Two-lever Wall Machine (New).....	
	Plate III, Symbols (Revised).....	March, page 80

In addition to the above, drawing No. 1233, mechanical dwarf signal spectacles and lamp bracket support was re-submitted for approval.

The committee has under consideration the desirability of standardizing a switch-and-lock movement, arranging the fittings to make it universal so that the crank may be reversible on its pivot, thus providing the means of applying the movement to a lifting block derail by reversing the crank and admitting of the lock and operating rods being contiguous, which cannot be done with the present standard movement. The revised movement which the committee has under consideration would be more costly than some of the present smaller movements, and a short discussion as to the need of such a standard was therefore requested. The committee also has under consideration further revision of the approved signal symbols. The manufacturers have appointed representatives to confer with the committee on this subject. A sub-committee has been investigating the desirability of standardizing the sizes of roundels and lenses primarily to reduce to the minimum the number of sizes used. This sub-committee is also looking into the matter of standardizing hand lamp globes.

All of the plans were accepted for submission to letter ballot and several members spoke in favor of the proposed new switch and lock movement, offering suggestions for the committee's benefit.

RELAYS

Committee VII recommended that no changes be made in the present specifications for relays until a thorough investigation can be made to determine just what is needed. One of the important changes will be the standardization of parts. This matter has been referred to the manufacturers' representatives, with the request that they reach an agreement on as many parts as possible.

The committee is of the opinion, first, that the ideal relay should pick up and release at the same point, and that a practical relay can perhaps be made that will approach that ideal condition more closely than the present design; second, the energy required for operating the relay should be increased; the amount of current consumed in operating the relay should more nearly approach the total amount of current supplied to the track circuit; third, a more economical, though perhaps more costly, relay can be designed, one that will require less energy, or one that will give a wider margin with the same expenditure of energy. It is believed that a relay can be designed that will be practically free from failure to release because of broken-rail conditions, provided there is no serious interference from foreign current. An abstract of the results of tests made by various roads to determine the proper drop-away values for track re-

lays was presented. Also, the results of a series of tests made at Purdue University on some four-point relays, one each from four different manufacturers. The resistance measured in these tests seemed to indicate that with the contact materials now in use, each contact should have a pressure of not less than 1½ ounces. The matter of material and dimensions for contact and contact springs has been discussed by the committee, and while this cannot be specified definitely, it is thought the same result can be obtained by specifying the contact resistance after a certain number of operations.

A series of tests made on the Buffalo, Rochester & Pittsburgh showed the resistance occasioned by an engine and a string of empty flat cars on the main line to be .000277 ohm, and with one truck of a flat car within the fouling section of a siding that was seldom used, to be .0382 ohm. In the latter case the signal for that block did not go to the stop position. These tests show the necessity for maintaining fouling sections in first-class condition if they are to insure adequate protection. In an investigation of the reasons for adopting the present standard four-ohm track relay, by James Anderson, signal inspector, New York Central, Lines West, the conclusion is reached that a low resistance relay will (one) readily detect broken rails; (two) be operative in places where low ballast resistance would make a high resistance relay inoperative, and (three) fail to release where conditions prevent a low wheel resistance from being maintained. On the other hand, a high-resistance relay will (one) readily shunt out with a high wheel resistance, (two) be inoperative in places where low ballast resistance prevails, and (three) fail to release with broken rails. The committee requested an expression from the members on the following points: (1) Is it desirable to express pick-up and drop-away resistance of all relays under 100 ohms, in volts, and mill-amperes? (2) Shall we adopt a maximum of .7 ohms resistance and a maximum average of .5 ohms, for 500,000 operations? (3) Shall we recommend the use of 4-ohm track relays of not more than four front contacts per relay? (4) Shall we continue the 4-ohm relay as a standard type relay? (5) Is it desirable to raise the drop-away point of the 4-ohm relay?

Discussion.—It was the sense of the convention that the questions raised by the committee should be settled by investigation and research rather than by discussion, and the members limited themselves, therefore, to discussing the methods used by the committee so far and the lines along which future investigation could profitably be directed. Mr. Anthony complimented the committee on the start that has been made and expressed the hope that it would be possible to determine that combination of the controllable features of the track circuit which will give the best results.

ELECTRIC RAILWAY AND A. C. SIGNALING

Committee VIII submitted descriptive data covering installations of alternating current signals on 19 steam and electric roads, and specifications for reactors for line and track circuits. It was also recommended that the committee be assigned the duty of re-editing all alternating current signal write-ups which it has furnished and all other prominent articles written on alternating current signaling, this material to be put in shape for publication for the information of the members of the association and others. The report was accepted without discussion.

STORAGE BATTERY AND CHARGING EQUIPMENT

Committee X submitted for acceptance as information data in regard to ordering lead stationary storage battery of types other than pure lead, also data covering typical cost of current for line charging storage battery. It was recommended that the description of storage battery, lead type, appearing in the Manual, be eliminated as obsolete and misleading, and not of sufficient importance to warrant revising. The committee presented for the approval of the convention and submission to letter ballot, the specifications for nickel-iron-alkaline storage battery, including the corrections requested at the May meeting. It reported that considerable work has been done on a com-

bined hydrometer and thermometer for stationary storage battery work, and it is hoped this will be ready for the association by another year.

The report was accepted without discussion.

ELECTRICAL TESTING

The special committee on Electrical Testing presented a progress report, with a request for constructive discussion for the guidance of the committee in future work.

Discussion.—Paul Dinkel (S. P.), G. K. Thomas (A. T. & S. F.), C. C. Anthony (P. R. R.) and G. H. Dryden (B. & O.) outlined the practice on their lines for the testing of circuits and apparatus. Mr. Anthony mentioned the use of a card record to show the result of tests of every single-wire circuit on some divisions of the Pennsylvania. W. H. Elliott (N. Y. C.) gave the following causes of insulation failures on the New York Central, as determined from a three-year record:

Mice eating insulation	50 per cent.
Broken conductors	30 " "
Bad joints	10 " "
Failure through mechanical injury.....	5 " "
Direct failure of insulation.....	5 " "

LIGHTNING PROTECTION

The special committee on Lightning Protection presented for the approval of the convention and for submission to letter ballot the following: Requisites for lightning arresters for signaling, requisites for choke coils for signaling, and specifications for vacuum-gap lightning arresters. The requisites were presented in revised form, after considering the suggestions offered at the last stated meeting. The report was accepted after a brief discussion.

CLOSING BUSINESS

The following officers were elected for the coming year: President, W. J. Eck, signal and electrical engineer, Southern Railway, Washington, D. C.; first vice-president, Charles A. Dunham, signal engineer, Great Northern, St. Paul, Minn.; second vice-president, W. H. Elliott, signal engineer, New York Central, Lines East, Albany, N. Y.; secretary-treasurer, C. C. Rosenberg, Bethlehem, Pa.; directors, C. J. Kelloway, signal engineer, Atlantic Coast Line, Wilmington, N. C.; A. H. Yocum, signal engineer, Philadelphia & Reading, Philadelphia, Pa.; J. C. Mill, signal engineer, Chicago, Milwaukee & St. Paul, Milwaukee, Wis.; and W. M. Vandersluis, signal engineer, Illinois Central, Chicago; nominating committee, F. C. Stuart, signal engineer, Elgin, Joliet & Eastern, Joliet, Ill.; Oswald Frantzen, supervisor of signals, New York, New Haven & Hartford, Boston, Mass.; P. F. Bikle, assistant foreman of signals, Pennsylvania Railroad, Johnstown, Pa., and J. P. Spoerl, signal foreman, Chicago & North Western, West Chicago, Ill. The Grand Hotel, Mackinac Island, Mich., was chosen as the place for the 1916 meeting.

ENTERTAINMENT

The annual dinner on Wednesday night was addressed by L. R. Clausen, formerly signal engineer of the Chicago, Milwaukee & St. Paul, and for several years one of the most active members of the association, and by Governor Spry, of Utah. The western team defeated the easterners in the annual ball game on Thursday afternoon by a score of 6 to 1. Other entertainment features included a trip to Emigration Canyon for the ladies, and to Salt Air Beach for the entire party, a special organ recital in the Mormon tabernacle and the annual ball.

S. A. A. ELECTION

At the annual business meeting of the Signal Appliance Association the following officers were elected for the coming year: Chairman, E. E. Hudson, Thomas A. Edison, Inc., New York; vice-chairman, E. M. Fisher, Fairbanks-Morse Co., Chicago; secretary-treasurer, F. W. Edmunds, Dressel Railway Lamp Works, New York; executive committee, L. Thomas, General Railway Signal Co., Chicago; J. M. Fitzgerald, Railroad Supply

Co., Chicago; J. V. Westcott, Q & C Co., Chicago; J. Warren Young, Kerite Insulated Wire & Cable Co., New York, and F. C. Lavarack, United Electric Apparatus Co., New York.

THE FREIGHT TERMINAL*

BY C. M. HIMMELBERGER
Superintendent, Raritan River Railroad

The freight and passenger terminals of a large railroad system may be likened to an immense stomach in which the function of digesting and assimilating the traffic is constantly taking place. As in the process of digestion, there are many functions taking place simultaneously, but all co-ordinated with a single end in view.

The operation of a freight terminal has become an extremely important part of railway service. It might be said that it is far more important in its relation to the prompt handling of traffic than actual road service. This is due to the necessity for handling promptly voluminous traffic through numerous arteries in a congested district without the means of expansion found in other branches of the service, and a generally accepted practice of using the terminal district as a storage ground for all classes of traffic.

Successful operation depends primarily on a well-planned track layout. The operating officers may possess every qualification necessary, but their efforts will, to a large extent, be fruitless, if the design of the yard is such as to prevent the free and uninterrupted movement of the traffic.

To handle a freight terminal successfully demands an efficient organization, controlled by practical men, preferably those who have worked up through the ranks, and who have displayed ability to handle and develop the latent qualities of subordinates; men who are broad-minded, fair in their dealings with the public and employees, and who possess the necessary tact to protect fully the interests of the company without antagonizing shippers who are not familiar with the complex nature of the handling of traffic through a busy terminal.

The terminal trainmaster, the general yard master, and the freight agent should, from time to time, hold joint staff meetings, at which there should be representatives of all classes of assistants in charge of the distribution of traffic in the different districts of territories which comprise the general terminal district.

For the successful operation of a yard, the yard office should be supplied with a good card waybill rack, preferably along the lines of that recommended by Mr. Droege in his book on "Freight Terminals and Trains," which allows a quick selection of the card waybills desired when cars are ready for movement.

It has been contended that it is good practice to have the yard clerks (instead of conductors) in the initial yard prepare the train record for cars forwarded, and to hold them responsible for the condition of the cars, shipments, seal records, correct initials and numbers, and the accompanying card waybills, thereby relieving the conductor of work of this character, enabling him to move the train from a yard with the least possible delay.

This method is a most economical means of handling matters in connection with outbound movement of cars, as it eliminates holding an entire crew and the payment of their wages during the time that the conductor is checking his train and correcting the errors which may be found. Assuming that the average time of a crew, from the time it is called or arrives in a yard until the time of leaving, is approximately one hour, the saving in expense of holding the train for the purpose of checking is quite apparent when comparing the wages paid to a full crew, against the service of one yard clerk while engaged in this work. This practice is also of additional benefit, as it shortens the time classification tracks are occupied by trains.

The quick and successful operation of the terminal depends to a large extent on the ability of the general yard office force

* Abstract of a paper read before a meeting of the New York Railroad Club, September 17.

to furnish information at a moment's notice regarding the location of cars, and to know the time necessary to place cars promptly at industrial plants, piers and docks for outgoing steamers, etc.

Another important factor in the efficient operation of a terminal district is the close contact and co-operation of the car distributor, chief despatcher, general yard master and the terminal train master. The close association of the car distributor with the chief despatcher's office, thus giving him a thorough knowledge of the conditions of the territory, will enable him to distribute cars throughout the different arteries leading out of the terminal district to much better advantage than if there was not this close co-operation.

Discussion—The paper was discussed by a number of the members. T. F. McCarthy, trainmaster of the Lehigh Valley, said that conditions frequently made it impossible to increase the size of freight terminals in large centers and that necessary increases in capacity had to be brought about by greater efficiency of operation. This greater efficiency is to be attained primarily by organization. J. P. Bougher, chief clerk in the car record department of the Reading, emphasized the importance of the car record office and the necessity for accurate reports. W. E. Gordon, division trainmaster of the Central of New Jersey, at Jersey City, also emphasized the task of the operating officer in increasing the capacity of an inflexible yard layout. He also referred to the freight terminal problem in New York, and spoke of the value of outlying yards.

THE FIRST FRENCH BRIDGE BUILT IN WAR TIME

BY WALTER S. HIATT*

An important work of peace has just been completed in France in the form of a new bridge across the river Seine at Rouen recently opened to traffic as a part of the railroad line from Paris to Havre.

This bridge is but one of the many pieces of engineering and construction work now going on all over France. Its completion is noteworthy not only because the bridge is the first important engineering job completed during this year of war on the continent, but also because it indicates how smoothly life goes on behind the battle lines in the Republic of France.

"Why build a fine new bridge when you may have to destroy

war; and then it was resumed with the result that the bridge was thrown open to traffic on July 21.

Otherwise the new bridge has a certain interest in that it replaces one built 70 years ago for the first railroad ever built between Paris and Rouen. The old bridge was built by the English, strangely enough, within a stone's throw of the place where William the Conqueror died. The English railroad and its bridge afterwards, in 1856, passed into the hands of a French company, that of the West, and this company was in 1909 taken over by the French government.

The old viaduct stone bridge, always termed the "English bridge," with its eight cast-iron arches, each 135 ft. long, had been in such poor condition for a number of years that but one train at a time was permitted to pass over it and then but slowly.

The government has been rapidly improving this line (which the stockholders and directors of the West company had gradually let deteriorate), beginning with the period when the government voted to take it over and make of it a state railroad; and this new bridge was one of the necessary improvements. Not only did the old one constitute an element of danger, as will be readily recalled by every American who has passed over it after leaving ship at Havre or who has been on a visit to the ancient city of Rouen, but it was an obstacle to the heavy traffic out of the Gare St. Lazare at Paris, which daily handles the largest number of trains of any railroad terminal in the world.

With the declaration of war and the heavy movements of English troops, of munitions of war and of hospital trains over the line, the completion of the bridge became yet more necessary.

The new bridge is 1,065 ft. long, some 165 ft. more than the width of the Seine at this point. One of its piers rests on the island of Brouilly, near the river's north shore. It is of the cantilever type, the steel superstructure being divided into four sections. The third one opens for a space of 285 ft. to permit the passage of vessels on the river Seine to or from Paris. The photograph is taken from the upper side of the bridge or from the direction of Paris, the city of Rouen lying to the left of chalk hill of St. Catherine, under which is one of the five old tunnels on this main line from Paris to Havre. A peculiar fact about these tunnels, which have not yet been widened, is that they still limit the size of the freight and passenger cars used throughout the West system. The tunnels were built small originally to accommodate cars not much larger than the old stage-coaches after which they were modeled.



New Bridge at Rouen, France; the Arches and Piers of the Old Bridge Which It Replaces May Be Seen in the Background

it again for military reasons?" I asked one of the construction engineers of the government-owned Western Railway, to which line the bridge belongs.

"Why, the war is over so far as that bridge is concerned," he replied.

This work of peace was begun two and a half years ago; it was interrupted for a few months during the early part of the

The French are rather proud of this bridge, not only because of its completion in war time, but also because the Pacific type locomotives may now be used for the fast trains. These engines are 50 tons in weight and haul 300-ton trains at a speed of 70 miles an hour. When the war is over and when coal is less scarce and passengers more numerous, it is planned to run expresses from Paris to Havre, a distance of 84 miles, in about two hours, instead of the three hours formerly required.

* Our special European correspondent

Master Car and Locomotive Painters' Convention

Reports on Flat Color vs. Enamel Color, Metal Protection, and Design and Protection of Steel Passenger Cars

The forty-sixth annual convention of the Master Car and Locomotive Painters' Association was held at Detroit, Mich., September 14-16. H. Hengeveld, first vice-president, presided under the direction of T. J. Hutchinson, the president, who on account of illness was unable to carry on the physical duties of a presiding officer. The convention was opened with prayer, and the association was welcomed to the city by the mayor, Oscar C. Marx.

President Hutchinson, in his address, commented on the valuable work the Test Committee of the association has done in testing the various kinds of paints placed on the market for different classes of service. He favored further consideration of standard letters and numerals for stenciling all classes of freight cars, believing that there is yet much to be done in providing a more legible letter and numerals with the ultimate advantages of reducing the chances for error when recording car initials and numbers.

PREPARED PAINTS FOR METAL SURFACES

Henry A. Gardner, assistant director, The Institute of Industrial Research, Inc., Washington, D. C., presented an interesting paper on this subject, an abstract of which follows:

In designing protective coatings for metal the modern practice has been to apply the results available from researches into the cause of corrosion. These results have shown that materials of a basic nature, or substances which contain soluble chromates, prevent the rusting of iron. For this reason pigments of a basic nature or pigments containing the chromate radical have come into wide use in the manufacture of protective paints. That they are the best pigments for this purpose has been proved not only in practice, but also in the Atlantic City tests,* which were made on a series of 300 large steel panels, using nearly 100 different pigment paints. Applying the results of these tests to the practical manufacture of protective coatings, the writer will discuss the use of the various pigments under separate headings, taking up the composition of the most widely used colors for metal painting, namely, red, gray, black, and green. Most of the paints outlined herewith are suitable for the painting of structural steel, bridges, steel railroad cars and equipment, ornamental ironwork, poles, posts and for general work on metal surfaces.

Red Lead Priming Paints.—It is well understood that one of the most valuable properties of red lead is its ability to set up to a hard, elastic film that shuts out moisture and gases which are apt to cause corrosion. This cementing action is due to the presence of unburnt litharge, a pigment which rapidly reacts upon linseed oil to form a lead linoleate compound. It will readily be seen, therefore, that red lead free from litharge has no cementing action and should not be considered more protective than iron oxide or any other similar neutral pigment. It is thoroughly essential that red lead should be highly basic and should contain a considerable percentage of litharge, if it is to protect iron from corrosion. It is a growing custom to use prepared red-lead paints made from finely divided red lead ground to a fluid condition in linseed oil. Such paints remain in excellent condition for a long period of time. They have a high protective value and are well suited for general purposes. They are used extensively for priming steel vessels. The Navy Department has found that inert pigments, such as silica and asbestine, give good results when used in ready mixed red-lead paints, their action being to prevent settling of the red lead upon storage.

A specification which may be used by the grinder when purchasing dry red lead for the manufacture of prepared paints is given herewith:

1. The dry pigment to be the best quality, free from all adulterants, and to contain not less than 85 per cent nor more than 90 per cent Pb_2O_3 , the remainder being practically pure lead monoxide (PbO).

2. It shall contain not more than 0.1 per cent of metallic lead, nor more than 0.1 per cent of alkali figured as Na_2O .

3. It shall be of such fineness that not more than 0.5 per cent remains after washing with water through a No. 21 silk bolting-cloth sieve.

NOTE.—If desired, the gram weight of the red lead may be specified. Extremely light, fluffy red lead should run from 10 to 13 grams per cubic inch. Medium red lead will run from 13 to 16 grams per cubic inch. Heavy red lead will run from 17 to 19 grams per cubic inch.

Composition of Red-Lead Priming Paints.—The cost of red-lead paints is a subject of vital importance to the large user. Red lead may be produced in different physical states. Ordinarily the grade that has been overburned is extremely heavy, 1 cu. in. weighing from 18 to 20 grams. For the production of a paint from such red lead, according to the formula used by one large consumer, the following quantities would be required:

Red lead.....	26 lbs.
Linseed oil.....	26 gills
Petroleum spirits.....	3 gills
Drier	3 gills

This would produce approximately 12/5 gal. of paint. Each gallon would contain about 20 lb. of red lead, the actual cost of the red lead itself being in the neighborhood of \$1.60. A red lead of a much better protective value, containing from 10 to 12 per cent of free litharge and produced in an extremely fine physical state of comminution, so that 1 cu. in. would not weigh over 12 to 15 grams, would produce a paint of exactly the same body on the following formula:

Red lead.....	20 lbs.
Raw linseed oil.....	26 gills
Turpentine	3 gills
Drier	3 gills

This would produce approximately 1 1/3 gals. of paint, each gallon of which would contain about 15 lb. of red lead, the actual cost of the dry pigment per gallon being in the neighborhood of \$1.20. Red lead of still lighter gram weight could be used, so that a still smaller quantity of pigment would be required per gallon of oil. The durability of such paints should compare favorably with those containing very high percentages of red lead of high gram weight. Pigments of an extremely light nature, such as lampblack, grind in very large quantities of oil, yet their films are more elastic and durable than many paints which are composed of much pigment and little oil.

Red Paints.—Iron oxide has always been one of the most widely used pigments for the manufacture of protective coatings. Oxides that are free from acid or soluble substances give the best results. There are many grades, from the brilliant Indian reds, containing 98 per cent, down to the natural mined brown shale oxides, containing from 30 to 60 per cent of ferric oxide, the balance being silica, clay, etc. Venetian reds, consisting of about equal parts of ferric oxide and calcium sulphate, are also quite widely used. It is customary to add to iron oxides from 10 to 20 per cent of zinc chromate, zinc oxide, or red lead, in order to make them rust inhibitive. Such red paints are widely used for application to tin roofs, metal siding and general structural steel. Red paints made from basic lead chromate (American vermilion), the pigment which gave the best results in the Atlantic City tests, would doubtless be the most economical in the long run, but the high cost will probably prevent their use to any great extent. The use of a percentage of basic chromate of lead in iron-oxide paints is to be approved.

Gray Paints.—Mixtures of white lead (basic carbonate or basic sulphate) and zinc oxide, tinted gray with carbon black,

*For full description of tests and further information see Proc. Amer. Soc. for Test. Mater., Vol. IX, 1909, pp. 203 and 204; Vol. X, 1910, pp. 79-86; Vol. XI, 1911, pp. 192-194; Vol. XIII, 1913, pp. 369-371; Vol. XIV, 1914, pp. 259 and 260.

are widely used for this purpose and give excellent results in every climate.

A valuable rust-inhibitive coating for general priming or finishing work may be prepared from sublimed blue lead. The use of two parts of blue lead and one part of linseed oil containing about 5 per cent of turpentine drier makes a paint of the right consistency. This may be purchased in prepared form. The rust-inhibitive value of this pigment is due to the high percentage of lead oxide (litharge). When purchased ground to a paste in 10 parts of oil, there should be added approximately 5 gals. of linseed oil and 1 pt. of drier for use. A specification for blue lead for use in metallic paints is given herewith.

	Minimum.	Maximum.
Lead sulphate.....	44 per cent	52 per cent
Lead oxide.....	33 per cent	40 per cent
Lead sulphide.....		0.5 per cent
Lead sulphite.....		3.5 per cent
Zinc oxide.....		3.0 per cent

Black Paints.—Black paints are often preferred for the finishing coat on steelwork, carbonaceous paints being unsuited for application direct to the metal on account of their rust-stimulative action. Carbon pigments, such as gas carbon black, oil black, artificial and natural graphite (flake and amorphous) are usually the base pigments used in black paints. Silica and other earth pigments may be combined with the carbon. The slow-drying nature of such paints is lessened by the addition of litharge. The use of boiled linseed oil as a vehicle is advisable.

Magnetic black oxide of iron (precipitated) forms an excellent black protective paint when ground in linseed oil. The slightly basic character of this pigment accounts for its inhibitive value. The natural variety of black magnetic oxide of iron is also suitable for this purpose, but should be tested for freedom from soluble acid impurities before use. Willow charcoal is not made in commercial quantity; its use, therefore, will be restricted. Its inhibitive value depends on the basic nature of the impurities present.

Green Paints.—Mixtures of zinc chromate and Prussian blue in oil are highly inhibitive and have proved satisfactory in long service tests. Chrome yellow tinted with black oxide of iron to an olive shade is permanent and protective. Chrome green made from lead chromate and Prussian blue is generally used when precipitated upon a barytes base.

Painting Galvanized Iron.—Roofing, siding, railing, drain pipes, cornice work, etc., constructed of galvanized iron require painting if they are to be kept in a good state of preservation. Paints are apt to peel from galvanized iron on account of the smooth, spangled surface. This condition, however, is obviated by first treating the metal before painting with a solution of copper salts. Such a solution may be prepared by dissolving 4 oz. of copper acetate, copper chloride or copper sulphate in one gallon of water. By brushing on this solution the galvanized iron is roughened, a thin deposit of copper being plated out over the surface. After an hour or so, the surface may be lightly brushed and then painted with a thoroughly inhibitive oil paint. Firmly adhering films are thus produced.

Painting Tinned Surfaces.—Tin plate, such as is used for roofing and siding, will rapidly corrode unless protected by paint. The pin-holes present in the tin coating on the steel base metal act as pockets to catch moisture, which causes rust spots and pit-holes. Before applying paint to the sheets it is advisable to rub the surface of the tin with a cotton rag saturated with benzine or turpentine. This will remove the palm oil that is present on the surface and allow the paint to firmly adhere. Iron-oxide paints containing an inhibitive pigment are widely used for preserving tin. The use of 15 to 20 per cent of zinc oxide, red lead or zinc chromate with a neutral bright iron oxide produces an excellent paint. The partial use of boiled linseed oil or kanri gum mixing varnish will add to the gloss and water resistance. Such paints are also suited for use on metal shingles and pressed-steel siding—plain black, galvanized or tinned. For dipping purposes, turpentine or high boiling point mineral spirits should be used for thinning. Cheap driers containing a low boiling point benzine should be avoided.

TEST COMMITTEE REPORT

The tests conducted by the several Master Painters' Associations and Committee D-1 of the American Society for Testing Materials have given definite results that may be summed up as follows: First, a composition paint made from a combination of several pigments will give better results than a single pigment paint; second, the pigment contained in a paint should be selected to meet the requirements of the service and the nature of the material it is expected to protect; third, carbon is not a rust inhibitive pigment, and it is generally acknowledged that carbon paints do not make a good primer for steel but there is no doubt but what carbon paints make the best cover or body coating for steel structures exposed to the action of alkali or acids. Tests have proved that paints should be selected to meet service and climatic conditions.

The test committee this year devoted its time to the study of paint vehicles. It is believed that the efficiency of linseed oil for paint purposes can be greatly increased by different forms of treatment, and that treated oils properly thinned will produce better paint vehicles at reduced cost than can be obtained by the use of raw linseed oil. The committee conducted tests along these lines, preparing films from different grades of linseed and china wood oil. It was found that practically all of the air dried films absorbed a higher degree of water than the baked film of the same material, showing that the baking closes up the pores and binds the several coats together better than the air drying method. The committee contended that a heat-treated oil containing a percentage of volatile oil sufficient to make it flow freely, will give better protection to steel than an oil that absorbs a high percentage of water. The results of the tests on steel plates demonstrated this. In substantiation of these conclusions quotations were read from a paper presented by Maximilian Toch, published in the June number of the Industrial and Engineering Chemistry, and also a quotation published in the same journal from Henry A. Gardner.

The test committee consisted of J. W. Gibbons, chairman (A., T. & S. F.); J. McCarthy (G. T.); W. H. Dutton (L. V.), and W. A. Buchanan (D., L. & W.).

PAINT COLOR VS. ENAMEL COLOR

Two papers were presented on this subject, one by M. L. Shaffer, of the Pennsylvania, and the other by J. B. Shuttleworth, of the Boston & Albany. Mr. Shaffer said in part:

It has been thoroughly demonstrated by tests extending over many years that the advantages in the use of a properly prepared varnish color are much greater than might be expected. In car work it has been the aim of the painter to make as elastic a foundation as possible, and experience has shown that if a color is applied that has been properly mixed with a rubbing varnish in the form of an enamel the general principle of elasticity is carried through the entire operation of painting.

There are many other distinct practical advantages which may be briefly noted as follows: First, the color being ground in varnish can be applied heavier and consequently will especially on repair work, tend to fill up and repair any slight imperfections on the surface. Second, the varnish color will hold out the succeeding varnish coats much better than will a flat color. By the use of a standard varnish color one coat of clear finishing varnish may be entirely eliminated, thus saving not only the cost of such a coat but the labor cost of application. Third, owing to the nature of the varnish used in making these enamels the color is more permanent and much less likely to fade.

Mr. Shuttleworth spoke strongly in favor of the enameled color over the old flat color, substantiating very clearly the claims made by Mr. Shaffer.

DESIGN AND PROTECTION OF STEEL PASSENGER CARS

Two papers were presented on this subject, one by John D. Wright of the Baltimore & Ohio and the other by George War-

lick of the Chicago, Rock Island & Pacific. Mr. Wright said in part: Both the design and construction of steel cars have a direct influence on the paint coatings which are applied to protect the metal, and they in turn determine in a large measure the life of the vehicle. From observations made on steel passenger equipment cars that have been in service for some time it appears that steel roofs, decks, deck screens, sash and doors are the principal parts to be considered, so far as the relation of the design and construction to the preservation of metal is concerned. A canvas roof if properly applied and painted at the outset is more evenly preserved than the all-steel roof, and it can remain longer in service without being repainted. On the steel cars the deck screens are objectionable because they form pockets in which the gases from tunnels and the cinders and moisture may collect, finally destroying the paint coating and starting corrosion. They are, furthermore, objectionable because the corrosion, which takes place back of the screens, cannot be detected without removing the screen frame. The arched roof with ventilators is preferred to the projecting surfaces common with the deck or clerestory construction.

It is strongly urged that for both the exterior and interior finish of steel cars smooth, level steel sheets be used in order to reduce the number of coats of surfacer and the amount of glazing and puttying to be done, to say nothing of the sandpapering and rubbing necessary to secure a good finished surface. Rough sheets require too much paint material to make a level surface. From past experience it would appear that the steel window sash cannot well be protected by paint, and they do not seem to be an improvement over the wood sash for use in steel equipment. Steel doors have also given a lot of trouble, having rusted out entirely after a few years' service.

The following is an abstract of Mr. Warlick's paper: In the construction of steel cars the body should be as plain as possible. No countersunk rivets or butt joints should be used. Open corners should be eliminated as far as possible, as they will hold dust and moisture, ultimately causing corrosion. Sharp corners should also be eliminated, and the joints should be soldered inside and out. Better results would be obtained were the Gothic sash not used, and the deck should be plain without projections that will hold the dust, cinders and moisture. Roofs should be plain and without the standing seams; where the side and deck panels are used they should be bent in one piece. The arch type of roof is preferred to the deck roof on steel equipment for this reason. Better results will be obtained if the interior of the steel car is finished in wood, as expansion and contraction on the steel finish cause the paint to crack.

Discussion.—The members strongly favored smooth steel sheets, claiming that the extra cost of these sheets will be fully warranted from the painting and maintenance standpoint. Some roads use aluminum doors with good success. Other members also spoke strongly in favor of the canvas roof on steel equipment; others objected to the use of screens which have been applied in many cases in the same manner as on wooden equipment. Mr. Hutchinson called attention to the stainless steel, manufactured by the Firth Sterling Steel Company, which might offer a solution to some of the difficulties experienced where excessive corrosion takes place.

PRICE VERSUS QUALITY IN BUYING PAINT STOCK

W. O. Quest of the Pittsburgh & Lake Erie presented a paper on this subject, an abstract of which follows:

In many instances the secret paint mixtures which have been sold by reliable paint manufacturers, and have proved to be of the first quality, cannot be safely imitated, regardless of the physical chemistry or the claims of the maker of the imitation, whose usual effort is to make and sell his product at such a low price that it is almost irresistible to a close buyer. A large percentage of the successful and fast surfacing systems of today are the original productions of the railway car and locomotive paint shop, and as a rule such specialty paints are recognized for their merits and worth and not by the price for which they are sold. The labor for applying the paint, costing ever so much

more than the very best of paint stock, makes the enforced use of a cheap and inefficient paint stock almost a criminal waste of valuable time and money.

Something new and cheap in the form of paint or varnish is at least dangerous until it has proved its worth. Mistakes in purchasing paint material can never be remedied without large expense. The painter should be consulted when a change of the quality of the paint is contemplated.

MAINTENANCE OF ENAMEL COLOR VERSUS VARNISH FINISH

Two papers were presented on this subject, one by E. B. Stair of the Atlanta & West Point, and the other by J. W. Quarles of the Chesapeake & Ohio. An abstract of Mr. Stair's paper follows:

When considering an exterior finish of enamel or varnish color compared to the regular varnish finish it can be said that the former will not wear or clean as easily and economically as the latter. With the enamel or varnish color the same luster is not obtained as with the clear varnish of a good quality. Several years ago a body enamel Pullman color was used on the exterior of several coaches, and it was found that the working qualities of the product were such that it was anything but a pleasure to apply, and the appearance of the job was not as satisfactory as that obtained from the varnish finish. It also did not wear as well, nor did it clean as easily nor as cheaply as the varnish finished job. We had some postal cars finished on the interior with white enamel and it proved to be more expensive to clean than cars finished with a varnish over the enamel, as the dirt penetrated into the enamel, requiring considerable rubbing to get it out.

The following is an abstract of Mr. Quarles' paper:

There is no question but that the varnish finish will give much better service as regards wear or durability, where the varnish is of a grade as good as the enamel or varnish color. The enamel or varnish color being soft and easily cut will wear out more quickly with the friction of cleaning than will the varnish finish. Any color pigment or matter mixed with the varnish is certain to weaken the elasticity according to the strength of the coloring matter required to produce an opaque varnish color. If a low grade of varnish is to be used in finishing, the good grade of enamel or varnish color would be preferred on passenger equipment.

PROTECTING STEEL WITH PAINT

P. J. Burns, foreman painter of Hoboken shops of the Pennsylvania, read a brief paper on this subject, an abstract of which follows:

The initial rusting of steel invariably commences on the sharp edges and minute projections existing on iron and steel surfaces, which proves that it is practically impossible to obtain a uniform protection when a brush is used in applying the paint. The lasting qualities of the "smalted" signs are well known. We have come to the conclusion that by substituting a very fine sawdust for the sand, using it in the same manner, and by painting over the sawdust we can secure a very much better metal protective coating. This might be carried farther by having a coating of fresh paint with a substance that will completely cover the metal and fill up all the small holes and cracks, cover the rivets and in fact form a ground for the subsequent coating. There is a large variety of materials that may be used, such as abestine, cement or any inert pigment. The finishing coat can be made very heavy and applied freely so as to completely cover the material.

INTERIOR FINISH OF STEEL PASSENGER CARS

A paper by J. C. F. Kunkel, Pennsylvania Railroad, discussed the most practical and economical method of maintaining the interior of steel passenger cars, whether grained or painted, appearances being considered. Mr. Kunkel outlined several of the troubles experienced with paint on the interior of steel cars, stating that the more elastic the protecting coat the better would be the result. He recommended the straight color finish instead of graining or stippling, as the marred parts of the

car can be repaired with far less expense and time, the color to be of a light tint, which will not require a high finish and will not show irregularities so prominently.

Discussion.—Several members stated that they had found it very difficult to make satisfactory repairs on the interior of the car where it was stippled or grained. For that reason the straight color finish is strongly favored, some members advocating the wood interior finish for that specific reason. However, as the steel equipment has not been in service sufficiently long, no definite action was taken on this subject.

OTHER BUSINESS

The following officers were elected for the ensuing year: President, H. Hengevelt, Atlantic Coast Line; first vice-president, John F. Gearhart, Pennsylvania; second vice-president, J. W. Gibbons, Atchison, Topeka & Santa Fe; secretary-treasurer, Albert P. Dane, Boston & Maine. The secretary reported a membership of 292. Wilmington, Del., received the largest number of votes for the next place of meeting.

A BANKER'S VIEW OF THE RAILROAD QUESTION*

By A. B. LEACH

President, Investment Bankers' Association of America.

Through our membership there has been placed in this country and in Europe a very large percentage of all of the railroad bonds and stocks, the proceeds of which have served to build up that magnificent system of transportation lines which this country has been proud of. Savings banks, insurance companies and the general investment public are the owners today of these securities, while a considerable proportion of them is held abroad. In view of this situation a very strong and able committee of our members attended a session of the Interstate Commerce Commission when the eastern railroad rate question was under consideration. They presented, with all possible emphasis, the investor's position in relation to the rate question, that the railroads should be granted the increase asked for. Whatever may have been the errors or failures or mistakes of mind or purpose in the issuing of some of these securities, the fact remains that the railroads have become a very important, if not the most important, industry of this country and the investments in railroad securities form a very large percentage of the security for the savings of our people in more than one way. The railroads today are facing new conditions. They face them—

In the character of the service they are called upon to render;
In the enormous volume of freight and passenger traffic to be handled;

In the new equipment necessary; safety appliances prescribed by commissions;

In the always pressing need of new terminals, additional tracks and sidings.

The Interstate Commerce Commission seems to place great stress upon the need of physical valuation of railroads, and seems to believe that the physical valuation should be made a basis for the interest return upon the capital actually shown in physical property today and the rates should be made on that as a base.

I submit to the just and reasonable consideration of the American people, and primarily the American shipping and business men, whether in any business in which we are connected, which has taken a number of years to build up, it would be fair to make its valuation depend absolutely on the physical property available. Vast sums of money have been spent not only in development, but also for intangible assets. I do not mean now that necessarily we should capitalize franchises and rights, for from the commission's viewpoint these rights and franchises are not an asset, but are available only to earn a deficit. The physical valuation of the railway properties will cost a large sum of money (running into many millions), but it will be

of little value and practically obsolete when completed, and serve but a small purpose in just and reasonable rate making. The difference to the farmer in the sale of his products, the difference to the merchant in the cost of his goods, the difference to any shipper in the advance of rates requested by the railroads, is so small that it is practically a negligible quantity.

May I not submit, too, that the watchword of Americans and America is "progress"? The past of each and every one of us is full of mistakes and regrets. Today let us have confidence and feel assured that from our errors and mistakes of the past we can reach to higher levels of progress and development for our country and our common good. Whatever the railroads' history in the past has been signifies but little at present to the railroads and the communities they serve unless it teaches us fair treatment for each other and common efforts for the common good.

Let us not forget that the railroads are furnishing the life currents of a large portion of the country; they are the largest employers of labor, they are the largest purchasers of supplies and materials, they constitute one of the greatest, if not the greatest, of American industries. The Interstate Commerce Commission—I find no fault and make no criticisms, but simply make the statement—was appointed not alone as guardian of the shipper, but also as the guardian of the railroads, and if our railroads are to succeed, a new vision and a new disposition on the part of this commission and of the state commissions must be brought about by the pressure of public sentiment, by the pressure of business, by the pressure of the investor.

In this great West the need for additional railroad facilities, additional mileage, is felt constantly. Increased railroad facilities can do more—and will do more—to develop the country than any other one agency. Take away from the investment world the confidence in railroad securities, the staunch belief that investments in railroads will always receive fair treatment, and the railways of the country face bankruptcy. I could name a long list of railroads which have fallen by the wayside, and are now in the hands of receivers, and although I will agree with the most radical as to the mistakes or errors—and crimes, if you will—that have been committed in the handling of some of these properties, I will say to you, nevertheless, that today is the time to forget; let us leave the past behind.

The new thought that is in the mind of the railroad managers today is explained by the plan of the Atchison management, carried out by what is known as the "Harmony Special." The railroads are prepared and ready to meet the public on a fair basis, on the basis of service, on the basis of mutual justice. But the public, and public sentiment, should meet the railroads in a similar manner.

What would it benefit the state of Colorado, what would it benefit the country as a whole, if as a punishment of the sins of the past the railroad mileage of the country were forced into the hands of a receiver, if lack of confidence in this great American industry is abroad and consequently new developments cease? I insist there is none. I would like to leave with the convention, I would like to leave with the state of Colorado, I would like to leave with the vast western world, of which I am proud to be a son, the thought that the day has come for a new alignment of public thought, and of public effort, when we shall all join, the shippers, the railroads, the investment world, on the basis that with the conditions of today the need for fair treatment accorded to the railroads is imperative, and that from today on the public should give the commission and their servants to understand, if recent developments have not already taught that lesson, that what this country needs is service, what we need is good equipment, what we need is railroads prepared to push developments, and this can only be realized by such fair treatment of the railroads as will restore the confidence of the investment public. Until that time, and I believe and hope it is coming nearer every day, we shall not get back that degree of prosperity of which this abundantly resourceful country, when given a fair chance, is capable.

* From the President's address to the Investment Bankers' Association at its annual convention at Denver, Colo., on September 20, 1915.

Recent Progress in the Federal Valuation Work

The Methods Are Being Revised and Standardized
and Increased Results Secured in All Departments

With the covering of 3,870 miles of line by the federal roadway and track valuation parties in June, and 4,060 miles in July, Director Charles A. Prouty feels assured that his original estimate of 50,000 miles of road valued per year will be reached and maintained from now on, and that the field work will be completed by January 1, 1920, the date originally set. This is borne out by the fact that the progress noted above has been made in a season of unusual rainfall with correspondingly heavy interference with field work and also by the fact that increased efficiency may be expected from month to month as the men become increasingly familiar with their duties. The original estimates of the director were based upon the placing of 16 roadway and track parties in each district, but in view of the progress which is now being made with 12 parties in each district, it is doubtful if the additional parties will be required to cover the allotted mileage. It is not considered

to show all the property of the carriers. The exact point to which this detail should be carried is hard to determine, as there is a wide difference of opinion among railway men themselves. In many instances the government forces are grouping the component units of an article into one item, believing that even if the estimates of individual units vary considerably, the average will be correct within all practical limits. At the same time, increased attention is being given to this subject and the men are being furnished with information showing the relative values of the different units making up the whole.

On September 1, roadway and track parties had completed the inventory on about 30,000 miles of road and 40,000 miles of track. Field work has been entirely completed and tentative reports have been prepared for the commission on a number of roads, including the Texas Midland, the New Orleans, Texas & Mexico, the San Pedro, Los Angeles & Salt Lake,



Excavation Across Embankment Showing Extent of Settlement

advisable to attempt to cover much in excess of 50,000 miles per year because of the large amount of incidental and office work which must keep pace with the field work.

The amount of line which may be covered properly by a roadway and track party in a day is a difficult one to determine. It is to the interest of the government and the railroads alike, that, having started, the work be completed as soon as possible. In view of the expense to the government, there is also a desire that each party cover the maximum number of miles per day. In some instances this has led to complaint on the part of the roads that the work was being done too hastily and that the data was not being collected in sufficient detail

and the Atlanta, Birmingham & Atlantic. Among the larger roads on which roadway and track parties are now engaged are the Boston & Maine (6 parties), the New York, New Haven & Hartford (3 parties), the Big Four (5 parties), the Pere Marquette (4 parties), the Illinois Central (4 parties), the Chicago, Rock Island & Pacific (8 parties), the Great Northern (8 parties), and the Chicago, Milwaukee & St. Paul (4 parties).

Awaiting the receipt of the information requested from the roads in Valuation Order No. 14, dated February 9, 1915, regarding unit prices, no values have been assigned to the units of materials. The government computers have the quantities

figured closely up to the field parties and have entered these quantities on the final summary sheets, so that on the determination of the unit prices, it will be a comparatively simple problem to apply them to these quantities and to arrive at the cost.

REVISION OF FIELD METHODS

With the expansion and increased experience gained with the continuation of this work, important modifications in methods are being made. One of the most important changes has been in the adoption of the "type" method of making the field inventory on the Boston & Maine, and later on the Pennsylvania and other roads. With this method many details are grouped into types, corresponding to the standards of the road under valuation. With many items such as culverts, concrete box drains, turnouts, etc., this can be done readily. It is only necessary then to designate the types and to measure the special dimensions of the individual units, as for instance, the length and diameter of concrete pipes, when taking the field notes. Unit quantities are established for these various types, which also reduce the computation work materially. With the adoption of the "type" method on the Boston & Maine, a special form of notes was adopted, providing for the computation of all quantities on the original data sheets. These sheets are made in duplicate and one copy is furnished to the road. In this way it receives a duplicate of the original field notes and computations rather than an entirely separate copy.

Another method followed extensively on the Boston & Maine is that of making borings in embankments wherever there is any indication of settlement. Many of the lines along the coast cross salt marshes, while other lines further inland pass over fresh water swamps. The settlement in such banks consists in compressing the water out of the upper strata of the original ground without creating the mud waves frequently found in other parts of the country. A chance excavation across an abandoned embankment revealed the condition shown in one of the accompanying photographs. In this particular instance the original ground line had settled $1\frac{1}{2}$ ft. under an embankment only $3\frac{1}{2}$ ft. high.

Because of the prevalence of this condition, the carrier secured two wash boring machines and borings are now made in embankments at all points where it is thought that such settlement may exist. These outfits follow at some distance after the roadway parties and make borings either in the center of the track or on the shoulders of the fill at points designated by the pilot with the roadway party. A government inspector accompanies each wash-boring party and the carrier will insist that all extra quantities discovered in this way be added to the original yardage figures. Another deviation from the original methods of organizing roadway and track parties is in the formation of such parties jointly by employees of the government and the carrier. On the inauguration of the valuation work, all field notes were taken by the government forces and the railroad furnished only a pilot with each party to point out to the government engineers all elements of value. Where a road desired to secure its own data to check the government figures, it made an entirely independent survey, creating a duplication of work. Largely to avoid this the Boston & Albany and the government have organized a joint party composed of two government and the remainder railroad employees. As worked out on this road, one of the government men is chief of party and the other is the recorder taking the notes. The railroad receives a copy of all notes taken. In addition to avoiding duplication of work, this method has the advantage from the standpoint of the government of reducing materially the costs of the surveys, while from the railroad standpoint the employment of a large number of the party gives a closer control over the speed and accuracy of the work and insures that the work be covered in sufficient detail to meet its desires. A similar method has been worked out for two parties on the Big Four. On the Chicago, Rock Island & Pacific, this plan has been further modified to two parties on the Chicago terminals so that

the railroad puts on the entire parties and takes all notes, and the government only sends a pilot with each party to see that the work is performed in accordance with the government standards and to receive a copy of all notes taken. These will be checked later by the government so far as may seem necessary.

In general, the lines originally established to divide the country into five districts are being adhered to with the exception that when one district undertakes work on a line, the general principle has been established that this district will continue the valuation on that road, even though this takes it into other districts. This eliminates the necessity of one railroad dealing with two or more district organizations. Thus, the Eastern district is planning to cover the Baltimore & Ohio system as far west as Chicago and St. Louis, crossing the southern and entering the central districts. The Southern district has already covered the lines of the Big Four in Illinois in the central



Wash Boring Outfit to Determine the Amount of Settlement of Embankment

district. The Western district is valuing all lines of the Rock Island outside of the Chicago terminals, although a large portion of these lines lie in the central district, while the Pacific district is covering all the lines of the Great Northern as far east as Duluth.

Wherever practicable, the roadway parties depend upon train service to carry them from their camps to work and no motor cars are provided for them. The bridge, building and signal parties are supplied with motor cars, as their work is more scattered.

BRIDGE, BUILDING AND TELEGRAPH WORK

It has not been definitely decided at this time whether in valuing the buildings, this valuation should be based upon unit prices per cubic foot of volume or per square foot of floor area, or on a detailed inventory of materials. This subject is now receiving the serious consideration of the government officers and definite instructions will be issued in the near future. At the present time the method followed in the central district is based primarily upon a bill of material. Where standards exist on the different roads, bills of material are made up carefully for these and applied so far as practical to structures found on the line. The detail with which the notes are taken in the field depends upon the extent to which the buildings be-

ing measured conform to standards. In addition to sketches, photographs are used freely to elaborate the notes.

Previous to sending bridge parties out over a line, officers of the government go to the offices of the roads and secure essential data regarding bridges, including the sizes and the dimensions of the various members from the plans. This information is furnished to the forces in the field, who check these dimensions with the structures and note any inaccuracies. With a complete set of plans in the office, it is possible to reduce very materially the field work of the bridge parties in this way. In general, one bridge man, one building man and one helper, accompanied by the pilot of the railway company, go over the line as one party.

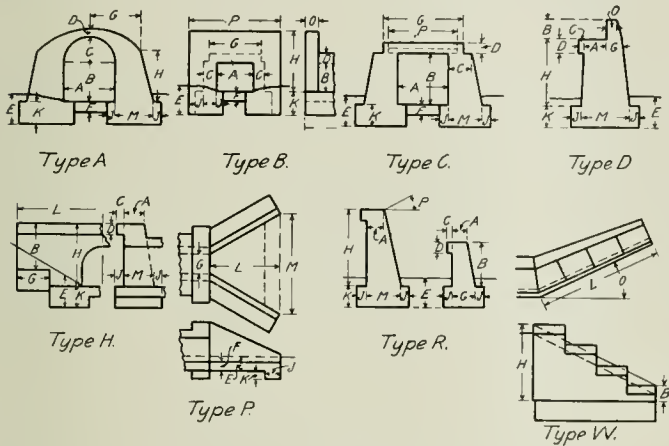
In some instances it has been found economical to combine the signal and telegraph parties, as in this way all the necessary data for both departments can be secured by passing over the road once. Before starting on a road, the telegraph and

taken from the car accountant's records. In examining work equipment, such as pile drivers, steam shovels and cars engaged in ballast service, it is necessary to go over the entire line. At the present time the government is not valuing the property of private car lines, including the Pullman Company and the various fast freight lines, although this will probably be taken up at some time in the future.

All passenger equipment is being inspected, including sleeping cars and similar equipment, where owned directly by the road. In inspecting passenger and freight cars they are considered in three parts, the body, the underframe and the truck, and notes of their condition are taken accordingly. The age of each series of equipment is also available from the records of the carrier.

All locomotives are examined in detail, whether on the lines of the owning carrier or not. On the New Orleans, Texas & Mexico, the larger part of the locomotives were off the line of the owning company and it was necessary for inspectors to go to this latter road to make their inventories.

In listing shop equipment, a number of the carriers have pro-



Typical Culvert Types

railroad companies are called upon to agree as to the ownership of all lines. The government then makes its valuation on the basis of this agreed ownership. On heavy lines a walking inventory of the telegraph lines is taken, noting carefully the condition of typical units. One feature which is requiring particular attention from this department is the condition of the iron wire, the quality of which has undergone material change in recent years.

MECHANICAL INVENTORY

Another phase of the valuation work in which material progress, has been made in the past few months is in the inventory of equipment. In general, these classes of mechanical parties have been organized, locomotive, car and shop equipment parties. Each of these parties is composed of one government and one railroad employe, both of whom have been selected because of their general experience in this field. As a rule, men of the grade of general foremen or higher have been assigned to this work. These men agree regarding the condition of all equipment inspected and make a joint inventory. Comparatively little difficulty has been encountered in securing agreement as to the various details.

Not less than 10 per cent and as high as 25 per cent of the total number of freight cars in each series are being inspected, the percentage depending on the number of cars in the series and their condition. Obviously the smaller the number of cars in any particular group, the larger is the percentage inspected to get accurate data. As a general principle, it has been the practice to continue to inspect cars of a particular group until both parties felt that representative data had been secured. Most of the cars are inspected in the terminals, although they are caught wherever possible, and in some instances where the number of cars in any particular group were small, it has required a careful search to locate a sufficient number. The existence of cars not inspected is verified from records of recent movements

LOCATION		LINEAL FT. OF PIPE		TYPE		CULVERTS HEADWALLS, RETAINING WALLS, ETC.																DATE		BY	
STATION		DIP		DIP		DIMENSIONS																DATE		BY	
						SEE DIMENSION NOTATIONS IN TYPE																			
						A B C D E F G H I J K L M N O P Q R S T U V W X Y Z																			
5+47		B		3 4 2 1 5 5		2 4 4 2 2 5 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1																			
5+47		W F		2 3		- - 5 - - 3 - - 1 1 2 2 1 - -																			
14+38 24		18		2		24																			
14+38		H R		2		- - 2 - - 3 - - 7 2 2 - -																			
92+66		D R		18 2		- - 4 - 15 3 - 2 2 3 5 2 1 5 -																			
92+66		2-6"x12"x8" girders		2-12"x12"x8"		2-6"x12"x8" 2-8"x12"x8" 2-8"x12"x8"																			
92+10		D R		2 2		- - 6 - 2 4 - 2 3 0 4 2 1 5 -																			
		2-6"x12"x8" girders		2-12"x12"x8"		2-6"x12"x8" 2-8"x12"x8" 2-8"x12"x8"																			

Typical Form of Field Notes for Culverts, Using the Type Method

vided the government with detailed registers of their materials. The government employees check this against the equipment found in the shops as of the given inventory dates, take condition notes and secure the age of the equipment from the records of the carrier.

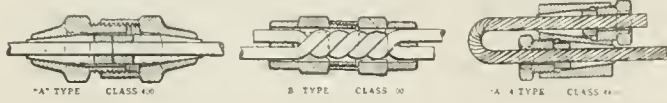
Aside from the completion of the valuation work now in progress, the law requires that this be kept up-to-date after it has been completed. One of the problems now confronting the government is the organization of a force to continue the revision of the records on those roads on which the work has been completed. This will require the organization of an additional force of considerable magnitude, as the latter problem is no small one in itself.

TRANSCONTINENTAL LINES IN SOUTH AMERICA.—Transcontinental traffic over the South American railway line extending from Buenos Aires to Valparaiso is still interrupted by winter storms, and blocked along the route in the mountainous regions, especially in the Chilean section. This unusually long suspension of through business on this occasion has led to an increased discussion of a second line for Chile. An alternative route from Argentina to the Pacific seaboard would be by the railway line extending in a northwesterly direction from Buenos Aires connecting with the railway system of Bolivia, and thence by existing lines to the Pacific. Work on the proposed line from La Quiaca, which lies on the boundary line between Argentina and Bolivia, to Tupiza, Bolivia, has just been begun, and it is hoped that this will within a comparatively short time give to South America a second transcontinental line.

FARGO'S CABLE CONNECTORS

The illustrations show typical designs of strong and well made connectors which have recently been brought out by the Fargo Manufacturing Company, Poughkeepsie, N. Y., and which have found favor on a number of railroads for both telegraph and signal wires.

Type "A" (Fig. 1) is a compression device by means of which the butt ends of cables are brought together so tightly at the joints that the conductivity secured is practically as high



Figs. 1, 2 and 3—Fargo Clamps

as if the metal were actually welded together. In type "B" (Fig. 2) the ends of wires or cables are twisted together in much the same manner that a lineman makes connections, except that the work of twisting is done by means of a wrench. The result is that each joint is uniform, with the least expenditure of time and skill. With either type of connector there is no dependence on the case as a conductor. Both types are made in a variety of forms.

The compression type of connector is made up of two coup-



Fig. 4—Ground Wire Connection

plings or sleeves, male and female, and two cone-shaped grips with composition ends where they grip together. The cable ends that are to be connected pass through these gripping cones and when the couplings are screwed together the grips are wedged against the cables. At the same time the grips are drawn toward each other, so that the cable ends can be pressed one against the other as tightly as may be desired.

The type "A" connections are used also for guy wires, span wires, and, in fact, for all uses where cables are ordinarily

poles, is shown in Fig. 4. The upper end (left in the picture) has a type "B" connector, and the lower end type "A."

With all these designs much time is saved in installation as all the work involved is pushing the cable ends into the grip and then screwing up several turns on the male casting. One lineman is said to place one of these cable grips in six minutes. The connections are made either with single or with double grips in series.

The same general principle is applied to cable locking, bus-bar

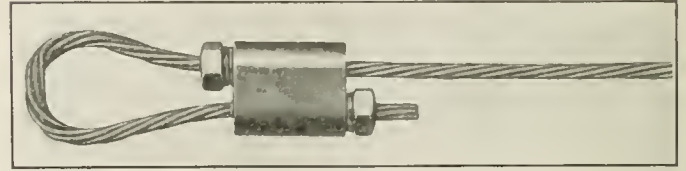


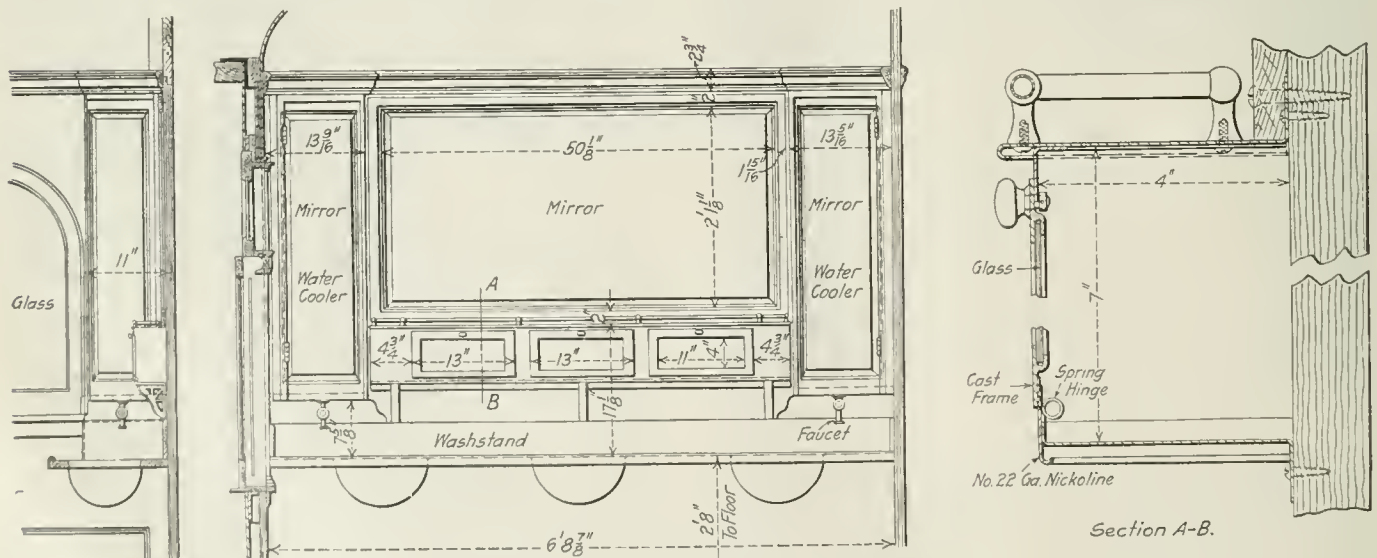
Fig. 5—Fargo Clamp; Type A4400

connections, guy terminals with bolts that thread into the dead-ending insulator, terminal connections, ground points and even wye, ell and tee connections. These various devices are made up merely by changing the shape of the casting that takes the place of the coupling in the straight cable connection.

Type "B" is made in practically all the forms suitable for the type "A" construction. Connections of this type are made for either single or double joints, the latter being provided for by an extra section of couplings with a central diaphragm containing two holes for the cables. This forms the joint in two twisted sections in series with each other.

SLEEPING CAR TOWEL RECEPTACLE

When towels are placed in the overhead racks ordinarily used in the toilet rooms of sleeping cars they are likely to collect more or less dust and become saturated with the odor of coal smoke. In order to avoid this, the Canadian Northern is using in its sleeping cars a closed receptacle for towels, as shown in the drawing. This is of metal construction, with glass doors in front, and is placed directly over the wash basin



Closed Receptacle for Clean Towels in Sleeping Cars

spliced. In one design of steel cable grip the gripping cones are set side by side in a single casting, the pressure on the cable being applied by stuffing boxes that are screwed against the ends of the gripping cones (Figs. 3 and 5).

A simple and compact design for fastening a wire to a ground point, as used for lightning arresters, and for ground wires on

in the toilet rooms so as to be most convenient for passengers. The doors are provided with spring hinges so that they close automatically.

This towel cupboard was developed in the office of A. L. Graburn, mechanical engineer of the Canadian Northern, Toronto, Ont.

General News Department

The locomotive forces at the Terre Haute (Ind.) shops of the Vandalia have been working on full time—54 hours per week—since the first of the month. The men in the car department have been working on this basis for some time.

The Wabash Railroad has made advances in the wages of station agents and telegraphers, to begin November 1, amounting to nine per cent. The 12-hour work day for agents will in most cases be reduced to ten hours. The overtime rate of pay, 25 cents an hour, will be advanced to 35 cents an hour.

The valuation committee of the National Association of Railroad Commissioners is circularizing the different state railway commissions with the idea of organizing a bureau at Washington to represent the state commissions in connection with the Interstate Commerce Commission's valuation of railroad property.

The express messenger on train No. 25 of the Lake Erie & Western, arriving at Indianapolis on the evening of September 15, reported that near Arcadia, 28 miles northeast of Indianapolis, he had been robbed. The single robber, after intimidating the messenger with a revolver, is said to have carried away money and jewelry valued at several thousand dollars.

The waiting rooms in the stations of the Nashville, Chattanooga & St. Louis are to be adorned with pictures of interesting views and agricultural scenes along the company's lines. Several hundred pictures have been made and will be enlarged and framed. The idea is not only to turn the prospective passenger's mind toward agriculture and show him the possibilities of the territory through which he will shortly be traveling, but also to brighten the appearance of the waiting rooms and break the monotony of the usual tariffs and time tables.

The New Hampshire Public Service Commission held hearings at Concord this week in connection with its investigation of the affairs of the Boston & Maine. Testimony was given to the effect that since January 1, 1912, the expenditures of the railroad in New Hampshire to influence legislation have amounted to \$841,267, of which \$258,132 went for payments to attorneys and \$116,811 for advertisements. Over \$25,000 is said to have been spent in a campaign in opposition to the extension of the Grand Trunk southward, through New Hampshire toward Boston.

The United States Civil Service Commission announces examinations October 20 for the following positions in the department of valuation of the Interstate Commerce Commission: junior architect, junior structural engineer, junior telegraph and telephone engineer, junior signal engineer, junior mechanical engineer, junior electrical engineer and junior civil engineer. Candidates for all these offices must be between the ages of 21 and 36, and the salaries range from \$720 to \$1,680 a year, except for junior architect, where the salaries will range from \$1,200 to \$1,680.

The Lehigh Valley Railroad, following the example of the authorities of the Pennsylvania Railroad and the city of New York, has made a thorough physical examination of all persons having to do with the preparation or serving of food in public places—that is, of all dining car employees. One hundred per cent. was the condition reported. The examination included also the workers in the headquarters of the dining car department at Easton, Pa. The company had its own surgeons make the examination, and a strict standard, including personal cleanliness, was adhered to. These examinations will be made periodically.

The Maryland State Industrial Accident Commission has reopened the question whether it has jurisdiction in cases involving accidental personal injuries to railroad employees engaged in interstate commerce, where the accident was not caused by the negligence of the employers. Some time ago the commission decided in the negative. A section of the Maryland compensation law provides that no compensation shall be paid in cases where

the Federal Employers' Liability Act applies. But the federal act provides compensation only in case of an accident where the railroad shall be found negligent. The Maryland act provides compensation in all cases except where it shall be shown that the employee caused the accident. The question arises whether the Maryland law applies in cases of accident to an interstate employee where the railroad cannot be shown to have been negligent.

Strikes of laborers occurred this week at a number of freight stations in New York (Manhattan) and at Weehawken and Communipaw, on the New Jersey side of the Hudson river. At the waterside stations of the New York Central, at Sixtieth street, New York, 250 men struck for an increase of 50 per cent in the rates of pay for work done on Sundays and holidays; and the demand was granted. Several hundred freight handlers at the Baltimore & Ohio terminus on Staten Island struck. There were strikes of freight handlers at the Lehigh Valley station in Communipaw. About 300 men in the freight houses of the New York, New Haven & Hartford at New Haven, Conn., struck on the 16th. There appears to be no general organization and it was expected that the trouble at New York would be short lived, many new men having been taken on; but embargoes on perishable freight were placed by two roads on Wednesday.

Employees' Life Insurance on the Brooklyn Rapid Transit Lines

The announcement of the Brooklyn Rapid Transit Company, Brooklyn, N. Y., that over 5,200 of its employees had applied for insurance under the plan of group life insurance, which was announced last July, was noticed briefly last week. This insurance is secured by a special arrangement with the Travelers' Insurance Company, of Hartford, Conn. The insurance became effective September 15. Inasmuch as more than 5,000 employees (65 per cent of all those eligible) have applied for the insurance, no physical examination will be required. Employees who are now eligible for the insurance as the result of having served two years in the employ of the road will be allowed until January 1, 1916, to come into the group without physical examination. After that date any employee who was eligible for the insurance prior to September 15, 1915, will be admitted to the group only upon a physical examination. In the case of employees who become eligible for the insurance hereafter, by the completion of their two years of service, the arrangement between the railroad company and the insurance company provides that such employees may be admitted to the group without physical examination if they apply for the insurance within six months after the date upon which they become eligible for it.

The applications thus far received call for aggregate premiums of \$56,000 a year. One half of this is paid by the employees and one half by the road.

The circular issued by the company says that this insurance is the cheapest life insurance that has ever been offered under a group plan toward which the employee contributes. For employees under 32 years of age the share of the premium which they will be called upon to pay (for \$1,000 insurance) will be about 7 cents a week. The premium increases slightly as age advances, but these increases are small. For example, those 50 years old pay a little over 13 cents a week; those 60 years, 26 cents. As before announced, a faithful employee, retired under the company's pension plan, will obtain what is equivalent for him to a paid up policy for \$1,000.

Special privileges have been obtained whereby any employee leaving the road may within a limited time obtain any one of the regular life or endowment policies issued by the insurance company without physical examination. Employees who are insured in the group not only are not penalized in case they leave the service and thereby drop out of the B. R. T. group, but are placed in a better position than if they had undertaken to insure as individuals at the age when they insured with the group, for in that case they would have had to undergo a physical examination.

Railway Revenues and Expenses for the Fiscal Year

Total operating revenues of the railways in the United States for the fiscal year ending June 30, 1915, amounted to \$2,889,029,457, or \$166,404,055 less than in 1914, according to the compilation of the Bureau of Railway Economics, giving the complete figures for the revenues and expenses of Class 1 roads, those having annual revenues of over \$1,000,000. By drastic economies the operating expenses were reduced to \$2,032,689,894, a decrease of \$186,244,099. Net operating revenue as a result shows an increase of \$22,840,044, to \$856,339,581. Total operating revenues averaged \$12,641 per mile, a reduction of 6.3 per cent; operating expenses averaged \$8,894 per mile, a decrease of 9.3 per cent, and net operating revenues averaged \$3,747 per mile, an increase of 1.8 per cent. Taxes amounted to \$133,993,519, a decrease of \$2,765,192, or 3 per cent per mile, while operating income was \$721,705,717, an increase of \$24,991,787, or 2.6 per mile. These figures cover 228,554 miles of line.

It should be noted that the decrease in total revenues in 1915 comes after a decrease of \$65,691,076 in 1914, as compared with 1913, and that the slight gain in operating income is obtained by comparison with a year in which there was a decrease in this item of \$118,657,668. And as nearly half of the reduction in expenses represents decreases in the maintenance accounts it is apparent that the small improvement in net for the year was gained only

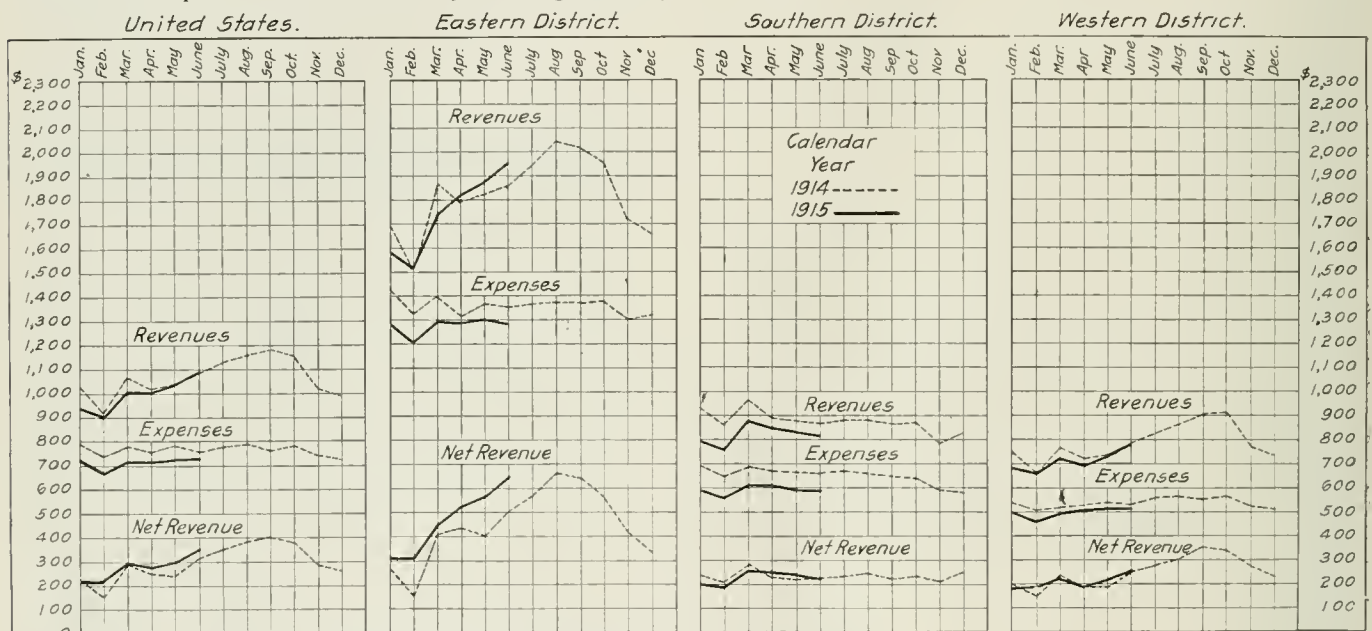
in all parts of the country. In June, 1914, net operating income per mile was 9.8 per cent less than in June, 1913.

Total operating revenues amounted to \$249,489,452, an increase from 1914 of \$366,431. Operating expenses were \$167,147,556, a decrease of \$12,080,015. Net operating revenue amounted to \$82,341,896, an increase of \$12,446,446. Taxes amounted to \$11,345,126, a decrease of \$516,782. This left \$70,860,953 for net operating income.

Operating revenues per mile of line averaged \$1,090 in June, a decrease of 0.6 per cent. Since aggregate revenues increased slightly, this decrease per mile is due to an increase in mileage of 1,700 miles. Operating expenses per mile averaged \$730, a decrease of 7.4 per cent; net operating revenue per mile averaged \$360, an increase of 16.9 per cent; taxes per mile were \$49, a decrease of 5.1 per cent. Net operating income was \$310, an increase of 21.2 per cent. Railways operating 228,827 miles are covered by this summary, or about 90 per cent of the steam railway mileage in the United States.

Operating revenues of the Eastern railways per mile increased 3.3 per cent, as compared with June, 1914, operating expenses decreased 7.4 per cent, net operating revenue increased 33.4 per cent, taxes increased 2.1 per cent, and operating income increased 39.2 per cent.

Operating revenues of the Southern railways per mile show a



Monthly Revenues and Expenses per Mile of Line in 1914 and 1915

by deferring many needed expenditures on roadway and equipment to some future date.

The increases in net operating revenue are entirely attributable to the more favorable showing of the Eastern roads in 1915 than in 1914. The Western and Southern group of lines show decreases both in total operating revenue and in net in spite of reductions in operating expenses. The relatively more favorable showing of the gross and net earnings of the Eastern roads was partly due to the fact that the advances in freight rates allowed by the Interstate Commerce Commission in the 5 per cent case were in effect a part of the year.

Reduced to a per-mile basis, the operating revenues of the Eastern group of railways decreased 4.9 per cent; operating expenses decreased 10 per cent; net operating revenue increased 11.5 per cent; taxes decreased 1.9 per cent; operating income increased 14.4 per cent. On a similar per-mile basis, the operating revenues of the Southern railways decreased 10.4 per cent; operating expenses decreased 10 per cent; net operating revenue decreased 11.3 per cent; taxes decreased 3.6 per cent; operating income decreased 12 per cent. Again, on a per-mile basis, the Western railways shows a decrease in operating revenues of 5.6 per cent; a decrease in operating revenue of 1.6 per cent; a decrease in taxes of 3.7 per cent; a decrease in operating income of 1.3 per cent.

Net operating income for June increased \$54 per mile, or 21.2 per cent, as compared with June, 1914. This increase was almost entirely due to reductions in expenses, which have been effected

decrease of 5.9 per cent, operating expenses decreased 9.4 per cent, net operating revenue increased 5.0 per cent, taxes decreased 7.2 per cent, and operating income increased 7.4 per cent.

Operating revenues of the Western railways per mile decreased 2.7 per cent, operating expenses decreased 6.3 per cent, net operating revenue increased 5.3 per cent, taxes decreased 10.3 per cent, and operating income increased 8.4 per cent.

Yale Engineering Association

The Yale Engineering Association, now being organized along the lines of similar associations conducted by the engineering graduates of other universities, will hold its first meeting in New Haven early in November. This association has as its primary objects: to help the educational work at Yale; to establish cordial and mutually helpful relations between Yale engineers, and, in general, to come into association with similar college engineering organizations for the promotion of good fellowship and engineering knowledge, to encourage Yale men to join the national technical societies, etc. The organization will appeal most strongly to those engaged in engineering, transportation and manufacturing, but any Yale graduate will be eligible for membership. The officers are: president, Edwin M. Herr, president of the Westinghouse Electric & Manufacturing Company; vice-president, Harry N. Covell, works manager of the Lidgerwood Manufacturing Company, Brooklyn, N. Y., and secretary-treasurer, Richard T. Dana, consulting engineer.

OPERATING RETURNS OF RAILWAYS FOR THE FISCAL YEARS ENDING JUNE 30, 1914 AND 1915

(Compiled by the Bureau of Railway Economics from returns to the Interstate Commerce Commission of railways having annual operating revenues above \$1,000,000)

Operating Revenues																Operating Expenses			Net Operating Revenue			Taxes			Operating Income							
Average miles operated 1915	Operating Revenues			Operating Expenses			Net Operating Revenue			Taxes			Operating Income																			
	1915	1914	Per Cent of increase	1915	1914	Per Cent of increase	1915	1914	Per Cent of increase	1915	1914	Per Cent of increase	1915	1914	Per Cent of increase																	
EASTERN DISTRICT:																																
Ann Arbor.....	294.60	\$2,310,902	0.7	\$1,645,879	\$1,653,418	d0.5	\$665,023	\$641,048	3.7	\$143,460	\$520,994	d72.6	\$476,998	\$476,998	9.2																	
Atlantic & St. Lawrence.....	166.72	1,557,152	d6.1	1,279,475	1,411,263	d9.3	277,677	246,244	12.8	138,019	129,736	d6.4	139,658	116,500	19.9																	
Atlantic City.....	170.22	2,357,275	d2.1	1,969,276	1,999,006	d1.5	387,999	409,007	d5.1	186,500	219,139	d13.1	260,007	260,007	d15.7																	
Baltimore & Ohio.....	4,355.27	91,815,797	d7.3	63,925,508	74,352,216	d14.0	27,890,289	24,732,835	12.8	3,289,611	21,506,370	d84.3	21,506,370	21,506,370	14.3																	
Baltimore & Ohio Chicago Terminal.....	79.50	1,555,299	d3.2	1,084,538	1,307,313	d12.7	470,761	333,165	41.3	222,783	112,200	d120.6	112,200	112,200	120.6																	
Bangor & Aroostook.....	631.56	3,763,398	d3.9	2,601,030	2,927,113	d12.7	1,162,368	1,382,206	15.5	129,917	1,269,600	d90.1	1,269,600	1,269,600	0.1																	
Belt Ry. Co. of Chicago.....	23.37	3,169,166	d3.6	1,704,062	1,877,273	d10.2	1,465,104	1,179,988	24.1	140,587	1,253,516	d15.7	1,253,516	1,058,454	25.1																	
Bessemer & Lake Erie.....	204.49	8,665,548	d3.7	4,759,122	5,833,578	d18.4	3,906,426	2,685,300	45.5	215,585	336,000	d35.8	3,690,770	2,349,000	57.1																	
Boston & Maine.....	2,301.90	46,673,049	d3.1	35,901,762	38,836,219	d7.6	10,762,277	9,304,067	15.7	1,978,223	7,245,050	d72.2	7,245,050	7,245,050	0.0																	
Buffalo & Susquehanna R. R. Corporation.....	252.56	1,444,898	d9.8	1,247,489	1,386,588	d10.0	197,409	215,485	d8.4	31,200	166,209	d81.5	166,209	195,772	d15.1																	
Buffalo, Rochester & Pittsburgh.....	586.48	9,479,936	d11.7	6,935,252	7,965,117	d12.9	2,544,684	2,769,574	d8.1	230,000	2,314,087	d1.7	2,314,087	2,535,574	d8.7																	
Canadian Pacific (Lines in Maine).....	233.30	1,297,609	d6.6	1,093,901	1,384,587	d21.0	203,708	4,718,421	d7.7	134,936	68,772	d49.2	68,772	41,347,322	151.0																	
Central New England.....	303.73	4,055,046	d7.7	2,572,654	2,518,893	d2.1	1,482,392	1,245,367	19.0	139,240	126,804	9.8	126,804	118,443	20.1																	
Central R. R. Co. of New Jersey.....	680.65	2,951,262	d1.7	1,891,307	1,974,844	d4.0	979,950	9,509,248	d3.0	1,433,783	1,339,454	7.0	1,339,454	1,169,794	24.2																	
Central Vermont.....	413.02	3,869,259	d6.7	3,047,311	3,688,529	d17.4	852,348	4,904,288	d7.3	186,270	192,475	d3.2	192,475	297,953	53.7																	
Chicago & Eastern Illinois.....	1,262.41	14,210,002	d9.1	11,605,905	13,086,489	d11.3	2,604,697	2,547,136	2.3	336,000	630,500	d47.0	630,500	1,916,636	2.6																	
Chicago & Erie.....	269.56	6,059,404	d9.8	4,492,837	5,844,915	d33.1	1,557,657	3,322,252	d56.8	202,993	176,300	15.1	1,354,617	d508,552	366.4																	
Chicago, Detroit & Canada Grand Trunk Jct.....	60.00	969,098	d1.6	678,021	5,184,728	d9.8	1,781,871	1,366,600	27.2	35,208	1,560,359	d9.6	1,560,359	1,426,287	9.6																	
Chicago, Indianapolis & Louisville.....	622.41	6,559,665	d0.5	4,612,431	1,787,306	d9.8	5,733,837	3,829,983	49.8	320,771	332,900	d4.4	332,900	244,983	35.9																	
Chicago, Terre Haute & Southeastern.....	372.71	2,186,268	d10.7	8,571,712	9,737,841	d12.0	1,154,260	346,376	d23.2	430,141	721,710	d67.4	721,710	d118,323	70.2																	
Cincinnati, Hamilton & Dayton.....	1,911.08	9,225,972	d10.8	8,571,712	1,437,541	d11.3	381,614	21,377,850	d4.2	70,059	316,594	d78.0	316,594	448,322	75.2																	
Cincinnati Northern.....	245.72	1,541,351	d16.3	1,459,278	1,437,541	d1.6	8,805,790	4,139,027	d51.7	1,549,027	1,469,369	5.4	7,242,192	2,669,692	171.3																	
Cleveland, Cincinnati, Chicago & St. Louis.....	2,372.74	3,524,106	d17.8	2,021,579	2,413,495	d16.2	8,805,790	1,111,967	d121.1	68,836	72,636	d5.2	808,379	1,039,331	d22.2																	
Cumberland Valley.....	163.65	2,898,794	d2.3	2,328,133	4,291,943	d4.9	14,702,656	15,462,187	d4.9	7,999,286	660,607	d0.2	7,339,504	7,105,339	3.3																	
Delaware & Hudson.....	880.55	22,701,942	d0.8	27,411,441	28,777,323	d4.7	15,633,265	14,615,984	7.0	1,025,399	13,526,152	d0.3	13,526,152	12,515,585	8.1																	
Delaware, Lackawanna & Western.....	958.64	43,044,705	d1.0	793,735	852,880	d6.9	283,582	357,453	d20.7	82,491	105,904	d22.1	105,904	251,549	d20.1																	
Detroit & Mackinac.....	400.22	1,077,317	d11.0	742,338	776,136	d4.4	728,822	776,136	d6.1	67,227	66,976	0.4	661,595	709,218	d6.7																	
Detroit & Toledo Shore Line.....	78.95	1,471,160	d3.7	1,541,330	1,541,330	d0.0	1,471,160	2,282,366	d1.7	411,477	287,850	d42.0	43,254	363,741	d46.9																	
Detroit, Grand Haven & Milwaukee.....	140.52	2,655,553	d3.4	2,244,076	2,290,315	d2.8	1,631,443	2,290,315	d28.8	136,136	d77,636,362	d117.5	58,200	77,918	109.2																	
Detroit, Toledo & Ironmount.....	441.29	1,767,580	d16.8	1,631,443	2,290,315	d28.8	136,136	d77,636,362	d117.5	58,200	77,918	d22.2	77,918	d851,216	109.2																	
Elgin, Joliet & Eastern.....	776.74	8,541,355	d24.1	5,298,604	7,755,239	d31.7	3,242,751	3,497,153	d7.3	434,700	426,863	d1.8	2,807,737	3,070,291	d8.5																	
Erie.....	1,987.84	54,790,254	d1.3	41,352,641	40,495,859	d2.1	13,427,793	14,983,953	d10.4	1,593,472	1,689,427	d5.7	11,807,039	13,294,526	d11.2																	
Grand Rapids & Indiana.....	575.03	5,315,747	d4.3	4,070,192	4,446,439	d8.5	1,245,556	1,106,403	12.6	274,624	289,245	d5.1	968,444	817,158	18.5																	
Grand Trunk Western.....	347.05	7,238,465	d0.5	6,054,365	6,150,735	d1.6	1,184,100	1,121,705	5.6	394,027	431,032	d8.6	789,188	690,674	14.3																	
Hocking Valley.....	351.70	6,181,153	d12.0	4,184,370	4,803,747	d12.9	1,996,783	2,217,398	d9.9	418,522	451,136	d7.2	1,577,216	1,766,262	d10.7																	
Indiana Harbor Belt.....	109.54	3,276,224	d0.3	2,262,446	2,504,207	d9.7	1,013,778	780,480	29.9	92,627	75,541	d22.6	920,433	704,938	30.6																	
Lake Erie & Western.....	900.01	5,683,649	d1.0	4,409,746	4,728,228	d6.7	1,273,903	1,015,421	25.5	280,541	267,640	4.8	992,207	747,781	32.7																	
Lake Erie & Hudson River.....	96.60	1,810,585	d2.4	1,174,792	1,293,131	d7.6	622,199	481,661	29.2	50,645	571,555	d43.1	571,555	431,893	32.3																	
Lehigh & New England.....	294.37	2,646,662	d17.3	1,479,802	1,257,280	d17.7	1,166,860	998,520	16.9	67,839	43,126	57.3	1,098,737	955,394	15.0																	
Lehigh Valley.....	1,443.52	42,532,962	d3.8	29,947,388	30,087,948	d0.5	12,578,574	12,082,742	4.1	1,689,109	1,659,281	1.8	10,874,683	10,423,461	4.3																	
Long Island.....	397.62	13,318,081	d0.3	9,075,764	9,304,948	d2.5	4,242,317	3,584,420	18.4	863,055	774,733	d11.4	3,376,281	2,809,687	20.2																	
Maine.....	1,215.94	11,350,423	d4.1	8,143,965	8,685,607	d6.2	3,206,458	3,148,382	1.8	644,785	611,496	5.4	2,561,482	2,536,886	1.0																	
Michigan Central.....	1,800.04	33,769,735	d3.4	24,876,172	27,566,105	d9.8	8,884,563	7,964,955	11.3	1,520,350	1,494,814	2.3	7,350,275	5,876,141	25.2																	
Monongahela.....	72.22	1,125,100	d12.1	619,938	594,313	d4.3	505,162	832,652	d39.3	20,481	27,200	d34.7	484,681	805,452	d39.8																	
New York Central.....	5,942.26	170,417,813	d3.9	119,663,964	137,370,961	d12.9	50,753,849	39,950,245	27.0	9,223,762	8,822,148	4.6	41,516,957	31,128,907	33.4																	
New York, Chicago & St. Louis.....	5,678.90	11,413,773	d3.3	9,063,946	9,761,702	d7.2	2,350,729	2,047,666	14.8	453,767	487,607	d6.9	1,895,989	1,500,064	21.5																	
New York, New Haven & Hartford.....	2,003.17	8,929,264	d3.1	4,426,624	4,923,010	d10.4	2,152,640	18,219,582	d16.6	1,743,921	3,563,355	d23.0	18,500,888	14,656,227	26.2																	
New York, Ontario & Western.....	5,032.16	6,729,962	d3.5	6,542,996	6,910,648	d5.3	2,383,950	2,340,922	1.8	242,455	238,562	1.6	2,141,444	2,102,360	1.9																	
New York, Philadelphia & Norfolk.....	1,192.00	3,816,460	d0.1	3,022,725	3,100,747	d2.5	793,734	712,079	11.5	111,477	105,550	5.6	682,026	606,529	12.4																	
New York, Susquehanna & Western.....	1,401.14	3,153,505	d1.4	2,124,839	2,278,538	d6.7	1,034,666	926,543	11.7	84,104	938,945	d34.3	938,945	777,212	20.8																	
Pennsylvania Co.....	1,757.47	53,652,932	d12.9	40,012,274	46,634,757	d14.2	13,640,659	14,963,5																								

OPERATING RETURNS OF RAILWAYS FOR THE FISCAL YEAR ENDING JUNE 30, 1914 AND 1915. (Continued) (Compiled by the Bureau of Railway Economics from returns to the Interstate Commerce Commission of railways having annual operating revenues above \$1,000,000)

Road	Average miles operated 1915	Operating Revenues			Operating Expenses			Net Operating Revenue			Taxes			Operating Income		
		1915	1914	Per Cent of increase	1915	1914	Per Cent of increase	1915	1914	Per Cent of increase	1915	1914	Per Cent of increase	1915	1914	Per Cent of increase
EASTERN DISTRICT—Continued:																
Vandalia	910.05	\$10,972,885	\$11,255,235	d2.5	\$8,686,453	\$8,842,199	d1.8	\$2,286,433	\$2,413,036	d5.2	\$394,263	\$381,865	3.2	\$1,891,550	\$2,031,172	d6.9
Walash	2,518.54	29,083,788	30,214,858	d3.7	23,178,837	24,651,975	d6.0	5,905,951	5,562,883	6.1	968,877	1,044,310	d7.2	4,931,005	4,518,573	9.1
Western Maryland	661.23	6,834,459	8,277,092	d4.0	6,257,412	7,859,740	d20.4	2,426,047	4,17,352	48.1	306,000	263,205	16.3	2,119,188	154,147	1,271.8
West Jersey & Seashore	356.47	6,634,491	6,569,778	d0.5	5,280,256	5,309,524	d0.6	1,254,235	1,260,256	d0.5	343,624	316,850	8.5	910,264	943,404	d3.5
Wheeling & Lake Erie	512.13	5,428,069	7,658,424	d29.1	4,039,740	5,296,660	d23.7	1,388,329	2,361,764	d41.2	385,907	396,831	d2.8	1,002,407	1,964,933	d49.0
SOUTHERN DISTRICT:																
Alabama & Vicksburg	142.78	1,403,067	1,860,650	d30.1	1,314,147	1,524,156	d13.8	178,920	345,494	d48.2	95,241	97,798	d2.6	82,153	247,697	d66.8
Alabama Great Southern	306.44	4,776,430	5,496,175	d12.0	3,653,374	4,269,411	d14.4	1,122,056	1,156,766	d3.0	177,030	189,857	d6.3	944,263	966,908	d2.3
Atlanta & West Point	92.60	1,186,338	1,266,524	d6.9	934,379	900,725	d3.7	250,959	314,709	d20.3	75,078	82,911	d9.4	175,454	231,888	d24.3
Atlanta, Birmingham & Atlantic	642.17	2,650,483	3,309,361	d21.0	2,374,111	2,766,954	d14.2	282,372	632,407	d55.3	146,682	172,042	d14.7	133,807	460,365	d70.9
Atlantic Coast Line	4,686.61	31,530,475	36,905,677	d14.5	22,904,157	26,294,507	d12.9	8,632,318	10,611,170	d18.6	1,589,157	1,561,159	1.8	7,038,197	9,050,011	d22.2
Birmingham Southern	42.93	796,495	1,161,830	d31.4	647,521	835,856	d22.5	148,977	325,974	d54.3	29,191	25,223	15.7	119,786	300,752	d60.2
Carolina, Clinchfield & Ohio	248.23	2,131,162	2,520,306	d18.4	1,121,669	1,185,828	d5.4	1,009,493	1,334,478	d24.4	157,248	124,802	25.9	851,936	1,209,586	d29.6
Central of Georgia	1,924.09	12,108,184	14,326,575	d18.5	8,973,512	10,785,764	d16.8	3,134,672	3,540,811	d11.5	576,544	631,597	d8.7	2,547,633	2,909,214	d12.4
Charleston & Western Carolina	340.64	1,765,636	2,095,812	d18.5	1,361,344	1,600,467	d14.9	404,292	495,345	d11.4	64,484	66,651	d3.3	339,730	428,694	d26.7
Chesapeake & Ohio	2,360.20	39,464,037	37,459,864	d5.4	27,556,414	26,413,866	d4.3	11,907,623	11,045,965	7.8	1,349,497	1,330,335	1.4	10,549,914	9,715,030	8.6
Cincinnati, New Orleans & Texas Pacific	3,327.27	9,422,252	10,962,100	d14.0	6,807,448	7,811,110	d12.8	2,614,804	3,150,990	d17.0	372,105	368,000	1.1	2,241,689	2,782,990	d19.5
Florida East Coast	719.93	5,513,478	5,397,546	d2.1	3,418,531	3,716,214	d8.0	2,094,947	1,681,432	24.6	236,090	239,717	d1.5	1,857,999	1,441,715	28.9
Georgia R. R. Lessee Organization	307.00	2,791,500	3,327,444	d16.1	2,332,399	2,632,073	d11.4	459,191	695,371	d33.0	56,740	37,261	46.0	403,083	658,110	d38.8
Georgia Southern & Florida	395.00	2,215,773	2,508,760	d14.7	1,843,662	2,115,522	d12.9	372,111	483,238	d23.0	116,180	136,220	d14.7	253,405	347,018	d27.0
Gulf & Ship Island	307.56	1,633,006	1,996,934	d18.2	1,110,352	1,375,146	d19.3	522,654	618,088	d15.0	92,057	90,057	1.5	430,234	531,098	d19.0
Illinois Central	4,770.03	62,111,552	66,373,503	d6.4	47,975,197	51,292,781	d6.5	14,136,355	15,080,722	d6.3	3,233,838	3,341,247	d3.2	10,878,473	11,739,475	d7.3
Kanawha & Michigan	176.60	2,911,415	3,110,672	d6.4	2,064,072	2,220,481	d7.0	847,343	890,191	d4.8	137,781	124,806	10.4	709,527	765,384	d7.3
Louisville & Nashville	5,030.67	51,606,015	59,006,467	d13.9	39,431,789	45,012,305	d12.4	12,174,226	14,894,162	d13.3	2,145,109	2,600,288	d17.5	10,023,052	12,288,155	d18.4
Louisville, Henderson & St. Louis	199.80	1,307,190	1,381,823	d1.1	1,088,151	1,025,008	d6.2	309,039	356,815	d13.4	38,425	45,463	d15.5	270,460	311,352	d13.1
Mobile & Ohio	1,122.48	10,982,149	13,082,823	d15.5	7,933,656	10,122,145	d21.6	3,048,493	2,880,438	5.8	385,591	416,519	d7.4	2,660,762	2,463,919	8.0
Nashville, Chattanooga & St. Louis	1,230.52	10,936,533	12,884,359	d15.1	9,099,622	10,195,523	d10.7	1,836,911	2,688,836	d31.7	318,333	326,557	d2.5	1,516,614	2,362,270	d35.8
New Orleans & Northeastern	203.73	3,486,255	4,057,275	d14.1	2,642,427	3,143,438	d15.9	843,762	1,213,837	d27.7	176,872	182,586	d3.1	1,666,151	2,31,250	d38.9
New Orleans Great Northern	282.77	1,599,999	1,874,986	d14.7	1,051,138	1,143,862	d7.2	548,861	724,124	d26.0	35,583	38,736	5.0	512,992	708,541	d27.6
New Orleans, Mobile & Chicago	402.95	1,771,473	2,290,986	d19.7	1,320,086	1,453,309	d9.1	450,787	732,305	d40.1	75,338	85,726	d11.5	374,126	666,578	d43.9
Norfolk & Western	2,041.95	42,987,044	44,650,310	d3.7	27,831,815	30,135,407	d7.6	15,155,229	14,514,903	4.3	1,878,800	1,620,000	15.9	13,276,418	12,894,903	3.0
Norfolk Southern	900.04	3,875,875	4,266,846	d9.2	2,973,878	3,183,991	d6.6	901,997	1,082,855	d16.7	130,943	136,309	d4.0	769,671	946,456	d18.7
Richmond, Fredericksburg & Potomac	87.68	2,907,830	2,578,393	d2.4	1,852,764	1,912,233	d3.1	1,055,066	1,066,158	d1.0	87,847	91,430	d3.9	967,014	974,728	d0.8
Seaboard Air Line	3,105.59	21,280,463	25,420,533	d16.3	14,922,534	17,443,706	d14.6	6,357,929	7,056,797	d20.1	1,062,247	999,000	6.3	5,286,779	6,957,797	d24.0
Southern	7,031.42	62,199,510	70,750,907	d12.1	46,174,711	51,760,649	d10.8	16,024,799	18,990,348	d15.6	2,595,828	2,679,390	d3.1	13,400,055	16,310,958	d17.8
Southern Ry. Co. in Mississippi	280.61	992,913	1,289,586	d23.0	900,666	1,040,554	d13.4	92,247	249,032	d63.0	101,874	190,864	1.0	d10,146	148,168	d106.8
Tennessee Central	293.71	1,481,404	1,707,339	d13.2	1,259,451	1,299,249	d3.1	221,953	408,090	d45.6	56,061	53,763	4.3	165,720	354,327	d53.2
Virginia & Southwestern	240.14	1,799,301	1,939,104	d7.2	1,338,706	1,370,867	d2.3	460,595	568,237	d18.9	80,815	77,410	4.4	379,769	490,827	d22.6
Virginian	503.59	5,820,406	6,556,499	d11.2	3,376,851	3,666,769	d7.9	2,443,555	2,889,730	d15.4	253,336	257,195	d1.5	2,189,974	2,632,535	d16.8
Washington Southern	35.57	1,263,358	1,297,852	d2.7	905,804	928,408	d2.4	357,554	369,444	d3.2	40,659	43,962	7.5	316,731	325,482	d2.7
Western Ry. of Alabama	133.07	1,252,293	1,511,085	d17.7	1,054,450	1,156,811	d8.8	197,843	354,274	d44.2	63,854	59,673	d7.0	133,374	294,601	d54.7
Yazoo & Mississippi Valley	1,378.41	11,836,984	12,552,596	d5.7	8,343,201	8,707,323	d4.2	3,493,783	3,845,273	d9.1	593,150	583,772	1.6	2,898,369	3,261,502	d11.1
WESTERN DISTRICT:																
Arizona Eastern	366.75	2,200,786	2,812,378	d21.7	1,377,672	1,638,281	d16.0	823,114	1,154,097	d28.7	151,111	160,658	d5.9	671,370	993,440	d32.4
Arizona, Topeka & Santa Fe	8,492.15	97,082,746	93,540,268	d3.8	61,384,299	60,172,701	d2.0	35,698,447	33,367,567	7.0	4,748,259	4,773,441	d0.5	30,930,100	28,594,126	8.2
Bingham & Garfield	26.87	1,346,009	1,775,538	d24.2	561,113	672,685	d16.6	784,896	1,102,853	d28.8	33,415	35,456	d5.8	751,481	1,067,397	d29.6
Chicago & Alton	1,033.48	14,245,624	14,259,479	d0.1	11,072,707	12,307,744	d10.0	3,172,917	1,951,735	62.6	508,839	568,938	d10.6	2,660,584	1,382,797	92.4
Chicago & North Western	8,107.82	80,779,675	81,590,335	d1.0	56,371,573	60,301,575	d6.5	24,408,102	21,287,759	0.6	4,516,943	4,252,790	6.2	19,883,905	20,004,969	d0.6
Chicago, Burlington & Quincy	3,339.31	91,125,065	94,397,311	d3.7	60,341,367	63,224,853	d4.4	30,683,694	30,462,288	0.7	4,681,840	4,016,658	1.6	26,577,688	26,445,631	d0.5
Chicago Great Western	1,427.91	13,920,780	14,399,730	d3.0	10,146,567	10,923,634	d4.4	3,474,118	4,426,105	1.4	580,027	498,764	16.3	2,889,931	2,927,341	d1.3
Chicago Union	23.01	1,957,565	2,090,767	d6.6	1,552,701	1,545,013	d0.3	324,354	484,751	d33.1	23,899	28,443	19.0	200,810	456,318	d34.3
Chicago, Milwaukee & St. Paul	10,045.50	91,415,374	93,617,701	d2.3	61,973,701	62,800,301	d1.5	29,463,673	30,723,399	d4.1	4,746,527	4,106,557	15.6	24,685,841	26,616,841	d7.3
Chicago, Peoria & St. Louis	258.47	1,597,908	1,683,803	d4.0	1,112,314	1,186,470	d6.3	471,594	492,679	d4.1	65,862	72,265	d8.9	119,732	404,935	d236.1
Chicago, Rock Island & Pacific	426.75	2,900,445	2,838,833	d2.2	2,188,174	2,135,300	d2.5	712,271	703,553	d1.2	93,660	115,055	d18.7	688,038	588,498	5.0
Chicago, Rock Island & Pacific	7,844.52	68,036,217	65,836,989	d3.8	57,339,255	49,500,521	d3.7	16,696,962	16,336,469	2.2	3,249,857	3,200,577	1.5	13,415,308	13,115,254	2.3
Chicago, St. Paul, Minneapolis & Omaha	1,732.81	17,841,348	18,210,083	d2.0	12,107,598	12,834,117	d5.7	5,733,750	5,375,966	6.7	1,015,029	973,293	4.3	4,713,887	4,402,684	7.1

a Returns for 1914 and 1915 are not fully comparable. d Decrease or deficit. dd Increase or deficit. * Less than one-tenth of one per cent.

OPERATING RETURNS OF RAILWAYS FOR THE FISCAL YEARS ENDING JUNE 30, 1914 AND 1915. (Continued)

(Compiled by the Bureau of Railway Economics from returns to the Interstate Commerce Commission of railways having annual operating revenues above \$1,000,000)

	Average miles operated 1915	Operating Revenues			Operating Expenses			Net Operating Revenue			Taxes			Operating Income		
		1915	1914	Per Cent of increase	1915	1914	Per Cent of increase	1915	1914	Per Cent of increase	1915	1914	Per Cent of increase	1915	1914	Per Cent of increase
WESTERN DISTRICT (Continued):																
Colorado Southern.....	1,100.66	\$7,662,277	\$7,674,557	d0.2	\$5,557,784	\$5,658,715	d1.8	\$2,104,493	\$2,015,842	4.4	\$423,150	\$397,543	6.4	\$1,680,932	\$1,618,299	3.9
Colorado, Midland.....	377.64	1,698,780	1,773,313	d4.2	1,341,176	1,754,952	d12.2	357,604	18,461	753.7	109,709	108,000	1.6	47,895	489,539	153.5
Cripple Creek & Colorado Springs R. R.....	86.65	1,235,728	1,228,512	d0.6	691,512	703,304	d11.7	544,216	525,208	3.6	66,824	75,865	d11.9	477,392	449,343	6.2
Denver & Rio Grande.....	2,571.46	21,823,236	23,593,641	d7.5	14,289,671	16,460,569	d13.2	7,533,565	7,133,072	5.6	1,020,606	1,009,144	1.1	6,511,607	6,123,564	6.3
Denver & Salt Lake.....	355.46	1,645,085	1,215,561	35.4	715,107	916,812	d21.6	929,978	298,349	77.5	76,776	36,587	109.8	453,202	261,962	73.0
Duluth & Iron Range.....	282.01	4,824,001	5,090,270	d5.6	2,761,606	3,585,736	d22.1	2,062,999	3,054,343	d32.4	248,658	350,917	d29.1	1,814,339	2,702,626	d32.9
Duluth, Missabe & Northern.....	366.97	7,302,071	7,301,267	d0.1	2,900,202	4,009,862	d27.1	4,391,869	3,291,405	0.3	326,939	406,118	d19.5	2,974,930	2,885,287	3.1
Duluth, South Shore & Atlantic.....	627.35	9,038,597	3,493,645	d15.9	2,491,835	2,842,414	d11.5	536,762	633,234	d17.8	197,313	247,443	d20.3	339,342	405,791	d16.4
Duluth, Winnipeg & Pacific.....	185.19	1,285,548	1,743,894	d26.3	971,200	1,378,570	d29.6	314,348	365,324	d14.0	44,166	87,721	d26.9	250,182	277,603	d9.9
El Paso & Southwestern.....	1,027.39	7,788,736	9,083,060	d14.2	4,729,225	5,653,071	d16.3	3,059,511	3,429,989	d10.8	400,743	487,224	d17.7	2,643,392	2,942,765	d10.2
Fort Worth & Denver City.....	454.14	5,302,762	4,778,283	11.0	3,831,487	3,580,063	7.0	1,471,275	1,198,220	22.8	144,716	182,072	d20.5	1,326,559	1,016,147	30.5
Galveston, Harrisburg & San Antonio.....	1,346.51	11,212,140	11,972,309	d6.4	9,251,989	9,901,961	d6.6	1,960,151	2,070,438	d5.3	504,114	573,952	d12.2	1,453,907	1,496,485	d2.8
Great Northern.....	8,059.56	67,133,303	76,823,434	d12.6	36,798,928	47,741,090	d22.9	30,334,375	29,081,344	4.3	4,627,944	4,790,573	d3.4	25,703,241	24,290,771	5.8
Gulf, Colorado & Santa Fe a.....	1,937.13	16,250,386	12,882,258	a	11,446,192	9,959,733	a	4,810,194	2,922,525	a	622,115	583,331	a	4,184,521	2,339,194	a
Houston & Texas Central.....	868.74	6,563,488	6,570,737	d0.1	5,182,224	5,576,679	d7.1	1,381,264	994,058	39.0	326,445	326,310	*	1,053,272	667,748	57.7
Houston East & West Texas.....	190.94	1,361,858	1,443,373	d5.6	1,031,927	1,061,696	d0.9	309,931	381,677	d18.8	59,767	57,010	4.8	249,796	324,667	d23.1
International & Great Northern.....	1,159.50	9,083,626	9,963,408	d8.8	7,871,449	8,062,467	d2.4	1,212,177	1,900,940	d36.2	400,000	339,841	17.7	806,500	1,561,099	d48.3
Kansas City, Mexico & Orient R. R.....	739.58	2,449,619	1,903,156	28.7	2,199,351	2,138,164	2.9	250,268	d235,007	206.5	110,544	113,216	d2.4	139,704	d348,223	140.1
Kansas City Southern.....	827.17	10,035,896	10,970,403	d8.5	6,478,821	6,910,931	d6.2	3,557,075	4,060,082	d12.4	574,316	567,857	1.1	2,977,274	3,492,225	d14.7
Louisiana & Arkansas.....	278.72	1,679,951	1,700,209	d1.2	1,113,721	1,135,865	d1.9	566,230	564,344	0.3	82,400	69,255	19.0	483,574	495,089	d2.3
Louisiana Ry. & Navigation Co.....	350.58	2,023,698	1,971,718	2.6	1,535,710	1,545,600	d0.6	487,988	426,118	14.5	111,655	80,060	39.5	376,313	346,058	8.7
Louisiana Western.....	207.74	2,186,500	2,348,788	d6.9	1,536,734	1,707,494	d10.0	649,746	641,294	1.3	124,967	114,372	8.9	524,242	526,562	d0.4
Midland Valley.....	380.19	1,392,739	1,619,499	d14.0	1,080,823	1,344,870	d19.6	311,916	274,629	13.6	69,833	78,083	d11.6	241,430	195,646	23.4
Minneapolis & St. Louis.....	1,646.47	10,111,975	9,306,223	5.1	6,903,504	6,803,126	0.2	3,208,381	2,727,549	17.6	432,070	410,361	5.3	2,776,305	2,317,188	19.8
Minneapolis, St. Paul & Sault Ste. Marie.....	4,102.76	27,763,225	29,320,673	d5.7	17,811,374	19,355,599	d8.0	9,951,881	9,757,984	2.0	1,135,439	1,132,640	0.2	8,816,412	8,769,597	0.5
Missouri & North Arkansas.....	365.24	1,181,851	1,293,618	d8.3	1,333,045	1,223,154	8.8	4,111,961	4,320,810	d5.1	69,815	72,338	d3.5	d221,619	d37,405,620.7	
Missouri, Kansas & Texas.....	3,865.07	32,898,750	31,971,924	3.1	22,967,592	23,222,832	d1.1	9,931,167	8,697,462	d14.0	1,327,871	1,499,521	d11.4	8,584,604	7,191,571	19.4
Missouri, Oklahoma & Gulf.....	334.37	1,174,211	1,177,560	d0.3	1,279,766	1,184,131	8.1	d105,555	480,333	d44.3	70,945	74,309	d4.5	d177,113	d81,162	id118.2
Missouri, Pacific.....	3,920.56	28,325,676	26,606,014	6.1	21,699,164	21,892,703	d0.9	6,626,512	4,803,311	38.0	1,213,763	1,170,180	3.7	5,390,773	3,633,131	48.4
Morgan's Louisiana & Texas R. & S. Co.....	404.33	4,376,736	4,742,576	d7.7	3,417,456	3,673,063	d7.0	959,280	1,069,513	d10.3	246,011	268,623	d8.4	708,858	800,890	d11.5
Nevada Northern.....	165.10	1,204,326	1,761,197	d31.6	691,935	925,708	d25.3	512,391	835,489	d38.7	60,265	81,242	d25.8	452,075	754,247	d40.1
New Orleans, Texas & Mexico.....	285.87	1,475,596	1,581,020	d6.7	1,346,269	1,466,805	d8.2	129,321	114,215	13.2	9,612	18,515	3.1	110,051	95,700	15.0
Northern Pacific.....	6,460.67	63,171,653	70,449,575	d10.3	37,108,049	43,082,458	d13.9	26,063,608	27,367,118	d4.8	4,470,959	5,033,661	d11.2	21,388,493	22,333,457	d3.3
Northwestern Pacific.....	400.99	3,568,701	3,743,893	d4.7	2,599,193	2,653,359	d2.0	969,508	1,092,446	d11.3	190,469	182,852	4.2	778,882	909,593	d14.4
Oregon Short Line.....	2,164.90	19,967,925	22,443,890	d11.0	11,880,519	12,632,306	d6.0	8,087,406	9,803,584	d17.5	1,284,232	1,516,784	d15.3	6,800,172	8,286,800	d17.9
Oregon-Washington R. R. & Navigation Co.....	2,003.04	15,444,056	17,658,067	d12.5	10,057,449	12,207,758	d17.6	5,386,607	5,450,309	d1.2	1,050,104	1,298,871	d19.1	4,335,163	4,151,491	4.4
Panhandle & Santa Fe a.....	669.05	4,041,901	1,350,819	a	3,034,077	911,653	a	1,007,824	439,166	a	117,140	45,010	a	889,122	394,155	a
St. Joseph & Grand Island.....	268.08	1,507,314	1,612,258	d6.5	1,172,925	1,420,441	d17.9	334,389	182,817	82.9	95,263	86,482	10.2	238,792	96,336	147.9
St. Louis & San Francisco.....	4,746.62	40,901,386	42,458,880	d3.7	27,858,045	31,073,710	d10.3	13,043,341	11,385,170	14.6	1,268,264	1,415,348	d10.4	11,755,204	9,969,821	17.9
St. Louis, Brownsville & Mexico.....	548.18	2,292,560	2,660,633	d13.8	1,690,068	2,107,944	d19.8	602,492	552,689	9.0	76,492	88,701	d13.9	525,267	463,988	13.2
St. Louis, Iron Mountain & Southern.....	3,364.65	29,883,620	33,289,717	d10.2	20,860,506	21,494,864	d3.0	9,023,123	11,794,853	d23.5	1,338,666	1,343,253	d0.3	7,662,866	10,451,600	d26.7
St. Louis Merchants' Bridge Terminal.....	9.26	1,813,408	1,232,428	d31.7	1,317,697	1,610,065	d18.2	495,711	133,363	58.2	83,180	167,871	d22.6	412,507	243,493	68.0
St. Louis, San Francisco & Texas.....	234.91	1,141,030	1,480,211	d22.9	1,124,787	1,321,907	d14.9	1,624,431	158,304	d89.7	14,935	18,368	d18.7	1,278	139,937	d99.1
St. Louis Northwestern Ry. Co. of Texas.....	943.30	6,907,573	8,247,467	d16.2	4,557,848	5,211,574	d12.5	2,349,725	3,035,892	d22.6	403,876	389,625	3.7	44,708	2,646,267	d26.5
St. Louis Southwestern.....	810.50	3,720,288	4,544,438	d18.1	3,620,005	4,622,226	d17.7	1,770,050	2,377,788	d35.4	177,963	212,621	d16.2	u261,966	d290,050	d30.7
San Antonio & Aransas Pass.....	724.06	3,997,055	4,648,197	d16.3	6,178,828	7,446,436	d17.0	3,319,068	663,441	d73.3	559,979	160,563	d40.4	16,207	502,878	d96.8
San Pedro, Los Angeles & Salt Lake.....	1,131.84	9,497,896	10,822,568	d13.8	6,178,828	7,446,436	d17.0	3,319,068	663,441	d73.3	559,979	160,563	d40.4	16,207	502,878	d96.8
San Pedro, Los Angeles & Salt Lake.....	1,131.84	9,497,896	10,822,568	d13.8	6,178,828	7,446,436	d17.0	3,319,068	663,441	d73.3	559,979	160,563	d40.4	16,207	502,878	d96.8
Southern Pa.....	6,514.25															

Proper Handling of Equipment

At the September meeting of the Western Railway Club, E. E. Betts, superintendent of transportation of the Chicago & North Western, presented a paper on "The Promotion of the Proper Handling of Equipment." Believing that there was no more complete information on that subject than was contained in the report of the special committee of the General Superintendents' Association of Chicago, of which he was chairman, he presented that report to the club, in full. This was published in the *Railway Age Gazette* of August 13, 1915, on page 281.

The American Electric Railway Association

The thirty-fourth annual convention of the American Electric Railway Association will be held in San Francisco, Cal., from October 4 to 8. Simultaneously there will also be held the annual conventions of the American Electric Railway Accountants' Association, the American Electric Railway Engineering Association, the American Electric Railway Claims Association, the American Electric Railway Transportation and Traffic Association and the American Electric Railway Manufacturers' Association.

The following is the program of the American Electric Railway Association:

MONDAY, OCTOBER 4

9:30 a. m. to 5:00 p. m.

Registration.

TUESDAY, OCTOBER 5

Morning session, 9:30 a. m. to 12:30 p. m.

Address of welcome by Hiram W. Johnson, governor of California.

Annual address of the president; annual report of executive committee; annual report of secretary-treasurer; appointment of committees on: (a) resolutions; (b) nominations, and (c) recommendations contained in the president's address.

Reports of committees on: (a) subjects; (b) education; (c) representing association at the American Good Roads Congress; (d) valuation, and (e) national joint committee on overhead and underground line construction.

Address on "Welfare Work" by Jesse W. Lilienthal, president of the United Railroads of San Francisco. Followed by general discussion.

Reports of committees on: (f) company membership; (g) company section medal; (h) federal relations; (i) Anthony N. Brady medal; and (j) compensation for carrying United States mail.

WEDNESDAY, OCTOBER 6

Morning session, 9:30 a. m. to 12:30 p. m.

Reports of committees on: (a) electrolysis; (b) ways and means; (c) company sections and individual membership; (d) dues of company section members; (e) changes in constitution and by-laws; (f) relations with state and sectional associations, and (g) public relations.

Address on Evils of Government by Jonathan Bourne, Jr., former United States Senator. Followed by general discussion.

Reports of committees on: (h) operation of motor vehicles; (i) Aera advisory; (j) insurance, and (k) standard for car loading.

THURSDAY, OCTOBER 7

Morning session, 9:30 a. m. to 12:30 p. m.

Reports of committee on: (a) cost of passenger transportation service.

Address on the "Foundation Principles of the Valuation of Electric Railways" by Bion J. Arnold, chairman of the board of supervising engineers, Chicago traction. Followed by general discussion.

Reports of committees on: (b) taxation matters; (c) on recommendations contained in president's address; (d) resolutions, and (e) nominations.

Unfinished business; election of officers; installation of officers; adjournment.

FRIDAY, OCTOBER 8

11:30 a. m.

Presentation of Testimonial from Panama-Pacific Exposition Company, commemorative of the 1915 meeting by exposition officers.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the *Railway Age Gazette* for each month.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 8 W. 40th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.

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

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November, 17, 1915, Chicago.

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

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

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.

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

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

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

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

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

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

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

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

MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

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

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

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

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

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May. Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

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

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.

RAILWAY REAL ESTATE ASSOCIATION.—Frank C. Irvine, 1125 Pennsylvania Station, Pittsburgh, Pa. Next meeting, October 13, 1915, Chicago.

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

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

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

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, October 19-21, Colorado Springs, Colo.

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

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

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

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Ken, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

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

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

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JUNE, 1915

Name of road.	Average mileage operated during period.	Operating revenues				Operating expenses				Net railway operation	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) last year.
		Freight.	Passenger.	Inc. misc.	Total.	Way and structures.	Maintenance of equipment.	Traffic.	Trans- portation.	Miscellaneous.	General.	Total.	
Chicago Great Western.....	1,427	\$804,203	\$271,476	\$1,182,131	\$1,182,131	\$177,586	\$144,264	\$49,430	\$397,246	\$7,930	\$24,223	\$382,166	\$99,931
Chicago, Terre Haute & Southeastern...	374	142,848	14,227	160,745	160,745	22,966	10,344	3,221	44,785	759	10,246	68,424	21,453
Chicago Great Western.....	1,427	\$9,645,527	\$3,074,050	\$13,920,685	\$13,920,685	\$1,876,924	\$2,398,216	\$561,526	\$5,150,730	\$85,868	\$384,092	\$10,446,567	\$37,409
Chicago, Terre Haute & Southeastern....	373	1,938,417	189,622	2,186,268	2,186,268	286,609	486,720	41,823	667,924	10,523	118,831	1,612,431	193,962
MONTH OF JULY, 1915													
Name of road.	Average mileage operated during period.	Operating revenues				Operating expenses				Net railway operation	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) last year.
		Freight.	Passenger.	Inc. misc.	Total.	Way and structures.	Maintenance of equipment.	Traffic.	Trans- portation.	Miscellaneous.	General.	Total.	
Alabama & Vicksburg.....	143	\$75,999	\$34,760	\$121,653	\$121,653	\$17,358	\$30,815	\$3,685	\$43,539	\$2,067	\$5,417	\$102,882	\$3,032
Atlantic City.....	170	79,331	271,024	369,261	369,261	23,622	24,172	2,244	2,690,320	43,380	208,241	1,080,433	784,788
Baltimore & Ohio System.....	4,535	6,724,561	1,307,008	8,670,752	8,670,752	836,551	1,650,836	164,758	2,690,320	18,088	9,816	2,882,016	409,358
Central Vermont.....	2,302	2,269,368	1,461,418	4,099,236	4,099,236	516,346	320,602	50,308	1,663,734	1,066	7,042	1,243,210	10,851
Chicago & Eastern Illinois.....	1,282	835,458	258,597	1,191,595	1,191,595	228,693	291,210	22,258	420,130	7,259	41,760	1,009,157	236,402
Delaware & Hudson Co.—R. R. Dept....	2,686	1,277,633	283,214	2,040,150	2,040,150	166,469	293,274	34,125	639,061	16,218	64,574	1,212,527	106,474
Denver & Rio Grande.....	2,977	1,977,831	347,972	2,002,400	2,002,400	383,769	325,220	39,306	521,139	66,882	46,941	1,383,267	529,082
Duluth & Salt Lake.....	2,727	1,034,231	47,721	1,191,700	1,191,700	20,721	26,296	2,900	46,511	.....	5,938	1,02,255	6,023
Duluth, Winnipeg & Pacific.....	183	99,682	16,113	119,301	119,301	12,448	12,754	1,660	35,151	103	6,208	68,324	5,897
Galveston, Harrisburg & San Antonio....	1,351	592,491	243,714	873,959	873,959	112,374	130,954	30,906	345,747	11,704	31,532	662,838	46,269
Georgia, Southern & Florida.....	307	125,199	63,343	205,778	205,778	24,473	36,103	12,307	83,529	98	7,366	141,902	3,194
Houston, East & West Texas.....	395	107,635	53,826	186,498	186,498	22,044	32,905	6,989	71,522	.....	9,862	143,775	3,161
Houston & Texas Central.....	895	381,304	137,061	538,867	538,867	83,662	97,943	16,633	188,506	5,408	20,281	412,082	117,613
Missouri Pacific.....	3,931	1,632,868	496,758	2,331,250	2,331,250	331,419	473,028	59,898	871,062	12,056	86,819	1,843,733	245,276
Mobile & Ohio.....	1,122	742,239	104,354	896,356	896,356	18,846	18,846	34,630	335,136	2,065	30,839	691,101	172,431
Monongahela.....	75	120,464	2,305	124,810	124,810	18,724	3,245	517	23,209	.....	3,053	48,698	76,113
Nashville, Chattanooga & St. Louis.....	1,231	623,834	236,288	142,403	142,403	119,684	178,617	45,725	337,798	9,064	32,814	716,830	199,365
Nevada Northern.....	165	133,916	10,904	148,747	148,747	19,061	11,497	628	26,673	65	4,164	62,087	20,053
New Orleans Great Northern.....	283	101,046	27,792	140,970	140,970	17,088	23,215	2,847	41,124	163	5,945	90,382	12,042
New Orleans & North Eastern.....	204	212,173	47,784	286,336	286,336	26,024	55,224	10,425	89,815	5,619	11,776	198,881	2,409
New Orleans, Mobile & Chicago.....	403	107,908	24,192	139,596	139,596	24,304	4,312	4,212	46,886	.....	7,508	104,172	19,119
New Orleans, Texas & Mexico.....	286	104,255	29,179	141,037	141,037	24,713	21,884	4,289	44,850	.....	10,477	105,943	2,633
New York Central Railroad.....	5,979	8,714,429	4,440,587	15,397,769	15,397,769	1,781,507	2,527,619	242,814	4,606,815	218,103	386,152	9,763,010	4,859,516
New York, Chicago & St. Louis.....	569	773,608	151,455	964,788	964,788	109,680	146,497	49,606	395,827	5,827	20,885	728,322	194,430
New York, New Haven & Hartford.....	2,005	2,967,945	2,426,425	6,247,659	6,247,659	833,452	710,958	36,996	2,041,089	47,883	130,436	3,818,332	613,134
New York, Ontario & Western.....	560	503,333	323,529	961,572	961,572	118,361	124,809	8,002	291,857	.....	15,294	358,322	382,253
New York, Philadelphia & Norfolk.....	112	406,650	44,426	481,464	481,464	42,001	82,583	5,233	163,098	4,492	10,309	368,317	20,394
New York, Susquehanna & Western.....	140	171,747	51,593	261,874	261,874	16,579	26,950	1,691	102,227	.....	6,460	133,899	10,424
Norfolk & Western.....	2,040	3,838,673	490,531	4,463,345	4,463,345	619,878	780,245	52,182	1,098,052	8,159	68,204	2,611,321	1,856,024
Norfolk Southern.....	907	3,327,625	1,052,412	3,327,625	3,327,625	444,439	46,241	7,730	119,370	64	17,302	235,146	12,351
Northern Pacific.....	6,471	11,793,493	3,529,884	16,755,645	16,755,645	974,008	784,545	111,433	1,562,224	109,517	86,962	3,554,434	377,148
Oregon Short Line.....	2,253	1,183,212	555,922	1,904,593	1,904,593	259,602	226,247	38,144	435,781	36,482	53,764	1,048,171	738,722
Oregon-Washington R. R. & Nav. Co....	2,027	794,806	477,436	1,396,980	1,396,980	151,480	157,883	44,137	405,314	15,156	59,398	828,782	95,907
Pennsylvania Company.....	670	240,243	85,474	345,384	345,384	90,850	66,441	4,053	88,001	.....	8,999	237,950	76,326
Pennsylvania Railroad.....	4,528	11,793,493	3,529,884	16,755,645	16,755,645	974,008	784,545	111,433	1,562,224	109,517	86,962	3,554,434	377,148
Perrin Merquette.....	2,262	942,199	441,913	1,552,603	1,552,603	231,301	281,177	32,953	535,193	5,147	41,170	1,126,841	46,889
Philadelphia, Baltimore & Washington....	717	1,092,666	643,612	1,904,687	1,904,687	270,540	344,532	26,078	714,071	24	49,122	1,404,367	54,175
Philadelphia & Reading.....	1,120	3,242,347	559,621	4,008,406	4,008,406	366,144	725,836	38,354	1,333,091	11,293	71,260	2,544,050	100,666
Pittsburgh & Lake Erie.....	225	1,416,356	153,136	1,655,433	1,655,433	149,376	231,256	11,099	332,091	3,321	27,585	764,737	890,696
Pittsburgh, Cin., Chicago & St. Louis...	1,479	2,288,100	733,831	3,390,186	3,390,186	426,616	617,242	63,624	1,143,193	25,648	84,628	2,426,983	963,203
Pittsburgh, Shawmut & Northern.....	294	157,339	9,871	170,355	170,355	27,944	39,937	1,983	46,945	.....	5,443	122,272	16,617
Port Reading.....	21	100,395	129,691	129,691	129,691	12,306	11,238	38	38,361	.....	7,128	62,050	15,067
Richmond, Fredericksburg & Potomac....	88	150,440	71,003	252,927	252,927	18,843	29,963	2,815	84,807	2,942	7,128	146,499	7,586
Rutland.....	468	160,409	113,779	313,758	313,758	46,045	49,569	1,012	106,425	1,012	5,560	219,499	74,258
Saint Louis & San Francisco.....	4,750	2,209,040	934,890	3,558,558	3,558,558	535,579	537,610	62,621	1,065,798	.....	105,850	2,288,462	290,581
St. Joseph & Grand Island.....	238	77,998	27,393	116,156	116,156	26,125	23,840	4,406	43,308	.....	4,962	102,642	5,893
St. Louis, Brownsville & Mexico.....	548	108,495	58,879	183,307	183,307	33,703	20,243	5,176	65,128	.....	9,537	133,549	49,758
St. Louis, Iron Mountain & Southern.....	3,363	1,782,488	463,998	2,432,049	2,432,049	332,590	519,126	64,980	757,852	6,792	58,226	1,759,040	673,008
St. Louis Merchant's Bridge Terminal....	9	.....	135	140,356	140,356	18,141	9,012	773	68,328	.....	7,083	103,336	37,020
St. Louis, San Francisco & Texas.....	235	69,187	22,315	112,039	112,039	22,277	15,149	1,226	40,924	.....	4,018	27,746	26,530
St. Louis Southwestern.....	943	403,716	107,007	547,418	547,418	40,426	97,970	25,438	152,173	3,453	23,008	342,353	17,702
St. Louis Southwestern of Texas.....	811	248,117	80,861	354,209	354,209	49,268	67,484	14,678	138,266	.....	16,027	272,073	67,008

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JULY, 1915—Continued

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses			Net revenue from railway operation	Railway tax accruals.	Operating income (or loss.)	Increase (or decr.) last year.
		Freight.	Passenger.	Total.	Maintenance Way and structures.	Equipment.	Of				
				inc. misc.	Trans- portation.	Miscel- laneous s.	General.	Total.			
San Antonio & Aransas-Pass.	734	\$176,246	\$89,325	\$265,571	\$65,328	\$67,307	\$11,441	\$278,620	\$15,732	\$4,736	—\$57,835
San Pedro, Los Angeles & Salt Lake.	1,132	506,190	475,086	981,276	124,146	174,711	16,983	576,757	51,303	455,343	204,988
Seaboard	3,123	1,081,160	382,663	1,463,823	192,538	240,744	7,403	577,685	476,563	383,662	—50,287
Southern	7,022	3,314,013	1,421,839	4,735,852	700,841	839,627	161,001	3,663,869	228,327	1,317,647	148,175
Southern Pacific	6,936	5,373,380	3,859,834	9,233,214	1,008,042	1,245,052	223,453	5,815,822	418,056	4,023,836	—1,250,875
Spokane, Portland & Seattle	556	106,660	182,202	288,862	48,969	95,157	11,902	203,999	53,400	168,541	—33,392
Staten Island Rapid Transit Co.	39	38,033	38,033	76,066	3,490	3,490	2,490	3,490	5,000	21,432	—18,557
Tennessee Central	291	83,300	36,790	120,090	17,570	45,893	6,670	103,726	2,009	4,676	—1,783
Terminal R. R. Assn. of St. Louis.	35	220	220	440	16,347	11,120	5,085	112,017	102,120	7,897	43,421
Texas & New Orleans	468	243,516	85,224	328,740	46,079	117,642	10,072	272,457	18,335	60,997	43,421
Texas & Pacific	1,944	1,016,023	338,309	1,354,332	187,336	563,236	10,674	1,071,602	76,000	324,474	69,941
Toledo & Ohio Central	436	318,960	55,173	374,133	66,280	62,087	9,889	288,136	20,852	93,979	100,297
Toledo, Peoria & Western	248	46,445	39,425	85,870	18,234	29,287	4,400	94,488	6,100	8,562	—20,051
Toledo, St. Louis & Western	451	332,332	38,388	370,720	44,465	70,950	8,203	278,515	118,052	98,511	—7,422
Union Pacific	3,617	2,954,294	1,074,406	4,028,700	740,218	561,061	110,804	2,717,151	183,343	1,636,976	44,663
Union R. R. of Baltimore	9	92,713	18,686	111,399	17,937	4,437	2,286	24,661	88,542	82,736	—29,277
Union R. R. of Pennsylvania	910	603,333	208,078	811,411	137,634	167,186	3,122	295,416	220,302	214,301	142,959
Vicksburg, Shreveport & Pacific	171	70,696	35,783	106,479	22,071	25,033	4,733	689,380	231,874	197,712	15,856
Virginian	504	497,083	39,172	536,255	70,273	97,852	113,561	126,650	15,054	21,204	96,444
Virginia & Southwestern	240	126,662	15,187	141,849	34,323	40,265	4,152	104,994	41,215	6,667	34,549
Wabash	2,519	1,633,070	579,025	2,212,095	309,835	406,524	15,760	1,918,833	503,660	421,090	—235,136
Washington Southern	36	701,790	37,279	739,069	115,760	13,789	3,228	75,234	40,526	36,986	36,612
Western Maryland	664	404,445	83,177	487,622	140,470	21,820	19,272	560,977	282,200	255,200	88,274
West Jersey & Seashore	356	209,137	622,985	832,122	107,459	87,048	14,999	495,658	399,447	370,624	59,483
Western Pacific	941	336,208	311,436	647,644	106,632	63,679	18,592	421,175	31,232	249,805	156,138
Western Ry. of Alabama	133	51,023	34,014	85,037	17,485	24,018	4,708	81,877	5,113	7,636	2,007
Wheeling & Lake Erie	512	452,708	63,174	515,882	99,403	85,183	1,361	386,526	33,836	141,443	30,576
Yazoo & Mississippi Valley	1,382	692,066	165,047	857,113	178,671	168,033	13,391	356,526	175,279	141,443	30,576

Traffic News

The number of vessels moved through the American locks at the Sault Ste. Marie canal on Saturday, September 18, was 118, the largest movement ever recorded in one day.

The Western Classification Committee has announced a hearing to be held on October 1, on application for changes in ratings, rules, etc., in Classification No. 53, on musical instruments and wooden ware.

Announcement was made by the War Department at Washington on Monday of this week that because of a landslide near Gold Hill the Panama Canal would be closed to traffic probably for at least ten days.

Eugene Morris, chairman of the Central Freight Association, has issued an amended export rate tariff giving rates from shipping centers in Central Freight Association territory to Pacific coast terminals, effective on September 15.

The Trans-Missouri Freight Bureau has been absorbed by the Western Trunk Line Committee. W. A. Poteet, who was chairman of the former at Kansas City, has moved part of his office force to the Chicago office of the Western Trunk Line Committee and will be assistant to Chairman E. B. Boyd.

Representatives of lumber associations from all parts of the country held a conference at Chicago on September 15 to discuss the proposed investigation by the Interstate Commerce Commission of lumber rates and classification. The lumbermen are seeking a number of important changes in classification.

A meeting of the Official Classification Committee was held in New York on September 21st for consideration of subjects enumerated in Docket No. 24, including recommendations of the Committee on Uniform Classification and other matters. A later hearing will be held in the rooms of the Central Freight Association, Chicago, on October 6.

The Missouri, Oklahoma & Gulf of Texas has recently begun operation over its own rails to the following points in Texas: Plano, Carrollton, Dallas, Ft. Worth and North Ft. Worth. Traffic arrangements have been effected with the Missouri Pacific whereby the M. O. & G. now runs a fast through freight train leaving daily from Kansas City for these cities.

The College of Commerce of the University of Cincinnati has announced the opening of its evening classes in traffic management and problems of the traffic manager on September 23. The traffic courses are in charge of Guy M. Freer, traffic manager of the Cincinnati Chamber of Commerce, and W. S. Groom, traffic manager of the Whitaker Paper Company.

The Atlanta & St. Andrews Bay Railroad, which runs from Dothan, Ala., southward 82 miles to Panama City on the Gulf of Mexico, has made an arrangement with the Steamship "Brunswick" for a rail and water freight line to and from New Orleans; and proposes to carry cotton through from Dothan to New Orleans at a rate of 13 cents per 100 lb., less than all rail rates between those two points.

In addition to the five demonstration farms now operated by the Nashville, Chattanooga & St. Louis under the supervision of Special Agent Joseph H. Judd, arrangements have been made for a new demonstration farm at Martin, Tenn., which will be in cultivation next year. At present the company operates farms at Decherd, Sewanee, Murfreesboro, Tullahoma and Dickson. With the farm at Martin the total acreage will be increased to 425.

The Salt Lake & Ogden, an electric line operating between Ogden and Salt Lake City, has filed tariffs with the Interstate Commerce Commission, effective on October 1, the giving through rates which will be put in effect as the result of a new traffic arrangement with the Ogden, Logan & Idaho. The road heretofore has not considered itself subject to the jurisdiction of the Interstate Commerce Commission, as it operates entirely in Utah.

The Chicago, Milwaukee & St. Paul and the Chicago & North Western have filed tariffs with the Interstate Commerce

Commission effective on October 1, cancelling the application of the Illinois classification to traffic moving between Milwaukee and points in the state of Illinois and St. Louis, Mo., and the substitution of the Western classification. The Merchants' & Manufacturers' Association of Milwaukee has announced its intention of protesting against the proposed change to the Interstate Commerce Commission and of asking for a suspension of the tariffs.

At the hearing before Judge Youmans of the United States district court at Oklahoma City on the application of the Oklahoma roads for an injunction to restrain the operation of the Oklahoma two-cent fare law. H. C. Phillips, secretary of the president's conference committee on valuation and formerly valuation engineer of the Atchison, Topeka & Santa Fe, testified in detail regarding the valuation of that road's property in Oklahoma. A. L. Conrad, statistician for the Atchison, Topeka & Santa Fe, introduced an exhibit showing the cost of preparing for the trial of rate cases in Oklahoma. In the year 1913 alone this road spent for this purpose \$111,980 in Oklahoma.

Milk Rates on the Boston & Maine

The Boston & Maine has given notice in Boston that there will be a general revision of rates for the transportation of milk to that city; whereat there is much loud protest. The protests are from dealers and consumers, or alleged spokesmen for consumers, who fear that the cost of their milk is to be increased. From those whose rates will be reduced nothing is heard. The company puts its case frankly before the public in an advertisement in the newspapers, which says:

"The Boston & Maine Railroad, subject to the approval of the public authorities, plans to revise its charges for transporting milk. Some points have rates only by passenger train, other only by freight, and some points by both. Where a freight rate exists, it is three-fourths of the passenger train rate. There are also variations in the rates at different points similarly situated. The result of all this is to give much lower rates from Maine and Northern New Hampshire than from Vermont. For example, Foxcroft, Maine, 256 miles from Boston, has a leased car freight rate of \$37 a day, while a similar shipment from Vergennes, Vermont, 213 miles from Boston, pays a passenger rate of \$63.96 a day.

The management believes the freight rate should be abolished, and that the passenger rates should be rearranged to give the same rate to localities similarly situated. With that end in view, it has prepared a new tariff, lowering rates in some cases, raising them in some others, and doing away with the freight rates in all.

The new rates are lower than those charged by other railroads entering Boston, and lower than those into New York or any other large city.

No carload rate to [from] any point within 165 miles of Boston is increased. Those between 75 and 150 miles are reduced to make the basis uniform.

The largest increase at any one point on the can rate to Boston, in baggage car service, is two cents, or less than a quarter of a cent a quart.

The longest journey of any leased car today is 284 miles. The largest increase to Boston on the leased car rate of the large shippers is less than one-third of a cent a quart. This is for a distance of 300 miles. For shorter distances this increase is smaller.

Cream retails at from three to six times the price of milk, this price being fixed on the amount of butter fat it contains. Cream is now carried at the milk rate. If it is damaged or spilled, the railroad must pay the owner the cream price. Because of this, the new rate for cream has been made one and one-half times the milk rate.

THE MADEIRA-MAMORE RAILWAY OF BRAZIL.—The Madeira-Mamore Railway, probably the most isolated railway in the world, is located far in the interior of South America and affords a means of getting around a chain of dangerous rapids which prevent navigation through portions of the Madeira, Mamore and Beni rivers. The route followed by the railway was surveyed a number of years ago by Colonel George Church, a distinguished American engineer. Most of the party died from diseases due to the climate. Several attempts were made before the road was finally built.—*The South American*.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has extended the effective date of its order in the Western Rate Advance Case in so far as it relates to packing house products from September 30 to December 31.

Commissioner Clark held a hearing at the Hotel LaSalle in Chicago, on September 17, on the application of the Southern Pacific for permission to continue the operation of the vessels of the Associated Oil Company, a subsidiary of the railroad, under the provisions of the Panama canal act.

The Louisiana Railroad Commission has filed a complaint with the Interstate Commerce Commission, making 17 Texas roads defendants, asking the commission to extend the effects of the Shreveport rate case order to the connections and subsidiaries of the principal defendants. A hearing was held at New Orleans on September 17.

A hearing will be held at the office of the commission in Washington on September 28 and 29 to consider the code of rules prepared by the chief inspector of locomotive boilers in accordance with the law approved March 4, 1915, extending the provisions of the boiler inspection act to include the entire locomotive and tender. These rules, excepting rules numbered 18, 29, and 31, were agreed to at a conference held in Washington, August 23 to 28, 1915, between the chief inspector of locomotive boilers, a committee representing and authorized to act for the carriers, and a committee representing railway employees.

At a hearing before Examiner Gutheim at St. Louis on September 15, representatives of St. Louis shippers presented evidence in support of their complaint that recent advances in interstate freight and passenger rates affecting shipments from St. Louis into Illinois territory are discriminatory as compared with the rates from Chicago to the same points, which were not advanced because the Illinois Public Service Commission has thus far declined to allow any advances in the rates under its jurisdiction. The St. Louis witnesses contended that the discriminations were having a serious effect on their business in competition with Chicago.

Supplemental Hearing on Western Rate Advances

Examiner E. W. Hines, of the Interstate Commerce Commission, began a hearing at the Hotel LaSalle, Chicago, on September 20, on proposed advances in freight rates on the railroads running west of Chicago, on a number of commodities on which advanced rates were filed during the progress of the hearings in the western rate advance case, and which were therefore postponed until a hearing which was originally set for July. The carriers postponed the advances so that the hearing might be held in September. The hearing involves rates on agricultural implements, canned goods and furniture, beer and liquor, boots and shoes, cement, clothing, granite and marble, iron and steel, wire, lumber, lime, machinery, oil, paper, steel rails, ties, structural iron, sugar, sandstone and other commodities, as well as several proposed changes in rules.

Rates on Lumber from the South to Ohio River Crossings

In re Rates on Lumber from Southern Points to the Ohio River Crossings and Other Points. Opinion by Commissioner McChord:

The original report in this case permitted the carriers to increase their rates to the north bank Ohio river points from the territory east of the Mississippi river in those instances in which such increases were necessary to effect a spread of one cent per 100 lb. between opposite points at the same crossing. The former finding is now modified for the purpose of aligning the rates of the Louisville & Nashville to St. Louis from stations on its line south of Decatur, Ala., with the rates of the other lines serving the same general territory, and to permit the rates from Helena, Ark., to Cairo, Ill., and St. Louis, Mo., to be increased to the Memphis basis. (36 I. C. C., 137.)

STATE COMMISSIONS

The California Railroad Commission has refused to sanction for intrastate shipments increases in express rates equivalent to those recently granted by the Interstate Commerce Commission.

The Nebraska Railway Commission, after a conference with a number of railroad officers, has announced that it will consider allowing a number of exceptions to the long and short haul rule when the railroads submit a list of instances in which the present rule is said to work a hardship.

The Louisiana Railroad Commission has ordered the railroads entering New Orleans to prepare and file with the commission not later than January 1 a tariff of reasonable rates, rules and regulations for the joint handling of freight between points within the switching district of the city of New Orleans.

The Louisiana Railroad Commission has issued an order authorizing the railroads operating in the state to use Southern Classification No. 41 and supplements 1, 3 and 4 thereof, on Louisiana business, but supplements 2, 5 and 6 have been objected to by the New Orleans Joint Traffic Bureau and the Baton Rouge Chamber of Commerce, and are ordered held in abeyance until further notice.

PERSONNEL OF COMMISSIONS

A. Z. Patterson, private secretary of Governor Major of Missouri, has been appointed assistant counsel of the public service commission in charge of the legal work in connection with the valuation of railroad property in the state.

COURT NEWS

Passenger's Duty to Board Right Train

The Georgia Supreme Court holds that it is the duty of the purchaser of a ticket, or one who desires to become a passenger on a train, to ascertain, before boarding it, that it stops at his station. Where he fails to do so, and the train is not scheduled to stop there, the railroad may eject him at the last regular stopping place before reaching the desired destination.—*Southern Ry. Co. v. Bailey* (Ga.), 85 S. E. 847.

Segregation of Races—Exception

The Alabama Supreme Court holds that the provisions of the statute providing for separate accommodations on trains for white and negro passengers, and making it a misdemeanor for a person to go into and ride on a coach to which he does not belong, do not apply where a white sheriff attempts to travel with a negro prisoner, and hence the two cannot be assigned to separate coaches. In such a case the conductor may, in his discretion, assign them to any coach or compartment of the train.—*Spenny v. Mobile & Ohio* (Ala.), 68 So. 870.

Liability for Freight—Undisclosed Principal

The Alabama Court of Appeals holds that a consignor of goods cannot change or escape his liability as such after entering into the contract of shipment and dealing with the railroad as the consignor, by notifying the railroad after his shipment has been carried to its destination and rejected by the consignee that he was acting merely as the agent of the true consignor, when that fact was not previously disclosed in the transaction.—*Cincinnati, N. O. & T. P. v. Vredenburg Sawmill Co.* (Ala.), 69 So. 228.

This principle was applied in another case, where oranges were consigned to a commission merchant for sale. Through mistake the railroad company made an undercharge, which the commission merchant refused to make good, having already sent the proceeds to the shipper. The commission merchant had not previously informed the railroad company that he was not the owner of the goods. It was held that he was liable for the undercharge.—*S. F. Cornelius & Co. v. Central of Georgia* (Ala.), 69 So. 331.

Maintaining Flagmen at Crossings

The Erie sought the review of an order of the New Jersey Board of Public Utility Commissioners requiring the maintenance of flagmen at two crossings during the 24 hours of the day. At each of the crossings there was the ordinary crossing sign and also approach boards reading "Railroad Crossing, 500 Feet." In addition there was an automatic audible signal, a bell which would start ringing when a train was 2,000 ft. from the crossing. The New Jersey Supreme Court held that the order was too broad and should be limited to requiring the road to keep a flagman on duty at the crossings covering the operation of all [regular?] trains over such crossings.—*Erie v. Board* (N. J.), 95 Atl. 177.

Duty Toward Person Voluntarily Assisting Station Agent

In an action for injury caused by a heavy trunk falling on the plaintiff's foot the Georgia Court of Appeals holds that one who, at the request of a station agent, who has no apparent authority to employ other servants, voluntarily undertakes to assist in loading a trunk, is a mere volunteer, and the company owes him no duty except that which it owes to a trespasser; that is, not to injure him willfully and wantonly after his peril is discovered. The position of the plaintiff at one end of the trunk was not so obviously perilous to the porter at the other end as to charge the porter (and through him the company) with willful and wanton negligence in letting his end of the trunk fall to the ground.—*Southern Ry. Co. v. Duke* (Ga.), 85 S. E. 975.

Rights of Railroad in Crossing Another

The statutory right of one railroad to cross another is in the first instance dependent upon a reasonable necessity for such a crossing; and, where such a necessity is shown, the crossing sought must be so located and constructed as not to inflict any unnecessary injury upon the road to be crossed. But, the Alabama Supreme Court holds, the statutes which give the right to cross do not require that there shall be no injury whatever to the rights of the road crossed, or require the selection of the place and mode which will least injure the company crossed, without regard to the interests and necessities of the crossing company, which must also be considered, and the question determined according to the circumstances of the particular case. The right to cross, though given in general terms, is not confined to the main tracks of either road, but applies to sidings and all tracks, and the making of one crossing, or even of several, does not necessarily exhaust the general right to cross.—*Mobile & Birmingham v. Louisville & Nashville* (Ala.), 68 So. 905.

EFFECT OF WAR ON RAILROADS IN MEXICO.—As a result of the four years' warfare and the purposeless destruction which has proceeded throughout the Republic of Mexico, there is hardly a line which has not been reduced either to uselessness or to hopeless wreck. Not since the first track was laid in Mexico in 1857, has such a condition been known. The Mexican Railway, the pioneer enterprise of the state, is, perhaps, in the most parlous condition and worse off than it has been at any time since the revolution began. The entire track, with the exception of about 25 miles out of Mexico City, which, for a short while, was operated intermittently by the company, has been out of its control since November 18 last. Since then an immense amount of destruction—mostly of a mischievous character—has been committed; miles of the track have been torn up, and a great deal of the equipment has been removed from the company's stores and distributed over other railways. The position of the Mexican Southern is hardly less serious. General Carranza took possession of the Interoceanic Railway (of which the Southern is a leased line) in August last; the Interoceanic has been out of possession ever since, and the military opposition has been continuous. There does not appear to have been quite so much destruction committed on the property of the Mexican Southern. The National Railways of Mexico, which now include the lines of the Central Railway, are likewise in a serious condition. The Vera Cruz Railway, a British undertaking, is more or less in the same condition, while the Mexican Northwestern is described as a wreck from end to end. * * * The restoration of these railways will require scores of millions of dollars.—*Railway Gazette, London.*

Railway Officers

Executive, Financial, Legal and Accounting

E. F. Bromhall has been appointed secretary of the Missouri, Kansas & Texas, with headquarters at Parsons, Kan., succeeding W. R. Snedaker, assigned to other duties.

Sidney Aronstein has been elected vice-president of the Georgia Coast & Piedmont, in charge of territorial development, with headquarters at New York City, succeeding T. D. Rhodes, resigned.

Operating

W. H. Haley has been appointed superintendent of car service of the Missouri Pacific, with office at St. Louis, Mo., vice W. I. Stine, resigned to enter the service of the American Refrigerator Transit Company.

L. U. Morris, superintendent of the eastern division of the El Paso & Southwestern at Tucumcari, N. M., has been appointed general superintendent of the system with headquarters at El Paso, Tex., vice G. F. Hawks, promoted. C. D. Beeth, trainmaster on the eastern division, has been promoted to the position left vacant by Mr. Morris. C. B. Eifort has been appointed trainmaster to succeed Mr. Beeth at Tucumcari.

T. S. Mahoney, superintendent of the transcontinental division of the Texas & Pacific, has been transferred from Texarkana, Tex., to Ft. Worth, where he will take charge of the Ft. Worth division, into which have been consolidated the transcontinental and joint track divisions and the Ft. Worth terminals. G. B. Johnson, superintendent of the joint division, and A. E. Pistole, superintendent of terminals, have been transferred to other duties.

Engineering and Rolling Stock

Frederick E. Morrow, who was appointed assistant chief engineer of the Chicago & Western Indiana and the Belt Railway Company, of Chicago, on September 1, graduated from the civil engineering course, at Purdue University in 1904. From June to November of that year he was employed in the engineering department of the Illinois Steel Company. From that time until April, 1907, he was in the service of the Chicago & North Western in the consecutive capacities of rodman, instrument man and assistant engineer. He then took a position as field engineer in the division of track and roadway of the Board of Supervising Engineers, Chicago Traction, which he held during the rehabilitation of the Chicago surface lines. In April, 1910, he entered the C.



F. E. Morrow

& W. I. organization as office engineer. In March, 1913, he was promoted to principal assistant engineer, and held this position until his recent appointment as assistant chief engineer of both the C. & W. I. and the Belt Railway.

A. A. McCree has been appointed roadmaster of the Northern Pacific, with headquarters at Tacoma, Wash. Effective September 16.

J. R. Holman, chief engineer of the Oregon-Washington Railroad & Navigation Company, has been granted an indefinite leave of absence. Samuel Murray, bridge engineer, has been appointed acting chief engineer, with headquarters at Portland, Ore. Effective September 14.

W. O. Thompson, whose appointment as superintendent of rolling stock of the New York Central for the lines west of Buffalo, with headquarters at Cleveland, Ohio, has already been announced in these columns, was born in July, 1861, at Clayton, Mich., and was educated at Adrian, Mich., high schools. He began railway work in 1880, on the Ft. Wayne, Jackson & Saginaw, and remained with that road until it became a part of the Lake Shore & Michigan Southern. From 1884 to 1890 he served as a locomotive engineer, and then was appointed traveling engineer of the Lake Shore & Michigan Southern, remaining in that position until August, 1893. He was then engine despatcher from 1893 to 1900 on the same road. In 1901 he was appointed general locomotive inspector of the New York Central & Hudson River. The following year he was appointed superintendent of motive power on the Rome, Watertown & Ogdensburg division, and in 1907 became district master car builder at East Buffalo, N. Y., which position he held at the time of his recent appointment as superintendent of rolling stock for the New York Central lines west of Buffalo, as above noted.



W. O. Thompson

The following year he was appointed superintendent of motive power on the Rome, Watertown & Ogdensburg division, and in 1907 became district master car builder at East Buffalo, N. Y., which position he held at the time of his recent appointment as superintendent of rolling stock for the New York Central lines west of Buffalo, as above noted.

Traffic

G. G. Early, chief of tariff bureau, of the Wabash Pittsburgh Terminal and the West Side Belt Railroad, has been appointed assistant general freight agent of these lines, with office at Pittsburgh, Pa., and his former position has been abolished.

E. S. Morgan, general southwestern freight agent of the Queen & Crescent Route at Dallas, Tex., having resigned to engage in other business, the position of general southwestern freight agent has been abolished. G. C. Whitney, commercial agent at Greensboro, N. C., has been appointed commercial agent, with office at Dallas; L. R. Gardner, traveling freight agent at San Antonio, has been promoted to commercial agent, and E. J. West has been appointed commercial agent at Greensboro, succeeding Mr. Whitney.

W. M. Kirkpatrick, assistant freight traffic manager, eastern lines, of the Canadian Pacific with office at Montreal, Que., having been appointed an officer in the army, the following appointments are made until he returns to the company's service: H. E. Macdonell, general freight agent at Montreal, will perform the present duties of the assistant freight traffic manager; E. N. Todd, division freight agent at Montreal, will perform the duties of the general freight agent; A. O. Secord, district freight agent at Ottawa, Ont., will perform the duties of the division freight agent with office at Montreal, and J. J. Kelly will perform the duties of the district freight agent with office at Ottawa, Ont.

OBITUARY

A. J. Seifert, signal supervisor of the Chicago terminals division of the Pennsylvania Lines West, died on September 9.

William F. Fitch, formerly president of the Duluth South Shore & Atlantic, died at Marquette, Mich., at the age of 76. Mr. Fitch was born at Circleville, Ohio, on June 28, 1839, and entered railway service on October 14, 1851, as clerk in the general manager's office of the Chicago & North Western. His rise from the ranks to a position of consequence was rapid and in 1866 he became general manager of the Fremont, Elkhorn & Missouri Valley and Sioux City & Pacific railroads. In 1888 he was appointed general manager of the Duluth, South Shore & Atlantic, a position which he held until 1911. From 1888 until 1902 he also held the vice-presidency of the road, and from 1902 until 1911 the presidency.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE HAVANA CENTRAL has ordered one 60-ton electric locomotive from the General Electric Company.

THE FAIRCHILD & NORTHEASTERN has ordered one Prairie type locomotive from Lima Locomotive Corporation. This locomotive will have 16 by 24 in. cylinders.

THE TEXAS & PACIFIC, reported in the *Railway Age Gazette* of last week as having ordered 13 locomotives from the Baldwin Locomotive Works, has ordered 7 Santa Fe type and 6 switching locomotives from that company.

THE NORFOLK & WESTERN has ordered 30 Mallet type (2-6-6-2) locomotives from the American Locomotive Company. These locomotives will have 22 and 35 by 32-in. cylinders, 56-in. driving wheels and a total weight in working order of 406,000 lb. They will be equipped with superheaters.

CHICAGO & NORTH WESTERN.—In the item in the *Railway Age Gazette* of last week giving the details of this company's recent order for 45 locomotives placed with the American Locomotive Company, the total weight in working order of six of the Pacific type locomotives was incorrectly given as 302,000 lb. instead of 229,000 lb. and that of the 12 Mikado type locomotives was incorrectly given as 165,000 lb. instead of 302,000 lb.

CAR BUILDING

THE CENTRAL OF GEORGIA is inquiring for prices on five passenger cars.

THE CINCINNATI, INDIANAPOLIS & WESTERN is inquiring for prices on 1,000 40-ton box cars.

THE BUFFALO, ROCHESTER & PITTSBURGH is inquiring for prices on 899 steel underframes for installation on old wooden box cars.

THE NEW YORK CENTRAL has ordered 1,000 freight cars each from the Standard Steel Car Company and the Pressed Steel Car Company for the Pittsburgh & Lake Erie, and 500 box cars from the American Car & Foundry Company for the Cincinnati Northern.

THE SOUTHERN RAILWAY, which has recently had 1,000 cars rebuilt and provided with steel under frames by the Lenoir Car Works and by various of the company's shops, will have another 1,000 cars repaired in like manner. It is hoped to have the work completed in time for the cars to be used in the fall crop movement.

IRON AND STEEL

THE PENNSYLVANIA has ordered 2,500 tons of steel for pier sheds at Greenville, N. J., from the McClintic-Marshall Company.

THE CHICAGO & NORTH WESTERN has ordered 228 tons of steel for the Webster avenue (Chicago) subway from the Chicago Bridge & Iron Company.

THE ALASKA ENGINEERING COMMISSION has ordered 5,000 tons of rails from the Colorado Fuel & Iron Company to be used on the main line of the government railroad from Seward, Alaska.

THE TOLEDO, ST. LOUIS & WESTERN has ordered 1,500 tons of rails from the Carnegie Steel Company, 1,000 tons of rails from the Lackawanna Steel Company and 500 tons from the Cambria Steel Company.

SIGNALING

THE GRAND TRUNK has contracted with the Federal Signal Company for the installation of a mechanical interlocking plant at the crossing of the Grand Trunk and the Canadian Pacific at Abbotsford, Quebec.

Supply Trade News

The Standard Steel Car Company is reported to be equipping its plant at New Castle to turn out a large order for shells.

The William Graver Tank Works, East Chicago, Ind., has received an order for three oil storage tanks from the Atchison, Topeka & Santa Fe. They will be erected at Silsbee, Brownwood and Cleburne, Tex.

The Chicago & North Western is in the market for 15,000 piles to be used in the foundation work for the new grain elevator to be erected at One Hundred and Eighteenth street and the Calumet river, Chicago, Ill.

The Pere Marquette has ordered 4,000 cross ties from the Indiana Tie Company, Evansville, Ind., and 1,000,000 feet of switch ties from the W. S. Mercereau Lumber Company, Parkersburg, W. Va. All of the material is for 1916 work.

Foster Milliken, formerly president of Milliken Brothers, Staten Island, N. Y., has been elected president of the McNab & Harlin Manufacturing Company, New York, manufacturers of brass, iron and steel valves, cocks and fittings.

President C. A. Starbuck, of the New York Air Brake Company, has announced that that company has closed a contract for an additional order for cartridge cases amounting to \$3,675,000, bringing the total amount of orders now on the books for war material to \$20,242,600.

R. W. Gillispie, New York district sales manager of the Pennsylvania Steel Company, has been appointed general manager of sales, succeeding John C. Jay, Jr., who has resigned from his position as vice-president and general manager of sales to become chairman of the Maxwell Motor Company.

The J. W. Murray Contracting Company, Kansas City, Mo., has been awarded the contract for building dikes for the St. Louis & San Francisco along the Trinity river, between Beaumont, Tex., and Houston; and has also received a contract from the Missouri, Kansas & Texas for work on the Brazos river, near Belasco, Tex.

The S. K. F. Ball Bearing Company was incorporated in Hartford, September 4, with \$2,000,000 capitalization, to engage in the manufacture of ball bearings. The former American S. K. F. Ball Bearing Company has been a selling organization for the bearings made by the parent Swiss Company known as the Aktie Bolaget Svenska Kullagerfabriken of Gothenburg. The new company will build a factory at Hartford to manufacture bearings in this country, but the S. K. F. steel will be imported from Sweden.

The directors of the Westinghouse Electric & Manufacturing Company, at a meeting held on September 22, declared a quarterly dividend of $1\frac{1}{2}$ per cent on the common stock, thus raising the annual dividend rate from 4 to 6 per cent. The income from purely domestic business during the last quarter was considered sufficient to warrant the $1\frac{1}{2}$ per cent quarterly rate. The Westinghouse Company, according to a statement made by Chairman Guy E. Tripp, has received firm contracts for the manufacture of war supplies aggregating approximately \$60,000,000, the greater portion of which is a contract for rifles, which is to be executed at factories in New England especially acquired for the purpose. This rifle business contributed nothing to the earnings for the quarter.

TRADE PUBLICATIONS

DEFEATING RUST.—The American Rolling Mill Company, Middletown, Ohio, has issued an attractive illustrated booklet giving the story of ingot iron, describing the qualities of this material, its method of manufacture, and the various uses to which it is adapted. The book is illustrated with a number of typical illustrations of these uses.

CENTRIFUGAL PUMPS.—Catalog H-2, recently issued by the Lea-Courtenay Company, Newark, N. J., describes and illus-

trates the various types and sizes of Lea-Courtenay centrifugal pumps. The booklet, containing 64 pages, is divided into 12 chapters, dealing respectively with the care taken in the manufacture of this company's product and the characteristics of the pump. The booklet is profusely illustrated.

SAND-BLAST APPARATUS.—The Mott Sand Blast Manufacturing Company, New York, has issued four folders dealing with the following sand-blast apparatus which it manufactures: the Mott direct-pressure sand-blast machine, hose type; the Mott sand-blast tumbling barrel; revolving table and cabinet, type G; the Mott type P. V. S. double sand-blast tumbling barrel and Mott sand-blast accessories.

RAILROAD SPECIALTIES.—The Q & C Company, New York, has issued an elaborate catalogue, illustrated in colors, describing its various products, including the Bonzano joint, the Vaughan rail anchor, tie plates and other track appliances, Ajax vestibule diaphragms, snow flangers and the Ross-Schofield system of circulation for locomotive boilers. The various features are illustrated in detail separately and in actual service.

STORAGE BATTERIES.—The Titan Storage Battery Company, Newark, N. J., has issued a very attractive catalogue relative to the company's line of storage batteries. The booklet touches upon the company itself and its aims, and treats of Titan storage batteries under the following heads: storage battery parts; elementary theory of the storage battery; Titan pasted plates, measurements, etc. Colored illustrations are given of the batteries and their parts.

THE RAILWAY RAIL.—The Pennsylvania Steel Company and the Maryland Steel Company are issuing a pamphlet describing in an interesting manner the origin and development of the railway rail, prepared by G. P. Raidabaugh. The various steps from the wooden tram rail of the seventeenth century to the 125-lb. Pennsylvania sections are described in detail with sketches. This book is valuable at this time of general interest in the steel-rail question.

STRUCTURAL STEEL BEAMS.—The Carnegie Steel Company, Pittsburgh, has issued a pamphlet on structural beams, second edition. This booklet gives dimensions and properties of a new standard of light, wide base I-beams, in sizes ranging from 8 in. to 27 in. It has been decided to roll these supplementary beams to meet a demand for beams of greater stiffness and smaller load-carrying capacity, which will be found suitable for use in certain classes of office buildings, light shop buildings and special classes of floor construction.

BALTIMORE & OHIO.—The historical booklet entitled "The Blue and the Gray," recently issued by the Baltimore & Ohio, is something unusual and interesting enough to deserve special mention. The folder contains 36 pages filled with an interesting description of the historic territory traversed by the lines of the railroad. The book, naturally, deals mainly with the civil war. It names the many points of interest from a historical standpoint and tells briefly what happened at each of these places. There is a chronological list of those battles of the civil war which occurred on or near the lines of the railroad and a map on which are designated the points at which these battles were fought.

DISTANT CONTROL ELIMINATES TRAIN STOPS.—This is the title given to Bulletin 131, recently issued by the General Railway Signal Company, Rochester, N. Y. The booklet deals with the operation of outlying passing siding switches by the G-R-S low voltage or "distant-control" switch machine, a device which was described in the *Railway Age Gazette* of March 19, 1915, page 678. The first installation of a low-voltage switch machine was in connection with a piece of single track on the Northern Pacific at Bozeman tunnel, Mont. This installation was described in detail in an article in the issue of April 16, page 831. The bulletin shows how distant-control eliminates train stops and notes the saving gained thereby. Besides containing a description and illustrations of the machine it also contains a number of wiring diagrams for different kinds of installations.

TRANS-AUSTRALIAN RAILWAY.—The work of constructing the Trans-Australian Railway, which will connect Western Australia with the Eastern States, is being pushed ahead at a good rate. The rails are now laid over a distance of 543 miles.

Railway Construction

AMERICUS, HAWKINSVILLE & EASTERN.—Arrangements have been made with western capitalists, it is said, to finance the construction of a line from Americus, Ga., northeast via Byromville to Hawkinsville, about 55 miles, and it is expected that the work will be started in October. J. S. Morton, Americus, president of the Georgia Lumber Company, may be addressed. (See Americus, Flint River & Gaines, July 2, page 38.)

CHARLESTON SOUTHERN.—Contracts are reported let by this company for work on the line to be built between Charleston, S. C., and Savannah, Ga., as follows: To the Gadsden Contracting Company, Savannah, a section of ten miles on the Savannah end of the line; to L. S. Wood, Gaffney, S. C., for work near Charleston and to M. Schiltz, Charlotte, N. C., for 12 miles south of this section. W. Z. Williams & Co., Macon, Ga., will fill in temporary trestles for 2 miles south of Ashpoo river and 2 miles north of Edisto river. (August 27, p. 409.)

FT. WAYNE, DECATUR & SOUTHERN.—Incorporated in Indiana with \$10,000 capital to build an electric line between Ft. Wayne, Ind., Decatur, Monroe, Berne, Ceylon, Geneva, Bryant, Portland, Winchester, Lynn, Fountain City and Richmond. It is said that the company will take over the property of the Ft. Wayne & Springfield, which operates a line from Ft. Wayne south to Decatur, 21.6 miles. The incorporators include J. H. Koenig, C. Oetting, C. Dirksen and M. Gerke.

FT. WAYNE & SPRINGFIELD.—See Ft. Wayne, Decatur & Southern.

KANKAKEE & URBANA TRACTION.—Grading has been begun on the extension of this road from Ludlow, Ill., to Paxton, a distance of about five miles. The plans call for one bridge 90 ft. long, the contract for which has been let to the Central States Bridge Company, of Indianapolis, Ind.

OKLAHOMA UNION TRACTION.—See Tulsa Traction.

PHILADELPHIA ROADS.—Bids are wanted until October 19 by A. M. Taylor, director, department of city transit, Philadelphia, Pa., for the steel superstructure and appurtenant work for a two-track elevated railway on the following sections: in Front street on a section comprising about 4,074 linear ft., and another section of about 7,128 linear ft.; in Kensington avenue, on about 7,769 linear ft., and in Kensington avenue and Frankford avenue on about 7,653 linear ft. (July 23, page 182.)

PHOENIXVILLE, VALLEY FORGE & STRAFFORD ELECTRIC.—Plans have been made to build a seven-mile extension, it is said, from Valley Forge, Pa., east to a connection with the Philadelphia & Western at Bridgeport.

SOUTH SAN FRANCISCO RAILROAD & POWER CO.—This company will let a contract within 90 days for a half mile of grading between Holy Cross, Cal., and South San Francisco.

TEXAS & PACIFIC.—This company has under consideration plans for the construction of a branch line, it is said, to be built from either Big Springs, Tex., or Midland, northwest to Seminole.

TULSA (OKLA.) TRACTION.—This company was recently incorporated in Oklahoma with \$100,000 capital, it is said, to succeed the Oklahoma Union Traction Company. A line will be built south of Tulsa, Okla., to Sapulpa and Okmulgee, and on the north to Collinsville. The company now operates six miles of single track to Orcutt Lake. G. C. Stebbins, president; and B. C. Redgreaves, superintendent.

RAILWAY STRUCTURES

BALTIMORE, MD.—The board of directors of the Baltimore & Ohio has authorized the construction of the large coal pier in the Curtis Bay terminal, Baltimore, and it is said that bids for the work will be asked for and the work started at once. The new pier will cost about \$1,500,000. Its capacity will be 10,000,000 tons a year. It will be of steel 700 ft. long by 115 ft. wide. The breakage of coal will be overcome by means of a

system of belts which will be run at speeds varying from 250 ft. to 500 ft. a minute, leading to movable towers which will load into vessels on either side of the pier. The individual car dumpers will be able to handle cars 53 ft. long and will unload forty of the largest cars in one hour. (September 17, p. 548.)

GREENVILLE, N. J.—The Pennsylvania Railroad has asked for bids on revised plans for the construction of a new pier at Greenville, N. J.

JOHNSTOWN, PA.—The Pennsylvania Railroad has given a contract to W. H. Fissell & Co., New York, for building the superstructure of a new passenger station in Johnstown, Pa., to cost over \$120,000. The building will be constructed of red tapestry brick and stone, and the interior will be finished in marble and tile. There will be two island platforms, each 900 feet long, from which access to the station will be by means of two tunnels, one for passengers and the other for baggage. The new station will be built just west of the present station. (December 4, p. 1068.)

KINNICKINNICK, WIS.—The Barnett & Record Company, Minneapolis, Minn., has the contract for the erection of the superstructure of the 1,000,000-bu. elevator being built here by the Chicago & North Western. The elevator will be of reinforced concrete and steel construction and will cost in the neighborhood of \$900,000.

MACON, GA.—Bids are wanted by A. Fellheimer, architect, 7 East Forty-second street, New York, for building the union station to be used jointly by the Central of Georgia, the Southern Railway, and the Georgia Southern & Florida. The proposed structure is to be of stone, brick and steel construction. It will be three stories high, 80 feet wide and 250 feet long. The work is to be started in October and will cost about \$500,000. (September 17, p. 548.)

OELWEIN, IOWA.—The contract for the reconstruction of the Chicago Great Western storehouse, destroyed by fire the early part of August, has been let to the Blackhawk Construction Company, of Waterloo, Iowa. It will be a reinforced concrete structure. (August 20, p. 369.)

OIL CITY, PA.—The Pennsylvania Railroad has submitted revised plans to the War Department for a railroad bridge to be built over the Allegheny river at Oil City.

ROANOKE, VA.—The work now under way on an extension of the Norfolk & Western engine erecting shop at Roanoke, Va., is a continuation of the building begun in 1912, and extended a second time in 1914. The building is 110 ft. wide, 48 ft. high to the bottom of the trusses, and the present extension is to be 150 ft. long. It will have steel frame and trusses, slate roof, brick walls on one side, and galvanized siding above the level of the machine shop roof on the opposite side, at which point it will connect with the machine shop. The building will be equipped with crane runways for 100, 15, 10 and 5 ton cranes, which are now in use in the completed portion of the building. The new structure is to be used for building and repairing heavy locomotives and will replace the present brick building used for the same purpose. The Virginia Bridge & Iron Company, Roanoke, has the contract for furnishing and fabricating the steel work, and the Norfolk & Western forces have constructed the foundations and will erect the building. The improvements are to cost about \$60,000, and the work will be finished this year. No new equipment will be required.

ST. JOSEPH, MO.—A comprehensive investigation of the grade crossings, terminal and depot facilities in this city is being made by a joint committee representing the Missouri Public Service Commission, the railways and the local Commerce Club.

SUNBURY, PA.—According to press reports the Philadelphia & Reading has adopted plans for building a railroad bridge over the Susquehanna river at Sunbury. The plans call for a 13-span steel girder bridge to carry single track. The new bridge is to be built to replace the light structure now in use.

WILLOW SPRINGS, MO.—The St. Louis & San Francisco has let the contract for a reinforced concrete coaling plant here to Fairbanks, Morse & Co. The plant will be of the "V" bucket type, will have 250-tons capacity, and will include a steam sand drier of one cubic yard capacity per hour.

Railway Financial News

BALTIMORE & OHIO.—Charles W. Harkness has been elected a director, succeeding Norman B. Ream, deceased.

HUDSON & MANHATTAN.—The New York Public Service Commission, first district, has granted this company permission to issue \$615,500 in bonds to reimburse the company for money expended in improving its plant, retiring underlying mortgages and for rolling stock. The bonds are to bear five per cent interest and run until February 1, 1957. There are to be sold to net the company not less than 80 per cent of the par value, and the order provides for the amortization during the life of the bonds of the discount and expense of sale.

MISSOURI PACIFIC.—A suit for foreclosure against this property was filed in the district court in St. Louis on September 19 by the Guarantee Trust Company of New York and B. F. Edwards of St. Louis.

NEW JERSEY & PENNSYLVANIA.—The property of this road was sold at auction September 21 to J. Irving Demarest, of Sewaren, N. J., owner of a quarry near the road at New Germantown. The line of the road extends from Morristown, N. J., southward 25 miles. No trains have been run for many months, the company being unable to keep the track in a condition fit for use. The price paid at this sale was said to be \$29,000. The sale cannot be consummated until it has been approved by the Court, in whose hands the road is held.

NEW YORK, NEW HAVEN & HARTFORD.—Charles F. Brooker, Charles M. Pratt, Lewis Cass Ledyard, Henry K. McHarg and Frederick F. Brewster, former directors of this company, indicted and awaiting trial before the district court in New York for alleged violation of the anti-trust law, have petitioned the court for separate trials.

PENNSYLVANIA RAILROAD.—This company on September 1, 1915, had an even 94,000 stockholders. This is an increase of 3,381 in a year, and is the largest number of stockholders ever reported for this or any other railroad in the world. Each stockholder on September 1 owned an average of 106.23 shares, or 3.96 shares less than the average holdings 12 months ago. Included in the total number of stockholders there were 45,428 women—1,743 more than last year—holding nearly a one-third interest in the property. Of the entire 94,000 stockholders 33,053 were in Pennsylvania, 16,024 lived in New York state, 16,366 in New England, 16,671 elsewhere in the United States and 11,886 in foreign countries. There were 62 more foreign stockholders on September 1, 1915, than on the same date in 1914, and 64 more than in July, 1914.

VIRGINIA & SOUTHWESTERN.—Robert L. Pennington, of Bristol, Tenn., has been elected a director to fill a vacancy.

THE BUSIEST PASSENGER STATION IN ENGLAND.—In an interview reported in a recent issue of the New York Times Magazine, H. W. Thornton, formerly general manager of the Long Island, and now general manager of the Great Eastern of England, made the statement that: "With one exception, and that is the St. Lazare station in Paris, there are more trains in and out of the Liverpool street station, which is the London terminus of the Great Eastern system, than any other railway station in the world. The Great Eastern serves territory generally known as East Anglia, but there are other roads also touching this section, which in a sense gives the Great Eastern some competition, though upon the whole, it has the eastern counties to itself. From 6 o'clock in the morning to 9:30, also of the morning, there are 278 trains arriving in the Liverpool street station, and the number of passengers alighting therefrom during these three hours and a half is about 75,000. During the entire 24 hours there are almost 700 trains arriving in the station, and about the same number departing therefrom, making a grand total of trains in and out of the station every 24 hours of about 1,400. So you see it requires the highest efficiency in the staff and the working force of the road to care for so many trains, so close to one another, to insure safety and promptness."

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GENERAL NEWS SECTION.....

*Illustrated.

The principal value of the International Engineering Congress, held in San Francisco last week, as far as railway men are concerned, lies in the character of the papers presented. The attendance at the meetings of the railway section was by no means representative of the railway engineers of the country, or even of the West,

International Engineering Congress

and the discussions on most of the papers were either perfunctory or entirely lacking. This does not imply, however, that the Congress was unsuccessful. On account of the vast scope covered by such international gatherings, the long periods that elapse between meetings, and the fact that all papers presented are written by individuals rather than by committees, it is not to be expected that the subjects will be handled in a manner that lends itself easily to discussion. The papers are essentially reviews of engineering practise and discussions of recent developments. For this reason, only brief abstracts have been taken

from most of them for use in the report published elsewhere in this issue. The complete volume of the proceedings of this section of the Congress will be valuable to many students of railway engineering both within and without railway organizations, but it is manifestly impossible for the *Railway Age Gazette* to do more than suggest the nature of the material that will be available in these proceedings when published.

In its opinion in the western freight rate advance case, the Interstate Commerce Commission left its attitude toward two

Rehearing of the Western Rate Case

important questions very doubtful. It did not state its conclusion as to whether the western lines needed an increase in their net revenues, although both the railways and those opposing advances in rates asked it to do so. It also failed to make clear its position on the question of state interference with interstate commerce. It refused to grant certain advances in interstate rates on the ground that there were lower state rates fixed by state authorities; but just to what extent it intends to let state regulation control interstate regulation it did not make clear. The attorneys of the railways in their brief for a rehearing, an abstract of which is published elsewhere in this issue, present a masterly argument for the commission to make clear its exact position respecting these matters. It is to be hoped that the commission will decide to do this. It either believes, or it does not believe, that the western lines need larger net revenues, and it ought to answer them one way or the other, so that they may act accordingly. It either intends, or it does not intend, to let rates fixed by state authorities control it in regulating interstate rates, and it ought to enlighten the carriers on this point so that they may know definitely how they must proceed to get the relief to which they consider themselves entitled. Such decisions as that in the western case, which really decided nothing, leave the railways in a state of uncertainty which is bad for them, and bad for business in general; and regulation which produces such results does not command or deserve respect and confidence.

With the inclusion of the Missouri, Kansas & Texas the mileage of railways in the United States in the hands of receivers is

42,000 Miles of Railway in Receiverships

now greater than it has ever been before. According to the *Railway Age Gazette's* record, the addition of the 3,865 miles of the Missouri, Kansas & Texas system makes a total of 82 railways, operating 41,988 miles of line, and with a total capitalization of \$2,264,000, now being operated by receivers. This is more than one-sixth of the railway mileage in the United States, and exceeds the total railway mileage of any other country in the world except European and Asiatic Russia combined. The total par value of securities outstanding of roads being operated by receivers represents about 15 per cent of the total capitalization of the railways of the United States, and is greater than the total capitalization of all the railways of any other country in the world outside of Russia, Great Britain, Germany and France. This is a record of insolvency unparalleled in history. The largest mileage of roads in receiverships previously recorded, according to the Interstate Commerce Commission's reports, was for the fiscal year ending June 30, 1894, when 192 roads, operating 40,818 miles of line, and with a capitalization of about \$2,500,000,000 or about 25 per cent of the total capitalization at that time, were being operated under the direction of the courts. It will be noted that with a greater mileage the capitalization of the roads now in receiverships is less than that of the roads bankrupt in 1894. The proportion of the total mileage in receivers' hands in 1894 was not quite one-fourth. The large mileage of roads in the hands of receivers in that year was, of course, accounted for principally by the effect of the panic of 1893, 126 of the roads that were insolvent on June 30, 1894, having become so during the fiscal year, and 35 during 1893. At the end of the fiscal year 1895, there were 169 roads

in receiverships, operating 37,855 miles and having at total capitalization of \$2,439,000,000, and on June 30, 1896, 151 roads, with a mileage of 30,475 and a capitalization of \$1,742,000,000. The present large mileage is made up chiefly of roads that have gone into receiverships comparatively recently.

A practical and startling demonstration of what may be accomplished by giving special attention to the training and coaching of employees in the right way of doing their work, and of securing their hearty co-operation in seeing that it is done in that way, has taken place on the St. Louis & San Francisco during the past year.

A Remarkable Record

The campaign on that road to reduce loss and damage to freight, which was purely educational in character, was described in the *Railway Age Gazette* of April 9, 16 and 23. The aim was to save \$200,000 during the fiscal year. The auditor's figures, which are now available, show that while the gross freight revenue for 1914-15 was \$28,182,181, as compared with \$28,654,454 for the previous year, a falling off of 1.7 per cent, the freight loss and damage claim payments dropped from \$482,038 to \$277,801, making a saving of \$204,237, or 42.4 per cent. If the gross freight revenue had not fallen off, and if the same rate of loss and damage applied, the saving would still have been over \$200,000. In 1913-14 the claim payments per thousand dollars of gross freight revenue amounted to \$16.82 on the Frisco, or about the average for all of the railroads in the country. For the year 1914-15 this figure dropped to \$9.86, a record which is equaled by very few other roads. During the year 22,905 freight claim preventive postals were turned in to the various committees, each one calling attention to some feature which was thought to be defective and which needed correction in order to remove the danger of further loss and damage. The slogan for the present fiscal year is another reduction of \$100,000 in freight loss and damage-claim payments.

THE MISSOURI, KANSAS & TEXAS RECEIVERSHIP

ON Monday of this week C. E. Schaff, president of the Missouri, Kansas & Texas, was appointed receiver in a suit brought by creditors with the acquiescence of the board of directors. The receivership was not the result of the failure of the operating department to make good; neither was it directly the result of such financial mistakes as were made in the cases of the St. Louis & San Francisco and the Chicago, Rock Island & Pacific. The company has strong banking support and the faith of the holders of large blocks of its securities. In 1913 it was able to sell \$19,000,000 secured two-year 5 per cent notes and the greater part of these notes was taken by bankers and financially strong individuals. The notes fell due May 1, 1915. Eventually 95 per cent of them, representing all of the notes held by those who were in a position to know the condition of the company, were extended. Active work has been done on a plan for a reorganization of the company's finances and the strong banking interests of J. & W. Seligman & Co. and Hallgarten & Co. have been secured for the carrying out of this plan.

The direct cause of the receivership is apparently that the suits brought by the holders of five per cent of the notes which matured May 1 last threatened the interests of other creditors and the integrity of working capital. While presumably the Missouri, Kansas & Texas reorganization will not be by any means as drastic as that of the Missouri Pacific, the receivership is another instance where voluntary reorganization of a fundamentally sound, although over-bonded, railroad could not be worked out even when banking support was available. It is easy to argue that it would be far better for all concerned to avoid the expense of receivership and submit to a voluntary reorganization and certain sacrifices, but the only instances where such theoretically wise self-interest can be put into practice is where a very large majority of securities are held by a few strong interests, as has been the case with the Western Maryland.

The holders of the five per cent of the 5 per cent notes which were not extended, by insisting on payment in cash and refusing to make a temporary sacrifice which the holders of many times that number of notes are willing to make, act in a selfish way, but there are always certain classes of lawyers and their clients who take a chance of making a profit by holding out on any proposition which requires an abatement of the letter of their legal right.

The Missouri, Kansas & Texas mortgages securing the bonds underlying the consolidated mortgage so restrict financing that the consolidated mortgage is necessarily a complicated structure superimposed on other mortgages, and although some such arrangement was absolutely necessary, it does not permit of as cheap financing as the earning power of the property deserves. There is, moreover, too large a proportion of Missouri, Kansas & Texas funded debt to stock.

Of course the Missouri, Kansas & Texas had extraordinarily bad luck in the fiscal year ended June 30, 1914. Unprecedented floods caused both expensive interruptions to traffic and expensive replacement work. Even so, however, the operating economies this past year have been such as to show a net operating income for the year ended June 30, 1915, of \$7,192,000, or more than 19 per cent greater than that for the year before, and a surplus of \$1,475,000 after the payment of interest charges will be shown for the year.

The indirect and underlying causes of the Missouri, Kansas & Texas receivership are the restrictions placed on economical financing by the mortgages prior to the consolidated mortgage; the confiscatory policy pursued for years by the legislature of Texas toward Texas railroads, which attitude, however, has been in good measure abandoned; vicious restrictions of the south-western states under the form of regulation; rates which were too low either because of competition or of nibbling by state commissions, and failure years ago to develop a northbound low grade traffic, such as the timber which some of the other south-western roads have.

The receivership will permit the elimination of the mortgage restrictions and presumably a reduction in fixed charges. The attitude of the state of Texas, as mentioned above, has already changed materially and the Missouri, Kansas & Texas management has gone far toward gaining the confidence of Texas people, and steps are already under way for the development of a profitable traffic northbound. What the rate situation in the south-west will be is only a matter of conjecture. It would seem as if the time had almost come when people had begun to realize the irreparable injury which was being done by demagogic railroad regulation.

TWO SYSTEMS OF STATE RAILWAYS

IN the report of the International Engineering Congress at San Francisco, which is published elsewhere in this issue, there are given abstracts of two papers which throw light on the question of government management of railways.

One is a paper on the railways of India, and indicates, as does most of the other available evidence, that the management of the state railways of that country has been successful. The article shows that these lines are profitable and other data might be cited indicating that, considering all the conditions, their capitalization is low, their service good and their rates reasonable.

The other paper referred to relates to the railways of Italy. Most of these lines are owned and operated by the government. Most of them always have been owned by it, although the state railways were leased to private companies from 1865 for varying periods of years, and again from 1885 to 1905. The author of the article on the Italian railways tries to show that government management since 1905 has been successful, or at least more successful than private management was.

Most people who are familiar not only with the results of the Italian railways in recent years, but also with their history, will be very slow to accept the view either that public manage-

ment of them has been a success or that it has secured better results than private management did. The writer of the paper in question shows that their net earnings are only about 1½ per cent on their capital cost. This net return fails by not less than \$35,000,000 a year to equal the interest which the government has to pay on the railway debt; and the government has been losing money at a proportionate rate ever since it assumed the management of the railways. Financially, therefore, the state railways are a failure. Furthermore, their service is still poor and their rates high.

For the reasons for the financial failure of the Italian railways we must go back to an era of railway building begun about a quarter of a century ago. At that time the government entered on an extensive campaign of construction which was extravagantly carried out, the result of which was that the lines built cost a great deal in excess of the original estimates. In one case contracts were let for 927 miles of line at \$50,300 a mile. The actual cost proved to be \$115,200 a mile. In 1879 the government provided for the construction of 3,762 miles, which it estimated would cost \$64,300 a mile. Nine years later an act was passed which recognized the probable cost of these lines, a large part of which had been built, as \$128,300 a mile.

The Italian railways when leased to private companies were burdened with the enormous capital cost resulting from wasteful government methods, and to this was largely due the failure of private management. Under government management since 1905 their capital cost has continued to increase at a rapid rate, and in 1913 it amounted to \$158,000 a mile, being exceeded by the capital costs of only two railway systems in the world—those of Belgium and the United Kingdom. Needless to say, the facilities provided and the traffic developed and handled are far inferior to those of the railways of Belgium and the United Kingdom. Measured by any rational standard government management of Italy has been a failure.

The inquiry naturally arises as to the reason or reasons for the difference between the results of state management in India and in Italy. The answer is at once suggested by the differences between the political conditions in the two countries, and the consequent differences between the organizations of the railways. India is not a self-governing country. It is ruled by a British civil service, the standards of honesty and efficiency of which are very high. The management of the state railways is in effect a part of this civil service. It is not influenced by politics of the "pork barrel" variety. It runs the railways on business principles.

On the other hand, the people of Italy are self-governing, although their government is monarchical in form. The management of the railways is under the control of parliament. In consequence their construction and operation always have been influenced by politics. Where new lines have been built, or improvements made, often has been determined by sectional

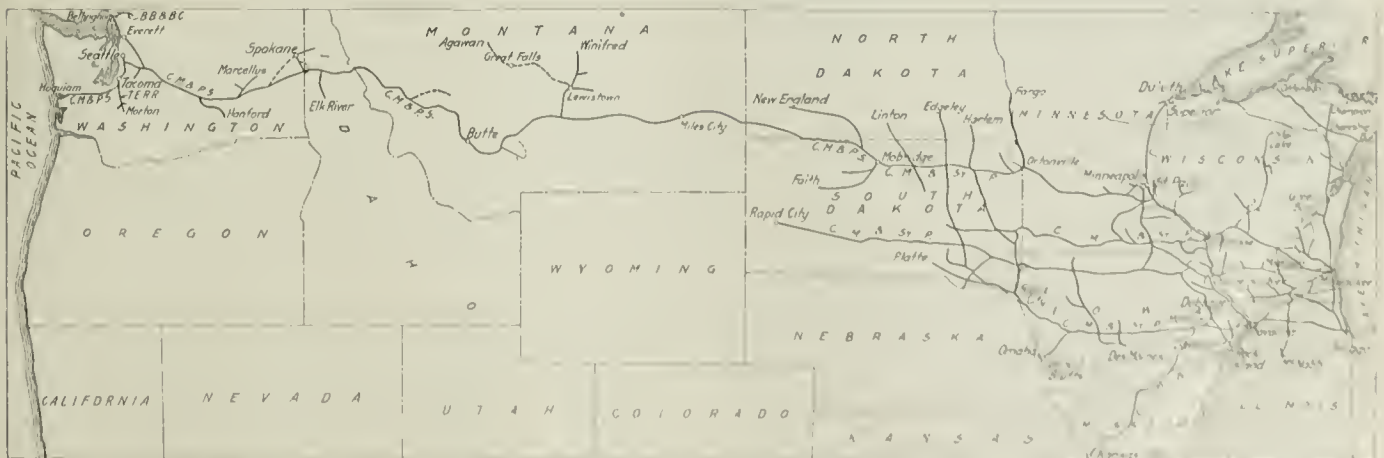
rather than national considerations. The employees of the state railways are organized, and their strikes and voting power have been important factors in determining the conditions and efficiency of the work done by them, and the wages they have been paid. These facts are not mentioned by the author of the paper presented at the Engineering Congress, but their truth is easily demonstrable by evidence from other reliable sources, and they afford the true explanation of the enormous losses inflicted by government railway management on the people of Italy.

The conclusion suggested by a comparison of state railway management and its results in India, on the one hand, and in Italy, on the other, is the same conclusion which is suggested by comparison of the management and results of the state railways of many other countries—of Prussia and of France, for example. This conclusion is, that the extent to which government management is a success or a failure is mainly determined by the extent to which politics is allowed to affect it. The more politics of the low, "pork barrel" kind there is in the government of a country, the more certain it is to fail as a manager of railways. Since there is as much politics of this kind in government in the United States as in any other country, the conclusion suggested as to the probable results of government management of railways here is obvious.

CHICAGO, MILWAUKEE & ST. PAUL

IT sounds paradoxical to say that the wisdom of the Chicago, Milwaukee & St. Paul Pacific coast extension was demonstrated in the fiscal year ended June 30, 1915, when the company failed to earn its 5 per cent dividend. Perhaps it would be more accurate to say that the necessity for the Pacific coast extension is being shown each year more clearly. The St. Paul, operating 10,053 miles of railroad, earned in the 1915 fiscal year \$91,435,000, or \$2,178,000 less than in the previous year. The expenses were reduced by \$919,000, and with heavier interest charges and a debit instead of a credit for hire of equipment, the company had net corporate income available for dividends of \$11,968,000, comparing with \$15,476,000 net available for dividends in 1914. Seven per cent dividends on the \$116,275,000 preferred stock and 5 per cent dividends on the \$117,361,000 common stock outstanding call for \$13,952,000. No attempt was made to scrimp on maintenance expenses in an effort to show the dividend as having been earned, and the, approximately, \$2,000,000 which was not provided by net income was taken from surplus. Past experience has proved almost invariably that it is a far sounder policy for a railroad company to frankly pay a part of its dividends from surplus if the company is strong enough to justify payment of dividends when not fully earned in a given year than to postpone maintenance expenditures in order temporarily to make a better showing in net.

Before the Pacific coast extension was built the St. Paul was



The Chicago, Milwaukee & St. Paul

easily earning 7 per cent on its then outstanding stock. It was a road, however, depending entirely on the traffic which it could originate on its own lines, or which was destined for points on its own lines, and it served a highly competitive territory. Competition is growing keener in the northwest every year. To get this competitive business it is often necessary to give a freight service and a passenger service that would not under normal conditions be justified by the traffic and rates. The St. Paul's competitors are the Northern Pacific; the Great Northern; the Minneapolis, St. Paul & Sault Ste. Marie; the Chicago, Burlington & Quincy, and the Chicago & North Western. The Hill Lines, of course, have their western outlet, the Soo has the Canadian Pacific, the Chicago & North Western has particularly close traffic relations with the Union Pacific. While, therefore, the St. Paul was apparently prosperous before it built to the coast, each year has shown the effects of the continually growing competition which the road has to meet and the impossibility of successfully meeting this competition and of reducing expenses, or rather of holding down expenses on local business.

Developing a new railroad is a slow process at best and requires a high degree of steadfast courage and even faith. The St. Paul's line from Mobridge, S. D., to Seattle and Tacoma, Wash., has been in operation since 1909. It is not even yet bringing to the system sufficient traffic to offset increased expenses of the rest of the system and to pay a fair return on the cost of its construction. The history of the transcontinental lines of the northwest, however, and the present development of that section of the country are such as to strengthen rather than weaken the belief with which the building of the Pacific coast extension was undertaken that in time it would be the salvation of the system.

The Hill Lines, the Soo and the North Western all feel the drain of competitive business in the territory east of the Missouri river. But these roads have built up also a through traffic which earns good revenue and can be handled economically. It would appear that it is the building up of a profitable through traffic, with resulting economies in transportation expenses, that will within a few years restore the earning power of the St. Paul, which has been adversely affected by conditions in the last four or five years. This is discussing the question, of course, as it affects the next decade of development of the property. The immediate prospects for large earnings this fall and winter from the movement of the unprecedented large crops apparently assure a prosperous year for 1916.

The falling off of \$2,178,000 in 1915 in operating revenues is less than what will be shown probably by a like mileage of most of the St. Paul's competitors. Revenue freight carried one mile totaled 8,186,000,000 tons, an increase of 1.32 per cent, but the revenue per ton mile was 7.813 mills in 1915, a decrease of 3.28 per cent as compared with the previous year. The number of passengers carried one mile was 858,500,000, a decrease as compared with the previous year of 5.91 per cent.

With only a very small falling off in freight traffic, there was a reduction in transportation expenses of \$1,151,000, the total transportation expenses in 1915 amounting to \$35,698,000. The following table shows the ratio of each class of expenses to total operating revenues:

	1915	1914
Maintenance of Way and Structures.....	11.35	11.45
Maintenance of Equipment.....	15.03	14.56
Traffic Expenses.....	1.92	1.92
Transportation Expenses.....	39.04	39.36
Miscellaneous Operations.....	0.79	0.83
General Expenses.....	2.04	1.78
Transportation for Investment—Credit.....	2.39	2.72
Total Operating Expenses.....	67.78	67.18

Transportation for investment—credit—is a subtraction from expenses representing a charge made by the company to itself for carrying company material. In 1915 the credit under this heading was \$2,183,000, in 1914, \$2,548,000. This looks rather large in both years, but as a matter of fact the amount of company freight carried by the St. Paul is large. The total ton mileage of company freight in 1915 was 1,439,000,000, in 1914, 1,597,000,000.

The average train load is not large, 390 tons in 1915 and 380 tons in 1914. In addition there was company freight which brought the total train load up to 459 tons in 1915 and 454 tons

in 1914. Such a large part of the St. Paul's traffic is local traffic, and so much of it has to be moved promptly without waiting for the opportunity to get a full train load, that, unless we remember what a network of branch lines the St. Paul has, we are apt to forget how difficult it is to make a good showing in train load when compared with a road having few branches and heavy through traffic on its main line. When the through traffic on the St. Paul becomes fully developed the train load figures should be very considerably higher than they now are. It will be noted that the company does a large passenger business. Of the total revenue, about 70 per cent is derived from freight and the other 30 from passenger and service incidental to passenger service. Both the quantity and the quality of the St. Paul's passenger business tend to make for a fairly high operating ratio. The St. Paul has the affection of travelers in the northwest and of citizens of St. Paul and Minneapolis to a remarkable degree. Even in the rather trying years through which the company has just passed the high standard of passenger service which the company has set for itself has been adhered to, and this policy, like that of refusing to stint on maintenance, leaves the company in a strong position to take advantage of better times.

The prospects for 1916 are bright. Never have there been such wheat and oat crops in the territory served by the St. Paul. Farmers of the Dakotas and Montana have cut an unheard-of crop of wheat and oats, and in some cases will probably get a bumper crop of corn also, although the frost probably will get some of the more northern corn. Hundreds of miles of land on which twelve bushels an acre of wheat was an average crop and twenty bushels a bumper crop have raised this year thirty to thirty-five bushels of wheat, and that planted to oats has raised 60 to 70 bushels per acre. The wheat has only barely started to move, so that the monthly earnings since the close of the fiscal year have not begun in the slightest to reflect the revenue which the road will earn from this year's crops. The less direct result which will come because of the traffic created by the prosperity of the farmers will be felt for two or three years.

The following table shows the principal figures for 1915 compared with 1914:

	1915	1914
Average Mileage Operated.....	10,053	9,684
Freight Revenue.....	\$63,953,799	65,315,755
Passenger Revenue.....	17,952,428	18,961,225
Total Operating Revenues.....	91,435,374	93,613,700
Maintenance of Way and Structures.....	10,377,185	10,722,100
Maintenance of Equipment.....	13,737,535	13,625,096
Traffic Expenses.....	1,756,801	1,799,621
Transportation Expenses.....	35,697,961	36,848,934
Miscellaneous.....	722,635	778,716
General Expenses.....	1,862,939	1,664,079
Transportation for Investment—Credit.....	2,183,355	2,548,245
Total Operating Expenses.....	61,971,701	62,690,301
Taxes.....	4,746,721	4,106,557
Operating Income.....	24,716,952	26,606,555
Gross Corporate Income.....	28,366,665	30,081,656
Net Corporate Income.....	11,968,283	15,476,286
Dividends.....	13,951,711	13,928,976
Surplus.....	*1,983,428	1,547,310

* Deficit.

HOCKING VALLEY

THE Hocking Valley was formerly owned jointly by five trunk lines, but control of it was bought in 1909 by the Chesapeake & Ohio. The company operates 352 miles of road running from the Ohio coal fields to Toledo. It has outstanding \$11,000,000 stock, of which the Chesapeake & Ohio owns \$8,825,800. A part of the Hocking Valley and the Toledo & Ohio Central, which is controlled by the New York Central, is operated as a double-track system, loads moving on one line and empties returning on the other. Heretofore the interchange of freight between the Chesapeake & Ohio and Hocking Valley has been over the Kanawha & Michigan, but, as mentioned in the comments on the Chesapeake & Ohio's annual report, printed in this issue, the Chesapeake & Ohio has sold its half interest in the Kanawha & Michigan and is now building an extension which, in conjunction with trackage rights, will give it a direct connection with the Hocking Valley.

Most, if not all, of the roads running north and south and serving the lakes will probably show a falling off in earnings due to the business depression of last year. In the case of the

Hocking Valley this was probably made worse by the fact that the Chesapeake & Ohio was shipping so much coal east that it sent as little as it conveniently could over the Kanawha & Michigan to the Hocking Valley.

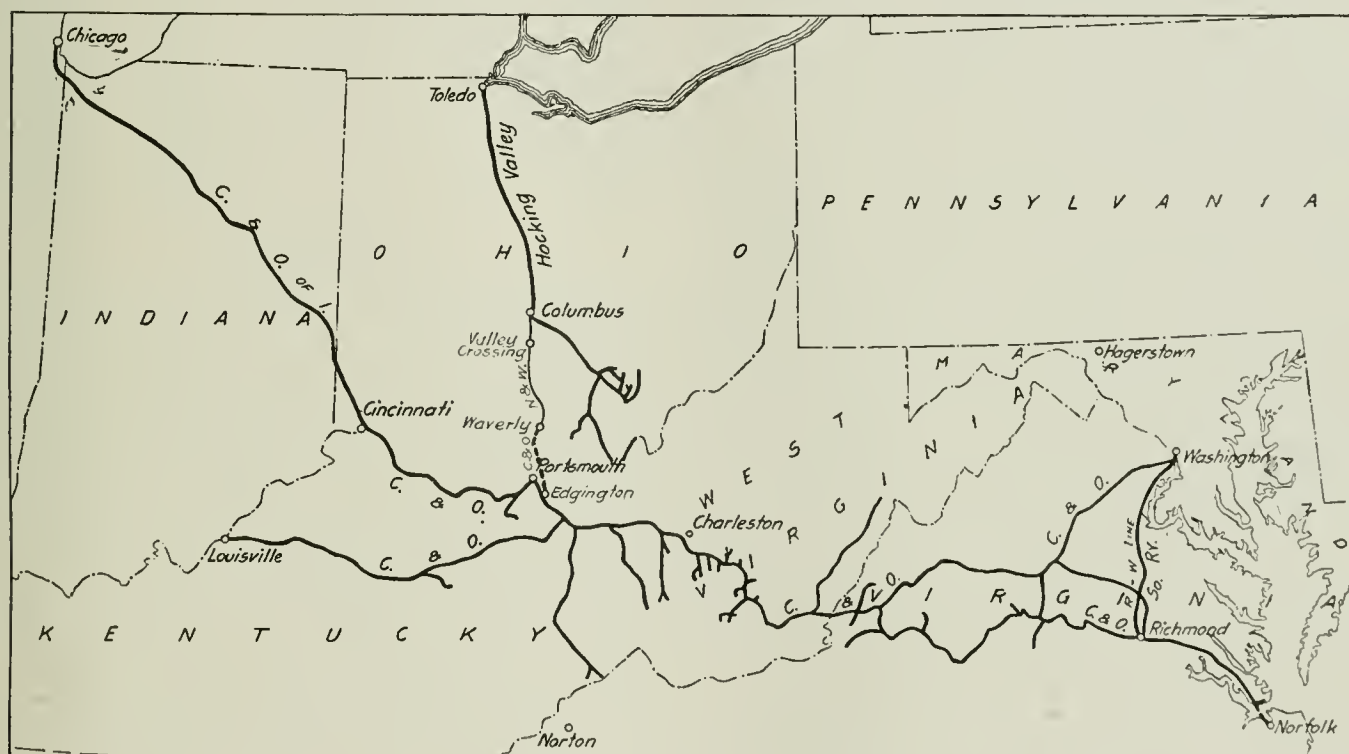
Total operating revenues of the Hocking Valley in 1915 amounted to \$6,181,000, a decrease as compared with the previous year of 12 per cent. Total operating expenses amounted to \$4,184,000, a decrease of 12.9 per cent. After the payment of rentals, taxes and interest there was \$493,000 available for dividends as compared with \$956,000 in the previous year. Dividends of 4 per cent were paid in 1915 as compared with 8 per cent in the previous year.

The principal reductions in operating expenses were in maintenance of equipment, on which there was spent \$1,159,000, or 20.7 per cent less than in 1914, and transportation expenses, which amounted to \$2,035,000, or 14.9 per cent less than in the previous year. The average revenue trainload in 1914 was just 1,000 tons, and even this high trainload was increased in 1915 to 1,035 tons. Including company freight, the trainload in 1915 was 1,068 tons, and the tons per locomotive, 922. With a decrease of 10.9 per cent in revenue ton mileage there was a

Taxes	\$418,522	\$451,136
Net operating income	1,578,261	1,763,263
Gross corporate income	1,871,152	2,215,182
Net income	493,402	955,741
Dividends	439,980	879,960
Surplus	53,422	75,781

CHESAPEAKE & OHIO

A CONDITION of the sale of \$33,000,000 Chesapeake & Ohio notes in 1914 was that \$2,000,000 should be spent from income for additions to the property in the fiscal year ended June 30, 1915; \$3,000,000 in the next year, and \$4,000,000 in each of the next three succeeding years. After the payment of 1 per cent dividends the company had a surplus for the year ended June 30, 1915, of \$2,036,000. From this amount and current funds there was spent a net total of \$3,024,000 on additions to road and equipment. No securities were sold during the year and the amount of outstanding equipment trust certificates was reduced from \$8,382,000 at the beginning of the year to \$6,413,000 at the end of the year. It will be seen, therefore, that the company not only spent somewhat over the required \$2,000,000 from this year's income, but about a million from the income of other years for additions and betterments.



The Chesapeake & Ohio and the Hocking Valley

decrease of 13.9 per cent in freight train mileage, while there was an increase in the percentage of empty car mileage from 43.8 in 1914 to 44.7 in 1915. The average length of haul on the Hocking Valley for freight was 129 miles in 1915 as against 125 miles in the previous year.

At the end of the year the company had on hand \$833,000 cash, with loans and bills payable of \$1,100,000. Since the close of the fiscal year the company has been showing a very considerable increase in business.

The following table shows the principal figures for operation in 1915 compared with 1914:

	1915	1914
Average mileage operated.....	352	352
Freight revenue	\$4,912,982	\$5,601,382
Passenger revenue	832,733	910,311
Total operating revenue	6,181,153	7,021,145
Maintenance of way and structures.....	707,207	668,455
Maintenance of equipment.....	1,158,671	1,460,653
Traffic expenses	110,916	107,576
Transportation expenses	2,033,491	2,391,640
Miscellaneous expenses		1,483
General expenses	172,602	175,422
Total operating expenses	4,184,370	4,803,747

It may be recalled that the Norfolk & Western's operating revenues for the fiscal year ended June 30, 1915, were about 3.73 per cent less than in the previous year. The Chesapeake & Ohio's operating revenues on the other hand were 5.35 per cent greater in 1915 than in the previous year, and totaled in 1915, \$39,464,000. By far the greater part of this gain in revenues was from the transportation of coal and coke. The total revenue tonnage of coal and coke in 1915 was 21,326,000, an increase over the previous year of 10.8 per cent. On June 1, 1914, the new coal pier of the Chesapeake & Ohio, at Newport News, was put in operation. The Chesapeake & Ohio was the last of the three roads running from West Virginia coal fields to Norfolk to build a steel electrically-operated coal-dumping pier, both the Virginian Railway and the Norfolk & Western having had piers in operation in 1914. The comparison of coal tonnage in 1915 and 1914 on the Chesapeake & Ohio, therefore, should be made with the explanation that in 1914 the Chesapeake & Ohio was probably not getting the proportion of export coal business to which it would have been entitled had it had facilities equal

to its two competitors. The Chesapeake & Ohio had also added to its coal car equipment previous to June, 1914, so that it was in a strong position to promptly move the coal of the operators on its lines, thus enabling them to take full advantage of the demand which the war has created for export coal.

With the present activity in the iron and steel trades and Canadian manufacturing plants there will be a large increase in movement of coal west and northbound from West Virginia. The Chesapeake & Ohio's average ton-mile rate on coal is but 3.06 mills. On some of this which moves west and which is now being delivered to the Kanawha & Michigan for haul over the Hocking Valley to the lakes the Chesapeake & Ohio gets a short and expensive haul. It may be recalled that arrangements were made in 1914 for the sale of the Chesapeake & Ohio's half interest in the majority stock of the Kanawha & Michigan. This sale was made at a profit to the Chesapeake & Ohio of \$1,119,000. A subsidiary company is now building a line from Edgington, Ky., to Waverly, Ohio, about 30 miles. At Waverly connection will be made with the Norfolk & Western over which trackage rights have been secured to a connection with the Hocking Valley, at Columbus, Ohio. The Hocking Valley is controlled by the Chesapeake & Ohio through ownership of the majority of its stock. This new connection will give the Chesapeake & Ohio a haul of two to three times as long on its coal for Toledo as it has when it delivers to the Kanawha & Michigan. Since the expense of loading, making up trains, etc., will be the same, the profit on the business will be very greatly increased when the new line is completed.

The net income available for dividends and for improvements to the property under the terms of the note sale in 1914 mentioned was \$2,664,000 in 1915, as compared with \$2,972,000 in the previous year. In 1915 only one per cent was paid in dividends, while in 1914 four per cent was paid. The 1915 net would have been much larger except that in 1915 the Hocking Valley paid only 4 per cent dividends on the \$8,825,800 stock which the Chesapeake & Ohio owns, whereas in 1914 eight per cent was paid by the Hocking Valley. This alone makes a difference of more than \$350,000, and the company spent about one million dollars more on maintenance in 1915 than in 1914.

Transportation expenses amounted to \$12,896,000 in 1915, an increase over the previous year of \$364,000, or 2.9 per cent. The total revenue ton mileage was 8,138,000,000, an increase over the previous year of 1,074,000,000, or 15.2 per cent. The passengers carried one mile totaled 269,000,000, as against 292,000,000 the year before, a decrease of 7.6 per cent. Freight train mileage totaled 8,979,000, an increase of 680,000, or 10.6 per cent, and the passenger-train mileage totaled 5,009,000, an increase of 222,000, or 4.2 per cent. The average revenue train-load freight in 1915 was 906 tons and in 1914 870 tons, an increase last year of 4.1 per cent. The gain in trainloading was made entirely through a heavier gross load pulled per locomotive, the average number of loaded cars per train being 28 in 1915 and 28.1 in 1914, while the average number of empty cars was 19.4 in 1915, as against 17.7 in 1914. The average load per loaded car was 32.3 in 1915 and 30.9 tons in 1914.

The total tonnage of all commodities carried on the Chesapeake & Ohio in 1915 was 30,048,000. Of this, 70.25 per cent was bituminous coal, 6.40 per cent lumber, and 3.92 per cent grain. The principal changes, as compared with the previous year, were an increase of more than 12 per cent in tonnage of bituminous coal; an increase of more than 140 per cent in tonnage of grain, and a decrease of nearly 14 per cent in the tonnage of lumber. There was also, of course, a big increase in the tonnage of livestock, probably principally horses, the total tonnage in 1915 being 106,000, as against 46,000 in the previous year.

The company spent \$4,695,000 in 1915 for maintenance of way. This is an increase of \$545,000 over the previous year, or a little over 13 per cent. By far the largest single item of increase was the expenditure for ties, a great deal of tie renewal work having been done this last year. The amount spent for ties in 1915 was \$2,136,000, an increase as compared with the previous year of \$513,000. There was also, of course,

the expenditure for maintenance of the new coal pier, which amounted to \$105,000, in 1915.

Maintenance of equipment cost \$8,243,000, an increase over the previous year of \$415,000. The average repairs per locomotive amounted to \$3,013 in 1915, and \$2,740 in 1914; the average expenditure for repairs of freight-train cars was \$82 in 1915, and \$74 in 1914; and for passenger-train cars, \$921 and \$909, respectively. Of the total locomotives and freight cars in service 11 per cent of each were awaiting or undergoing heavy and general repairs at the close of the year. This seems a rather high percentage.

The prospects for the present year are that there will be a further increase in coal traffic eastbound and a very much increased coal traffic westbound and northbound. Passenger business also ought to be better, and the Hocking Valley's prospects for a good year, as mentioned elsewhere, are good.

The following table shows the principal figures for operation in 1915, compared with 1914:

	1915	1914
Average mileage operated.....	2,369	2,346
Freight revenue	\$31,288,537	\$28,866,516
Passenger revenue	5,696,088	6,098,059
Total operating revenue.....	39,464,037	37,459,864
Maintenance of way and structures.....	4,694,522	4,149,457
Maintenance of equipment.....	8,243,170	7,827,660
Traffic expenses	650,406	669,283
Transportation expenses	12,896,079	12,532,329
Miscellaneous expenses	232,347	248,347
General expenses	873,883	986,822
Transportation for investment—Cr.....	33,994	
Total operating expenses.....	27,556,414	26,413,899
Taxes	1,349,497	1,330,935
Net operating income.....	10,558,126	9,715,030
Gross income	11,576,346	11,859,681
Net income	2,663,537	2,971,815
Dividends	627,816	2,511,264
Surplus	2,035,721	460,551

NEW BOOKS

Poor's Manual of Industrials for 1915. Bound in cloth; 2,872 pages; size, 6 in. by 9 in. Published by Poor's Manual Company, 80 Lafayette street, New York. Price \$5.

The sixth edition of Poor's Manual of Industrials contains 412 more text pages than the fifth or 1914 edition, the increase resulting from the inclusion of a large number of new statements of industrial companies presented for the first time in manual form. Poor's Manual Company now issues three manuals. The Manual of Railroads has been issued for 49 years and has long been recognized as an authority. Of the Manual of Public Utilities but three editions have been issued, and of the Manual of Industrials the present volume is the sixth. The last relates primarily to manufacturing, mining and miscellaneous companies and contains 2,872 pages, being the largest of the three. It contains information relative to the capital stock, directors and officers of the various companies and also, when such are obtainable, income accounts, balance sheets and other important data, all of which would otherwise be almost inaccessible. One of its valuable sections is the Railroad Appendix, containing data of railroads and utilities received too late for publication in the other two manuals.

Oxy-Acetylene Welding and Cutting. By Calvin F. Swingle, M.E. 190 pages, 4½ in. by 6½ in. Illustrated. Bound in leather or cloth. Published by Frederick J. Drake & Co., Chicago. Price, \$1.50 in leather; \$1.00 in cloth.

This book is intended as a practical treatise on the subject of welding and cutting with the oxy-acetylene flame, and only so much of the theory pertaining to the subject has been included as will enable the practical man to acquire a thorough working understanding of the subject. After an introductory chapter dealing briefly with the adaptability of various methods of welding, several chapters are devoted to welding flames and the properties and methods of handling the gases most commonly used. This portion of the book is confined largely to the oxy-acetylene flame, which has the widest practical application, and touches only briefly on other gases which have been used with oxygen to a less extent in welding and cutting operations. The equipment used in welding and cutting is next discussed, after which the operation of the plant and the practices followed in welding and cutting are taken up. A final brief chapter is devoted to the subject of carbon removal with the oxygen torch. The book contains a large number of illustrations and a number of tables.

Railways Ask Rehearing of Western Rate Case

Request Specific Findings on Adequacy of Carriers' Revenues and Relation of State and Interstate Rates

The committee of attorneys, representing the western railways, of which C. C. Wright, general solicitor of the Chicago & North Western, is chairman, on September 25 filed its petition with the Interstate Commerce Commission, asking the commission to grant a rehearing and reargument of the western rate advance case and to modify the findings and order of July 30, in regard to the following particulars:

As to the request of the respondents and protestants for a finding by the commission upon the question of the adequacy of the revenues of the carriers. Upon the reasonableness of the proposed rates on grain and grain products, livestock, packing house products, fresh meats and hides (except as the same were allowed), fertilizer and fertilizer materials and cotton piece goods.

The respondents pray that the findings in the order be modified so as to permit the carriers to make effective the rates in the tariffs directed to be cancelled, and that if there is, in the opinion of the commission, evidence raising a serious question as to the proper relation of the state rates to the proposed rates, then that the commission shall order an investigation as to the relation of such state rates to interstate rates, in which the relation may be properly determined by the commission, and may allow the petitioners to establish such rates as are in its opinion just and reasonable, and require the carriers to remove any discriminations which may be found to exist by reason of lower state rates.

REASONS FOR A REHEARING

The following is an abstract of the statement of the carriers as to why they are entitled to a reargument and to a modification of the opinion:

There are some things in the opinion of the commission in this case which are so vital, not only as affecting the advances proposed, but also as affecting the ultimate welfare of the railroads and of the public, that we do not hesitate to ask this commission to reopen the case that they may be more fully presented. With a record of more than 15,000 pages and the voluminous exhibits contained in this case, it is not at all strange that the members of the commission who did not hear the testimony should fail to gather its full import, and what may be said in criticism of the opinion is not in criticism of the actions of individual members of the commission. We desire, however, to speak plainly as to the effects of this opinion, both upon the transportation problems of this country and upon the future of this commission. The almost unlimited power of the commission makes it imperative that it shall most carefully consider and weigh the effect of its opinions upon so important questions as those here raised. In view of the fact that there is no adequate review of the commission's opinion, it is the more proper that reargument of the questions be granted.

THE NEEDS OF THE CARRIERS FOR ADDITIONAL REVENUE

The rules of the commission recently adopted required that the parties to a proceeding before it shall state distinctly the findings which are desired. The carriers in their brief specifically asked for a finding upon the sufficiency of the revenues of the carriers. The principal brief for the protestants also contains a request for a finding on this subject. The first paragraph of their brief is as follows: "Are western railroads entitled to more revenue through advanced freight rates, is the issue presented in this case?" It will thus be seen that this issue was specifically joined. Elaborate proof was introduced by both sides. It is a question which is important alike to the railroads and to the public to know what the policy of this commission is to be.

A few pertinent facts may properly be called to the attention of the commission as bearing upon this question. In 1910 various carriers undertook some general advances in rates. In the opinion in the eastern case, it is pointed out that the question presented was the need of additional revenue. In the western freight advance case it was held that the revenues must play a not inconsiderable part in arriving at a final judgment, and the commission epitomized the grounds of justification of the advances in the phrase: "We need the money." It is true that in both cases the commission held that the carriers had not shown the inadequacy of their revenues. It is, however, noteworthy that the commission in those cases not only distinctly passed upon the issue presented in this case, but that it said to the same carriers that now appear before the commission that if in the future they felt their rates were not sufficient to give an *adequate return*, they would find the door of the commission open to them. This implied a promise on the part of the commission that they would at such future time pass upon that question.

In the entire history of the commission, so far as we are able to determine, from that time since, there has never been any indication of a change in the views of the commission. Certainly there has been no change in the law. On the other hand, in the recent so-called five per cent case, the eastern carriers renewed their application for an increase in rates, based solely upon the need of additional revenue. The commission in that case, as now constituted, considered the question and rendered its decision based upon its conclusions as to the need of additional revenue.

We recognize that it does not necessarily follow that a particular rate has been justified by a showing that the revenues of the carriers are insufficient. However, the fact of the insufficiency of revenue is one of the fundamental questions which underlies and must underlie a general advance in rates. The western carriers did not base their claim *entirely* upon the inadequacy of revenues, but they harkened to the advice of this commission and introduced evidence of the comparative returns upon various commodities.

In every other general advance rate case the commission has not only considered but has passed upon the question of the sufficiency of revenues, and the carriers in this case therefore ask that that matter may be distinctly passed on. It is important to the carriers and to the public to know the conclusion which the commission arrived at upon this question. If the commission shall find that the present revenues are adequate, then the railroads and the public must adjust themselves to the service which will allow the carriers from those revenues to secure the fair return guaranteed by the law. The public likewise is interested in this matter, as, depending upon the permanent policy of this commission may ultimately depend the question of whether railroads shall continue to be operated by private capital under efficient government regulation and control, or shall be operated by state and governmental authorities.

THE FINDINGS OF THE COMMISSION

Many of the facts upon which the conclusion as to the adequacy or inadequacy of revenues must rest have been determined. It was found, among other things, that the carriers are required to pay a higher average percentage for borrowed capital than heretofore; that they are paying higher prices for many materials and higher wages for most kinds of labor; that in meeting the increased cost with increased prices for service they are subject to certain disabilities not similarly encountered by many other industries; that the relative equal

depreciation of the carriers' credit with credit generally is not evidence of the adequacy or inadequacy of their present revenues (it should be noted that the carriers never contended that it was); that their net corporate income cannot be accepted as the measure of the adequacy or inadequacy of present rates (the carriers did not so contend and did not present the data as to net corporate income); that the increased percentage of bonds to capital obligations indicates a growing disinclination to invest in railroad stocks and a growing unwillingness to accept the prospect of dividends as a sufficient incentive to assume the risk of railroad proprietorship. It also found that the relative profitableness of the business, taking the roads as a whole, has declined since 1901; that the main cause effecting this result has been an increase in expenditure not offset by an increase in receipts.

The tables presented beyond question show that the same statement is true comparing 1910 with present conditions. It may be said generally that the contentions of the carriers in this case as to the financial needs and the basis upon which they should be determined have been sustained by the commission with the possible exception as to the value of the roads. The operating ratio is found to have increased materially. The substantial integrity of the carriers' accounts has been approved. The fact of the decreasing net return from operations is shown to be due to the increased wages and taxes and maintenance, and to be from causes beyond the control of the carriers. Every fact that was found in the five per cent case by the commission upon which it based its conclusion that the carriers needed additional revenue has either been found in the present case by the commission or is supported by uncontradicted testimony. Parallel columns of the findings and results of the findings as between the five per cent case and the present case demonstrate that the showing in this case is clearer and upon a more substantial basis than that presented in the five per cent case. The needs of the carriers are shown to be greater and the insufficiency of the revenue is more marked.

Inasmuch as the opinion refers to certain returns upon stock of some of the carriers, we direct the commission's attention to the fact that the carriers presented their case upon the *operating* income from the property devoted to the public service and not upon the *corporate* income as compared with the capitalization. That this test is not a test of the adequacy or inadequacy of revenues, the commission has held. If a test is to be made of the corporate income as compared to the capitalization, or the return upon the stock of the company, then the question of the financial management of various carriers would become a much more important element than when the *railway operating income* and the value of the physical property is considered. The injury from financial mismanagement is primarily and directly to the stockholders and bondholders of the carriers. It is, we believe, however, a very small element when the *operating* revenues are compared to the value of the property. To put the matter more concretely, if it were conceded that a road had been financially mismanaged, it would not in any way affect the amount of commodities to be moved upon that road. The present case includes not the single road but all of the roads. The commodities which were handled by these roads were exactly the same, whether the one line of road or all of the roads had been financially mismanaged. If there had never been in times past a dollar misspent by any of the roads it would not in any particular affect the gross revenues to be derived by the carriers in this section, as that must depend upon the amount of commodities and the rates charged. The effect upon the *operating* revenues would therefore be nil. Its effect upon the *net operating income* could only be predicated upon the fact of mismanagement of the *property*, not its *finances*, or upon *unlawful expenditures which were charged to operating costs*. In the present case there is no evidence to indicate that the *property* of any of these roads has been mismanaged. The operating ratios on the Rock Island, which has been recently criticized by the commission, are shown to be

substantially the same as on other lines in that section. There is no evidence in this case of any improper charges against the operating expenses since 1902. The carriers did not present this case to the commission upon the claims of roads that were in the hands of a receiver, or upon the claim that the roads were entitled to any definite rate of return from *corporate income*. It was and is contended that the net operating revenues are insufficient to allow a return upon the value of the properties equivalent to what the courts have said is the lowest level of reasonableness.

It is needless to point out to this commission that this case is one of a series involving other commodities, and involving passenger rates. The same question must be before this commission in all of those cases, as it has been stipulated that this record shall be a part of the record in the other cases. This makes it appear to be very proper that we ask that this case be reopened, and that the opinion may be modified in the light of a reargument and the arguments which shall be presented in those cases.

A NEW DOCTRINE

Overshadowing all questions of the amount of revenue involved, there arises the question of whether this commission shall surrender the power and duties of the federal government which Congress has reposed in the commission. We believe that the announcement of the commission in this case as to its policy as to advance rates where there are lower state rates is the most startling one that has ever come from the commission. We put the matter strongly and desire to make our views as plain as possible. It must be that we misunderstand the opinion, or the opinion is the result of an entire misconception, both of the law and the facts.

The commission has in the past repeatedly held that there was no greater presumption attaching to state-made rates than attaches to the voluntary rates of carriers. State-made rates may be introduced for comparative purposes the same as voluntarily-made rates. They are evidential in character and not controlling.

In the now celebrated Shreveport case, which was affirmed by the Supreme Court of the United States, this commission established the doctrine that it is the duty of the Interstate Commerce Commission to determine *for itself the reasonableness of interstate rates*. When reasonable interstate rates have been determined by the Interstate Commerce Commission, it has the jurisdiction to determine whether lower rates, established by a carrier voluntarily or by a carrier under the direction of the state authorities, are unjustly discriminatory. This commission never assumed the right to consider or determine in any way the reasonableness of state rates as such. The Supreme Court fully sustained the commission, and in substance said: The paramount rights in relation to determining the reasonableness of interstate rates is in the Interstate Commerce Commission and this commission has the power, and, when its jurisdiction is invoked, must exercise the duty of determining whether lower rates fixed under an order of the state discriminate unjustly against the interstate shipper. When such determination has been made by the Interstate Commerce Commission, the law says to the carrier, you may remove that discrimination, even if by so doing you charge higher rates than fixed by the state authorities for the movement within the state.

For the purpose of the discussion of this particular question, if it be conceded that every state rate was lower than the interstate rate, it could not affect the reasonableness *per se* of the interstate rate. In the eastern advance rate case and in the western advance rate case, the commission held that its duty in passing upon an increased rate is identical with its duty in passing upon the reasonableness of a rate when complaint has been made. The only effect of the amendment to Section 15 of the act giving the commission the power to suspend rates was to allow the commission to determine in advance of the effective date of the rates the same questions which it must determine if the rates had gone into effect and a complaint been made

as to their reasonableness or discriminatory character. If it be, however, the doctrine that in an advance rate case the carriers must assume the burden of showing that the lower state rates are unreasonable, then the commission would be called upon to exercise jurisdiction over state rates and to determine a matter which has not been committed to the commission. We direct particular attention to the Shreveport case. Whatever may have been the individual opinions prior to that decision, it is now the law upon the subject of the duties and powers of this commission. The commission found the commodity rates enforced on the railroads from Shreveport to be just and reasonable and that there were lower rates on the same commodities carried from Texas points under similar conditions. The commission did not say because there were lower rates carried in Texas therefore you must reduce your interstate rates. It did say that the commission, acting as the representative of the federal government, must determine, according to *its judgment*, the reasonableness of the interstate rates, and if the carriers by reason of the compulsion of some other body maintained lower rates which were discriminatory, the discrimination must be removed.

The Supreme Court appreciated the very lucid statement of the commission upon that subject. The court adopted the conclusion of the commission, that it was empowered and therefore it was its duty to determine the reasonableness of the interstate rates by standards of its own.

AUTHORITY CONFERRED UPON THE COMMISSION IN PASSING UPON ADVANCED RATES PRIOR TO THEIR EFFECTIVE DATE

The commission, without the matter having been discussed in argument, and we believe without full comprehension of the effect of their statement, assumed that the use of the word "propriety" in Section 15 of the act to regulate commerce extends the authority of the commission so that it may go outside of the ordinary questions, which it may determine upon a charge that a rate is unreasonable and discriminatory, and determine the "propriety" of the rates. It is said, "Propriety is a broader and more inclusive term than reasonableness." Just what is meant is left uncertain in the opinion of the commission, but it evidently must be either the exercise of such judgment as the management of a carrier might exercise, or of that judgment which a purely legislative body might exercise. That it was not the intention of Congress to confer such power upon the commission, must be evident for various reasons. The commission has never so considered it heretofore. In the western rate advance case in 1911 the commission distinctly and positively disclaimed any other or different power in relation to a hearing upon suspended rates than it possessed in relation to rates under attack. It also stated that the commission was not the general manager of railroad companies. It seems clear that the duties delegated to the commission are not the purely legislative ones which must be involved in the determination of propriety of rates, if such determination is to be based on other than fixed rules. That Congress did not so intend, appears to be very plain from the context of the act. The word "propriety" is limited to a determination of the same matters which must be determined when a rate is attacked; that is, the unreasonableness and discriminatory character of the rates. To hold otherwise and extend the meaning of the word "propriety" to embrace the judgment of the commission upon outside matters other than the reasonableness or unreasonableness of the rates and the discriminatory or undiscriminatory character thereof, is contrary to all the canons of statutory construction.

If, however, a broad definition of propriety as being something other and beyond the fixed standards and rules is the meaning in this statute, then the statute itself is in violation of the provisions of the constitution that require the separation of the powers of government. The Supreme Court has distinctly passed upon such questions. The legislature cannot delegate its power to make a law, but it can make a law to delegate a power to determine some fact or state of things upon which

the law makes or intends to make its own action depend. The construction of the statute which makes "propriety" mean something broader than those terms included in the other paragraphs of the law would be such a delegation of legislative power.

Before the commission commits itself to a doctrine so subversive of the position which it has taken in all of its previous decisions, without the matter having been discussed in the hearing so far had, would seem to justify the carriers in a request that they have an opportunity to be heard upon the matter.

PROCEDURE WHEN STATE RATES ARE LOWER THAN INTERSTATE RATES

As before pointed out, it is the settled doctrine of the Supreme Court that the Interstate Commerce Commission *must determine the reasonableness of the interstate rates according to its standards and judgment*; that the Interstate Commerce Commission *is the sole judge of the relation which the state rate shall bear to the interstate rate*.

It therefore becomes important in considering an advance rate case to see by what method the Interstate Commerce Commission can fully discharge its duty. That it cannot so do by simply denying the carriers the right to establish rates, which are otherwise reasonable, solely because there are lower rates would seem to be apparent. To adopt that course is to allow the states to determine the relation of state and interstate rates. By this method, no advance on interstate rates to the reasonable basis determined by the Interstate Commerce Commission could be made until a similar advance was made in state rates. It appears in this case that the state rates on livestock and some other commodities are lower than the present interstate rates, and of course lower than the proposed interstate rates, and it becomes important to determine what course the commission should pursue in such case, if, in its judgment, the proposed interstate rates are reasonable. In relation to grain and grain products, a similar condition existed as to minimum weight on grain products. The interstate minimum is in many cases higher at the present time and it was proposed to make the interstate minimum still higher. In that case the commission approved of the increase in the interstate minimum and disposed of the very urgent claim of discrimination which was presented by the protestants.

In the matter of coal rates it is true that the proposed rates were higher than some state rates for a similar distance, and probably under substantially similar conditions, yet the commission permitted the advance in rates. The same condition that existed in relation to the minimum weights on grain products exists in relation to livestock rates. The rates in different states are different, and it would be impossible for the commission to fit the interstate rate to each state rate. "To do so would result in state regulation of interstate commerce."

The commission in this case, we believe, adopted the proper method in relation to minimums on grain products and to the rates on coal. As we understand it, this was in line with the previous course of this commission. The commission cited the Shreveport case and the St. Louis grain case as authority for the different course in livestock than was taken with relation to the grain products and the coal rates. Those cases were complaints as to existing rates, and there was directly put in issue the relation between state and interstate rates.

In an advance rate case that is not *directly* in issue. The carriers cannot bring it into the case. They file tariffs. These are suspended pending investigation. That suspension, however, *gives no notice to a party using the state rate* that the measure of his rate is to be investigated; and therefore it appears that in an advance rate case, the commission cannot determine the relation of the state to the interstate rates. Such apparently was its view in the establishment of the express rates, and particularly allowing an advance in the express rates when there are many lower state rates. There was before this commission and is now pending before it a case where the state-made express rates are so very much lower than the rates fixed by the Interstate Commerce Commission that carloads of posts

are being shipped by express at a less charge than the third class freight rates. Notwithstanding this complaint the commission allowed the advance in the interstate express rates. The evidence, on file with the commission in that case, will disclose that the discrepancies between the interstate express rates and the state express rates of South Dakota are even greater than the discrepancies between the interstate and state livestock rates. In view of the consistent course of the commission heretofore, the carriers ought not to have been expected to have met that issue or to argue it, and this rehearing is asked that they may have the advantage of an opportunity to discuss that question.

Again, in the five per cent case, the advances were allowed in spite of the fact that the state rates were lower. The fact that there might possibly be a discrimination affected by the putting into effect of interstate rates, reasonable in themselves, did not make it necessary to deny the interstate advances. That this course is eminently proper is illustrated by the fact that there is now pending before the Interstate Commerce Commission a complaint of the St. Louis Business Men's League versus the railroads in which they seek to remove the discrimination which was produced by this order of the Interstate Commerce Commission. The same course was pursued in relation to the express rates. Sioux City brought an action to remove the discrimination incident to the rates fixed by the Interstate Commerce Commission and the lower South Dakota rates.

REMEDY FOR STATE DISCRIMINATION AGAINST INTERSTATE COMMERCE

If the rates are otherwise just and reasonable, it would not seem to be improper to allow them to go into effect and to order the removal of any impropriety that may exist by reason of lower state-made rates. Upon the present basis as outlined by the commission, that could not be done. We suggest the proper remedy and ask that a hearing may be had upon it. First, the commission should pass upon the reasonableness and justice of the proposed interstate rates without regard to the relation to state rates. If, having found the proposed interstate rates reasonable, but that there were lower state rates which might be discriminatory, the commission should allow reasonable interstate rates to go into effect and proceed to an investigation of the relation of the state rates to the interstate rates.

It is not the thought of the carriers in this case that the evidence is sufficiently definite to warrant the commission in a finding of unjust discrimination as between state and interstate rates for the reasons hereafter set forth. For this reason and because it was not consonant with the prior practice of this commission, the carriers did not undertake such a task. It would require that they search their whole tariff records, and make negative proof as to a great many rates.

However, if the commission should find that the evidence is sufficient to show discrimination, it ought, either *to allow the advance rate to go into effect and order the discrimination removed, or it should allow the advance rate to go into effect and order a general investigation to determine the proper relation of the state rates to the interstate rates.*

We do not suggest the first of these courses because of the doubt as to the jurisdiction of the commission to make an order removing the discrimination in an advance rate case without having given definite notice that the relation of the state and interstate rates will be considered. The latter course would seem to be the one which is consonant with prior practice and with reason. The prior practice has not been to order a general hearing upon the relation of the state and interstate rates, but to await a complaint. If, however, there is sufficient evidence produced to the commission in an advance rate case of this kind to indicate that there is a serious question as to the propriety of the relation between the state and interstate rates which will become effective, the commission ought not to wait for the individual complaints.

We have presented in the motion a request that this be done. It is very apparent that as the matter is now left, assuming that the proposed livestock rates are reasonable, in and of themselves,

the carriers are effectually tied up so that they may never secure an advance in livestock rates unless they can be able to convince the commissions of some eight or more states. In other words, the Interstate Commerce Commission cannot permit the carriers to earn the fair rates upon interstate business unless the state commissions permit them so to do. The attitude of the state commissions in this case indicates the chance the carriers would have in such an undertaking. This would be a surrender of the prerogative of this commission, and allow the states to fix the relation of state to interstate rates. The course suggested above obviates this difficulty and maintains the power and authority of the Interstate Commerce Commission over interstate rates and the relation to state rates.

The least that could be done under such a condition, as we view it, would be to postpone the final determination as to allowing advance rates to go into effect until that general investigation of the relation of rates can be had.

What has been said in relation particularly to livestock rates would apply to packing-house products, fresh meats and some other commodities. We understand that the protestants in relation to coal rates have asked for a rehearing, and they ask that the doctrine applied to the livestock be applied to coal. As we view it, the commission took the proper course in relation to the coal rates, and the remedy of the protestants as to coal rates is not in a rehearing but in a complaint to remove the discrimination on account of lower rates.

(That portion of the petition dealing at length with the decision as to specific commodities is here omitted.—EDITOR.)

EFFECT OF THE DOCTRINE ANNOUNCED

We think that the only safe way to maintain the authority of an administrative body like the Interstate Commerce Commission is to adhere to certain rules and standards. This is clearly indicated in the repeated decisions of the Supreme Court. In the discharge of its duties and in determining the facts, it is in the exercise of quasi-judicial functions. It seems it was the intention of Congress that this commission should act upon the evidence and make its conclusions according to the rules and standards fixed by Congress. The respect which this commission has gained in the public mind has, we believe, been largely due to the fact that it is discharging its duties in an impartial and judicial manner. And in order that there may be success in the regulation of railroads, it is of course apparent that a uniform line or policy must be adhered to. There cannot be a different basis in each case. The strength of the common law arose from its adherence to fixed principles. It is not necessary that a hide-bound adherence to precedents be established. It is, however, proper, and we believe necessary that the commission act according to some standards and rules. Such was the evident intention of Congress. Such is the view of the Supreme Court. It gives dignity and power and authority to the commission. The effect of this opinion as we look at it, and as generally considered, not only by the respondents but also by the protestants and by the public, is to depart from the rules and standards which have heretofore been established. If a substantial reliance cannot be placed upon the maintenance of the standards by which the reasonableness of rates shall be determined, the deserved prestige of the commission will soon be lost. If this commission shall finally determine to abandon its prior standards, it ought to clearly so indicate, and to say that its opinions in the prior cases have been wrong. It ought not, however, to abandon its prior standards until it shall have had the advantage of the fullest discussion wherein those standards are directly involved. It ought to place its opinion in such clear and definite mold that the matter may be presented to the courts for determination whether it can act upon its own notions of propriety in determining the reasonableness of rates or whether it shall be governed by the rules and standards fixed by Congress.

The petition is signed by C. C. Wright, general solicitor, Chicago & North Western; T. J. Norton, general attorney, Atchison, Topeka & Santa Fe; W. F. Dickinson, general attorney, Chicago,

Rock Island & Pacific; C. S. Burg, interstate commerce counsel, Missouri, Kansas & Texas; A. P. Humburg, commerce attorney, Illinois Central; R. B. Scott, general attorney, Chicago, Burlington & Quincy, committee of attorneys for the carriers.

TRANSCONTINENTAL ROADS PROPOSE FURTHER REDUCTIONS IN RATES TO MEET CANAL COMPETITION

Increasing competition of the water lines using the Panama Canal, which has impelled the transcontinental lines to make reductions on a large number of additional commodities to the Pacific coast, was described by witnesses for the railroads and for the shippers at a hearing before Examiner Thurtell, of the Interstate Commerce Commission in Chicago, which was begun on September 23, in support of the petition of the railroads for authority to establish reduced rates from eastern to Pacific coast terminal points. The commodities on which the carriers asked relief from the original fourth section order of the Interstate Commerce Commission in the intermountain rate cases, are included in a supplement to Schedule C, which included the commodities on which the commission allowed relief on account of the canal competition in its decision rendered last January. It is a list of 156 items, including several hundred commodities.

Paul P. Hastings, assistant general freight agent of the Atchison, Topeka & Santa Fe at San Francisco, testified on behalf of the transcontinental railways and introduced as an exhibit the list of commodities, together with the present rail rates from the eastern part of the United States, included in groups A to J of the transcontinental tariff, to Pacific coast terminals, a list of representative points of origin for each commodity, the water rates which have been quoted by the water lines through the Panama Canal during the past year, the tonnage of movement via the water lines, and a column of remarks giving explanations, as to each commodity, of the reasons why it was necessary to reduce the rates. Mr. Hastings explained that at the time of the application of the roads last fall for relief on the Schedule C commodities the canal had just been opened and the roads were not thoroughly posted as to the extent of the competition. Since that time they have found many commodities on which the movement from the eastern part of the United States has been almost entirely by water from points as far west as Chicago and the Mississippi river, including a number of commodities which have never been considered subject to water competition.

After the rendering of the commission's decision in January representatives of the transcontinental roads held a meeting in Chicago to consider the situation and remained in session from March 1 till about a month ago, considering the requests from shippers for changes in the rail rates to meet the new competition by the water lines. About 200 shippers had submitted questions or petitions regarding the rates necessary to meet water competition direct to the Interstate Commerce Commission, which had furnished copies to the roads, and between 200 and 300 shippers had appeared personally before the committee and explained why a reduction in their rates was necessary if they were to continue to do business on the Pacific coast in competition with the seaboard shippers.

Mr. Hastings said that the list of commodities on which the reductions were now proposed included only about one-tenth of those on which the shippers had asked reductions, and represented the results of the most thorough investigation on the part of the roads as to the necessity for reductions and the rates which would be necessary to apply. He said that the articles included in the supplements are affected by the same circumstances and the same kind of competition as the articles in Schedule C, as disclosed by the investigations of the railroad traffic men and information furnished to them by shippers and their agents regarding the rate, volume of tonnage, packing conditions, and the proportion of business which the railroads could expect to retain by adjustments in their rates. To some

extent, he said, the petition also asked for a further relief on some articles included in Schedule C. The entire list includes only commodities on which the railroads have reached the conclusion that it is necessary to make a carload rate of less than \$1 per 100 lb., or a less than carload rate of \$1.50 or less.

In another exhibit Mr. Hastings gave a compilation of the local rates from interior points to New York on the same commodities, and the water rates from Boston, New York and Philadelphia added to make the through rates to the Pacific coast. He also gave a statement of the number of vessels operated through the canal westbound, with general merchandise cargoes for the four months' period ended September 5, from the Atlantic to the Pacific coast. If a vessel passed through the canal more than once it was only counted once. The list is as follows: American-Hawaiian Steamship Company, 21; Grace & Company, 2; Luckenbach Steamship Company, 10; Panama-Pacific Steamship Company, 2; Isthmian Steamship Company, 1; Crowell & Thurlow, 2; Tallac Steamship Company, 1; Boston and Virginia Transportation Company, 2; Western Steam & Navigation Company, 1. A number of lines, he said, had discontinued operation through the canal because of the greater profit, since the European war began, in chartering their vessels for ocean trade. A number of small lines which had engaged in the service at first had dropped out, but others had taken their place. During the year since the canal has been opened the water-borne tonnage from the Atlantic to the Pacific coast has been about double what it was the year before. At the previous hearing he had estimated that the tonnage through the canal of American traffic from the Atlantic seaboard to the Pacific coast ports would amount to about 1,000,000 tons. In the 11 months ended with July 1, the tonnage had amounted to 900,000 tons.

Mr. Hastings then took his first exhibit, and item by item explained for each commodity the justification for each of the rates proposed, and the reasons why it was necessary to make reductions to keep the middle western shippers in business. He said the information as to the water rates had been obtained from bills of lading and freight bills and had been furnished to the railroads by shippers, as examples of the rates quoted to them by the steamship lines, although the water rates had fluctuated greatly.

Mr. Hastings was followed by a number of shippers from various points in the middle west, who explained how they were affected in their competition with eastern shippers for the Pacific coast business. For example, a shipper of buckwheat flour at Janesville, Wis., testified that he had formerly been able to ship flour to the Pacific coast on even terms with the New York shipper, because he had a milling-in-transit rate of 90 cents, which allowed him to take buckwheat from New York and mill it and lay it down on the Pacific coast at the same rate paid by the New York shipper direct. With the opening of the canal the miller in interior New York was able to ship to the Pacific coast for 40 cents; 10 cents for the rail haul to New York and 30 cents for the water haul; a reduction of 50 cents under the all-rail rate. He said that if the railroads could make the proposed rate of 75 cents he could retain a portion of his business on the Pacific coast, but that a differential of 10 cents in favor of the water rate would influence the movement.

THE SAO PAULO RAILWAY OF BRAZIL. The Sao Paulo Railway, 134 miles in length, produces more revenue per mile than any other railway in the Western Hemisphere. The line extends from Santos, via Sao Paulo, to Jundiahy, with a branch to Braganza. The railway enjoys a monopoly of the traffic between Sao Paulo and Santos, and every year carries over one-half of the world's supply of coffee. Dividends of 14 per cent and upwards are paid annually. The railway is one of the best maintained properties in South America. At Sao Paulo a magnificent passenger station has been erected, while excellent terminals are owned at Santos. *The South American.*

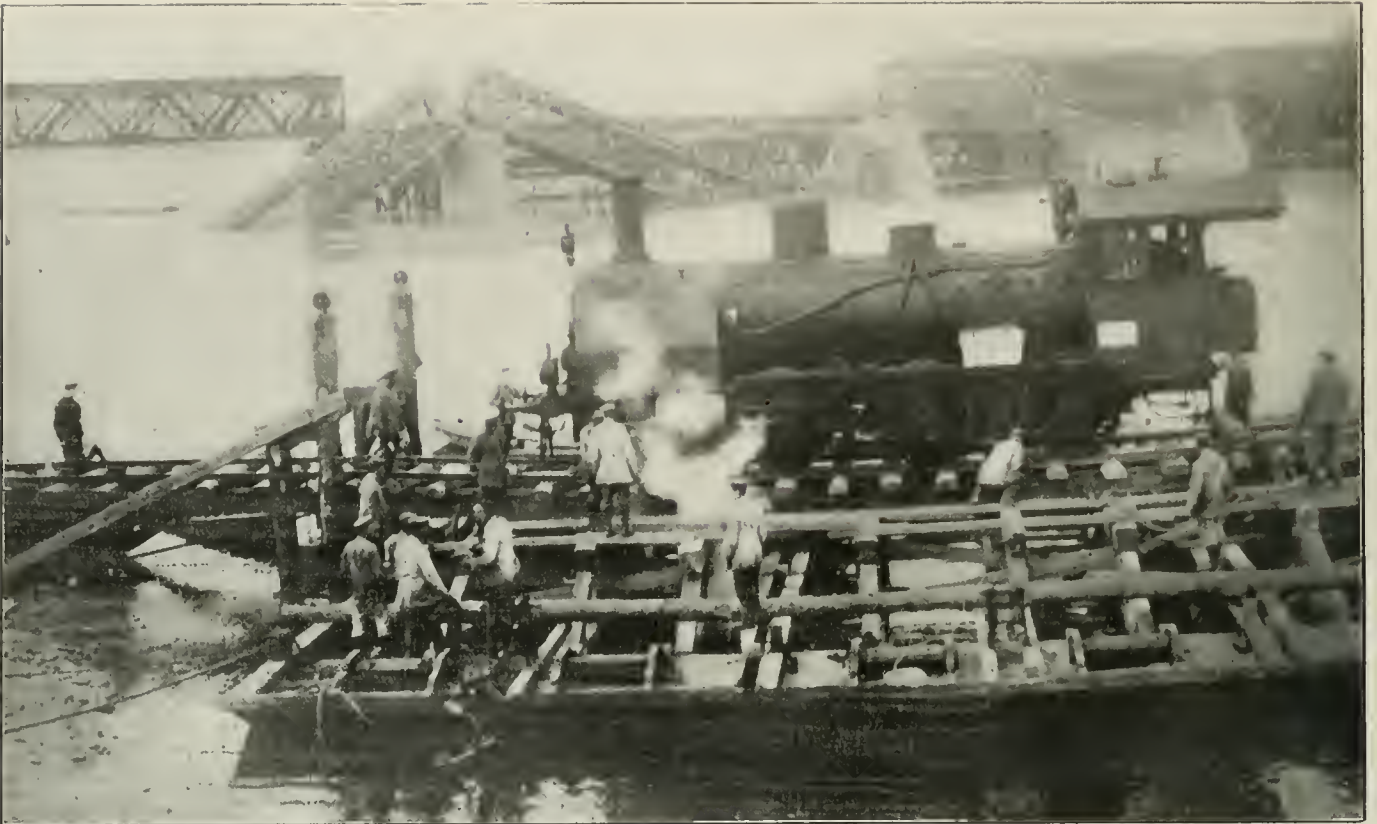


Photo by Paul Thompson

Ferrying a German Locomotive Across the Vistula from Warsaw to Praga Before a New Bridge Had Been Rebuilt to Replace the Old One Blown Up by the Russians



Photo by Paul Thompson

The Germans Have Made Many Polish Women Work on the Roads and Railways of Their Conquered Territory

International Engineering Congress at San Francisco

An Abstract of the Papers and Discussions Relative to Railroads at the Meeting Held September 20-25

The International Engineering Congress, organized and conducted under the auspices of the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, the American Institute of Electrical Engineers, and the Society of Naval Architects and Marine Engineers was held in the new Auditorium in the civic center of San Francisco, Cal., September 20-25. Two general sessions were held, on Monday morning and one Saturday morning, and in addition 52 section sessions were held for the presentation and discussion of papers on 11 general subjects. About 230 papers had been prepared in advance of the meeting by authors representing 18 countries. The attendance at the Congress totaled 830.

The general session on Monday was opened by William F. Durand, of Leland Stanford University, chairman of the Congress, who introduced Governor George W. Goethals, of the Canal Zone, honorary president of the Congress. After addresses of welcome by the mayor of San Francisco and the president of the Panama-Pacific Exposition, General Goethals addressed the meeting on the central theme of the Congress, the construction of the Panama canal. He touched only on the general features which were not covered by the technical papers presented later before the Panama canal section, paying tribute to many engineers connected with the work more or less directly, without whose efforts the success of the project would not have been so striking. Among the men mentioned were George M. Totten, in charge of the early construction work on the Panama Railroad; the early French engineers, who failed largely on account of mal-administration; Colonel Gorgas and others who practically exterminated yellow fever; John F. Wallace and John F. Stevens, the preceding chief engineers, and W. G. Bied and Ralph Budd, who assisted materially in the reconstruction, operation and maintenance of the Panama Railroad.

Railway engineering occupied five sessions and abstracts of the papers presented are given herewith. A paper on "The Mechanical Problem of Electric Locomotives," presented before the third session on electrical engineering, and one on the "Commercial and Trade Aspects of the Panama Canal," presented at the session relating to the canal, have also been abstracted because of their interest to railway men.

ITALIAN RAILWAYS

BY PROF. LUIGI LUIGGI

Former Member of the Italian State Railway Board, Rome, Italy

The railways of Italy can be divided into "principal lines," owned and operated by the state, about 9,500 miles; and "secondary lines," owned and operated by many private companies, about 3,500 miles. The latter act as feeders and reach places in the mountains where an ordinary line could not run at a profit. Italy being generally hilly, and in some parts mountainous, railways are costly to construct, and operation is expensive owing to heavy gradients (up to 1 in 40 and in a few cases even 1 in 28) and to the fact that all the coal is imported. The working expenses in 1913 on the state lines were \$11,200 per mile.

On the other hand, the revenue is rather low, as in Italy there are no great mines or forests, and the goods traffic consists principally of agricultural products, which, in general, cannot afford a high tariff. The passenger rates also are very moderate. In 1913-14 the revenue of the state railways was \$13,750 per mile, which makes the operating ratio 81.5.

Tariffs are rather low—the law requires that for the first-class tickets the rate shall not exceed two cents per kilometer;

for second-class, $1\frac{1}{2}$ cents; and for third-class, one cent. On a few lines there is a fourth-class, at $\frac{3}{4}$ cent per kilometer. These rather trying conditions are aggravated by a law which requires that on all lines three trains, at least, must be run daily. Thus, on several lines many trains run almost empty, especially in winter.

By this arrangement the financial situation of the state railways and private companies cannot be very flourishing. The result of the high operating ratio and high cost of the lines is that the traffic barely pays an interest of 1.6 per cent on the invested capital, and for some private lines there is a deficit, so that the state is obliged to pay annual subsidies of from \$1,000 to \$3,000 per mile of line. In such cases after 50 to 70 years the lines become state property.

Although from a financial point of view this policy may not seem satisfactory, the results from the standpoint of the national interests are important. Many regions of Italy were still very backward up to some years ago; agriculture was rudimentary and the population poor and ignorant. The construction of state railways was a national duty, to bring moral and material progress into those regions, regardless of high cost of the lines, which were difficult to build owing to mountains, ravines and malarial zones.

Thanks to this provident policy, the state railways, with their "differential tariffs," have cemented the political unity of Italy and given an enormous impetus to commerce. Agriculture is improving, especially in the south, and new industries are being started, especially in the north. The railways, with their low rates, are a great help in exchanging the products of the different provinces.

The most marked improvements have taken place since the advent of the State Railway Board, in 1905. Before that time the railways, although for the greater part belonging to the state, were worked by three private companies whose interests were different from those of the state. Each company worked its system with the object of getting the largest revenue with the smallest expenditure; therefore, tariffs were kept at the highest rate allowed by law, trains were slow and barely sufficient for the local needs, the rolling stock was old and not kept in good repair, and the personnel was under-paid and dissatisfied. Strikes were becoming alarmingly frequent. Parliament protested; and in 1905, when the contracts with the private companies expired, the state took over the control of all its own railways, and of a few other private lines necessary for the public interests.

This was a daring act and was especially risky from a financial point of view. Happily the government was lucky in securing the services of a most competent specialist in railway administration in the person of Comm. Riccardo Bianchi, formerly general manager of the Sicilian railways, who was given sufficient liberty of action to meet the many and serious difficulties which had to be overcome. The lines were put in good working order by renewing the permanent way, doubling many trunk lines and sidings, and improving the stations and shops. Then the rolling stock was renewed and augmented, and more and faster trains were run on the main lines. The tariffs were rearranged to facilitate the transportation of agricultural products for long distances, and a "differential tariff" for passengers was started, by which the rates per mile diminish with the increase of the journey. The personnel was also improved, so that strikes became more rare and easily settled, and the service was greatly benefited.

From a technical point of view, Italian railways present interest both for the large number of bridges, viaducts and

tunnels, which are a consequence of the hilly character of the country, and for the traction, either by electric or by steam locomotives. Large span bridges, steel girders or metallic arches are a necessity, and among these the most notable are the steel girders of the several bridges across the Po, and the 360-ft. steel arch bridge of Paderno. The most notable masonry bridge is that over the Adda, with a 236-ft. granite 3-hinged arch. There is also a handsome concrete bridge of three 100-ft. arches on the Bologna-Brindisi line at Fiume Rosso. Reinforced concrete bridges are in favor only for small spans, although on some secondary lines reinforced concrete arches of 100 ft. span are now under construction. It is in the matter of tunnels that Italian railways offer the greatest interest.

When the new state administration took over the lines, in 1905, it was confronted by a sudden and rapid increase of traffic, which continued steadily until it had actually doubled in 1912. The problem of traction was aggravated not only by the material difficulties of the profile of the line, but by the antiquated and dilapidated condition of the locomotives. This difficulty was overcome by adopting new types of steam locomotives on ordinary lines, and electric locomotives on steep inclines. Thus the problem of the great cost of coal was solved, for hydro-electric power in Italy is cheap.

Three types of steam locomotives were adopted; an 0-10-0 type for very heavy grades, a 4-6-2 (Pacific) type for fast passenger trains, and a 2-8-0 (Consolidation) type for mixed passenger and freight traffic. The first two are four-cylinder simple engines equipped with Schmidt superheaters, the second weighing close to 200,000 lb., and the third is a two-cylinder simple engine weighing 147,000 lb.

The distinctive feature of Italian electric locomotives is their operation by the three-phase system. It was adopted for the first time on lines where there are gradients up to 1 in 40 and long tunnels, where smoke is a serious drawback. Water power being cheap, it was possible to haul trains up these inclines at double the speed hitherto acquired, thus solving the problem of congestion of traffic, which was becoming pressing. On private lines, electric traction on the mono-phase and tri-phase systems has also been applied, but not on such a large scale as on the government lines.

The best of the electric locomotives used work on the tri-phase system, and were built by the Italian Westinghouse Company. There are 152 of these in service, and 40 more are in construction. These, coupled one at the head and another at the tail of a train weighing 400 tons, can go on an incline of 1 in 40 at the normal speed of 31 miles an hour. When coming down, the motors act as generators of current, and thus about 50 per cent of the energy is utilized.

It is difficult to say in general terms whether state management of railways is to be encouraged or not. As far as it concerns Italian railways—and considering how matters stood up to 1905—it would have been almost impossible to continue under private management. Thus state administration became automatically an absolute necessity. On the other hand, it must be said that in a country where parliament is all powerful state management is rather risky, especially from the financial point of view, and in regard to the discipline of the personnel. Happily, the government was very wise in appointing Comm. Riccardo Bianchi as president of the board of directors, a man of great experience and firmness, coupled with exquisite tact, who proved to be the right man in the right place.

THE STATUS OF INDIAN RAILWAYS

By VICTOR BAYLEY

Assistant Secretary, Railway Board, Simla, India

At the end of the year 1913-14,* the mileage of Indian railways open to traffic and under construction or sanctioned was as follows:

	Open	Under construction or sanctioned
5 ft. 6 in. gage	17,641 miles	932 miles
3 ft. 3 in. (meter) gage	14,389 miles	821 miles
2 ft. 6 in. gage	2,174 miles	578 miles
2 ft. 0 in. gage	454 miles	112 miles
Total	34,656 miles	2,443 miles

STATE CONTROL.

Indian railways are more or less under government control. The nature of the control varies from absolute ownership to mild supervision coupled with the power of purchase. The government also has certain control regarding maximum and minimum rates, matters affecting the safety of working, etc. The following list shows the ways in which railways are connected with the government:

Class 1. Railways Whose Accounts Pass Through Government Accounts—	
I. State Railways Worked by the State.....	7,264 miles
II. State Railways Worked by Companies.....	18,568 miles
Class 2. Railways Whose Accounts do not Pass Through Government Accounts—	
III. District Board's Lines.....	166 miles
IV. Branch Line Companies Assisted by Government...	1,420 miles
V. Companies' Lines Guaranteed by Native States.....	721 miles
VI. Companies' Lines Assisted by Government.....	2,646 miles
VII. Native State Lines.....	3,643 miles
VIII. Miscellaneous	228 miles
Total	34,656 miles

The railways shown under Class 1 are the state railways of India, and their accounts form part of the finances of the government of India. These railways are the property of the government; they are officered by government officers; their revenues are part of the general revenues of the country, and all capital sums required are provided by the government. In the case of railways shown in Class 2 the relation to the government is not so close, but owing to the responsibility assumed by the government for payment of interest, etc., in many cases, it assumes a measure of control, which is, however, not so intimate as in the case of Class 1.

The state railways worked by companies are the property of the government but have been leased to private companies. The first railways in India were constructed and worked by companies, under favorable terms as to government guarantee of interest, which proved to be so advantageous to the companies and disadvantageous to the government that the earliest opportunity was taken to purchase them. Certain of these lines became state railways, and others became those now under consideration. The government has entered into contracts with the companies, the broad features of which are (1) that the company shall have a small working capital in the concern on which the government guarantees interest at rates from 2 to 3½ per cent; (2) that the company shall receive a share of the surplus profits earned by their efforts calculated on a fixed proportion agreed upon or in proportion to the capital contribution made by the company; (3) that the company shall keep the railway in good order; (4) that the government shall have power to terminate the contract after due notice, and repay the company's capital at par.

The interest of the government is to see that fresh capital put into the concern is well spent, that the line and rolling stock are kept in good order, and that a profit is earned by good management. The interest of the company is mainly in making the most of the railway as a dividend-earning investment during its period of tenure. The policy of the government is to conclude long term agreements with the companies and renew the agreements as they fall in, with possibly a revision of the terms if this is expedient. The companies' administration is loyally and efficiently carried out, and the result is a substantial addition to the revenues of the country, and also the declaration of substantial dividends for the companies' shareholders.

District boards have been established in certain localities as a measure toward giving the inhabitants a measure of control

* The financial year runs from April 1 to March 31. Thus the year 1913-14 means the year April 1, 1913, to March 31, 1914.

over their own domestic politics. In a few cases they have shown praiseworthy ability and have accumulated surpluses which they have been permitted to invest in the construction of light feeder railways. In such cases the assistance rendered by the government is practically confined to giving the land required, free of cost, to the district board and in using its good offices in the preliminary negotiations. The government takes no share of the profits and only reserves the right to purchase the line in certain contingencies. As a rule, the railway is worked by the main line with which it connects for an agreed percentage of its gross earnings. This development of a form of state ownership (since a district board is a form of government) is interesting as an example of Indian enterprise.

Branch line companies assisted by the government are a modern development. One of their objects has been to provide an outlet for the savings of the people. Indians are shy of investing their savings in industrial enterprises, and require definite assurances of profit before they will come forward. The government, therefore, recently published an ordinance inviting proposals for the construction of branch lines to the existing systems from promoters, and engaged, after being satisfied as to the financial prospects of the proposed branch and the reliability of the promoters, to render assistance by giving free land and a guarantee of $3\frac{1}{2}$ per cent on the capital invested; or a rebate out of the net earnings of the main line, with which the branch connects, derived from interchange traffic, sufficient to make up, together with the net earnings of the branch, a sum equal to 5 per cent on its capital. A combination of guarantee and rebate terms may be permitted. In return the government retains the right to share equally with the branch line company all profits above 5 per cent and to purchase the line after a term of years.

The success of this agency for financing feeder railways is assured. Apart from 21 branches, aggregating 1,420 miles, already in operation under these or similar terms, concessions have been granted to six more companies to operate an aggregate of 224 miles, and proposals are under examination involving the construction of 2,257 miles of railway at a capital outlay of \$40,000,000. It is interesting that short feeder lines on the 2 ft. 6 in. gage have so far proved most attractive to promoters.

Companies' lines guaranteed by native states are the result of a peculiarity of British administration whereby certain parts of India are under the rule of native chiefs. Certain progressive states have desired to shoulder the guarantees normally given by the government and to reap for themselves the benefits arising from railway construction within their borders. Such railways are practically independent of government control, except in so far as the government is responsible for the safety of the working and the good administration of the railway as forming a part of the administration of the native state.

Companies' lines assisted by the government are lines built by companies receiving miscellaneous forms of government assistance. They are liable to be bought up by the government as their agreements fall in. They are practically independent of government control, except in so far as the government is concerned in safe working and in eventual purchase.

Native state lines are under the rule of native chiefs. Some of these native states are prosperous and under an enlightened ruler surplus revenues may, by government sanction, be invested in railway construction. In this way a considerable mileage of native-state-owned railway has been built. Some of these railways are worked by the native state and others by companies. Others again are worked by the main system to which they are branches for a percentage of the gross earnings. The government is interested in the good management of the lines, and in some cases exercises control over maximum and minimum rates, but, on the whole, government control sits lightly.

FINANCIAL RESULTS

Taking first the railways mentioned in Class I, i. e., the State

Railways of India, the financial results, in United States dollars, for the year 1913-14, are as follows:

Capital outlay (booked cost)	\$1,495,443,000
Gross revenue	188,196,000
Working expenses	100,374,000
Net revenue	87,822,000
Percentage of working expenses on gross revenue.....	53%
Percentage of net revenue on capital outlay.....	5.9%

If the state railways were a private business concern, the net revenue of 87.8 million dollars would be available for the declaration of a dividend, etc. It was actually applied as follows:

Interest charges on capital borrowed for direct application to works and also for purchase of railways.....	\$46,278,000
Annuities in purchase of railways.....	15,015,000
Payments in redemption of capital.....	4,833,000

Total charges on net revenue.....	\$64,126,000
Net profit to government from state railways.....	23,696,000

Although the accounts of the railways in Class 2 do not pass through government accounts, their results of working are available for addition to the above figures in order to view the results of working the entire body of Indian railways considered as a whole. The financial results for the year 1913-14 are as follows:

Capital outlay (booked cost)	\$1,650,300,000
Gross revenue	211,951,000
Working expenses	109,768,000
Net revenue	102,183,000
Percentage of working expenses on gross revenue.....	52%
Percentage of net revenue on capital outlay.....	6.2%

Comparison of these figures with those for the state railways alone, given above, show the preponderating importance of the state railways; in fact, the state railway administration controls railways on which the capital outlay is 90 per cent of that of all Indian railways and whose gross revenues are 89 per cent of those of all Indian railways.

STATE RAILWAY ADMINISTRATION

The state railways are controlled by the railway board, consisting of a president and two members, and are divided into eleven separate concerns, of which three are worked by the state and eight by companies. Each of these railways is administered by an agent (general manager), who is responsible to the railway board for the efficient working of his railway. A system of delegation of powers places the agents in an independent position for all practical purposes. Broadly speaking, the object aimed at is that the agents shall settle for themselves all details of management and the railway board shall possess control over major questions of policy and finance.

The railway board with its staff forms a distinct railway department of the government of India, the portfolio of which is held by the member of council who has charge of the Commerce and Industry Department. The government of India again is responsible to the British government in the person of the secretary of state for India. Here again a system of delegation of authority from the secretary of state to the government of India and from the government of India to the railway board, has resulted in a workable scheme wherein only questions of the first importance need to be referred to higher authority. A slight complication is introduced by the fact that all the eight companies which are engaged in working state property are constituted in England, and the boards of directors of these companies naturally exercise authority over the agents of their railways. Smoothness of working is assisted by the fact that an official of the India office is appointed to sit on the board of directors of the companies, and that by a delegation of their powers the directors are usually content to leave the management of their property in India to the agent, subject to their retaining control of important matters.

The state already owns 90 per cent of the railway property in India, and if it chooses to exercise the power it possesses under the purchase clauses of its agreements with the remaining 10 per cent can become the owner of all railways in India,

in time. Whether such powers will be exerted when the time comes, as each agreement falls in, will probably be determined by the circumstances of each case on its own merits. There is no reason to regret the policy of acquirement in the past, as the state railways are returning handsome profits to the government. The strong position they occupy will be augmented as the payment of terminable annuities for the purchase of railways ceases. The capital value of the state railways is believed to be considerably in excess of the book value, owing to the policy of applying certain sums from revenue to works involving a degree of betterment.

THE STATUS OF CHINESE RAILWAYS

By CHARLES DAVIS JAMESON

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The first definite plan for a railway in China was a petition by the foreign merchants in Shanghai, mostly English and Americans, dated July 20, 1863, which was not granted. In 1864, Sir McDonald Stephenson, an eminent British engineer, arrived in China to impress the advantages of railways on China, but his scheme was pigeonholed. The next scheme was the Woosung Railway, from Shanghai on the Huangpu river to Woosung at its mouth, a distance of 12 miles. On June 30, 1876, the road was opened for traffic for a distance of five miles, but the Chinese authorities wanted no foreign railway. Eventually the Chinese government bought the railway and demolished it. During 1887 to 1893 there was constructed on the Island of Formosa, then a part of China, some 60 miles of metre-gage railway, by the Chinese. The construction was of inferior quality, and the work was stopped by orders from Peking; the railway gradually went to pieces until the taking over of Formosa by the Japanese in 1896. About 1870 there was organized the China Merchant Steam Navigation Company, with a fleet of coast steamers, Chinese capital and under Chinese management. Much coal was needed. The Kaiping coal mines at Tongshan were 29 miles from the nearest point of delivery on the sea, and railways were proposed, but the imperial sanction was revoked, and a canal decided upon. This canal could not reach the mines by seven miles, and a tramway with mule power was constructed. The tramway and canal were finished in 1881.

Thus was inaugurated China's railway system. In 1887 the railway was completed from Tangshan, via Tongku, to Tientsin; in 1894, from Tangshan to Shanhai Qian, and in 1897, from Tientsin to Peking. The government of China had, by 1898, realized two points regarding the introduction of railways: First, the necessity of railways, and, second, the impossibility of procuring Chinese capital for the building of railways. The Chinese would not subscribe because of a lack of confidence in the government. The result was the railway concessions.

In Peking, 1898 was the year of concession hunters. The whole world was represented. Some represented bona fide syndicates. Many represented hopes and were hunting for both concession and syndicate. Then was seen the difference between the methods of the continental and the Anglo-Saxon. The English and American would not sign until every detail of the agreement was satisfactory. The Belgian or French would sign almost any agreement that gave them the absolute right to the work and then fight out the details later. The continentals then, and ever since, have had the cream of the railway concessions, and they have done the work they agreed to do. The British also have done most excellent work in all the railways they have built. An American syndicate was granted a concession for the Hankow-Canton Railway, did but little work, and later was bought out by the Chinese government, and the line is now being built by British money and British engineers.

All the railways of China, with the exception of a few short lines usually for some special purpose, are government owned and government run. They are under the ministry of communication located in Peking. On all the railways having a

foreign indebtedness, certain positions are filled by foreigners with necessary foreign assistants. The nationality of these foreign employees, in every case, follows the nationality of the syndicate furnishing the capital, except in subordinate positions. From this one can see the small opportunities there are in China for Americans in railway employment. American participation in the construction of Chinese railways has been, to say the least, unfortunate, and, of course, the non-participation of Americans in this work has militated strongly against the purchase of American rolling stock, locomotives and railway material. There are now some 6,200 miles in operation, and between 8,000 and 9,000 miles under construction, location, or for which definite agreements between the Chinese government and foreign syndicates have been signed, for either financing and constructing, or for merely financing. Less than 300 miles of this amount comes to America.

The freight rates in China are high—what the traffic will bear and often a little more. In North China the coal rate is \$2.05 for 300 miles. On the Peking-Mukden Railway the rates are: First class per ton, 5 cents per mile; second class per ton, 3½ cents per mile; third class per ton, 1¾ cents per mile; dangerous, 5 to 7¾ cents per picul (133 lb.).

ELECTRIC MOTIVE POWER IN THE OPERATION OF RAILROADS

By E. H. MCHENRY

The first serious consideration of the application of electric traction to heavy railroad service was undertaken by Henry Villard, who appointed a commission early in 1892, of which the writer was a member, to investigate and report on the feasibility of electrically equipping the main line of the Northern Pacific. No substantial progress was made apart from the completion of a schedule of service requirements and general specifications for an electric locomotive substantially as constructed in the course of the following year by the North American Company.

The subsequent evolution at first separated into two distinct lines of progress; in one of which the primitive type of motor cars hauling one or more trailers was simply substituted for the steam locomotive previously used, from which the powerful high-speed trains of to-day have grown.

The necessity for some form of motive power better adapted to conditions of tunnel operation forced the almost simultaneous development of an electric locomotive of sufficient power to afford a satisfactory and efficient substitute for the steam engine then in use. The first commercially practical engines of this kind were operated by the Baltimore & Ohio through its Baltimore tunnel in 1905. The present list of tunnels so operated is a long one.

Next in the order of time and importance, electric traction was adopted in large terminals, to which it is peculiarly well adapted. By an act of the New York State Legislature the New York Central and the New Haven were required to electrify within the City of New York, on or before July 1, 1908. The magnitude, complexity and high traffic density involved in this terminal made necessary the solution of many new and formidable problems on a much higher plane of operation than had been previously attempted, and no less remarkable is the Pennsylvania's great passenger terminal in New York City. Other railroad terminals have been electrified in this country and abroad, some of which antedate the two most prominent examples already cited.

Electric switching was initiated very early and has now reached an advanced stage, best represented in the Mott Haven yard of the New York Central & Hudson River, the Sunnyside yard of the Pennsylvania and the Oak Point and Harlem river yards of the New York, New Haven & Hartford—all within the city limits of New York.

The Long Island was the first steam road to equip its lines for passenger travel on an extensive scale (1905), and the Spokane & Inland Empire was the first to attempt long distance

heavy freight traffic in 1906. Later and more advanced examples of railroad electrification of this class in the United States are afforded by the Norfolk & Western, Baltimore & Ohio; Chicago, Milwaukee & Puget Sound and the New York, Westchester & Boston.

The inability of the electric locomotive to flexibly utilize its available horsepower by inversely varying speed and tractive effort is a severe handicap under some conditions. Another factor which undoubtedly exercises a deterrent effect upon the more rapid adoption of electric traction is the number and diversity of the types now under trial, together with the yet unsettled opinions of the specialists in this field. Electric traction also labors under disabilities of restricted radius of operation, which limits commercial efficiency. This is a temporary disadvantage, however, and grows less as the zone limits are enlarged. Also the greater freedom and flexibility of operation within the zone limits applies in compensation. Electric traction leads to the necessity for an intricate and highly developed system of inter-related and inter-dependent power stations, line equipment and locomotives requiring more highly specialized and better paid labor for its proper maintenance and operation.

Induction may seriously impair telegraph and telephone service in adjacent circuits, and is more particularly incident to single-phase operation. Electrolysis may cause great damage to pipe systems, underground cables and all metal structure, but its effects are practically confined to direct current operation. Among the minor difficulties should be noted those arising in the transition stage in changing from steam to electric power, more particularly those incident to train lighting and heating; mixed steam and electric operation; engine transfers; track signals; restricted interchangeability of engines and cars and other difficulties of adaptation. These difficulties are greatest in the earlier stages of the transition, but rapidly diminish in both absolute and relative importance as the zone of electric operation is extended.

A better utilization of the possibilities of the electric locomotive is probable, which in one important particular compares very unfavorably with the steam engine of the same horsepower capacity, as it cannot effectively utilize its rated capacity throughout the same wide range of variable speed and tractive effort, which has the effect of greatly limiting its field of usefulness.

A further and promising opportunity is presented for reducing and limiting the present great expenditures incurred for maintenance of equipment and maintenance of way and structures. There is also a pronounced tendency in electric engine design to eliminate all reciprocating parts, including connecting rods, pins, jack shafts and counterweights in order to reduce wheel loads, machinery friction and maintenance charges.

It is also probable that some form of multiple unit control will be developed for the operation of freight trains which will relieve and distribute the present excessive strains on draft rigging, track and bridges, which will require the equipment of freight trains with a system of control circuits. The necessity for such equipment seems close at hand, in connection with similar requirements for electro-pneumatic brake control and the growing need for better means of communication throughout the length of modern freight trains.

A comprehensive review of the results already obtained, and of the attractive possibilities indicated by the experience of later years, leads to the conclusion that the field in which electric traction may be profitably applied is much larger than generally understood, and that there are many existing opportunities for capital investments upon a large scale which will earn from 10 to 20 per cent with reasonable certainty. While the art is not yet fully developed in some applications, in many others all present practical requirements may be met with added advantages of great value and profit, and there is consequently little reason to doubt a continued development and further expansion in the field of electric traction as soon as the financial and legislative conditions permit.

ELECTRIC MOTIVE POWER IN THE OPERATION OF RAILROADS

BY WILLIAM HOOD

Chief Engineer, Southern Pacific

In considering the question of electric motive power versus steam locomotives, the probability of the electric motive power being proper for adoption is evidently greater on a new than on an existing railroad. This question is especially important when the existing railroad is an extensive suburban system, with steam locomotives and cars of special adaptation to the service and not suitable for general use on a steam-operated main line, and which suburban system is giving satisfactory returns on the investment. In such a case the change to electrical operation may transform a satisfactory remunerative property into a heavily losing investment for a disastrously long period.

The probabilities of the propriety of electrical operation are greatest on a new main line railroad, next greatest on an existing main line railroad when the equipment, other than motive power equipment, will not be changed, next greatest on one or more operating divisions of an existing main line railroad, when the equipment, other than motive power equipment, will not be changed, and least on a railroad when electrification involves scrapping or nearly corresponding salvage value of existing equipment.

The question of whether or not to adopt electric motive power on a portion, for instance on an operating division, of a main line elsewhere operated by steam locomotives is especially likely to be taken under advisement in reference to a mountain operating division having a steep grade system of considerable length, the electric operation at first glance appearing particularly attractive on such a piece of railroad.

Evidently such a railroad if already built with a double track is more conveniently operated either with electric locomotives or with steam locomotives, than if built with only a single main line track. The opinion that is sometimes entertained, however, that in cases where a single-track road is already overburdened with traffic as handled by steam locomotives, the substitution of electric locomotives will materially postpone the expenditure necessary for double tracking the road is not always correct, excepting with the condition that an unusual and, perhaps properly termed, unreasonable and impracticable amount of electric power is available at a cost that can be properly contemplated.

The reason for this condition is that on a single-track mountain railroad operating division with a steep grade system and having a considerable number of daily passenger trains throughout the year, the time of passage of these trains over the mountain division cannot be materially modified, owing to necessary business adjustment of times of departure from and arrival at important terminals. And with a considerable freight traffic at all times, and perhaps several times the average freight traffic at certain seasons of the year it is necessary to move a number of freight trains of maximum practicable size one after the other, and as near as practicable to each other, up the steep grade, at such periods of the twenty-four-hour day as will least interfere with the passenger train movements.

This is accomplished without difficulty with steam locomotives, but with electric operation, not only must the adequate number of electric locomotives be on hand for meeting these traffic conditions, but the amount of electric power available must correspond to the special traffic requirements.

In general, a transportation company will find it impolitic to attempt to equalize power production and fluctuating consumption on so large a scale by entering the market and selling power to suitable consumers in competition with power producing companies regularly in the business of supplying the market. This results in the cost of power to a railroad company for operating a mountain division being, in effect, equal to the entire cost of operating the power house or houses and their related plants plus the entire fixed charges, without very material

variation in this cost on account of variations in amount of traffic as between seasons of the year or as between the several years. The cost of power under these conditions then has no direct relation to the actual power expenditure for conducting transportation, and in a way is analogous to the fixed charges pertaining to power-plant installation, as well as to the fixed charges pertaining to the cost of the railroad itself, which fixed charges are constant, regardless of traffic fluctuations.

In general, the cost of double tracking a mountain division will be so great that it should not be done until absolutely necessary, especially in view of possible failure of traffic to increase or even remain constant, on account, for instance, of the construction of competitive lines, entered into judiciously or otherwise. Evidently on light grade railroads the question of amount of installation of power plant versus fluctuations of traffic is less serious.

The reduction in the necessary production of electric energy by the returning to the line of energy produced by the control of descending trains on a mountain division, electrically operated, might be worth the expense of installation of the necessary appliances as effecting some fuel saving in a steam-power electric-generating station; but when the electric energy is developed in a water-power station, the power saving would be of doubtful value, and in particular because, as heretofore outlined, the cost of power so produced is not per kilowatt hour or any usual function, but is essentially so much per year, regardless of any ordinary fluctuations of power requirements.

The increasing cost of fuel for steam locomotives or for steam electric-generating plant tends to hasten the time when railroads will be operated by electric power generated by hydraulic plants, particularly on mountain grades. Presumably much more would have been accomplished in this direction if the national laws and regulations had been so modified as to give to railroad companies the necessary confidence to enable them to make the very large investment required.

THE MECHANICAL PROBLEM OF THE ELECTRIC LOCOMOTIVE

By G. M. EATON

Engineer Railway Division, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

The stresses due to the static and dynamic interactions of the various elements of the transmission systems of crank-and-rod coupled electric locomotives have been the subject of an active discussion during recent years, and elaborate formulae for the approximation of existing stresses have been developed. It is the purpose of this paper to approach the static problem from a somewhat different angle than has been previously employed.

On a steam locomotive the pistons, piston rods, main rods, and main driving axle constitute a statically determinate system, the indicator diagram and the masses of the various elements supplying all the data necessary for a complete analysis of static and dynamic phenomena. In contrast with this determinate mechanism, practically all electric locomotive crank-and-rod drives are statically indeterminate, to the extent that no accurate general formulae can be derived that will determine the distribution of tractive effort between the near and far rods at all points of revolution.

If the material of the shafts, crank pins, bearings, framing, etc., were absolutely rigid and appreciable play existed in the various pin and journal bearings, a sudden interchange of load between the near and far sides would occur at points approximately 45 deg. from the plane of shaft centers. For the sake of uniformity, anti-clockwise rotation, with the near crank 90 deg. ahead of the far crank, will be adopted in all cases.

It is evident that the near rod, when on the dead center, can carry no load, since it hangs loosely on its pins. As rotation occurs the near rod will continue in its relaxed position (if the material is rigid) until it approaches the 45-deg. position. There will then be a sudden transfer of load to the near rod. It will

be assumed that when the cranks are on the 45-deg. points, the tractive effort is equally divided between the two rods. It is evident that when one rod and its pin are in the plane of the shaft centers, the entire tractive effort is carried by the rod whose cranks are at 90 deg. from the plane of centers. The stress imposed on the rod in this 90-deg. position will be termed a 100 per cent stress. Further, as the far rod approaches the plane of the shaft centers, the stress during the period in which the rod transmits the entire tractive effort will increase to a greater

value than the 100 per cent stress, following the law $P = \frac{\sin A}{100\%}$

where P is the rod stress and A is the angle between the crank and the line of shaft centers.

Maximum Stress Conditions.—Abandoning the inaccurate assumption of rigid material, the point at which the stress on the far rod is a maximum can be approximately determined by a cut-and-dry method that will be described later. It is first necessary to analyze briefly the various conditions under which the maximum stress may occur.

These conditions will fall under the following general heads:

Regular service—

- Slipping wheels at maximum adhesion.
- Running at maximum speed (rod whipping).
- Running at critical speed (resonance).
- Brake application.

Emergencies—

- Flashing or bucking of motors.
- Errors of assembly.
- Collision, derailment, etc.

Method for Determining Maximum Stress.—The approximate method for determining the maximum stress, after the maximum condition is determined, is as follows:

Assume all dimensions of a specific transmission, including all pin and journal clearances, and including the framing in which the shafts are mounted. Examine the specific transmission with a view to determining which of the following deflections, etc., are of magnitude worthy of consideration:

1. Torsion of the driving shaft.
2. Bending of the driving shaft.
3. Elimination of clearance in the driving shaft bearings.
- *4. Compression of the driving-shaft bearing brasses.
- *5. Torsion of the driving crank.
- *6. Bending of the driving crank.
7. Bending of the driving-crank pin.
8. Elimination of clearance in the driving-pin bearing.
- *9. Compression of the driving-pin bushing.
10. Compression or elongation of the connecting rod.
- *11. Compression of the driven-pin bushing.
12. Elimination of clearance in the driven-pin bearing.
13. Bending of the driven-crank pin.
- *14. Bending of the driven crank.
- *15. Torsion of the driven crank.
- *16. Compression of the driven-shaft bearing brasses.
17. Elimination of clearance in the driven-shaft bearing.
18. Bending of the driven shaft.
19. Torsion of the driven shaft.
20. Bending of the locomotive framing.
21. Torsion of the locomotive framing.

In electric locomotive practice, in the United States, the parts usually approximate rigidity closely enough to make it safe to neglect the starred items, 4, 5, 6, 9, 11, 14, 15 and 16. In studying any new design, however, all twenty-one items should be roughly evaluated in a preliminary survey, before eliminating any from further consideration.

The position where the far rod will be subjected to maximum static stress will, evidently, be between the position $A = 90$ deg. and $A = 45$ deg. Select a point about midway between these two positions and assume arbitrarily a definite division of effort between the near and far rods. Start with the near driving-crank pin as origin and locate by rectilinear co-ordinates the following points of the transmission in the order named, making allowance for clearing and for essential deflections: Near driving-shaft bearing; far driving-shaft bearing; far driving-crank pin; far driven-crank pin; far driven-shaft bearing; near driven-shaft bearing, and near drive-crank pin.

Calculate the distance between the near driving-crank pin and the near driven-crank pin. If this distance checks with the length of the near rod, under the assumed stress and clearance conditions, then the assumed distribution between the near and far rods is approximately correct. If the rod length fails to check, the distribution assumption must be altered and the calculations repeated. Having determined the distribution for one point, analyze adjacent points in the same manner. The analysis of three or four points will determine the maximum point with sufficient accuracy for all practical purposes. The very laborious and approximate method outlined above is offered with a full realization of the errors involved. It is, however, the most accurate method the writer has been able to devise and has been successful in actual use.

With the material, proportions, and clearances customary in electric locomotive practice in the United States, and at 40 per cent rail adhesion, the above method shows a maximum static stress on the rods of about 15 per cent in excess of that imposed at the 90 deg. position. This stress will be referred to as the 115 per cent stress. This value is approximately correct under the assumed conditions, both for the transmission from the motor shaft to the jack-shaft, and from the jack-shaft to the axle. This stress occurs practically at the point where the other point comes into action. It is evident that the maximum stress will vary in the following manner:

First, the maximum stress will vary as an inverse function of flexibility. This constitutes an argument in favor of heat-treated and alloy steels, since high unit stresses, and therefore greater deflections, are permissible; second, the maximum stress will vary as an inverse function of the load; third, the maximum stress will vary as a direct function of the speed (with motors of series characteristics); fourth, the maximum stress will vary as a direct function of pin and journal clearances.

In none of the above features are the arguments necessarily conclusive. They must be balanced against the other existing arguments for the purpose of selecting that compromise offering the greatest overall advantage. Having once arrived at the figure 115 per cent for maximum static stress under a definite set of conditions, it is sufficiently accurate to use this figure for all designs consistently worked out in accordance with the same general practice. For any radical departure of practice, a specific maximum stress should be derived.

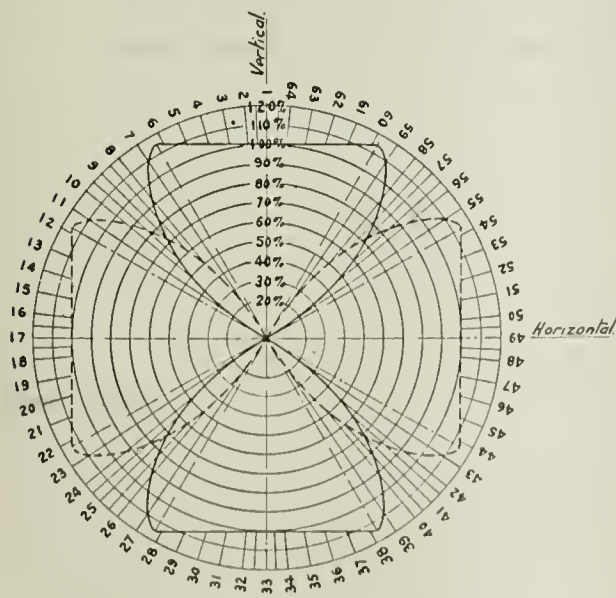


Fig. 1

Polar Diagrams.—It now becomes possible to construct an approximate polar diagram, Fig. 1, which will be characteristic for all cases of driving and driven shafts, crank-and-rod connected, whose maximum stress is 115 per cent. Points 1 to 6, inclusive, are correct, and points 7, 8, 10 and 11 are approximations, the

curve being so constructed that it is a fair curve; and, at the same time, the sum of the turning movements on the near and far cranks is always equal to the constant turning movement of the motor.

With motors of series characteristics, as the speed increases, the tractive effort decreases. The deflections, therefore, decrease and the clearances assume a greater importance as the speed increases. There will be some deflections, and the maximum rod stress will probably never reach the limiting value of $\frac{100\%}{\sin 45^\circ} = 141$ per cent. This 141 per cent stress might be reached, or even exceeded, if the interchange of effort between the near and far rods were accompanied by a shock. However, the rod is, at high speed, always held in intimate contact with its pin by centrifugal force.

Without going through the elaborate deflection calculation, the maximum condition that may be expected is closely approximated by Fig. 2, where the law $P = \frac{100\%}{\sin A}$ is assumed to apply, except over a very acute angle of interchange of effort between the near

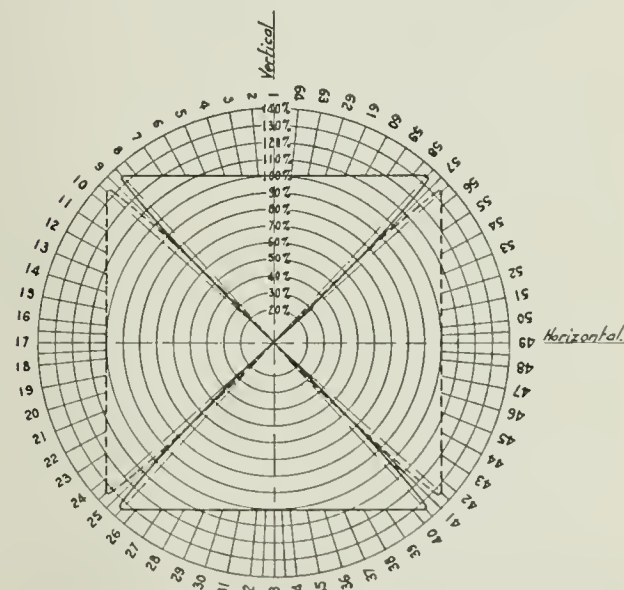


Fig. 2

and far rods. In case of a motor flash, and attendant high pressure at high speed, considerable deflection will occur because of continual intimate contact of the rods and pins. The action of the pin will be a rolling from a driving to a retarding position in the rod bushing, rather than a jumping across the bearing clearance. Figs 1 and 2 form the basis from which pressure diagrams may be plotted for the various shafts, bearings, etc., in the transmission of various types of crank-and-rod coupled electric locomotives at a maximum tractive effort, and also at maximum speed where the design is such that the maximum stresses are 115 per cent and 135 per cent respectively.

[The remainder of the paper contained a discussion of polar diagrams of the pressures on the crank pin, rod bushing, jack shaft and its bearing for maximum speed and maximum adhesion conditions for three types of crank-driven electric locomotives.—EDITOR.]

COMMERCIAL AND TRADE ASPECTS OF THE PANAMA CANAL

By EMORY R. JOHNSON

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The Panama Canal was constructed primarily to shorten the length and time of ocean voyages. The people of the eastern and southern parts of the United States are interested in the Panama Canal, first, because it affords a shorter highway to the west coast of the United States; secondly, because it reduces the distance to the west coast of South America; and,

thirdly, because of the opening of a shorter route to Australasia and the Orient. The people of the western section of the United States are benefited by the Panama Canal because it gives them readier access to the markets of Europe and the eastern part of the United States, while the manufacturers and traders of Europe are benefited by securing a shorter and more direct route to the west coast of the three Americas.

The best test of the value of the Panama Canal will be the use made of it by the commerce of the world, and particularly by the shipping engaged in American commerce. The canal was opened for traffic August 15, 1914, before it was fully completed. Since it was opened for traffic, slides in the Gaillard (Culebra) Cut have, on a few occasions, interrupted the use of the canal for periods of one to five days, and these interruptions to traffic have doubtless somewhat delayed the establishment of regular services through the canal, and have possibly made the increase in the traffic of the waterway somewhat slower than the gain otherwise would have been. The conflict in Europe started shortly before the canal was opened, and all advance estimates as to the use that would have been made of the canal have been thrown out of line by the war which has temporarily stopped the commerce of some nations and has seriously interfered with the international trade of most countries. It is probable that the European war has cut in half the tonnage of the Panama Canal traffic.

The use made of the Panama Canal by American manufacturers and traders will depend upon the extent to which the steamship lines operating through the canal are able to compete with the rail lines connecting the eastern and western parts of the United States for traffic originating or terminating at interior points. It is too early to reason with any degree of finality concerning the ability of the coastwise carriers to secure traffic between the Mississippi Valley and the Rocky Mountain states. There is no doubt, however, that the rail and water lines will actively compete for large west-coast shipments to and from all points between the Atlantic seaboard and places as far west as St. Paul and St. Louis. For the most part, the traffic of the eastern part of the United States will move to the west-coast states by rail, but there will be active and continuous competition for a portion of this traffic.

There has been apprehension on the part of manufacturers in the central section of the United States and also on the part of the railroad companies whose lines connect the Mississippi Valley with the Pacific Coast lest the Panama Canal may cause the rates coastwise between the two seaboards to be so much lower than the rates all-rail or by rail-and-ocean between the section extending from the Allegheny Mountains to the Missouri River and the section along and tributary to the west coast as to make it impossible for some producers at interior points to compete successfully with producers at or near the seaboard, and in consequence to bring about the shifting of some industries from the Mississippi Valley to the Atlantic seaboard states and to cause new industries to be located near the seaboard rather than in the inland cities.

Producers located at inland points will, without doubt, have to pay higher rates on goods shipped in either direction between the eastern and western sections of the United States, and producers located at or near the Atlantic and Gulf seaboards will enjoy lower rates than can be secured by producers at interior points, not only on traffic between the two seaboards of the United States, but on shipments to and from western South America, Australasia and the Orient. The influence of the canal on the location of industries may, however, be easily exaggerated. The United States as a whole is so large, its industries are so varied and so widely distributed through the country, and the interstate commerce by rail is so many times greater than the entire traffic through the canal will ever be that the commerce by way of the canal between the two seaboards of the United States and between either of those seaboards and foreign countries can be only one of the many forces that will influence the location of industries. The greatest

factor determining the location of industries in the United States is the domestic market. A second, and a most influential, factor is the source of raw materials. While freight rates are a third influence that determines where plants shall be constructed and industries be conducted, freight rates are not the strongest influence determining the distribution of industries. It often happens that the ability to ship by rail to all points of the country with despatch and with a minimum handling of goods will cause an industry to locate at an inland point, although by locating at or near a seaport lower freight rates could be obtained.

It was the states on the Pacific Coast that had the greatest interest in the construction of the canal. Manufacturing being in an early stage of development, those states were, before the opening of the canal, obliged to secure manufactured goods mostly by rail, and to pay high freight rates for the long and expensive haul from the eastern and central sections of the country over the Rocky Mountains barrier. Likewise, the people of the west coast section had to pay high freight rates on their grain, lumber, fruit, fish and other staple products. The Panama Canal has enabled the west coast of the United States to reach the markets of both sides of the Atlantic readily and inexpensively, and has prepared the way for the expansion of west-coast industries at an even more rapid rate than has thus far characterized their development.

Shortly before the canal route became available, the Supreme Court upheld the decisions of the Interstate Commerce Commission in the Intermountain Rate cases and the commission issued an order establishing the percentage adjustment between the through rates to the west coast and the rates to intermediate intermountain points. Had that system of percentage adjustments remained unchanged, the effect of the canal upon through rates by rail between the two seaboards would have been to have determined automatically the rates to intermediate intermountain points. The Pacific railroads, supported by certain business interests in the Middle West, were, however, desirous of securing authority to reduce rates by rail from the Middle West to the Pacific Coast without being obliged thereby to lower the charges to intermediate places in the Rocky Mountain territory; and the Interstate Commerce Commission was petitioned to permit the reduction of some through rates without making a change in the intermediate charges. In other words, the Interstate Commerce Commission was petitioned to modify its decisions in the Spokane and Reno cases; and, after hearings held in October, 1914, the Interstate Commerce Commission, in an opinion rendered January 29, 1915, permitted the railroads under certain limitations to reduce the through rates to the west coast without lowering the charges to intermediate points in the Rocky Mountain territory on a list of articles, including the commodities for the transportation of which the competition between the rail and water lines is most active. This rate adjustment indicates concretely the effect which the Panama Canal has actually had upon the rates of the trans-continental railroads.

OTHER PAPERS

A paper on "Railways" was presented by William Barclay Parsons, consulting engineer, New York, N. Y. This paper contained a summary in figures to show how railways have grown in the various countries of the world, with their equipment, what the earnings have been and are, the rates charged for service, the conditions of employment of the working staffs and the varying methods of ownership and governmental control. The author recognized that many of the figures are approximate, that omissions are frequent and that some of the statistics are not comparable on account of the varying methods of reporting in different countries, but hoped that this first attempt to set forth a measure of the railways of the world may lead to other efforts whereby statistics as complete and full as possible may be compiled.

A paper on "The Status of the Railways of North and South

America" was given by F. Lavis, consulting engineer, New York City. The introduction of this paper is a discussion of the relation between the economic development of the two continents and its bearing on the financing and construction of railways. This was followed by a general review of the railway situation in each country. The observations in regard to the United States and a number of the South American countries were based largely on the writer's personal practice.

"The Status of Railroads and Tramways in the Netherlands East Indies," was presented by E. P. Wellenstein, Netherlands Indian government railway's engineer. Railroads in the Netherlands East Indies are characterized by light traffic, light construction and relatively high rates in order to afford a reasonable return on the investment. The lines are either government-owned or privately-owned, with charters providing for eventual government ownership. Some of the charters provide for government guarantee of dividends. Tramways form an important feature of the development.

"Economic Considerations Controlling and Governing the Building of New Lines," was the title of a paper by John F. Stevens, New York City. The conditions under which the present railway systems of the United States have grown up, he pointed out, are very different from those prevailing in any other civilized country in the world. Owing to the rapid growth of the country, the development of the railroads has been correspondingly rapid and decidedly haphazard. The situation at the present time is entirely different; the necessity for new main lines is not manifest and further development will be concerned almost entirely with branch lines and terminals. Railroad planning and building is an exact science and not a rule-of-thumb matter, and all projects for further development should receive most careful and conservative consideration before construction commences. This applies particularly to the establishment of ruling grades and maximum rates of curvature, the elimination of pusher grades and the initial construction of permanent work. Economize out on the line, but not at stations nor at terminals proper.

William Hood, chief engineer, Southern Pacific, in a paper entitled, "The Locating of a New Line," discussed the designing of the grade system and center line of a road whose terminals have been fixed, touching on the temporary use of sharp curvature to reduce cost, the co-ordination of grades to reduce to a minimum the number of classes of locomotives required, the use of easement curves, field work in locating the line, compensation of grades on curves, and the comparison of alternative lines.

G. M. Eaton (Westinghouse Electric & Manufacturing Company), in discussing Mr. Hood's paper, called attention to a factor which may influence the location of main trunk line railways in the future to a much greater extent than it has in the past, viz., the certainty that the line will be operated electrically. On account of the shorter wheelbase of electric locomotives, it may be practicable to adopt sharper curves, and in view of the great short time overload capacity of the electric locomotive, heavier grades for short distances need not be prohibited in such a line.

Mr. Hood replied to the above suggestions that while these factors could well be considered in locating a road which it is absolutely known will be operated only by electricity, this certainty is very difficult to determine in present-day work. Even allowing for important developments in the electrification of main line steam roads and the construction of new lines of this class for electric operation, it is probable that many will retain steam engines for some classes of service or may be forced to change back to steam operation entirely, so that a road located according to the best practice of to-day is still preferable. Such a line can be operated fully as economically by electricity as one designed according to the suggested factors, and he considered it injudicious to attempt to effect some slight savings in the cost of the line by adopting a location that cannot be operated economically with steam.

David Wilson, Johannesburg, S. A., submitted a paper on "The Locating of a New Line." This was an account of the standards and practices of the South African railways in the construction of new line. The methods follow very closely those of early railroad construction in the United States.

A paper on "Tunnels," by Charles S. Churchill, assistant to president, Norfolk & Western, gave an account of the most important tunnels now under construction or recently completed in America. Most of these have been previously described in engineering periodicals. The Snoqualmie tunnel on a change of line in the Cascade mountains, on the Chicago, Milwaukee & St. Paul, is single track, 11,890 ft. long, and was completed in January, 1915. It is in hard rock and was excavated with a bottom heading from one end and with a top heading from the other end. It is lined with concrete. The Sandy Ridge tunnel is on the Elkhorn extension of the Carolina, Clinchfield & Ohio, single track, and 7,804 ft. long. It was driven through sandstone and slate by the top heading and sub-bench method. The concrete lining was not placed until after the tunnel was opened for traffic. The double track Nicholson tunnel, 3,630 ft. long, on the change of line of the Delaware, Lackawanna & Western, is an example of a tunnel driven in soft rock, clay and gravel, requiring full timbering throughout. The Mount Royal tunnel, Montreal, and the Seattle tunnel are examples of tunnels built to gain access to important terminals. The Rogers Pass tunnel, now being constructed by the Canadian Pacific for a change of line in the Selkirk mountains, will be the longest tunnel in North America. The pioneer drift method is being used.

"Tunnels Recently Constructed in Italy," was the title of a paper by Prof. Dr. Luigi Luiggi, Rome, Italy. The Italian railways are characterized by the number and length of their tunnels, not only in the Alpine district but throughout the length of the Italian peninsula. Most of the tunnels described were of difficult construction because of their location in soft or disintegrating rock and limestone containing large caves. Of special interest is the Gattico tunnel, in which a 610-ft. section was constructed by use of pneumatic caissons driven vertically from the surface 200 ft. above the crown of the tunnel. The use of modern tunneling machinery, largely of American make, is quite general.

In a paper entitled, "The Railway Tunnels of Switzerland," R. Winkler, director of the Technical Division of the Swiss Railway Department, Bern, Switzerland, brought out the fact that the number of railway bridges and tunnels, determined by the topography of Switzerland, is very great, and there are certain lines which consist of practically an unbroken series of this construction. On January 1, 1915, there were 627 tunnels with a total length of 175.01 miles in operation or under construction.

The paper discussed the tunnels of more than 2,000 m. (6,560 ft.) in length, covering the most important conditions affecting construction work prosecuted during the last ten years.

"The Reconstruction of the Panama Railroad," was the title of a paper by Frederick Mears, member Alaska Engineering Commission, Washington, D. C. The reconstruction of the Panama Canal involved two separate processes. The first step was the rehabilitation of the old French line substantially on its original location, including the double-tracking of 37 miles, and the addition of extensive passing tracks and yards, to take care of the traffic incidental to the building of the canal. The second step was to rebuild the entire railroad on a new location in order to raise the line above the level of the water in the Gatun and Miraflores lakes and make a detour around Gold Hill to avoid the Gaillard cut. The most formidable problem was encountered in the great embankments across the arms of Gatun lake, involving over 5,000,000 cu. yds. of embankment, a large part of which was rock. Bridges were quite an item, the two largest ones being those over the Chagres and Gatun rivers, the latter including a 100-ft. plate girder bascule span. A tunnel 636 ft. long was required at Miraflores.

A paper on "Railway Construction Methods and Equipment in Australia" was presented by Maurice E. Kernot, chief engi-

neer, railway construction, Melbourne, Victoria, Australia.

In a paper on "Railway Construction Methods and Equipment," William G. Sloan, chief engineer, McArthur Bros. Co., New York, outlined the development and present status of railway construction in this country, discussing the subject under seven headings, viz., Clearing and Grubbing, Handling Material from Excavations and into Embankments, Tunnelling, Bridge Construction, Track Laying, Ballasting, and the Construction of Miscellaneous Structures.

Under the title "Track and Roadbed," George H. Pegram, chief engineer Interborough Rapid Transit Company, New York City, gave a brief review of American practice on this subject and covered both steam and electric lines, with special attention to electric lines having exceptionally heavy high speed traffic. A set of specifications for the treatment and use of crossties was given and the paper closed with a review of the present rail situation in America.

J. E. Greiner, consulting engineer, Baltimore & Ohio, Baltimore, Md., gave a paper on "American Railroad Bridges." As now constructed they are the result of an evolution which may be divided into three periods. The first, extending to 1865, was largely a period of temporary construction in which the designers were governed very largely by judgment. During the second, ending in 1890, scientific designing became general, and the pin connected steel truss was developed. The third period brings us to the present. The influences bringing about the present state of development may be designated briefly as the increase in train loads, necessitating heavier structures; the increase in speed necessitating stiffer ones; the introduction of new materials of construction, such as modern structural steel and the alloys and special steel of recent introduction, and reinforced concrete; the improvement in machinery for shop use, and the development of derricks and other equipment for the erection, which has very largely increased the weight of members and the use of field rivets. As examples of modern tendencies, the most important ones include the reinforced concrete and timber ballast decks, the encasing of I-beam spans in concrete, the use of long plate girders, the decreased use of pin connected trusses, and the substitution of riveted trusses for greatly increased span lengths, the exploitation of many patented types of bascule bridges and the general tendency to use stiff connections and bracing wherever possible. An account of the development of the Cooper wheel loading was followed by a discussion of the present tendency of locomotive development and unit stresses in structural steel to the conclusion that little or no increase in the strength of bridges over that provided at present is necessary to fully anticipate all possible increase in the rolling loads on railroad tracks.

Mr. Greiner's paper was discussed by C. F. Loweth (C. M. & St. P.), who took exception to the inference in the paper that open deck timber trestles should only be built on lines of light traffic or branch lines. While it is recognized by all engineers that a more permanent type of structure is preferable, the necessity for utilizing to the best advantage the limited amount which is available for bridge work on the average railroad each year frequently requires the use of structures which would not be built if additional expenditures were allowable.

While the contents of a paper on "Recent Locomotive Developments," by George R. Henderson, consulting engineer, The Baldwin Locomotive Works, Philadelphia, is a matter of common knowledge to railroad men in the United States, the paper was an excellent one from the standpoint of the foreign railroad officer. It described the transition from the American, Consolidation and Ten-Wheel types to the corresponding types having trailing trucks, namely, the Atlantic, Mikado and Pacific types, with the resulting increase in boiler capacity, giving higher speeds with equal tractive effect or vice versa. An outline was given of the development of the Mallet type, with a somewhat more lengthy description of the "Triplex compound." Under the headings, "Details of Construction" and "Adjuncts and Specialties," mention was made of the substitution of cast steel for wrought steel, the use of alloys and heat treated steels, the substitution of the

Walschaert valve gear for the Stevenson link motion, improvements in boiler and firebox design, the superheater, the pneumatic coal pusher and stoker, and the use of oil as a fuel.

The paper by Arnold Stucki, consulting engineer, Pittsburgh, Pa., on "Rolling Stock Other than Motive Power," dealt with the car equipment used by the railroads of the United States of America and Canada pointing out the improvements made during the last decade in the various types of passenger and freight cars and special parts.

"The Floating Equipment of a Railroad," was the title of a paper by F. L. DuBosque, assistant engineer of floating equipment of the Pennsylvania, New York City. Most of the railroads approaching New York from the west and south have their terminals on the west side of the Hudson river, necessitating a water transfer for all passengers and freight having destination east of the river. In consequence these railroads have developed a number of standard types of floating equipment. The most common of these is the Hudson river passenger ferryboat with a screw propeller at each end, a steel hull and a wooden superstructure. An all-steel fireproof ferryboat used on the Delaware river is suggested as an improvement over the prevailing Hudson river type. Car floats for freight service are of two types, pier floats and transfer floats. The former are used for delivery to freight stations on piers where the cars are unloaded without removal from the floats. The latter are used for the transfer of cars from one side of the river to tracks on the other side, and are larger and of heavier construction, usually steel. One of the most interesting problems involved in the operation of floats is the construction of satisfactory bridges for the transfer of cars to and from the floats with varying heights of tide. The delivery of freight to steamship piers and to manufacturing plants is usually made in house barges propelled by tugs or in self-propelled barges, the latter usually being constructed of steel. Other types of equipment are the hand-power and steam-power derrick barges and coal barges. All equipment which is not self-propelling is handled by means of tugs of various sizes, many of them very powerful, so that tows sometimes contain as many as 28 boats. A small size of tug is employed at the docks for service which corresponds very closely to the switching of cars.

The paper on "Railway Terminals," by B. F. Cresson, chief engineer, Board of Commerce and Navigation of the State of New Jersey, contained a general discussion of the relation of terminals to railroad systems and to economic conditions in the larger cities and a detailed statement of the terminal situation in six cities, New York, Chicago, Buffalo, Cleveland, St. Louis and New Orleans.

Charles Hansel, in a paper on "Signals and Interlocking," gave a brief review of the development of the automatic block system, placing particular stress on the development of the alternating current signal track system and the adoption of the upper quadrant semaphore signal. The automatic train control was designated as another important development, which was discussed at some length.

A paper on "Preservative Treatment of Timber," by Howard F. Weiss, director, Forest Products Laboratory, and Clyde H. Teesdale, in charge of wood preservation, Forest Products Laboratory, Madison, Wis., presented a general review of the results obtained in the United States in preserving wood. The authors attempted to do this by showing, first, the quantity of wood preservatives used and amount of timber treated annually, and, second, the extent to which the various treatments have prolonged the natural life of wood.

RAILWAY CONSTRUCTION IN INDIA.—The following work on railway projects has been sanctioned by the Indian authorities: Surveys by the Eastern Bengal State Railway of the 36 miles between Serajgunj and Bogra, and by the Bhavnagai Durvai of a metre gage railway, about 56 miles long, from Savarkundla via Dongar to Mahuva, with a branch from Dongar to Port Albert Victoria, and the construction by the Junagadh of a line, 60 miles long, between Varavaland and Una.

WELFARE WORK AT PITCAIRN FREIGHT TRANSFER

The remarkable improvement made during the past two or three years in the management of the personnel at the freight transfer station of the Pennsylvania Railroad at Pitcairn, Pa., 16 miles east of Pittsburgh, was noticed in the *Railway Age Gazette* of September 3, pages 413 and 430. Here, under the management of George F. Wagner, agent, a force of 318 laborers has been kept in service for two years with no change; only one man was taken on, and he was an addition to the force. It is hardly correct to call these activities "welfare work" in the restricted and technical sense in which that term is now used, for the welfare of the employees is only one of the beneficial results. The results from a cold and strictly business standpoint are equally noteworthy, and all that has been done would have been fully justified as a good thing for the railroad company from the narrowest motives of self-interest. And 99 per cent of these men are foreign born, another fact which will give interest to the additional details here given concerning this station and its management.

The work done at this transfer station was formerly done at Pittsburgh, but was crowded out of the city several years

The assistant labor foremen and the shipping clerks, one of whom is assigned to each gang of four truckers and one loader, are all Americans.

Under former conditions the proximity of the numerous large manufacturing concerns fostered the habit of "floating" and it was not uncommon to lose a hundred men a month, principally because another job was close at hand and to be had for the asking. The men who left did not usually better themselves; they merely wanted change, apparently; and many of them would in time drift back to the Transfer and be re-employed, if they were needed, and if they were of satisfactory quality. It goes without saying that this constant "floating" was demoralizing to the whole force.

The Pitcairn sheds are not noted for beauty, being plain, low wooden structures. The agent who set out to improve conditions had, therefore, no aid either from the architect or from any committee on art or esthetics; but he made a good beginning by covering the whole with a coat of white-wash. This, they say, acted like a tonic on all hands, and seems to have suggested other ideas of tidiness. It began to be easier to keep tracks and platforms clear of rubbish and all foreign matter; and an order was issued to burn or send to the dump every day all sweepings and litter. Getting rid of the rub-



Some of the Freight Handlers at "Pittsburgh Transfer," Pitcairn, Pa., Pennsylvania Railroad

ago. Pitcairn is the main freight-train terminal for the Pittsburgh division. Between Pitcairn and Pittsburgh there is a long chain of manufacturing towns which have a distinct influence on the labor problem at the Transfer. The labor supply in this district has, for many years, been very largely foreign and the percentage of native-born laborers has decreased steadily year by year. The total number of men employed at the transfer is 464, of whom 318 work on the platforms as truckers and laborers. Nearly all of these are natives of central Europe, the large majority coming from Austria-Hungary. A creditable number of them have become citizens of the United States, yet a considerable part of the whole body has only a limited knowledge of the English language. This ignorance of English was, of course, a drawback, as the trucking of miscellaneous freight into and out of cars demands something more than mere brawn; but at the present time all can read and speak English with satisfactory proficiency.

The agent's force, aside from the clerical department, consists of one general foreman in charge of floor operation day and night, and two assistant general foremen, one day and one night. There are ten assistant labor foremen, five day and five night, in charge of the work in different parts of the house.

bish, it was found, soon brought another improvement; the rats were exterminated. This was an emigration of no small proportions, as the station is a large one (the platforms accommodate 402 cars).

Next came the Spring; and a little plot of grass and of blooming flowers was soon seen where only cinders had bloomed before; and the workmen at once took an interest in this minor feature. The men, discussing the matter among themselves, concluded that an American flag was needed, and with contributions of ten cents apiece, no more and no less, a fund was raised to buy it; and with a tubular steel pole, furnished by the railroad company, the flag was raised. The flag raising, though not ostentatious, was, from a local standpoint, a notable event, and there were a few brief speeches and some music by the Pitcairn shop band.

The appreciation accorded these outside activities served only to emphasize such lacks as there were inside, and before long the agent mustered the courage to acquaint the superintendent with the needs inside the building; and with the cordial co-operation of this officer and others, there was soon installed a ventilated steel locker for each man; and this improvement was followed with shower baths, porcelain enamel washstands,

supplied with hot and cold water, and a system of absolutely odorless water closets and urinals. The drinking water is now supplied by sanitary fountains and the water, which comes direct from the mountain back of the village, is cooled by iced coils.

The men have a comfortable room in which to eat their lunches, and facilities are provided for heating food and for simple cooking. The truckers have one large lunchroom lined with cement, both the floor and the wainscoting. All these fixtures are of first quality and the facilities are adequate to the number of men who wish to use them.

Every one of these improvements is now in as good condition as when it was new, and cleanliness is maintained every day. The floor of the cement-lined lunchroom just mentioned is sanded every day with white sand.

When the men are idle they may smoke in rooms provided for that purpose; and in these rooms they play checkers, dominoes and other games of skill. Outdoors there is a place where they may pitch quoits.

The Victor Victrola which furnishes music at noontime was bought by the men themselves; and with it there is a good assortment of records. That the workmen have music in their souls is evident from the pleasure that they take in listening to great artists and famous bands. Now and then the sheds are favored with a concert by the Pitcairn shop band, of 40 pieces, and this also is warmly appreciated.

These contributions to the comfort of the men have in a very definite way promoted contentment, and the officers of the road feel quite sure that whatever cost has been incurred was wiped out long since. Not the least effective means of keeping in sympathetic touch with the men is a "suggestion box" provided for the purpose of enabling any employee to submit ideas that may occur to him in the way of improving methods of work; and Mr. Wagner says that he is indebted to the men for many excellent ideas. He is personally acquainted with each one of the 318 men comprising the house force, and he takes care to keep the acquaintance alive; that is to say, he makes it a point to have a little talk with each man at least once a week. Tale-bearing is not tolerated. Where a foreman notices a tendency to carelessness the man at fault is warned; and if, after continued warning, there is no improvement the offender finds himself reduced in rank. Thus an offending shipping clerk may become a stowman, a stowman a trucker and a trucker a laborer. All understand, however, that a position which has been lost may be regained by subsequent good conduct; and, in fact, men do thus recover their places. Commendation for good work is given freely, and there are said to be no vicious cases to deal with.

Every available means is taken to facilitate the freight work. Hinged counterbalanced bridges are provided for trucking across tracks, so that the fact that one of two or three tracks is not occupied by cars, does not hinder ready access from the platform to cars beyond. The abolition of the old practice of trucking through several cars, hindered as it is by the obstacles due to differences in heights of floors and sometimes bulky freight in cars which have to be passed through, has made easier the work of trucking, has added to the earning capacity of the men, and has reduced the number and importance of bills for damage to freight and injury to persons.

Most of the trucking along the platforms longitudinally, that is, in lines parallel to the track, is done on flat steel tread plates laid in the shed floors and countersunk. With these it is found that in many cases a trucker can move a load twice as heavy as he would dare to take over the ordinary plank floor.

The men are grouped in gangs, and are paid by the ton of freight handled. A gang is composed of a shipping clerk, a loader and four truckers. Each gang knows approximately what is its standing as compared with other gangs, and enough rivalry is kept up to secure a good degree of accuracy in the work. There have been seasons, when freight was unusually

heavy, when some outside men had to be employed; and, on the other hand, during dull periods the regular men are laid off, one day at a time, each man taking his turn.

As may well be supposed, the men have now been so long at this station that their acquaintance with details is complete. Every man knows exactly where to find a car for any point to which cars are loaded; and he knows that right in that same spot he will find a car for the same point to-morrow, next week or next month; that is to say, indefinitely, until a formal change is ordered and announced.

Every man knows his duty and also knows that it is the duty of the foreman to exact constant faithfulness. No one is pampered; there is no confusion, no lack of order and no idleness when there is work to be done.

THE FRENCH RAILROADS AS SECURITY BROKERS

BY WALTER S. HIATT*

The old practice of the French railroads of selling new issues of stocks and bonds directly to the public through the railway stations is proving very useful in connection with present issues of new loans and as a means of helping the government in its campaign to collect gold coin. Because the small investor in France has been educated through long years to buy railroad stocks and bonds directly from the companies, as has been pointed out in an article in the *Railway Age Gazette* of August 6, in the present war crisis the railroads forced to make new loans are able to get money in France without too much difficulty.

Contrary to the impression of the outside world, which has underestimated the enduring power of accumulated wealth, there is still an astonishing amount of money in the hands of the saving French people, and large amounts of it are going into the purchase of railway securities. One notable indication of the presence of this money yet in the hands of the public is shown in the statement of the Bank of France which is collecting gold for the government. Last May the government called on the public to let it have its hidden gold, to aid it in maintaining its credit abroad. To date no less than \$150,000,000 worth of gold has been turned in at the hundred odd branches of the Bank of France. It is estimated by French financial experts that counting the gold actually coined in France during the past 15 years and the billion dollars worth of gold in bank vaults, another billion dollars worth is yet in the hands of the public.

In view of their rôle as brokers in handling their own securities the various railroad companies are helping in the gold collection by opening special windows in all their larger stations for the exchange of their own securities or paper money for gold coin, which coin is duly turned over to the Bank of France. No less than \$5,000,000 in gold has been obtained at the instance of railway employees, either through soliciting their friends or else taking the gold out of their own savings. The railway companies are also turning in gold out of their own treasuries, the Northern Railway having as early as May 21 made a first deposit of 3,000,000 francs, and later the Paris-Lyon-Mediterranee of 3,500,000 francs.

In regard to their own finances, practically every railroad in France, because of reduced earnings and the necessity of repairs and upkeep, has put out new loans this summer. These loans have done reasonably well, because of the old selling relation with the public. Had the railroads been forced to place the loans entirely through bankers, the money would perhaps have come in more slowly, and it certainly would have been necessary to pay far more than the customary rates for the service.

The case of the Northern Railway, normally the best paying of all the French roads, is interesting because it has suffered most from the war. Virtually one-half of its 2,300 miles of

*Our Special European Correspondent.

line are either in the hands of the Germans, or else so near the front as to be impossible of normal operation. The other half of its available line runs from Paris into the war zone, and yields a smaller return than usual, since the army is using it for military purposes, refusing its passenger trains to travelers and its freight trains to commercial traffic except under strict surveillance.

The result is that the earnings of this railroad are less than half those of a peace year. In 1912 the net earnings were \$25,000,000, the gross receipts being \$65,000,000, and expenses \$40,000,000. For the year ending December 31, 1914, including five war months, the receipts fell off \$19,000,000, the total for the year being barely \$48,000,000, with expenses of \$37,000,000. Of this sum but \$6,000,000 was received from the government for war transportation, which sum cannot in any sense be considered an adequate compensation for its huge losses of freight and passenger business and the destruction of its depots,

this stock has not further decreased because the French holder does not readily sacrifice a stock that he feels will eventually return to normal. For these reasons this company's new \$40,000,000 issue of 5 per cent bonds, made to meet war deficits of all kinds, has fared far better than could have been expected.

These bonds are on sale at every railroad station of the company, according to French railroad custom, and hand bills are there posted notifying the public of the issue. At the smaller places the station masters, as on all the roads, have charge of the sale and receive small commissions from the company for bonds sold. The company is thus able to reach the small investing public of the little towns and villages. The people do not have to apply to bankers or brokers to make the purchase and, indeed, effect a small saving by this direct buying from the company. Neither the company nor the public is forced to pay a broker's commission on these sales.

At the stations in the larger cities, as in Paris, the companies



The Bank and Security Sales Room in the Paris Offices of the Southern Railway of France

bridges and tracks. The decreases in revenues as between 1913 and 1914 were as follows: Passenger traffic, \$7,500,000; slow freight, \$16,000,000; fast freight, \$2,500,000; cattle, \$200,000; mail and other, \$200,000.

The enormity of these decreases will be realized if it is understood that normally this road's passenger receipts are \$20,000,000, and its freight receipts \$36,000,000. At one stroke the German invasion cut off \$12,500,000 in coal and coke freights from the mines of northern France and Belgium. It must be borne in mind that, notwithstanding these losses, operating expenses have continued over one-half its lines.

In the face of such disaster, its stock (*actions*), originally issued at \$80 (400 francs), and quoted at the high figure of 1,727 francs (\$345) the day before war was declared, are now quoted on the Bourse at 1,215 francs, a drop of about \$100. That this stock has not decreased more after 14 months of war is due to the confidence of the holders in the value of the stock, and to the fact that the company is paying its interest as usual, not having sought to take advantage of the moratorium. Finally

have big reception rooms fitted up to accommodate this business, the room being not unlike that of a bank, with special windows for each class of buyers and each class of securities, and for the payment of interest as the securities mature. Not only the small buyers come to these rooms, but brokers, bankers and officers of private organizations who wish to make larger investments of capital. Of course, the companies do not attempt to supplant altogether the selling role of the broker or banker. Thus, once the new stocks or bonds have been issued and sold, the companies do not attempt to handle them further. The only railroad in France that does not to day use this method of reaching the public is the State Railway, which, however, does business directly with the public at the offices of the Minister of Finance.

One of the good features of this method, from purely a railroad point of view, is that railroad employees themselves are led to invest their savings in the company for which they work and thereby their personal interest in the welfare of their employer is stimulated. It has also been pointed out to me by

officers explaining the direct method of sales that the people living along a railroad line and investing in its securities naturally desire the prosperity of the railroad, and that this reduces the number of people who loosely consider the railroad a public enemy.

In the case of the Southern Railway (Chemin de Fer du Midi), the rôle of broker has been carried out so far that the railway virtually has a bank in its general offices in Paris. Here it is its own banker. It not only sells its stocks and bonds but makes short-time loans to other banks and commercial houses as a part of its daily business.

To illustrate how well its system works, one of its directors explained to me that, two years ago, the company decided to build a new hotel at a certain point on its line as an attraction for tourists. It organized a private hotel company and asked a banking firm to sell for it the 14,000 bonds issued to obtain money to build the hotel. The banking firm was able to sell but 5,000 of the bonds. Then the railway undertook the sale itself, at its own stations, and within a few months was able to dispose of the other 9,000 bonds. At this Paris banking office the company further settles all of its large bills, again acting as its own banker.

The company has had the direct sales system in force since 1860, and has during that time handled all of its own loans. Whenever it has put out a new loan, say 100,000 bonds at 500

francs, it advertised the fact on the billboard space at all its stations.

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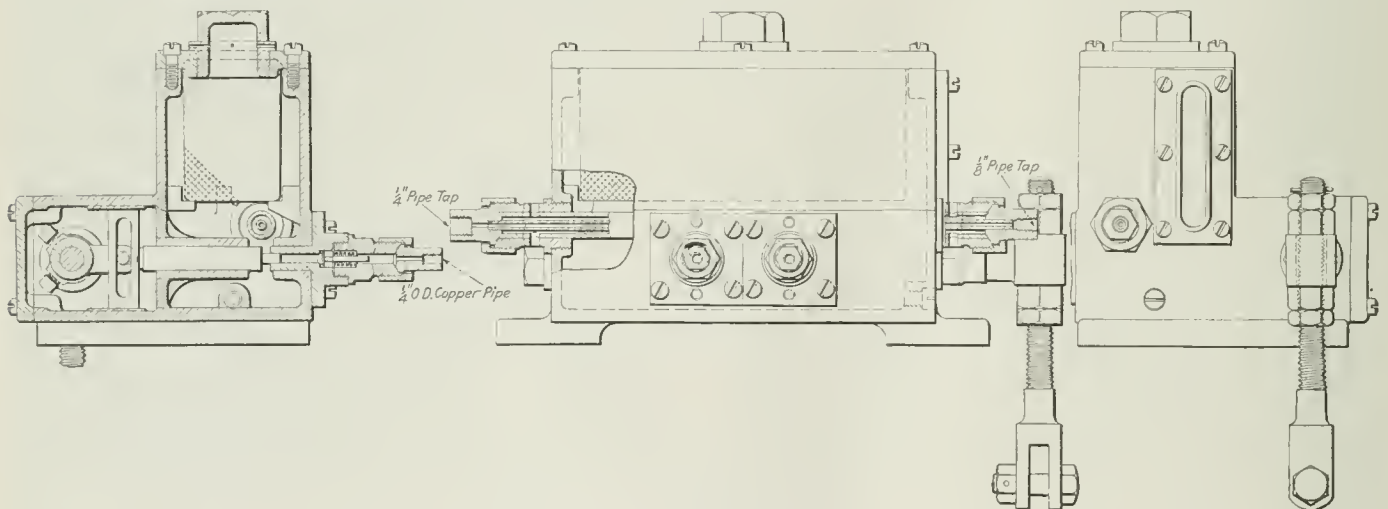
There are four windows at this Paris office maintained for the investor. While the clerks at these windows in slack times do other company accounting work, the same clerks are always at hand and ready to engage in the work of selling with which they are familiar. The customer begins at the first and central window, stating the amount of money he wishes to invest, and whether he wishes a bond issued in his name or merely in blank. He then passes to window number two, where he pays for the bond or bonds, and receives a receipt. At window number three he receives his bond. He comes back to window number four to collect his interest twice a year, or else collects it by mail. At this window there is also maintained, as a protection to the investor, an information service regarding lost or stolen securities. If an outside banker pays the interest on a coupon or purchases a security, he does so at his own risk.

The officers of the Southern Railway who went into the details of their system, when I explained that it seemed on the surface that it might be modified for the use of American railways stated that the system had stood the test of long years and that it was satisfactory from many points of view in the way of stimulating public confidence and interest in their business. They further declared that it was inexpensive, and that in this war year it had rendered great service in that the ma-

FORCE FEED CYLINDER LUBRICATOR

The force feed lubricator, shown in the drawing, is designed for use in lubricating locomotive cylinders. It is of the double action type and is manufactured by the Nathan Manufacturing Company, New York.

By referring to the detail drawing of the lubricator it will be seen that it is directly operated without the use of a ratchet. The lever attachment to the lubricator is designed to be connected in any suitable manner with a reciprocating part of the engine, the length of the arm being adjustable to suit the amplitude of the motion. The oscillating shaft to which the lever is attached is provided with arms in the lubricator which are pin-connected to slotted crossheads on the ends of the pump plunger, the arrangement being such that for each complete cycle or revolution of the engine two complete cycles of the pump plungers are produced. Oil is thus forced into the steam passages twice during each revolution by the use of but one plunger for each cylinder. The plunger is shown in the drawing at the end of its forcing stroke. At the other end of the stroke it is drawn back from the end of the barrel, thus allowing the



Nathan Force Feed Cylinder Lubricator

oil to enter directly from the reservoir. A spring operated check valve prevents the back flow of oil from the lubricator pipe.

The oil reservoir contains a small exhaust steam heater of a novel design. Steam from the air pump exhaust passes through a small pipe extending from end to end of the reservoir, the condensation being carried from the lubricator to any convenient point under the engine. Surrounding the steam pipe is a larger pipe with openings to the atmosphere at either end of the reservoir, providing for a circulation of air about the steam pipe and preventing overheating of the oil in the lubricator.

THE RAILWAY GAGES OF THE INDIAN PROVINCE OF ASSAM.—At a railway conference begun on June 30, at Shillong, in Assam, and attended by members and representatives of all the various interests in Assam, including steamer companies, it was decided that there should be only two gages in Assam, the metre and 2 ft. gages. The gage of any proposed line is to be selected on its merits, but in general the metre gage will be adopted for the Surma Valley and the 2 ft. gage for the sparsely populated portions of the Assam valley. It was also decided to lay the meter gage on the feeder lines in the Surma valley, connecting the three subdivisional headquarters of Hailakandi, Maulvibazar and Habiganj with the Assam-Bengal Railway.

General News Department

The State Department, at Washington, which is trying to decide which faction should be recognized as the government of Mexico finds its efforts blocked by the impossibility of keeping up railroad communication between Vera Cruz and the city of Mexico. A freight train carrying supplies from the coast to Mexico City was blown up by bandits. A long bridge of the Intercoceanic Railway, 25 miles from Vera Cruz, was destroyed. A press despatch from San Diego, Cal., reports that at Torres, a small town 70 miles north of Guaymas, Mexico, a Southern Pacific passenger train was burned September 24, by a band of Yaqui Indians, and that 80 passengers, forced to stay in the cars were thus put to death.

C. Stanley Sale, who since November, 1913, has been editor for the Chicago Association of Commerce Committee of Investigation on Smoke Abatement and Electrification of Railway Terminals, and who for two years, 1907-1908, was associate editor of the *Railway Age*, has been appointed assistant to the director of the engineering experiment station and instructor in civil engineering at the University of Illinois. Mr. Sale was graduated from Purdue University in 1906, and was for one year assistant engineer of the Florida East Coast Railway. Before becoming connected with the electrification committee he was for two years secretary and general manager of the Engineering Publishing Company, Indianapolis, Ind.

Disturbances among freight handlers on the docks of New York City, reported last week, have continued, but, so far as the railroads are concerned, the employment of new men,

or of men drawn from other departments of the railroad service seems to have been successful in keeping freight moving, though with considerable delay. Many of the men who struck are returning and being taken back. In addition to the railroads named last week, large numbers of men left their work at the docks of the New York, New Haven & Hartford Railroad and of the Metropolitan and Maine Steamship companies. The demands of the strikers in most cases were for an increase of the rate of pay from 20 cents an hour to 25 cents. No strong organization of laborers seems to be prominent, yet it is reported from Washington that the secretary of labor has appointed a conciliator, John A. Moffatt, to take up questions presented by 900 freight handlers of the Pennsylvania Railroad in Jersey City. The difficulties this week seem to have been more serious at the piers of the transatlantic steamship lines and the claim has been made that agitators, working supposedly in the interest of Germany and Austria, have incited the strikes. It is said that at piers where no materials for the French and English governments were being loaded there was no trouble.

Revenues and Expenses of Express Companies for May, 1915

The following statement, which is subject to revision, has been compiled by the Interstate Commerce Commission from the monthly reports of operating revenues and expenses of the principal express companies for May, 1915:

A—FOR THE MONTH OF MAY												
Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.*		Great Northern Express Co.			
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914		
Mileage of all lines covered (miles)	44,936.22	38,326.94	73,909.69	61,199.83	8,876.50	7,080.31	.....	2,839.78	9,557.73	9,334.20		
Charges for transportation.....	\$3,092,137	\$2,635,551	\$4,274,145	\$3,497,550	\$273,231	\$271,973	\$3,299	\$50,592	\$263,126	\$256,611		
Express privileges—Dr.....	1,462,863	1,372,393	2,149,067	1,730,687	127,623	126,930	3,784	25,639	159,676	155,875		
Operations other than transp.....	46,165	32,801	244,000	171,720	5,125	10,802	49	785	4,859	4,438		
Total operating revenues.....	1,675,439	1,295,958	2,369,078	1,938,583	150,733	155,846	435	25,738	108,309	105,174		
Operating expenses.....	1,463,598	1,354,975	2,039,133	1,888,776	127,533	130,933	5,809	27,970	86,132	86,391		
Net operating revenue.....	211,840	59,016	329,945	49,807	23,199	24,913	6,245	2,231	22,176	18,783		
Uncollectible revenue from transp'n	687	.....	413	.....	6	.....	.....	.....	13	.....	
Express taxes.....	13,733	11,426	49,480	30,952	4,000	3,000	250	600	3,443	3,348		
Operating income.....	197,419	70,443	280,051	18,855	19,193	21,913	6,405	2,831	18,717	15,435		
Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for All Companies Named†			
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914		
Mileage of all lines covered (miles)	8,188.34	8,080.40	34,679.60	33,496.60	114,923.23	99,969.21	5,174.26	5,008.97	300,175.57	296,677.58		
Charges for transportation.....	\$231,863	\$245,880	\$1,273,385	\$1,331,122	\$3,476,102	\$2,548,093	\$109,664	\$97,309	\$12,996,966	\$12,378,075		
Express privileges—Dr.....	126,601	133,399	664,328	683,408	1,778,131	1,347,656	49,466	51,936	6,521,543	6,373,392		
Operations other than transp.....	3,505	3,380	25,130	26,957	68,692	59,121	3,259	2,500	400,789	332,903		
Total operating revenues.....	108,778	115,861	634,187	674,672	1,766,663	2,259,559	53,457	47,873	6,876,212	6,337,586		
Operating expenses.....	85,356	87,429	526,435	549,343	1,501,777	1,181,013	52,131	46,790	5,887,900	6,172,692		
Net operating revenue.....	23,421	28,432	107,751	125,329	264,885	78,545	11,326	1,083	988,303	164,894		
Uncollectible revenue from transp.	44	1	66	.....	599	.....	10	.....	1,804	1		
Express taxes.....	5,000	4,500	14,147	15,247	31,563	35,000	925	1,155	122,544	115,953		
Operating income.....	18,377	23,930	93,537	110,081	232,762	43,545	10,390	73	863,955	48,940		
Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.*		Great Northern Express Co.			
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914		
Charges for transportation.....	\$31,443,347	\$30,510,076	\$42,472,971	\$38,088,587	\$2,844,241	\$2,910,153	\$596,398	\$607,947	\$2,839,093	\$2,941,852		
Express privileges—Dr.....	15,670,229	16,011,610	21,327,319	19,089,563	1,417,936	1,380,318	301,142	306,810	1,731,170	1,799,157		
Operations other than transp.....	459,002	335,615	2,088,674	1,983,299	55,119	102,864	8,102	9,048	47,848	46,091		
Total operating revenues.....	16,232,120	14,834,081	23,234,326	20,982,323	1,481,424	1,632,609	303,359	310,185	1,155,772	1,188,786		
Operating expenses.....	16,558,991	15,539,356	22,539,592	21,232,199	1,411,289	1,530,443	296,558	328,210	972,476	985,253		
Net operating revenue.....	326,870	525,274	694,733	249,875	70,135	102,256	6,800	18,204	183,285	203,533		
Uncollectible revenue from transp.	5,558	.....	2,615	207	95	.....	.....	.....	103	.....	
Express taxes.....	182,522	180,825	378,541	344,234	44,000	31,700	10,850	11,400	41,446	41,750		
Operating income.....	514,952	706,100	313,375	594,317	26,040	70,556	4,049	29,424	141,745	161,782		
Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for All Companies Named†			
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914		
Charges for transportation.....	\$2,493,745	\$2,721,931	\$12,964,423	\$14,465,480	\$34,966,740	\$28,678,514	\$1,063,588	\$1,090,070	\$13,684,553	\$13,839,828		
Express privileges—Dr.....	1,362,709	1,480,025	6,701,404	7,430,335	17,891,945	14,429,451	546,681	604,404	66,950,510	71,371,593		
Operations other than transp.....	36,381	36,637	277,985	305,029	660,966	607,162	34,071	26,180	3,668,152	3,727,645		
Total operating revenues.....	1,167,417	1,277,543	6,541,004	7,340,175	17,735,760	14,856,226	550,977	511,846	68,402,162	72,195,880		
Operating expenses.....	970,297	994,093	5,787,900	6,328,855	16,304,982	13,517,927	569,968	542,158	65,412,057	70,318,635		
Net operating revenue.....	197,119	283,449	753,103	1,011,328	1,430,778	1,338,298	18,991	30,311	2,990,105	1,877,245		
Uncollectible revenue from transp.	195	34	504	127	9,557	.....	102	.....	18,822	374		
Express taxes.....	55,000	49,500	160,035	166,149	182,579	368,000	10,911	9,722	1,265,888	1,323,729		
Operating income.....	141,924	233,910	592,473	845,040	1,038,642	970,298	30,004	40,038	1,705,395	553,142		

* Discontinued active operations April 30, 1915. † Includes previous years' returns of United States Express Co.

The Erie Barge Canal

The New York State Court of Claims has before it 2,440 claims demanding \$62,000,000 from the state for damage occasioned by the construction of the barge canal. The next term of the court opens in Rochester on October 4. Claims for lands taken in New York county for barge canal terminal purposes aggregate \$2,106,000 and in Queens \$1,190,000. Other large sums claimed are \$10,000,000 in Herkimer, \$5,326,000 in Saratoga, \$3,678,000 in Wayne, \$3,861,000 in Monroe, and \$5,761,000 in Rensselaer. Claims arising from leakage and damage caused by the old canals amount to \$128,623.

Brownell's Automatic Stop

A mechanical-trip automatic train stop, invented by George W. Brownell, of St. Albans, Vt., has been tried on a sidetrack of the Central Vermont Railway at that place. Mr. Brownell places a ramp on the ties between the rails of the track and, by means of a sliding tripper, suspended from the locomotive frame, causes the lifting of a valve on the engine as the ramp is passed, applying the air-brakes. The ramp is moved into or out of position by a dog, turned by a shaft connected to the visual signal. To prevent trouble from freezing, the ramp is supported in a trough, which, in winter, contains salt. The air apparatus, on the locomotive, moves a piston in a double cylinder, so arranged as to exhaust, at first, only a part of the air necessary to make a service application, further reduction, as may be demanded, being provided for by suitable adjustments.

Railroad Abuses Charged

The United States Commission on Industrial Relations (the Walsh Commission) has filed, at Washington, what is said to be its final report. It recommends inspection of railroad labor camps by the United States Public Health Service and contains drastic criticism of construction camps, railroad benefit associations conducted by the managers of the roads, and so-called private armies maintained by railroads. The commission recommends the assumption by the States of the task of protecting private property as a remedy for the alleged evils. Some of the abuses declared to exist are the following:

Unsanitary railroad construction camps, overcrowded and improperly equipped; overcharging at the commissary and grafting by foremen, "voluntary" benefit associations in which membership is often compulsory and in which the employees have no voice; the establishment by some railroads of large arsenals of arms and ammunition, the recruiting of gunmen from detective agencies, the usurpation by these forces of the functions of the State and the various encroachments on the rights of private citizens.

To carry out the ideas of the commission a number of bills will be introduced in Congress.

Crossing Accidents on the Long Island

J. A. McCrea, general manager of the Long Island Railroad, has issued a review of his experiences with reckless automobilists during the past summer, giving detailed accounts of cases of carelessness, inexperience, or deliberate recklessness, of drivers, which has led to deaths, injuries and damage.

Since January 1 eighty-five automobiles and several motorcycles and wagons have been deliberately driven through low-erected gates. In fifty of these cases the gates were broken.

For publication of warnings and exhortations in the advertising columns of newspapers the railroad has spent in the last three months, \$4,327; this went to 176 newspapers in New York City, Brooklyn, and on Long Island. Twenty-five crossing gates have been painted with black and white stripes.

Heavy gates made of telegraph poles have been placed at one of the crossings leading to Long Beach, and another at Central Islip. Thirteen large signs, most of them electrically lighted at night, have been put up. The hours between five and eight in the evening seem to be most productive of reckless driving. On several occasions the crossing watchmen have been run into while at their posts and have been either killed or injured. On September 9, at Hempstead Turnpike, Queens, 5:15

P. M., an automobile driven at high speed struck and killed crossing watchman, J. P. Joyce, who was warning the driver to keep back, so gates could be lowered for an approaching train.

"We want the people to know just what we have done," said Mr. McCrea, "so that they will not accuse the railroad of carelessness when some of the reckless drivers are hit by trains. To prevent automobile accidents we have adopted every suggestion that was at all feasible; but it is quite clear that the railroad alone will not be able to do very much. Accidents will occur unless the State and township authorities take up the subject vigorously. We are going to continue our campaign, and I hope next summer we shall be able to think of something sufficiently startling to arrest the attention of those reckless drivers with whom it seems utterly useless to reason."

Disastrous Explosion at Ardmore, Oklahoma

By the explosion of a tank car containing gasoline, standing on the track near the union station at Ardmore, Okla., on Monday last, 40 or more persons were killed and buildings were damaged to the extent of about \$500,000. Repairers were at work on the car and it is supposed that a spark caused by a workman's hammer ignited vapors which had escaped from the car, which was one of 250 barrels capacity. It is said that much of the damage was due to dynamite, in the freight house, exploded by the shock caused by the gasoline explosion. Most of the fatal injuries to persons appear to have occurred in frame buildings which fell. Burning liquid was thrown many hundred feet and fires were started in 20 buildings. About 200 persons were injured, many of them being rescued with much difficulty because of the great volume of smoke from fires. Included in the property destroyed were 30 freight cars in the yard of the Gulf, Colorado & Santa Fe.

Traffic Club of New York

The regular meetings of the Traffic Club of New York will henceforth be held at the Waldorf-Astoria Hotel instead of at the Hotel Astor as formerly.

Engineers' Society of Western Pennsylvania

The regular bimonthly meeting of the mechanical section of the Engineers' Society of Western Pennsylvania will be held in the society rooms in the Oliver building, Pittsburgh, on October 5. The subject of the meeting will be "Gas Welding and Cutting—A Symposium." Papers will be presented by C. K. Bryce, engineer of the Oxweld Acetylene Company, Newark, N. J., on "Use in Welding Heavy Parts"; by J. B. Henry, general superintendent of the Union Steel Casting Company, Pittsburgh, Pa., on "Use in Steel Foundries," and by A. F. Mitchell, assistant to superintendent of the armor plate department of the Carnegie Steel Company at Homestead on "Use in Steel Mills."

Convention of National Association of Railway Commissioners

The twenty-seventh annual convention of the National Association of Railway Commissioners is to be held in San Francisco on October 12-16. A new feature of the convention this year is to be the allotment of 45 minutes at the beginning of each day's session for 5 or 10 minutes' discussion by each commission represented on the most important developments of the year relating to its work. This is to be a discussion of the methods of the work rather than the work accomplished. Judson C. Clements, of the Interstate Commerce Commission, and E. W. Bemis, of Chicago, are to address the association on matters pertaining to the work of the commissioners. A reception and banquet will be tendered the association by the Exposition Commission on Wednesday, October 13, at which addresses will be made by the governor and lieutenant-governor of California. Most of the time of the meetings is to be given up to the presentation and discussion of the various committee reports. The secretary of the association is William H. Connolly, 1319 Columbia road, Washington, D. C.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AIR BRAKE ASSOCIATION.**—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 2-5, 1916, Atlanta, Ga.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.**—F. A. Pontious, 455 Grand Central Station, Chicago. Annual meeting, July, 1916.
- AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.**—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.**—R. O. Wells, Illinois Central, East St. Louis, Ill. Next meeting June 20-23, 1916, Cincinnati, O.
- AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.**—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, October 26-27, 1915, French Lick Springs Hotel, French Lick Springs, Ind.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.**—E. H. Harman, Room 101, Union Station, St. Louis, Mo.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.**—E. B. Burritt, 8 W. 40th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.
- AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION.**—H. G. McConaughy, 165 Broadway, New York. Meetings with American Electric Railway Association.
- AMERICAN RAILROAD MASTER TINNERS', COPPERSMITHS' AND PIPEFITTERS' ASSOCIATION.**—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago.
- AMERICAN RAILWAY ASSOCIATION.**—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, Chicago.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.**—C. A. Lichty, C. & N. W., Chicago. Next convention, October 19-21, 1915, Detroit, Mich.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.**—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 21-23, 1916, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.**—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June, 1916.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.**—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July, 1916.
- AMERICAN SOCIETY FOR TESTING MATERIALS.**—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.**—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.**—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.**—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.**—E. R. Woodson, Rooms 1116-8, Woodward Bldg., Washington, D. C. Annual meeting, June 28, 1916, Detroit, Mich.
- ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.**—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.**—Willis H. Failing, N. Y. C., 3842 Grand Central Terminal, New York. Next meeting, May 19, 1916, Atlantic City, N. J.
- ASSOCIATION OF RAILWAY ELECTRIC ENGINEERS.**—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual meeting, October 18-24, 1915, Chicago.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.**—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 20-22, 1916, St. Paul, Minn.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.**—G. P. Conard, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.**—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.**—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.**—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.**—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.**—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Stadler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.**—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.
- FREIGHT CLAIM ASSOCIATION.**—Warren P. Taylor, Traffic Manager, R. E. & P., Richmond, Va. Annual session, May 17, 1916, Washington, D. C.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.**—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- INTERNATIONAL RAILWAY FULL ASSOCIATION.**—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May, 1916, Chicago.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.**—Wm. Hall, 1126 W. Broadway, Winona, Minn.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.**—A. L. Woodworth, C. H. & D., Lima, Ohio. Next meeting, August, 1916, Chicago.
- MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.**—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.
- MASTER BOILER MAKERS' ASSOCIATION.**—Harry D. Vought, 95 Liberty St., New York.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.**—A. P. Dane, B. & M., Reading, Mass. Next annual meeting September, 1916, Wilmington, Del.
- MASTER CAR BUILDERS' ASSOCIATION.**—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June, 1916.
- NATIONAL RAILWAY APPLIANCE ASSOCIATION.**—C. W. Kelly, 349 People's Gas Bldg., Chicago. Next convention, March, 1916, Chicago.
- NEW ENGLAND RAILROAD CLUB.**—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.**—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.**—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.**—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.**—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.**—J. B. Curran, Eric R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.**—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.**—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.**—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.
- RAILWAY FIRE PROTECTION ASSOCIATION.**—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.
- RAILWAY REAL ESTATE ASSOCIATION.**—Frank C. Irvine, 1125 Pennsylvania Station, Pittsburgh, Pa. Next meeting, October 13, 1915, Chicago.
- RAILWAY SIGNAL ASSOCIATION.**—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Next annual convention, September, 1916, Grand Hotel, Mackinac Island, Mich.
- RAILWAY STOREKEEPERS' ASSOCIATION.**—J. P. Murphy, N. Y. C. R. R., Box C, Collingwood, Ohio.
- RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.**—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders' and Master Mechanics' Associations.
- RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.**—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.
- RICHMOND RAILROAD CLUB.**—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.**—L. C. Ryan, C. & N. W., Sterling, Ill. Next annual convention, September 19-22, 1916, Chicago.
- ST. LOUIS RAILWAY CLUB.**—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.**—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SIGNAL APPLIANCE ASSOCIATION.**—F. W. Edmunds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.**—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, October 19-21, Colorado Springs, Colo.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.**—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Annual meeting, January, 1916.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.**—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.**—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRACK SUPPLY ASSOCIATION.**—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.
- TRAFFIC CLUB OF CHICAGO.**—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.**—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.**—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- TRAFFIC CLUB OF PITTSBURGH.**—D. L. Wells, Gen'l Agt., Eric R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.**—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.**—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 21, 1916, Toronto, Ont.
- TRANSPORTATION CLUB OF DETROIT.**—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- TRAVELING ENGINEERS' ASSOCIATION.**—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Next meeting, September, 1916, Chicago.
- UTAH SOCIETY OF ENGINEERS.**—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADIAN RAILWAY CLUB.**—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.**—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.**—J. H. Warden, 135 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The "Oriental Limited" train of the Chicago, Burlington & Quincy and the Great Northern, running between Chicago and Seattle, Wash., has arrived at Seattle on time 507 times in 530 days. Most of the delays have been due to blasting in connection with tunnel construction in the Rocky mountains.

Governor Fielder, of New Jersey, has appointed a committee of 24 citizens—public officers and business men—to present to the Interstate Commerce Commission a formal complaint, alleging discrimination against New Jersey in freight rates from the North and West, referring especially to shipments destined to New York harbor.

The counties of La Salle, Bureau and Putnam, Illinois, have been quarantined against the foot-and-mouth disease by an order of the United States Department of Agriculture. This action is taken owing to the discovery of the disease in two herds of cattle in La Salle county. The Department has concentrated its field force of veterinarians and inspectors on suppressing the outbreak in Illinois. At present 71 federal veterinarians and 54 assistants are at work in and around the suspected territory, making farm to farm examinations, disposing of infected herds, disinfecting premises and arranging for local quarantines to prevent the spread of the disease from infected farms to their neighbors. Co-operating with the department force is a large force of Illinois state veterinarians and inspectors.

Supplemental Hearing on Western Rate Advances

As mentioned in last week's issue, Examiner E. W. Hines, of the Interstate Commerce Commission, held a hearing in Chicago last week on advances in freight rates proposed by the railways in Western Trunk Line and Southwestern Tariff Committee territory on a number of commodities which were filed too late to be heard in connection with the Western rate advance case, and which have been suspended by the commission to December 29. It was announced on behalf of the carriers that the tariffs advancing rates on furniture would be withdrawn, pending conferences with the shippers, and that new tariffs would be filed at a later date. The principal advance under consideration was that on agricultural implements of two cents per 100 lb. throughout most of the territory, effected by advancing these articles to Class A. The principal testimony on these rates was given by E. B. Boyd, chairman of the Western Trunk Line Committee, who testified that at the present rates agricultural implements are not bearing their proper share of the burden of transportation. Additional testimony was given by W. A. Poteet, vice-chairman of the Western Trunk Line Committee, and testimony on behalf of the protesting shippers was given by C. T. Bradford, assistant traffic manager of the International Harvester Company. R. G. Brown, assistant general freight agent of the Chicago, Rock Island & Pacific, testified in behalf of the carriers regarding the proposed advance of one cent per 100 lb. in the rates on canned goods. In addition to representatives of commercial organizations and individual shippers, the state railway commissions of Iowa, Minnesota and Kansas were represented among the protestants.

THE WATER POWER POSSIBILITIES OF RUSSIA.—Without considering the Caucasus, the trans-Caspian region, or eastern Siberia, there are still in Russia proper great sources of hydraulic energy. In the northwest are the falls and rapids of various rivers, for example, the Volkhov with 30,000 to 50,000 horsepower, the Msta with 30,000, the Narova with 40,000 to 70,000, the eastern Duna with 120,000 and the Niemen. In the north again the Olonetz region offers a number of available power sites, as do the rivers which flow into the Arctic. In the Ural Mountains energy could be obtained from lakes and from the rivers Chusovaya and Bielain, and on the Valdai plateau are sites for power development. In the south and southwest are the falls of the Dniester, 120,000 to 200,000 horsepower, and the rapids of the Dniester and the central Bug.—*The Engineering Magazine.*

Commission and Court News

STATE COMMISSIONS

The Illinois Public Utilities Commission has again suspended the tariffs providing for an increase of 5 per cent in freight rates in the state, filed by the railroads after the Interstate Commerce Commission had allowed a similar advance on interstate rates. The rates have now been suspended until December 15.

At the hearing before the Texas Railroad Commission last week on the application of the railroads of the state for authority to increase intrastate freight rates by 15 per cent, attorneys for the commission made a motion that the commission reserve its decision in the case until the railroads have filed complete answers to all the questions propounded during the hearing on which the commission ordered the roads to furnish the desired information.

The Montana Railroad Commission, acting on the complaint of the Polleys Lumber Company, of Missoula, has ordered reductions in the rates for the transportation of lumber to the principal points in the state, the reductions varying from 10 to 15 per cent. Complainants averred that their business in lumber, all of low grade, suffered from the competition of dealers on the Pacific coast, who make large quantities of high grade lumber and can afford to sell their low grade product at any price that can be obtained. The chairman of the commission, J. H. Hall, dissented from the opinion of the majority, holding that larger reductions should have been made. He would require that the rates on lumber in carloads should never exceed 8.39 mills per ton mile, which is said to be the average received from all lumber carried by the Northern Pacific.

Representatives of various organizations of shippers in Illinois held a conference with the Illinois Public Utilities Commission on September 21, for the purpose of discussing what action the commission should take in reference to a complaint filed by the Business Men's League of St. Louis with the Interstate Commerce Commission, alleging that freight and passenger rates from St. Louis to Illinois points are discriminatory as compared with the rates in effect from Illinois points to East St. Louis, which were not advanced at the time the interstate rates were advanced by order of the Interstate Commerce Commission in the 5 per cent rate case.

The Public Service Commission, of Missouri, has dismissed the complaint of the firemen's brotherhood against the principal railroads in that state asking the commission to order the equipment of switching engines with headlights, on both ends, of sufficient power to enable the engineman to see a box car 400 ft. away. The commission is enjoined by statute to require safe and adequate facilities, but it holds that in this matter the state law is superseded by congressional action, and therefore is of no effect. In the work done by switching engines the separation of interstate traffic from intrastate is impracticable, and, Congress having taken action, the jurisdiction of the state commission is nullified. Reference is had particularly to the act of March 4, 1915, by which Congress, in legislating concerning inspection of locomotives by federal authority, took jurisdiction over the entire locomotive and tender and all parts and appurtenances thereof.

Steam and Electric Roads Must Be Friendly

In an opinion by Commissioner Hodson, the New York State Public Service Commission, Second District, has ordered the New York Central and the International [Electric] Railway to provide facilities for the switching of freight between the two roads at Lockport, and to agree on a reasonable switching tariff. This is the oldest case before the commission, having been filed in 1908. Commissioner Hodson says that the long delay is due to the fact that a number of similar cases were pending in the courts and commissions of other states, and that a case parallel to this has only recently been decided by the United States Supreme Court. He says that the carriers

themselves should have adjusted the problem long ago. The decision holds that the present service is unreasonably inadequate, inconvenient and expensive, as well as possibly discriminatory, and that neither the law nor an order to enforce it will be confiscatory, following the just rendered decision of the United States Supreme Court in a Michigan case. The Erie Railroad and the International, which uses the line of the Erie into Lockport, alleged that it was a condition of the lease between the two that no road other than the Erie should participate in freight originating on its line leased to the International.

The opinion shows that when a car of freight arrives in Lockport on one road, consigned to a plant on the other road, the consignee must either unload and haul the contents across the city in a wagon, or must allow the car to be hauled 14 miles back to North Tonawanda, there switched to the other road and hauled 14 miles again to his plant, subjecting him not only to this delay, but to a switching charge of upward of \$30. There are several places in both the upper and lower parts of Lockport where these two railroads could be joined by a switch, and where there are ample opportunities to have sufficient storage tracks to hold all the cars which might be placed there at any one time for delivery from one road to the other. The city and the commercial bodies stand pledged to assist the railroads in the acquirement of necessary private property. There are plants in Lockport contiguous to both roads, and the steam locomotives of the New York Central and the electric engines of the International haul cars over the same tracks to and from these plants.

Commissioner Hodson says:

"The underlying theory of the roads seems to be the maintenance of competition, while the complainants seek to invoke the more modern theory of regulation. * * * Both carriers seem to forget that they have no prescriptive right to the freight business at Lockport." * * * The clause in the International-Erie lease confining the International switching to Erie business is qualified by the phrase "unless required by law to do so," and Commissioner Hodson says that the time has arrived when the law should require such special switching service to be extended and made general in accordance with the demand of the complainants.

COURT NEWS

The recent decision of the Missouri Public Service Commission, awarding a certificate of public necessity and convenience to the Kansas City Connecting Railroad, and authorizing the company to construct and operate a terminal and eight miles of tracks on the Missouri side of the Kansas City Stock Yards, was sustained in a decision on September 21 by the Cole County Circuit Court at Jefferson City, Mo. The trunk line railroads which had appealed from the order of the commission filed notice that they would appeal from the decision to the state Supreme Court.

"Engaged in Interstate Commerce"

The Circuit Court of Appeals, Fifth circuit, holds that an employee, while cleaning stencils used by the company to mark cars owned and used by it in interstate commerce, was not engaged in interstate commerce within the act.—*Illinois Central v. Rogers*, C. C. A., 221 Fed. 52.

The Pennsylvania Supreme Court holds that an employee was "engaged in interstate commerce" when he was injured from being struck by a passenger train while he was waiting for a freight train to pass over another track on which he was bonding together rails with copper wires, where the tracks were used in interstate commerce.—*Glunt v. Pennsylvania* (Pa.), 95 Atl. 109.

Repair Shop Employees—Fellow-Servant Rule

A car repairer was injured by a heavy casting which fell on him from the top of a cab when the engine was passing from the roundhouse. The Michigan Supreme Court held that the injury was due to no failure of the railroad to furnish a safe place to work, but to the negligence of the fellow-servant operating the locomotive, for which the railroad was not liable. The Michigan act abrogating the common-law fellow-servant rule as

applied to railroad employees expressly excepts employees working in shops or offices, and the plaintiff was within this exception.—*Revolinski v. Manistee & N. E.* (Mich.), 152 N. W. 941.

Recovery for Loss of Profits—Notice as to Use

A cotton gin was delayed in transit and recovery was sought for loss of business caused by the delay. The Alabama Court of Appeals held that notice of the particular use to which the gin was to be put could not be implied merely from the circumstances of the shipment, being in the ginning season, so as to authorize recovery. There were many uses to which the gin could be put other than operation for profit. It might have been bought to resell, or to lease, or ordered for a customer, or for demonstration, and the like.—*Illinois Central v. Brothers* (Ala.), 67 So. 628.

Intrastate Shipments—Division of Rates

The Texas Court of Civil Appeals holds that the Railroad Commission, under the statute authorizing the commission to fix the pro rata part of charges received by each of two or more connecting carriers and to establish joint rates, etc., has authority to order a division of revenue accruing to connecting carriers under freight rates on coal not belonging to either carrier. But it also holds that on an intrastate shipment a carrier is not entitled to the benefit of a joint rate on its own line for carrying its own property, in the absence of contract therefor; and an order of the Railroad Commission, which permits a carrier to charge freight rates for hauling its own property over its own road, and to participate in a through rate for so doing, permits an unjust discrimination, in violation of the statute.—*Rio Grande & Eagle Pass v. Railroad Commission* (Tex.), 175 S. W. 1116.

Fireman's Contributory Negligence Diminishing Damages

Action was brought under the federal employers' liability act against a railroad by a fireman for injuries caused by his engineer disregarding stop signals, and running into a train. There was clear evidence showing negligence by the engineer. The substantial question was as to the effect of the fireman's conduct. He saw the green signal requiring the train to slacken speed and called it to the engineer, but, when it became evident that the engineer was paying no attention to the caution, the fireman did nothing further to insure that the signal be obeyed. The Circuit Court of Appeals, Sixth circuit, held that he was guilty of contributory negligence, diminishing his damages, as provided by the statute. His inaction was not excusable because of his supposition that the signal had been changed to a white signal before they passed it; this supposition being based on nothing except the fact that the engineer failed to slacken.—*Pennsylvania v. Sheeley* (C. C. A.), 221 Fed. 901.

The New York "Jitney" Law

The New York Supreme Court, Justice Hasbrouck, considering the so-called "jitney bus" law, holds that the following classes of vehicles must secure the consent of local authorities and apply to the Public Service Commission for a certificate of public convenience and necessity, namely: (a) A bus line; (b) a stage route; (c) a motor vehicle line or route; (d) a vehicle in connection with a bus line, a stage route, a motor vehicle line or route; (e) a vehicle carrying passengers at a rate of fare of fifteen cents or less for each passenger within the limits of a city; (f) a vehicle carrying passengers in competition with another common carrier which is required by law to obtain the consent of the local authorities of said city to operate over the streets thereof.

Practically all operators of bus lines in the cities of the state are liable to procedure under the penalty clause of the Public Service Commission Law unless they secure the permission of the city authorities and the certificate of the Public Service Commission. It is held that in the case of Elmer G. Booth, of Rochester, the license of the city of Rochester, granted before this law took effect, does not relieve Booth from the necessity of getting the consents of the city authorities under the new law and of the Public Service Commission.

Railway Officers

Executive, Financial, Legal and Accounting

S. H. Reams, agent of the Seaboard Air Line at Savannah, Ga., has been elected vice-president of the Durham & Southern, with headquarters at Durham, N. C., vice J. E. Stagg, deceased.

C. E. Schaff, president of the Missouri, Kansas & Texas, and of the Missouri, Kansas & Texas Railway of Texas, with office at St. Louis, Mo., has been appointed receiver of both companies.

O. G. Parsley, vice-president of the Missouri, Oklahoma & Gulf of Texas, has removed his offices from Kansas City, Mo., to Ft. Worth, Tex., where he has assumed charge of traffic and operation in Texas.

H. U. Mudge, president and co-receiver of the Chicago, Rock Island & Pacific, has resigned as receiver and has been appointed by Jacob M. Dickinson, the sole remaining receiver, chief executive officer for the receiver. See an item in Financial News under Chicago, Rock Island & Pacific.

Operating

J. E. Votaw has been appointed assistant general manager of the Memphis, Dallas & Gulf, with headquarters at Nashville, Ark.

E. Lambert has been appointed trainmaster of the New York Central, with headquarters at Syracuse, N. Y., and W. E. Nelson has been appointed trainmaster, with headquarters at Lyons, N. Y.

Robert King, division superintendent of the Canadian Pacific at London, Ont., has been appointed division superintendent of the National Transcontinental, with headquarters at Winnipeg, Man.

A. E. Pistole, superintendent of terminals of the Texas & Pacific at Ft. Worth, Texas, has been appointed trainmaster of the Ft. Worth subdivision of the Rio Grande division, with headquarters at Baird, Texas.

J. K. Yohe, Jr., trainmaster of the Baltimore & Ohio at Connellsville, Pa., has been appointed assistant superintendent, with headquarters at Cumberland, Md., and C. M. Stone, assistant trainmaster at Smithfield, Pa., has been appointed trainmaster, with office at Connellsville.

John T. Broderick, chief clerk to the third vice-president of the Baltimore & Ohio at Baltimore, Md., has been promoted to supervisor of special bureaus of the operating department, in charge of the safety first department, agreements and contracts, records and reports of federal and state commissions, free transportation and the employees' magazine.

M. Seargeant, inspector of transportation of the Louisville & Nashville at Jackson, Ky., has been appointed superintendent of the Eastern Kentucky division and J. R. Pates has been appointed master of trains. The Eastern Kentucky division includes the Louisville & Atlantic Railroad and that part of the Lexington & Eastern Railway from Maloney to McRoberts, Ky. Division headquarters are at Ravenna, Ky. The rest of the Lexington & Eastern, from Lexington to Maloney will be the Lexington & Eastern branch, and will be added to the Kentucky division of the Louisville & Nashville.

Traffic

N. C. Spangler, division freight agent of the Baltimore & Ohio, at Chillicothe, Ohio, has resigned to go into other business.

A. A. Boyle has been appointed commercial agent of the Missouri & North Arkansas, with headquarters at Birmingham, Ala.

C. J. Chisam, assistant general freight agent of the Chicago Great Western at Omaha, Neb., has been appointed general agent, with office at Los Angeles, Cal., vice M. F. Collins, resigned.

J. S. Houston, assistant general freight agent of the International & Great Northern, with headquarters at St. Louis, Mo., has been promoted to assistant general freight and passenger

agent, with headquarters at St. Louis and Chicago. Effective October 1.

David H. Hilton has been appointed general eastern agent of the Chicago, Indianapolis & Louisville, with headquarters at New York.

L. C. Finkle, has been appointed commercial agent of the Atlantic Coast Line, with office at Cincinnati, Ohio, vice E. H. Smith, resigned.

L. Osborn has been appointed division freight agent of the Chicago, Rock Island & Pacific, with headquarters at Hutchinson, Kan., vice J. B. Rishel, deceased. Effective October 1.

A. C. Littlejohn, traveling freight agent of the Queen & Crescent Despatch, has been appointed commercial agent, with headquarters in New Orleans, La., vice A. B. Collins, transferred.

Edgar Yungman, division passenger agent of the Pennsylvania Railroad, at Pittsburgh, Pa., has been appointed assistant general passenger agent with headquarters at Philadelphia, succeeding

Colin Studds, deceased. Mr. Yungman was born on August 24, 1867, at Tamaqua, Pa., and was educated in the public schools of Camden, N. J. He entered the service of the Pennsylvania Railroad on August 14, 1883, as a clerk in the passenger department at Philadelphia, Pa., and after serving in various positions in that department was made passenger agent of the Baltimore district at Baltimore, Md., in October, 1902. The following year he was transferred to the Southeastern district at Washington, D. C., and later in the same year was appointed chief clerk of the passenger

department at Philadelphia. In December, 1907, he was appointed division ticket agent of the Philadelphia & Erie division and the Northern Central Railway at Williamsport, Pa., and in April, 1910, was transferred to Pittsburgh as division ticket agent of the Western Pennsylvania and Allegheny divisions. In March, 1913, when the passenger department of the Pennsylvania Lines East of Pittsburgh and Erie was reorganized, Mr. Yungman was promoted to division passenger agent at Pittsburgh, which position he held at the time of his recent appointment as assistant general passenger agent of the same road as above noted.

F. W. Robinson, assistant traffic manager of the Oregon-Washington Railroad & Navigation Company, has been appointed traffic manager at Portland, Ore., to succeed R. B. Miller, resigned. Effective November 1.

Al J. Hirschman, traveling freight agent of the St. Louis Southwestern of Texas, has been appointed general traveling agent with headquarters at Ft. Worth, Tex., vice Claude Wilson, resigned. Effective September 10.

R. E. Larmour, assistant general freight agent of the Canadian Pacific at Vancouver, B. C., has been appointed general agent of the freight department, with office at New York, succeeding W. F. Stevenson, deceased.

M. W. Burns has been appointed general southwestern agent of the Chicago & Eastern Illinois, with headquarters at Chicago, Ill. George H. Hume has been appointed commercial agent, with headquarters in Chicago, vice M. W. Burns, promoted. Effective September 20.

E. L. Goff, division freight agent of the Chicago, Rock Island & Pacific, with headquarters at Davenport, Iowa, will assume the duties of S. F. Boyd, district freight and passenger agent in Davenport, on October 1. Mr. Goff's title will be divi-



E. Yungman

sion freight and passenger agent. Mr. Boyd, who has been in the employ of the Rock Island for about 35 years, has been retired on a pension, and his jurisdiction, extending over Davenport, Iowa, Moline and Rock Island, Ill., has been added to that of Mr. Goff.

J. W. Daniel, J. M. Hansell and J. S. Smith have been appointed commercial agents of the Missouri, Oklahoma & Gulf of Texas, with headquarters at Houston, Sherman and Ft. Worth, Texas, respectively. Effective September 1. H. W. Ross, general freight and passenger agent, with headquarters at Denison, Tex., has resigned.

Engineering and Rolling Stock

William Henry Haley, whose appointment as superintendent of car service of the Missouri Pacific—St. Louis, Iron Mountain & Southern was announced last week, was born on July 27,

1872, at Dundee, Mo. After a grammar school education he entered railway service as messenger boy for the Terminal Railroad Association of St. Louis on August 15, 1888. He held consecutively the positions of yard clerk and car accountant for the same association and on January 10, 1901, was appointed general yard clerk of the Missouri Pacific at St. Louis, Mo., a position which he held until October 1, 1904. From that date until June 16, 1905, he held the same position for the Missouri Pacific and the St. Louis, Iron Mountain & Southern; from June, 1905, until June 1, 1907,

he was car clerk of the St. Louis terminal division of the same roads; from June, 1907, to May 8, 1912, freight distributor of these railroads. Up to the time of his recent appointment as superintendent of car service, noted above, he was superintendent of the American Refrigerator Transit Company at St. Louis.

Ralph L. Chandler, whose appointment as district master car builder of the New York Central, with headquarters at East Buffalo, N. Y., has already been announced in these columns,

was born on June 4, 1875, at Milford, N. Y., and was educated in the public and high schools of Buffalo, N. Y. He began railway work on June 28, 1891, with the New York Central & Hudson River and served as machinist's apprentice until October, 1894. He was then to December of the following year a machine hand in the mill of the Pullman Company at Buffalo. From January, 1896, to September, 1897, he was car builder with the American Car & Foundry Company, at Buffalo, and then re-entered the service of the New York Central & Hudson River as car

repairer. He was promoted to foreman in January, 1898, becoming assistant general foreman in September, 1900, and three years later was appointed piece work foreman on the western

division. In January, 1911, he was appointed superintendent of shops at East Buffalo, and the following August was made division general foreman of the Pennsylvania division of the same road. On October 22, 1912, he was promoted to supervisor of piece work, covering the car and locomotive departments, which position he held at the time of his recent appointment as district master car builder of the New York Central, with headquarters at the East Buffalo, N. Y., car shops, as above noted.

William Victor Wicks has been promoted from locomotive engineer of the Northern Pacific to the position of road foreman of engines.

W. B. Wood has been appointed acting assistant superintendent of shops of the Chicago, Rock Island & Pacific at Silvis, Ill., vice P. Linthicum, promoted.

Grant W. Lillie, who resigned recently as mechanical superintendent of the Second district of the Chicago, Rock Island & Pacific, at Topeka, Kan., has been appointed master mechanic of the Bingham & Garfield. His headquarters will be at Magna, Utah.

A. J. Mayham, master mechanic of the Spokane & Inland Empire, with headquarters at Spokane, Wash., has resigned, and D. I. Clough, master mechanic of the Oregon Electric and the United Railways, at Portland, Ore., has had his jurisdiction extended to include that of Mr. Mayham.

H. S. Hills has been appointed master mechanic of the Eastern Kentucky division of the Louisville & Nashville, and J. O. Ely, roadmaster of the Lexington & Eastern at Jackson, Ky., has been appointed roadmaster of the Eastern Kentucky division of the Louisville & Nashville. See item in Operating Officers.

Purchasing

W. L. Peabody, storekeeper of the Lake Superior division of the Northern Pacific, with headquarters at Duluth, Minn., has been appointed storekeeper of the St. Paul division, with office at Mississippi street, St. Paul, Minn. G. C. Harpke has been appointed storekeeper of the Lake Superior division to succeed W. L. Peabody, transferred.

OBITUARY

Rudolph Ellis, a director of the Pennsylvania Railroad, died on September 22, at his home at Bryn Mawr, Pa., at the age of 78.

John T. Johnson, general superintendent of the Central of Georgia at Savannah, Ga., died in that city on September 21. He was born in December, 1862, in Hanover county, Va., and began railway work in 1879 as a brakeman on the Chesapeake & Ohio. Subsequently he served as conductor on the same road. Since 1886 he had been in the continuous service of the Central of Georgia, serving consecutively as conductor, yardmaster and trainmaster until 1898, when he was appointed superintendent. From 1903 to January, 1905, he was superintendent of transportation; then was appointed general superintendent of transportation, and since 1906 was general superintendent.

Frank A. Durban, general attorney of the Baltimore & Ohio in the states of Ohio and Indiana, with headquarters at Zanesville, Ohio, died, as has been previously noted, in an official car on a Baltimore & Ohio train, near Cumberland, Md., on September 8, while returning to his home from Atlantic City, where he had gone for his health. Mr. Durban was born in Zanesville on November 10, 1859, and was educated in the public schools of that city and at the University of Michigan, where he completed the law course in 1879. In May, 1891, he became local counsel for the Baltimore & Ohio and later general counsel of the Zanesville & Ohio River, now the Little Kanawha division of the B. & O., and local attorney for the Cincinnati & Muskingum Valley, and for the Zanesville Street Railway. He became solicitor for the Cincinnati & Muskingum Valley in 1904 and continued in that capacity after it was absorbed by the Pennsylvania. In January, 1904, he succeeded J. H. Collins as division counsel for the B. & O. and on July 1, 1909, became general attorney for Indiana and Ohio. He also held various offices of responsibility with subsidiary roads and had served as president of the Zanesville & Ohio, the Detroit, Toledo & Ironton, and the Ann Arbor.



W. H. Haley



R. L. Chandler

Equipment and Supplies

LOCOMOTIVE BUILDING

THE NORFOLK & WESTERN is in the market for 10 Mountain type locomotives.

THE CHICAGO JUNCTION is in the market for 10 six-wheel switching locomotives.

THE MINNEAPOLIS & ST. LOUIS is in the market for 15 Santa Fe type locomotives.

THE PHILADELPHIA & READING has ordered 20 Mikado type locomotives from the Baldwin Locomotive Works.

THE PUBLIC BELT RAILROAD OF NEW ORLEANS has ordered 5 switching locomotives from the Baldwin Locomotive Works.

THE CINCINNATI, INDIANAPOLIS & WESTERN is in the market for 48 locomotives, including a number of Mikado type, Pacific type and switching locomotives.

THE RUSSIAN GOVERNMENT is said to be contemplating the purchase of 150 locomotives in addition to the 400 now being built by the Baldwin Locomotive Works, the American Locomotive Company and the Canadian Locomotive Corporation.

THE CUPEY SUGAR COMPANY has ordered one four-wheel saddle tank locomotive from the American Locomotive Company for export to Cuba. This locomotive will have 11 by 16 in. cylinders, 33-in. driving wheels and a total weight in working order of 39,000 lb.

THE PUNTA ALEGRA SUGAR COMPANY has ordered one four-wheel saddle tank locomotive and two Mogul type locomotives from the American Locomotive Company for export to Cuba. The saddle tank locomotive will have 11 by 16 in. cylinders, 33-in. driving wheels and a total weight in working order of 39,000 lb., and the Mogul type locomotives will have 12 by 18 in. cylinders, 34½-in. driving wheels and a total weight in working order of 50,000 lb.

CAR BUILDING

THE COPPER RANGE is in the market for 40 ore cars.

THE MICHIGAN ALKALI COMPANY is inquiring for prices on 30 hopper cars.

THE NEW YORK, NEW HAVEN & HARTFORD is in the market for 2 dining cars.

THE PHILADELPHIA & READING has issued inquiries for 1,000 gondola or hopper cars.

THE SAN PEDRO, LOS ANGELES & SALT LAKE has ordered 5 caboose cars from the Pullman Company.

THE CENTRAL OF NEW JERSEY has ordered 25 coaches and 5 baggage cars from Harlan & Hollingsworth Corporation.

THE LA BELLE IRON WORKS, Steubenville, Ohio, has ordered 5 30-ft. 200,000-lb. capacity flat cars from the Ralston Steel Car Company.

THE BALTIMORE & OHIO has given the Western Steel Car & Foundry Company an order to repair 250 box cars and the Ryan Car Company an order to repair 500 box cars.

THE CENTRAL OF GEORGIA, reported in last week's issue as inquiring for 5 passenger cars, is in the market for 1 baggage and mail car and 4 baggage and express cars.

THE WESTERN MARYLAND has ordered 200 automobile cars from the Western Steel Car & Foundry Company and 650 70-ton gondola cars from the Standard Steel Car Company.

THE MINNEAPOLIS & ST. LOUIS, reported in the *Railway Age Gazette*, of September 17, as being in the market for 100 box cars, is now said to have increased its inquiry to 1,000 cars.

THE CHICAGO & NORTH WESTERN, reported in the *Railway Age Gazette* of September 17 as being in the market for 500 ore

cars, has ordered these cars from the American Car & Foundry Company.

THE DELAWARE & HUDSON has ordered 9 72-ft. all steel passenger coaches with smoking compartments, and 6 60-ft. all steel baggage cars from the American Car & Foundry Company, and 9 72-ft. all steel passenger coaches with smoking compartments from the Barney & Smith Car Company.

IRON AND STEEL

THE ERIE has ordered 20,000 tons of rails from the Illinois Steel Company.

THE WHEELING & LAKE ERIE has ordered 21,000 tons of rails from the Illinois Steel Company.

THE PERE MARQUETTE has ordered 17,000 tons of rails from the Algoma Steel Corporation.

THE SEABOARD AIR LINE has ordered 7,000 tons of rails from the United States Steel Corporation.

THE CHICAGO, BURLINGTON & QUINCY has ordered 18,000 tons of rails from the Illinois Steel Company.

THE WESTERN MARYLAND has ordered 500 tons of bridge material from the Fort Pitt Bridge Works.

THE BALTIMORE & OHIO has ordered 600 tons of structural material from the American Bridge Company for a new freight station at Pittsburgh.

THE NEW YORK CENTRAL has ordered 55,000 tons of rails from the Illinois Steel Company, 55,000 tons from the Lackawanna Steel Company and 10,000 tons from the Cambria Steel Company for 1916 delivery.

THE CHICAGO & NORTH WESTERN has ordered 600 tons of steel from the American Bridge Company for a record and office building.

THE PENNSYLVANIA has ordered 810 tons of steel from the American Bridge Company for a coal-handling plant, to be built at Baltimore, Md., and has ordered 400 tons of arch steel centers from the Phoenix Bridge Company for the bridge to be erected at Manayunk, Pa.

MACHINERY AND TOOLS

THE PENNSYLVANIA RAILROAD is in the market for some punching and shearing machinery and a 40-ton gantry crane for the Altoona shops.

THE PENNSYLVANIA EQUIPMENT COMPANY is in the market for a second-hand turntable, 50 ft. long, with a capacity of 40 or 50 tons or heavier.

SIGNALING

THE LOUISVILLE & NASHVILLE has authorized the installation of automatic block signals on the line between La Follette, Ky., and Etowah, 113 miles. It is estimated that the cost will be \$178,000.

CONSULAR REGULATIONS OF FOREIGN COUNTRIES (Canada and Latin America).—This is the title of tariff series No. 24, recently issued by the Bureau of Foreign and Domestic Commerce. The pamphlet contains a complete description of the shipping documents required in all Latin-American countries and Canada, gives facsimiles of consular invoices used in such countries, and points out such peculiar features as may be overlooked by the average exporter. The material has been compiled with great care, the chapter for each country having been submitted for revision to the consular representative of that country in the United States. Some American banking institutions and commission houses have also been consulted, and it is believed that by using this publication the average exporter will be able to prepare his shipping documents in correct form and save his customer in Latin-America from fines and delays in the delivery of his goods. The bulletin contains 66 pages and may be obtained from the Superintendent of Documents, Washington, D. C., for 10 cents a copy.

Supply Trade News

The Algoma Steel Corporation, Ltd., will install additional open-hearth furnaces at the Sault Ste. Marie plant.

After a four months' test the Schroeder Headlight Company has received an order for its headlights from the Baltimore & Ohio Southwestern.

The Pratt & Whitney Company, New York, has moved its Chicago sales office to the Sharples building on Washington boulevard and Jefferson street.

Fairbanks, Morse & Co. have received a contract from the New York, Ontario & Western for a conveyor-type coaling station of large capacity to be erected at Utica, N. Y.

The Franklin Railway Supply Company, New York, has opened an office in the Transportation building, Montreal, Canada, in charge of J. S. Coffin, Jr., Canadian sales manager.

The Loco Light Company, Indianapolis, Ind., has been incorporated for the manufacture of headlights, with a capital of \$10,000, and directors, R. H. Pyle, L. J. Isbell, G. D. Thornton.

W. E. Hardy, who has been in charge of the sales of the mechanical rubber goods division of the Diamond Rubber Company and the B. F. Goodrich Company, has been appointed sales manager of the Boston Belting Company, Boston, Mass.

The Q & C Company, New York, has secured exclusive control of the Peffer air brake hose protector, which was previously sold by the Railway Economy Device Company, Chicago. This device will henceforth be known as the Q & C-Peffer hose protector.

T. W. Weaver, director of purchases of the Power & Mining Machinery Company, Cudahy, Wis., has become associated with L. E. Meidinger in the management of the Milwaukee office of A. M. Castle & Co., Chicago, and George M. Rider, formerly in the iron and steel brokerage business in Kansas City, has been placed in charge of the company's office at Kansas City.

Roland L. Taylor, a member of the firm of William A. Read & Co., New York, has completed negotiations for the purchase of the Midvale Steel Company, Nicetown, Philadelphia, Pa., for a syndicate headed by William Ellis Corey, at one time president of the United States Steel Corporation. Charles J. Harrah, the founder of the company and its president for 28 years, has resigned from his position as president and director, and Charles B. Dunn and Howard Sellers have also resigned as directors. James F. Sullivan, the vice-president, has resigned, and has been succeeded by W. P. Barba, the present general manager. The vacancies in the board will be filled by the election of William E. Corey, Percy A. Rockefeller and Samuel F. Pryor. Mr. Pryor is also a director of the Baldwin Locomotive Works. Joseph Entwistle, a stenographer, is at present in the position of president, but William E. Corey will be elected president shortly. The Midvale Steel Company is engaged in the manufacture of axles, wheels, steel parts, forgings, etc. It is also well equipped to supply cannon, armor plate and other munitions of war, but has done but little in that line during the present war. It is expected that it will immediately secure a number of large orders for munitions. It is also rumored that the Midvale Steel Company may be but one of a number of companies which will be secured by the same interests.

The du Pont powder interests have made a large investment in shares of the Baldwin Locomotive Works. It has been reported that they have secured enough of the stock to give them control, but Pierre S. du Pont, the president of the du Pont de Nemours Company, has refused either to confirm or deny the report. The Baldwin Locomotive Works has been a corporation in its present form only since June 7, 1911. At that time it acquired the property of Baldwin Locomotive Works, incorporated June 7, 1909, to take over the entire property of Burnham, Williams & Co., which had been operating the business known as Baldwin Locomotive Works, founded in 1831, by Matthias Baldwin. The company's present outstanding capital stock totals \$40,000,000, of which \$20,000,000 is common, and \$20,000,000 7 per cent cumulative preferred, having equal and full voting

power with the common stock. The Baldwin Locomotive Works is said to be working on war orders, having an aggregate value of \$140,000,000. Some details of these orders were given in the *Railway Age Gazette* of September 17, page 546. The Baldwin Locomotive Works may, as defined by its charter, manufacture only locomotives, trucks, railway and industrial equipment and parts thereof, castings and forgings, and engage in the sale of articles manufactured by it. For that reason it has established the Eddystone Munitions Company for the purpose of taking care of its orders for munitions, but it is understood that it will soon obtain a new charter which will give it the right to manufacture munitions of war itself.

TRADE PUBLICATIONS

WATER TUBE BOILERS.—The A. D. Granger Company, New York, has issued Bulletin No. 2 describing and illustrating the company's Oswego internally fired water tube boilers.

SCREW-CUTTING TOOLS.—The Wells Brothers Company Division of the Greenfield Tap & Die Corporation, Greenfield, Mass., has recently issued catalog 34 relative to the company's line of screw-cutting tools and machinery. The booklet contains a large number of new devices and improvements on old ones, and, like its predecessors, stands in the front rank as a reference book in this line.

CHAIN DRIVES.—Publication No. 14, recently issued by the Morse Chain Company, Ithaca, N. Y., bears the appropriate title: "A Chain of Evidence." The booklet deals in particular with large power drives. It explains the advantages of silent chain drives and touches upon the superiority of Morse silent chain, mentioning among other things the economies secured through the use of the Morse rocker-joint which differentiates Morse chain from that of other makes. The catalog contains a number of interesting illustrations, including views of the largest chain drive in the world, a 5,000 h.p. Morse drive in the Ox Bow Hydro-Electric Plant, Snake River, Copperfield, Ore., and of the chain drive installation on the 300 h.p. McKeen gasoline switching locomotive built for the Motley County Railway which was described in the *Railway Age Gazette* of January 15, 1915, page 101.

LOCOMOTIVES.—The Baldwin Locomotive Works has recently issued Record No. 81, describing and illustrating the triple articulated or Triplex locomotive recently built by that company for the Erie, and Bulletin No. 82, showing a number of views of Baldwin locomotives for export. The former booklet contains a detailed description of the Matt H. Shay, as the locomotive has been named, well illustrated by half-tone views of the locomotive and various of its parts and line drawings showing the side elevation and cross sections. There are a number of pages dealing also with the Erie's Santa Fe type locomotive. The booklet dealing with locomotives for export contains views of a number of locomotives supplied on recent orders. The introduction touches upon the favorable position of the company as to export business and contains the interesting statement that the Baldwin Locomotive Works has been exporting locomotives since 1838, when two engines were shipped to Cuba. The illustrations given include views of the Pacific type locomotive built for New Zealand, the Pechot type locomotive built for the French government, the Mallet type engine built for the Archangel railway of Russia and a number of others.

ENGLISH RAILWAYS AND THE GOLD SUPPLY.—In furtherance of the desire expressed by the Chancellor of the Exchequer that the postoffice and all public departments charged with the duty of making cash payments shall use notes instead of gold coins wherever possible, and that the public shall co-operate in this policy, we understand that the railway companies are issuing instructions to all passenger stations, goods depots and offices in charge of the receipt of moneys to pay all gold received from the public into the banks instead of returning it into circulation. By these means railway booking and receiving offices will fall into line with the postoffices in the conservation of the gold supply of the country, whilst economy will further result by the discontinuance of the use of gold as a medium for the payment of wages to railway employees.—*Railway Gazette, London*

Railway Construction

ABERDEEN RAILROAD (ELECTRIC).—Incorporated in South Dakota to construct an electric railway and capitalized at \$250,000. Incorporators: S. C. Hedger, Charles A. Howard, Charles N. Harris.

CHESAPEAKE & OHIO.—Under the name of the Pond Fork Railway, plans have been made to build a line up Pond Fork of Coal river in Boone county, W. Va., to the head of Pond Fork, about 20 miles. The principal commodities the new line will carry are lumber and coal. (See Pond Fork Railway, Sept. 17, p. 547.)

CHICAGO, MILWAUKEE & ST. PAUL.—The report of this company for the year ended June 30, 1915, shows that the Seattle, Port Angeles & Western has under construction a line from Fairmount, Jefferson county, Washington, west via Port Angeles to Earles in Clallam county, 62 miles. The section of this line west of Port Angeles, about 24 miles, has been completed and was put in operation in January, 1915. The construction of second main track and grade reduction work on the Chicago & Council Bluffs division, in Iowa, was completed in June, 1915, between Green Island and Manilla, 270 miles. The work which was temporarily suspended on the Hastings & Dakota division has been resumed and 178.70 miles was finished and put in operation in June, 1915. New sections of second main track were completed and placed in operation on the Chicago & Council Bluffs division, from one mile east of Delmar, Iowa, to Lost Nation, 12.80 miles; Elberon to Capron, 40.46 miles; Coon Rapids to Manilla, 31.90 miles, a total of 85.16 miles, and on the Hastings & Dakota division, from Hopkins, Minn., to Cologne, 23.87 miles; Minnesota Falls to Great Northern tower, 5.80 miles; west of Montevideo, to double track switch, 10.09 miles, a total of 39.76 miles. The work of depressing the tracks from Hiawatha avenue to Hennepin avenue, in Minneapolis, Minn., about three miles, was delayed during the past year. It includes the elimination of 37 grade crossings. About 64 per cent of the work has been finished and the company plans to complete all this work during the season of 1916. Work on the elevation of the tracks along Bloomingdale road, in Chicago, 2.4 miles, is finished on about 95 per cent. This work includes the elimination of 35 grade crossings. The elevation of tracks in Milwaukee, Wis., from Kinnickinnick avenue to Fowler street, and from Clinton street to First avenue, 1.4 miles, was finished on 30 per cent and it will take about two years to complete the work which includes the elimination of 14 grade crossings. Considerable progress has been made in connection with the elevation of tracks on the Chicago & Evanston division from Montrose avenue to Howard avenue, Chicago, 4.4 miles. Of the total work 30 per cent is finished, and it will probably take about two years to complete this work, which will eliminate 36 grade crossings. The line from Lewistown, Mont., to Great Falls, 137 miles, was completed and opened for operation early in September, 1914. The grading of the Choteau line, from Great Falls, Mont., to Agawam, 70 miles, is completed, but track laying has been temporarily suspended. Construction work on the Newwood River line, a logging road extending 18.25 miles northwesterly from Merrill, Wis., was completed and the line was placed in operation in December, 1914. The construction of the Snoqualmie tunnel at the summit of the Cascade mountains was completed, and the tunnel placed in operation in June, 1915.

CUDAHY PACKING COMPANY'S LINE.—Cameron, Joyce & Co., Kansas City, Mo., has been awarded a contract by the Cudahy Packing Company for grading, bridge construction and track laying from Fowler, Kan., to silicate beds, eight miles distant.

DOVER, MILLERSBURG & WESTERN (ELECTRIC).—Grading will soon be begun on this road, which will extend from Canal Dover, Ohio, to Millersburg, a distance of 37 miles. Ben George, secretary and treasurer, Canal Dover, Ohio; D. F. A. Wheelock, chief engineer, Warren, Pa.

ERIE.—This company plans to carry out the double-tracking work and grade reduction for which surveys have been made

on about 36 miles in Lake, Porter and La Porte counties, Indiana, as soon as the work is authorized. This work when finished will complete the double-tracking of the Chicago & Erie. (December 18, p. 1165.)

KINSTON BELT LINE.—Incorporated in North Carolina with \$25,000 capital to build a belt line of steam railroad around the city of Kinston, N. C., and an electric car line through the city streets. The lines are to carry both passengers and freight. The incorporators are J. T. Deal, M. L. German, W. S. Spottswood and G. V. Cowper.

LAKE ERIE & EASTERN.—Double tracking work on about two miles of this road has been authorized to be carried out this year.

LUCERNE & AURELIA CROWN.—It is planned to begin work in the spring of 1916 on this line from Lucerne, Wash., to Aurelia Crown Mines, 16 miles. The final survey is now in progress and the average grade is to be less than 3 per cent. There will be six or seven bridges with an average length of from 50 to 60 ft. each and one tunnel about 400 ft. long. Among the structures contemplated in connection with the road are two stations, a warehouse, machine shop and wharf on Lake Chelan. The railway will serve the Aurelia Crown Company, by which it will be controlled, and its principal traffic will be about 2,000 tons of ore per day down grade and machinery and supplies for the mine up grade. O. Robert Dahl, president, Box 187, Seattle, Wash.

NEW YORK, CHICAGO & ST. LOUIS.—On September 1 this road began an extensive grade elimination project in Cleveland, Ohio, under the direction of A. J. Himes, engineer of grade-crossing elimination. The program includes the depression of tracks from Fulton road to Detroit avenue—a distance of about two and one-half miles, the construction of a four-track roadbed, and the erection of 13 reinforced concrete bridges and numerous retaining walls. About 1,600 tons of steel and 43,000 cu. yd. of concrete will be utilized, 750,000 cu. yd. of material will be removed from the excavations and 25,000 cu. yd. filled in at the street approaches. The work is being done by company forces, and will cost in the neighborhood of \$2,900,000.

NEW YORK SUBWAYS.—The War Department having granted a satisfactory form of permit for the construction of a tunnel under the East river from Fourteenth street, New York, in the borough of Manhattan, to North Seventh street, in the borough of Brooklyn, bids for the construction of the tunnel will probably be asked for in the near future.

PHILADELPHIA & READING.—An officer writes regarding the report that this company will build a short line from Wilmington, Del., to a point opposite the du Pont Powder Company's plant at Carney Point, N. J., that the matter is under way, but nothing definite has yet been decided upon.

POND FORK RAILWAY.—See Chesapeake & Ohio.

SOUTH DAKOTA SHORT LINE.—Incorporation has been asked for in South Dakota by this company with a capital of \$2,000,000 to build a railway from Mitchell, S. D., northwest to Pierre, 130 miles. The proposed line will pass through the counties of Davison, Aurora, Jerauld, Buffalo, Hyde and Hughes. The farmers along the proposed route have been asked to subscribe to stock. G. W. Adams, Council Bluffs, Iowa, is the promoter. N. Johnson, Mount Vernon, S. D., A. J. Hughes, J. E. Ziebach, F. E. Swartout and J. Jorgenson, Gann Valley; G. M. Schumway, and E. H. Scott, Letcher, are directors.

SOUTHERN RAILWAY.—Contracts have been let for second track work between Greenville, S. C., and Easley, 11.5 miles, it is said, to H. J. Dunavant & Co., Knoxville, Tenn., and from Easley to Central, 15 miles, to M. M. Elkan, Macon, Ga.

SOUTHWESTERN LIGHT, POWER & RAILWAY.—Contracts have been given to the Arbuckle Construction & Improvement Company to build this line, also for constructing a power station at Davis and repair shops at Arbuckle. The company was organized recently in Texas with a capital of \$12,000,000 to build an interurban electric line between Denison, Tex., and Oklahoma City, Okla., about 176 miles. W. T. Croslen, president; W. P. Woolsep, general manager, Oklahoma City, Okla. (Sept. 17, p. 547.)

WRIGHTSVILLE, ADRIAN & LYONS.—The rights and property of this company were recently sold to F. J. Garbutt, Sandersville, Ga., and it is said that the new owner will complete and operate the line. The company was organized to build from Wrightsville, Ga., southeast via Adrian to Lyons, about 40 miles, with a number of extensions. Grading work was finished in 1910 on about 35 miles.

RAILWAY STRUCTURES

BROOKLYN, N. Y.—The New York Public Service Commission, First district, will open bids on October 26 for the station finish construction of 11 stations on the New Utrecht avenue elevated railroad between Tenth avenue and Coney Island in the borough of Brooklyn.

BUFFALO, N. Y.—The Delaware, Lackawanna & Western has filed plans for the construction of a power station on Ohio street, in connection with the new passenger station now under construction.

CHICAGO, ILL.—Officers of the Chicago Union Station Company appeared before the Illinois Public Utilities Commission on September 21, at a hearing in support of their petition for an order authorizing the issuance of \$50,000,000 first mortgage, 4½ per cent gold bonds for 50 years, to purchase land and construct the proposed new Union station, and for an order approving the operating agreement between the roads that will own the terminal.

COLUMBIA, S. C.—A contract has been given by the Seaboard Air Line to Jonas & Garretson, Columbia, for building a reinforced concrete bridge over Blanding street, in Columbia. The bridge will be about 110 ft. long, and will cost about \$15,000.

DURANGO, IOWA.—The Chicago Great Western is building a bridge here consisting of three 70-ft. through plate girders, resting on two concrete piers and two concrete abutments. The work is being done by company forces and the estimated cost is \$25,000.

FREEMONT, ILL.—The Illinois Central is planning to build three washroom buildings for the benefit of its shop employees, carmen, enginemen and firemen. The buildings will contain lavatories and individual lockers, and shower baths will be provided for the enginemen and firemen. The structures will be brick and will represent a total cost of about \$20,000.

GRASS VALLEY, CAL.—The shop building of the Nevada County Narrow Gauge recently damaged by fire is being rebuilt. The estimated loss is \$30,000.

GREENVILLE, N. J.—The Pennsylvania Railroad has given a contract to Henry Steers, Incorporated, New York, to build the new pier at Greenville (September 24, p. 586).

KANSAS CITY, KAN.—This municipality has granted the Kansas Southern a 20-year franchise which carries with it obligations in connection with future viaducts at Fifth, Seventh and Twelfth streets, and a bridge over the Kansas river to meet the requirements of the Kaw Valley Drainage District. It is doubtful whether any of this work will be begun within the next year.

NEW HOOPER, WASH.—The Oregon-Washington Railroad & Navigation Company will build a bridge over the Palouse river consisting of three 70-ft. through plate girder spans on concrete piers and abutments. Substructure bids were received by S. Murray, acting chief engineer, until September 20.

OELWEIN, IOWA.—The Chicago Great Western freight house, the contract for which was reported in our issue of last week as having been let to the Black Hawk Construction Company, of Waterloo, Iowa, will be a two-story brick structure, with reinforced concrete floors, columns and roof. The Barton spider-web flat-slab type of floor and roof construction will be used. The dimensions will be 100 ft. by 100 ft. and the estimated cost about \$22,000.

TIPTON, IND.—The Lake Erie & Western is constructing a concrete machine shop, 40 ft. by 120 ft. to replace the building destroyed by fire some time ago.

Railway Financial News

CHICAGO, MILWAUKEE & ST. PAUL.—See editorial comments elsewhere in this issue on the annual report.

CHESAPEAKE & OHIO.—See editorial comments elsewhere in this issue on the annual report.

CHICAGO, ROCK ISLAND & PACIFIC.—H. U. Mudge, president and co-receiver of the Chicago, Rock Island & Pacific, has resigned as receiver and has been appointed chief executive officer for the receiver, Jacob M. Dickinson remaining sole receiver. Mr. Dickinson gave out the following statement in regard to Mr. Mudge's resignation and new appointment:

"I knew nothing about Mr. Mudge's resignation until I saw it in the paper this morning on my arrival from Memphis. It was a great surprise and a matter of deep personal regret to me.

"The ground upon which he put it, the fact of it becoming my duty to sue him and other directors, was one for him to determine. It should, however, be understood that there was a marked differentiation between him and most of the other directors, in that the transaction for which he voted as a director was presented and acted upon at a meeting at which he was elected a director, and immediately after his election, and also in that he was not a stockholder either of the Rock Island Company of New Jersey or the Chicago, Rock Island & Pacific Railroad Company of Iowa.

"As soon as I heard of the resignation of Mr. Mudge I went to Judge Carpenter and stated that I would regard it as a misfortune to those interested in the Rock Island lines for Mr. Mudge to resign unless he would consent to remain in charge of the operation of the road under the receiver. Judge Carpenter expressed the hope that his services could be retained. Mr. Mudge agreed to continue his services."

DELAWARE & HUDSON.—The New York Public Service Commission has been asked to authorize an issue of \$14,451,000 5 per cent 20-year convertible bonds of the Delaware & Hudson to be dated October 1, 1915. The proceeds from the sale of these bonds are to be used to retire \$13,973,000 4 per cent convertible debentures due June 15, 1916. Authority is also asked for the issue of stock to provide for the conversion of the bonds.

HOCKING VALLEY.—See editorial comments elsewhere in this issue on the annual report.

MISSOURI, KANSAS & TEXAS.—A protective committee has been formed for the first and refunding 4 per cent bonds consisting of Alexander J. Hemphill, chairman of the board of the Guaranty Trust Company; Charles A. Peabody, president of the Mutual Life Insurance Company; W. A. Day, president of the Equitable Life Assurance Society; E. S. Marston, president of the Farmers' Loan & Trust Company, all of New York, and A. A. Jackson, vice-president of the Girard Trust Company, Philadelphia. Protective committees are also being formed for the general mortgage 4½ per cent bonds by the New York Trust Company and for the second mortgage 4 per cent bonds by the Union Trust Company, New York.

See editorial comments elsewhere in this issue on the appointment of C. E. Schaff, president, as receiver.

PENNSYLVANIA RAILROAD.—The New Jersey Public Utilities Commission has approved of the consolidation of the Camden & Burlington County, the Vincentown branch of the Burlington County Railroad, and the Mount Holly, Lumberton & Medford under the corporate title of the Camden & Burlington County Railroad. All of these companies are subsidiaries of the Pennsylvania.

COKE REPLACING COAL IN SWEDEN.—Sweden's importation of German coke is reported as exceptional recently. It is caused by the high prices of coal in England and the freights. Many Swedish steamers as well as state and private railroads are now using coke, either alone or mixed with coal or wood, with apparently good results as coke imports are continually increasing.—*Iron Age*.

[ADVERTISEMENT.]

ANNUAL REPORTS

THE CHESAPEAKE AND OHIO RAILWAY COMPANY, THIRTY-SEVENTH ANNUAL REPORT

RICHMOND, VA., September 16, 1915.

To THE STOCKHOLDERS:

The Thirty-seventh Annual Report of the Board of Directors, for the fiscal year ended June 30, 1915, is herewith submitted.

The average mileage operated during the year by The Chesapeake and Ohio Lines was 2,369.2 miles, an increase over the previous year of 23.4 miles. The mileage at the end of the year was 2,371.7 miles, an increase of 4.3 miles over mileage on June 30, 1914.

RESULTS FOR THE YEAR

Operating Revenues were.....	\$39,464,036.99
(Increase \$2,004,173.10, or 5.35%.)	
Operating Expenses were.....	27,556,413.50
(Increase \$1,142,514.99, or 4.33%.)	
Net Operating Revenue was.....	\$11,907,623.49
(Increase \$861,658.11, or 7.80%.)	
Taxes were.....	1,349,496.96
(Increase \$18,562.07, or 1.39%.)	
Operating Income, Taxes deducted, was.....	\$10,558,126.53
(Increase \$843,096.04, or 8.69%.)	
Miscellaneous Income was.....	1,018,219.08
(Decrease \$1,126,431.18, or 52.52%.)	
Rentals and Other Payments were.....	\$11,576,345.61
(Decrease \$138,449.99, or 14.52%.)	
Income for the year available for interest was.....	\$10,761,578.48
(Decrease \$144,885.15, or 1.33%.)	
Interest (75.25% of amount available) amounted to.....	8,098,041.86
(Increase \$163,394.02, or 2.06%.)	
Net Income for the year, equivalent to 4.24% on capital stock outstanding, amounted to.....	\$2,663,536.62
(Decrease \$308,279.17, or 10.37%.)	
Dividend paid during the year: One dividend of 1%.....	627,816.00
Remainder	\$2,035,720.62

FINANCIAL

The changes in funded debt in the hands of the public during the year were as follows:

4 per cent. Big Sandy Ry. First Mortgage Bonds.....	Retired	\$82,000.00
4 per cent. Coal River Ry. First Mortgage Bonds.....		36,000.00
4 per cent. Greenbrier Ry. First Mortgage Bonds.....		20,000.00
4 per cent. Raleigh & Southwestern Ry. First Mortgage Bonds		23,000.00
Equipment Trust Obligations.....		1,514,392.00

Decrease

Other changes in obligations shown under funded debt on Balance Sheet of June 30, 1915, were:

	Increase	Payments
5 per cent. First Lien and Improvement Mortgage Bonds	\$3,147,000.00	
6 per cent. Equipment Contracts—General Equipment Co.		\$16,800.00
5 per cent. Equipment Contract—Standard Steel Car Co.		583,252.23
5 per cent. Equipment Contract—Central Locomotive and Car Works.....	159,750.00	56,537.15
6 per cent. Equipment Contract—American Locomotive Co.	147,300.00	104,876.60
	\$3,454,050.00	\$761,465.98
Net Increase	2,692,584.02	

The five per cent. First Lien and Improvement Mortgage Bonds were issued during the year for additions and betterments and other capital purposes. The entire issue of these bonds, \$40,270,000 face amount, is pledged as collateral for your Company's Five Year 5% Secured Gold Notes, no part of the unissued notes having been sold during the year.

Mention was made in last year's report of the sale of your Company's holdings of the capital stock of The Kanawha and Michigan Railway Company. The transaction was completed October 7, 1914, netting your Company a profit of \$1,119,315.59, which sum was transferred to Surplus. The proceeds of the sale were deposited with the Trustee under the First Lien and Improvement Mortgage and will be re-invested in improvements and investments, which is permitted under that Mortgage.

Your Company acquired during the year 479 shares of the Capital Stock of The Chesapeake and Ohio Northern Railway Company and additional shares of stock of White Sulphur Springs, Incorporated, and of Logan and Southern Railway Company. Additional First Mortgage Bonds of Elkhorn and Beaver Valley Railway Company were acquired at par in reimbursement for advances made for construction purposes.

Further shares of stock and First Mortgage Bonds of The Chesapeake and Ohio Railway Company of Indiana were issued in respect of the cost of certain additions and betterments made to that line and were pledged under your Company's First Lien and Improvement Mortgage.

A statement of charges to property accounts will be found on page 16, showing a net addition of \$3,024,127.55; that is, \$1,045,134.97 was added to cost of road and \$1,978,992.58 was added to cost of equipment.

A schedule of securities owned June 30, 1915, will be found on page 17.

During the past six years your Company's increase in capital liabilities in hands of the public, its principal acquisitions of stocks and bonds of other companies, and its expenditures for equipment branch line construction, second track and other additions and betterments, have been as follows:

CAPITAL OBLIGATIONS ISSUED OR ASSUMED:

	PAR VALUE.
General Mortgage 4½% Bonds.....	\$3,716,000.00
First Consolidated Mortgage 5% Bonds	2,000,000.00
Convertible 4½% Debentures.....	31,390,000.00
Three Year 4½% Collateral Trust Notes	25,000,000.00
One Year 5% Collateral Trust Notes	3,500,000.00

Five Year 5% Collateral Trust Notes	\$33,000,000.00
Coal River Railway Co. First Mortgage 4% Bonds.....	3,000,000.00
Raleigh and Southwestern Railway Co. First Mortgage 4% Bonds	860,000.00
Big Sandy Railway Co. First Mortgage 4% Bonds.....	229,000.00
Virginia Air Line Railway Co. First Mortgage 5% Bonds...	900,000.00
Equipment Trust Certificates Series N.....	1,700,000.00
Equipment Contracts	4,084,390.00
	\$109,379,390.00
Realizing	\$103,796,715.00

Less:

CAPITAL OBLIGATIONS PAID OR PURCHASED:

Peninsula Division First Mortgage 6% Bonds matured January 1, 1911.....	\$2,000,000.00
Greenbrier and New River Railroad Co. First Mortgage 5% Bonds redeemed February 1, 1911	339,000.00
General Funding and Improvement Mortgage 5% Bonds...	7,302,000.00
Greenbrier Railway Co. First Mortgage 4% Bonds retired November 1, 1911.....	2,000.00
Three Year 4½% Collateral Trust Notes	25,000,000.00
One Year 5% Collateral Trust Notes	3,500,000.00
Equipment Trust Payments..	10,967,000.00
Through Sinking Funds:	
Big Sandy Railway Co. First Mortgage 4% Bonds.....	326,000.00
Coal River Railway Co. First Mortgage 4% Bonds.....	157,000.00
Greenbrier Railway Co. First Mortgage 4% Bonds.....	118,000.00
Raleigh and Southwestern Railway Co. First Mortgage 4% Bonds	38,000.00
	\$49,749,000.00
Costing	50,032,740.58
	\$53,763,974.42

ACQUISITIONS:

Stocks of:	
The C. & O. Railway Co. of Indiana	\$5,948,800.00
Elkhorn and Beaver Valley Railway Co.	30,000.00
The Gauley and Meadow River Railroad Co.	116,300.00
The Hocking Valley Railway Co.	7,671,800.00
The Kanawha and Michigan Railway Co.	4,029,200.00
Logan and Southern Railway Co.	292,100.00
Levisa River Railroad Co. (of Ky.)	50,000.00
The Levisa River Railroad Co. (of Va.)	50,000.00
Kanawha Bridge and Terminal Co.	400,000.00
The Silver Grove Land and Building Co.	200,000.00
White Sulphur Springs, Incorporated	2,550,000.00
First National Bank Building Corporation (Richmond, Va.)	180,000.00
The Chesapeake and Ohio Northern Railway Co.....	47,900.00
Miscellaneous	12,300.00
	\$21,578,400.00
Costing	\$21,808,546.39

Bonds of:	
The C. & O. Railway Co. of Indiana First Mortgage 5%.....	\$6,774,000.00
Elkhorn and Beaver Valley Railway Co. First Mortgage 5%	1,026,000.00
	\$7,800,000.00
Costing	6,496,200.00
Properties of:	
Coal River Railway Co.....	\$2,304,359.88
Raleigh and Southwestern Railway Co.	816,562.42
Virginia Air Line Railway Co.	1,071,947.12
Costing	4,192,869.42

Construction of:	
Extensions of Branch Lines, costing	\$1,557,707.90
Second Track (173.1 miles) and Additions and Betterments, costing	15,081,219.47
(Excluding \$2,214,490.08 ex-	16,638,927.37

pendent on Chicago Line to April 30, 1915, for which securities have been acquired.)

Equipment:

Additional equipment acquired less retireals	\$18,865,092.67
(Excluding \$33,248.59 expended on Chicago Line to April 30, 1915, for which securities have been acquired.)	
Costing	\$68,001,635.85

GENERAL REMARKS

The equipment inventory as of June 30, 1915, was as follows:			
Locomotives owned	605	Inc.	19
Locomotives leased	212	Dec.	27
Total	817	Dec.	8
Passenger train cars owned.....	358	Dec.	8
Passenger train cars leased.....	29	....	..
Total	387	Dec.	8
Freight train and miscellaneous cars owned	23,911	Inc.	1,603
Freight train cars leased.....	22,435	Dec.	387
Total	46,346	Inc.	1,216
The changes during the year in the accrued depreciation of equipment account were as follows:			
Balance to credit of account June 30, 1914.....	\$4,212,541.93		
Amount credited during year ended June 30, 1915, by charges to:			
Operating expenses	\$786,491.51		
Charges to account for:			
Accrued depreciation on equipment retired during year—20 locomotives, 6 passenger, 1,060 freight and work cars.....	\$92,227.62		
Accrued depreciation on cars changed in class during year...	2,526.15		
	94,753.77		
			691,737.74
Balance to credit of account June 30, 1915.....	\$4,904,279.67		

	1915	1914		
Operating Revenues amounted to	\$39,464,036.99	\$37,459,863.89	Inc.	\$2,004,173.10
Net Operating Revenue.....	\$11,907,623.49	\$11,045,965.38	Inc.	\$861,658.11
Operating Ratio	69.8%	70.5%	Dec.	.7%
Tons of Revenue Freight carried one mile.....	8,138,347,516	7,064,650,082	Inc.	1,073,697,434
Revenue train load, tons	906	870	Inc.	36
Revenue tons per loaded car	32.3	30.9	Inc.	1.4

New industries were established during the year as follows: 16 manufacturing of farm implements and farm products, 15 manufacturing of lumber products, and 30 manufacturing of mineral, metal and other products. At the close of the year there were 215 companies organized for producing coal and coke on your Company's lines, with a total of 338 separate mines, of which 319 were in actual operation. Of the 1,219 coke ovens 445 were in blast, and of the 10 iron furnaces, having a total daily capacity of 1,490 tons, 6 are in operation, with a total daily capacity of 950 tons of pig iron. 214 new settlers located in your Company's territory during the year, these settlers having purchased 49,011 acres of land from private parties, with an investment of \$1,288,811.

An extension of Pine Creek Branch of Logan and Southern Railway, eight-tenths of a mile, has been completed.

The construction of about thirty miles of the Chesapeake and Ohio Northern Railway has been begun, during the year, from a point near Edgington, Kentucky, to a point near Waverly, Ohio, on the Norfolk and Western Railway, including a steel bridge across the Ohio River, which is expected to be completed in the fall of 1916. Arrangements have been concluded by The Chesapeake and Ohio Northern Railway Company with the Norfolk and Western Railway Company by which trackage rights are secured over the Norfolk and Western Railway from a connection near Waverly, Ohio, to the line of the Hocking Valley Railway at Valley Crossing near Columbus, Ohio, which provides a through route from your Company's main line to the line of the Hocking Valley Railway.

The revenue coal and coke tonnage was \$21,325,742, an increase of 10.8 per cent; other revenue freight tonnage was \$7,222,712, an increase of 3.0 per cent. Total revenue tonnage was 30,048,454 tons, an increase of 8.4 per cent. Freight revenue was \$31,288,536.62, an increase of 8.4 per cent. Freight train mileage was 8,979,417 miles, an increase of 10.6 per cent. Revenue ton miles were 8,138,347,516, an increase of 15.2 per cent. Ton mile revenue was 3.84 mills, a decrease of 6.1 per cent. Revenue per freight train mile was \$3.484, a decrease of 2.0 per cent. Revenue tonnage per train mile was 906 tons, an increase of 4.1 per cent; including Company's freight, the tonnage per train mile was 962 tons, an increase of 3.8 per cent. Tonnage per locomotive, including Company's freight, was 870 tons, an increase of 5.2 per cent. Revenue tonnage per loaded car was 32.3 tons, an increase of 4.5 per cent. Tons of revenue freight carried one mile per mile of road were 3,135,061, an increase of 14.1 per cent.

There were 6,487,803 passengers carried, a decrease of 0.1 per cent. The number carried one mile was 269,379,558, a decrease of 7.6 per cent. Passenger revenue was \$5,696,088.37, a decrease of 6.6 per cent. Revenue per passenger per mile was 2.115 cents, an increase of 1.1 per cent. Number of passengers carried one mile per mile of road was 113,700, a decrease of 8.5 per cent. Passenger train mileage was 5,008,603, a decrease of 4.2 per cent. Passenger revenue per train mile was \$1.137, a decrease of 2.5 per cent; including mail and express, it was \$1.345, a decrease of 1.7 per cent. Passenger service train revenue per train mile was \$1.375, a decrease of 1.8 per cent.

There were 7,353.2 tons of new rails (3,054.1 tons 100 lb. and 4,299.1 tons 90 lb.) equal to 49.8 track miles, used in renewal of existing main tracks. 2,252 tons of relaying rail were laid in various parts of the line, with an aggregate expenditure of \$29,350.00. 13,500 tons of 100 lb., 3,500

tons of 90 lb. and 500 tons of 125 lb. rail were purchased after July 1, 1915, a portion of which has been laid prior to the date of this report.

The average amount expended for repairs per locomotive operated was \$3,013.29; per passenger train car \$920.85; per freight train car \$81.88.

Mr. Frank A. Vanderlip resigned as a director and member of the Executive Committee on August 20, 1914, and Mr. Charles E. Gramam was elected a director and member of the Executive Committee on that date to succeed Mr. Vanderlip.

The Board renews its acknowledgment to the officers and employees for faithful and efficient services performed during the year.

By order of the Board of Directors,

FRANK TRUMBULL,
Chairman.

GEO. W. STEVENS,
President.

THE CHESAPEAKE AND OHIO LINES

GENERAL INCOME ACCOUNT

For Year ended June 30, 1915, and Comparison with Year ended June 30, 1914.				
Table 2.	1915	1914	Increase or Decrease	Per Cent
OPERATING REVENUES:				
Freight Traffic	\$31,288,536.62	\$28,866,516.16	\$2,422,020.46	8.4
Passenger Traffic ..	5,696,088.37	6,098,058.96	—\$401,970.59	6.6
Transportation of				
Mails	438,666.73	426,967.03	11,699.70	2.7
Express	602,911.91	636,785.75	—33,873.84	5.3
Miscellaneous	1,437,833.36	1,431,535.99	6,297.37	.4
Total Transportation Revenues	\$39,464,036.99	\$37,459,863.89	\$2,004,173.10	5.4
OPERATING EXPENSES:				
Maintenance of Way and Structures...	\$4,694,522.17	\$4,149,457.27	\$545,064.90	13.1
Maintenance of Equipment	8,243,170.36	7,827,659.53	415,510.83	5.3
Traffic	650,406.20	669,283.00	—18,876.80	2.8
Transportation	12,896,078.82	12,532,329.07	363,749.75	2.9
Miscellaneous Operations	232,347.26	248,347.38	—16,000.12	6.4
General	873,882.70	986,822.26	—112,939.56	11.4
Transportation for Investment-Cr. ..	33,994.01		33,994.01	....
Total Operating Expenses	\$27,556,413.50	\$26,413,808.51	\$1,142,514.99	4.3
Net Operating Revenue	\$11,907,623.49	\$11,045,965.38	\$861,658.11	7.8
INCOME FROM OTHER SOURCES:				
Hire of Equipment	\$77,632.04	\$684,832.80	—\$607,200.76	88.7
Interest from Investments and Accounts	635,345.97	1,168,027.93	532,681.96	45.6
Miscellaneous	305,241.07	291,789.53	13,451.54	4.6
	\$1,018,219.08	\$2,144,650.26	—\$1,126,431.18	52.5
Gross Income.....	\$12,925,842.57	\$13,190,615.64	—\$264,773.07	2.0
DEDUCTIONS FROM GROSS INCOME:				
Interest on Debt.....	\$8,098,041.86	\$7,934,647.84	\$163,394.02	2.1
Taxes	1,349,496.96	1,330,934.89	18,562.07	1.4
Rentals Leased Roads, Joint Tracks, &c.....	869,074.09	835,077.32	24,996.77	3.0
Loss on C. & O. Grain Elevator....Cr.	88,696.23	62,616.28	—151,312.51	241.7
Miscellaneous	43,389.27	55,523.52	—12,134.25	21.9
Total Deductions.....	\$10,262,305.95	\$10,218,799.85	\$43,506.10	.4
NET INCOME.....	\$2,663,536.62	\$2,971,815.79	—\$308,279.17	10.4
Amount to credit of Profit and Loss June 30, 1914.....			\$1,561,833.30	
Amount of Net Income for year ended June 30, 1915, transferred to Profit and Loss.....			2,663,536.62	
			\$1,225,370.01	
Deduct:				
Dividend No. 32 of 1% paid December 31, 1914.			627,816.00	
			\$3,897,554.01	
Balance of Discount on Five Year Secured Gold Notes sold previous year and expenses in connection with bonds and notes issued..			\$1,647,679.44	
Refunds under West Virginia two cent fare law			1,647.80	
Settlement of judgment in McKell Suit			1,28,000.00	1,1316.94
			\$1,833,237.07	
Add:				
Profit on Kanawha and Michigan Ry. Co. Stock, Sold			\$1,119,318.00	
Sundry adjustments			4,981.50	1,124,302.76
Balance to credit of Profit and Loss June 30, 1915			\$2,947,539.83	

GENERAL BALANCE SHEET

June 30, 1915.

ASSETS

(Excluding Stocks and Bonds owned of The C. & O. Ry. Co. of Indiana and of The C. & O. Equipment Corporation.)

PROPERTY INVESTMENT:		
Cost of Road.....	\$171,906,286.05	
Cost of Equipment.....	49,911,903.17	
		\$221,818,189.22
Accrued Depreciation of Equipment—		
Cr.		4,904,279.67
		\$216,913,909.55
SECURITIES OF PROPRIETARY, AFFILIATED AND CONTROLLED COMPANIES—		
PLEGGE.		
Stocks—See Schedule, page 18.....	\$11,049,599.44	
Bonds—See Schedule, page 18.....	3,098,112.01	
		\$14,147,711.45
SECURITIES—ISSUED OR ASSUMED—PLEGGE.		
Bonds—See Schedule, page 18.....	40,270,001.00	
(Includes First Lien and Improvement Mortgage 5% Bonds \$40,270,000.00. See Contra.)		\$54,417,712.45
MISCELLANEOUS INVESTMENTS.		
Physical Property		305,424.09
SPECIAL FUNDS, AND FUNDED DEBT ISSUED AND RESERVED.		
Potts Creek Branch—Cash.....	\$43,641.27	
Raleigh and Southwestern Railway Co. Bonds authenticated in advance of construction	40,000.00	
Special Deposits account of Construction	4,086,710.42	4,170,351.69
(Includes Cash and Notes—Proceeds K. & M. Ry. Co. Stock Sale.)..		
		58,893,488.23
		\$275,807,397.78
WORKING ASSETS.		
Cash in Treasury.....	\$578,788.86	
Cash in Transit.....	957,752.12	\$1,536,540.98
Cash deposits to pay Interest and Dividends	354,577.80	
Cash deposit to pay Equipment Trust Principal	112,000.00	
Cash deposits to pay Matured Bonds and Scrip	11,174.17	
Cash deposit to pay Taxes.....	103,488.59	
Loans and Bills Receivable.....	158,860.82	
Traffic Balances	879,409.96	
Agents and Conductors.....	1,003,709.43	
Miscellaneous Accounts Receivable.....	878,817.47	
Other Working Assets.....	37,301.32	
		\$5,075,880.54
Materials and Supplies.....		2,581,952.18
SECURITIES IN TREASURY—UNPLEGGE.		
Stocks—See Schedule, page 17.....	\$4,764,403.45	
Bonds—See Schedule, page 17.....	1,543,903.00	
		6,308,306.45
DEFERRED ASSETS.		
Unmatured Interest, Dividends and Rents	\$75,147.61	
Advances to Proprietary, Affiliated and Controlled Companies	99,961.90	
Advances, Working Funds (Fast Freight Lines, etc.)	37,675.93	
Special Deposits with Trustees, Various Mortgage Funds.....	94,770.99	
Cash and Securities in Sinking and Redemption Funds.....	51,167.24	
Cash and Securities in Insurance Reserve Fund	9,971.41	
Sundry Accounts	387,488.42	
		756,183.50
		14,722,322.67
Total		\$290,529,720.45

LIABILITIES

(Excluding Stocks and Bonds owned of The C. & O. Ry. Co. of Indiana and of The C. & O. Equipment Corporation.)

CAPITAL STOCK.		
Common	\$62,792,600.00	
First Preferred	3,000.00	
Second Preferred	200.00	
		\$62,795,800.00
Common—The Chesapeake and Ohio Railway Co. of Indiana.....		1,200.00
		\$62,797,000.00
FUNDED DEBT.		
First Mortgage, Kineon Coal Co., 5% Bonds	\$200,000.00	
Secured Gold Notes, 5%.....	33,000,000.00	
First Mortgage, Terminal, etc., 6% Bonds	142,000.00	
General Funding and Improvement, 5% Bonds	3,698,000.00	
Convertible, 4½% Bonds.....	31,390,000.00	
First Mortgage, R. & S. W. Railway, 4% Bonds	862,000.00	
First Consolidated Mortgage, 5% Bonds	29,858,000.00	
First Mortgage, Craig Valley Branch, 5% Bonds	650,000.00	
First Mortgage, Greenbrier Railway, 4% Bonds	1,801,000.00	
First Mortgage, Warm Springs Branch, 5% Bonds	400,000.00	
First Mortgage, Big Sandy Railway, 4% Bonds	4,674,000.00	
First Mortgage, Paint Creek Branch, 4% Bonds	539,000.00	
First Mortgage, Coal River Railway, 4% Bonds	2,843,000.00	
First Mortgage, Potts Creek Branch, 4% Bonds	600,000.00	
First Mortgage, Va. Air Line Railway, 5% Bonds	900,000.00	
First Mortgage, R. & A. Division, 4% Bonds	6,000,000.00	
Second Mortgage, R. & A. Division, 4% Bonds	1,000,000.00	
General Mortgage, 4½% Bonds.....	48,129,000.00	
		\$166,686,000.00
Equipment Trust Obligations and Contracts		6,413,163.21
		\$173,099,163.21
First Lien and Improvement Mortgage, 5% Bonds (see Contra).....		40,270,000.00
		\$276,166,163.21
WORKING LIABILITIES.		
Loans and Bills Payable.....	\$95,000.00	
Traffic Balances	409,645.46	
Audited Vouchers and Pay Rolls.....	3,737,859.15	
Unpaid Wages.....	45,985.51	
Miscellaneous Accounts Payable.....	292,756.72	
Matured Interest and Dividends Unpaid	381,832.65	
Matured Mortgage and Secured Debt Unpaid	11,174.17	
Other Working Liabilities.....	69,573.37	
		\$5,043,827.03
DEFERRED LIABILITIES.		
Unmatured Interest and Rents.....	\$1,889,997.36	
Taxes Accrued	1,332,088.02	
Sundry Accounts	131,916.16	
		3,354,001.54
		\$8,397,828.57
APPROPRIATED SURPLUS.		
Additions to Property through Income since June 30, 1907.....	\$2,984,365.23	
Reserve Invested in Sinking Fund... ..	23,852.20	
Reserve Invested in Other Reserve Funds	9,971.41	
		\$3,018,188.84
PROFIT AND LOSS—BALANCE.....		2,947,539.83
		\$5,965,728.67
Total		\$290,529,720.45

This Company is also liable as a guarantor of the following securities in hands of the public—

The Chesapeake and Ohio Grain Elevator Co., First Mortgage 4% Bonds due 1938.....	\$820,000.00
The Chesapeake and Ohio Northern Railway Co., 5% Gold Notes due 1915.....	500,000.00
Norfolk Terminal and Transportation Co., First Mortgage 5% Bonds due 1948.....	500,000.00
Western Pocahontas Corporation, First Mortgage 4½%	

Bonds due 1945.....	\$750,000.00
Western Pocahontas Corporation Extension Mortgage No. 1, 4½% Bonds due 1945.....	83,000.00
Western Pocahontas Corporation, Extension Mortgage No. 2, 4½% Bonds due 1946.....	51,000.00
Louisville and Jeffersonville Bridge Co. Mortgage (C. & O. prop'n, ½) 4% Bonds due 1945.....	4,500,000.00
Richmond-Washington Co. Collateral Trust Mortgage (C. & O. prop'n, ½) 4% Bonds due 1943.....	10,000,000.00

THE HOCKING VALLEY RAILWAY COMPANY SIXTEENTH ANNUAL REPORT

COLUMBUS, Ohio, September 16, 1915.

To the Stockholders:

The Sixteenth Annual Report of the Board of Directors, for the fiscal year ended June 30, 1915, is herewith submitted.

The average mileage operated during the year was 351.7 miles, an increase over the previous year of .2 miles. The mileage at the end of the year was 351.1 miles. See schedule on page 8.

RESULTS FOR THE YEAR

Operating Revenues were.....	\$6,181,152.97
(Decrease \$839,992.10 or 11.96%.)	
Operating Expenses were.....	4,184,370.00
(Decrease \$619,376.51 or 12.89%.)	
Net Operating Revenue was.....	\$1,996,782.97
(Decrease \$220,615.59 or 9.95%.)	
Taxes were	418,522.15
(Decrease \$32,614.12 or 7.23%.)	

Operating Income, Taxes deducted, was.....	\$1,578,260.82
(Decrease \$188,001.47 or 10.64%.)	
Miscellaneous Income was.....	292,890.78
(Decrease \$156,029.12 or 34.76%.)	
	\$1,871,151.60
Rentals and Other Payments were.....	31,298.34
(Decrease \$79,640.09 or 71.79%.)	
Income for the year available for interest was.....	\$1,839,853.26
(Decrease \$264,390.50 or 12.56%.)	
Interest (73.18% of amount available) amounted to.....	1,346,450.88
(Increase \$197,947.83 or 17.24%.)	
Net Income for the year amounted to.....	\$493,402.38
(Decrease \$462,338.33 or 48.37%.)	
Dividends paid during the year:	
One dividend of 3%	\$329,985.00
One dividend of 1%	109,995.00
	439,980.00
Remainder	\$53,422.38

FINANCIAL

The changes in funded debt shown by balance sheet of June 30, 1915, as compared with June 30, 1914, consisted in the annual payments of \$496,000 on equipment trusts, and in the retirement of \$4,000,000 face amount one-year 5% gold notes by the issue and sale of \$4,000,000 face amount one-year 6% gold notes maturing November 1, 1915.

The District Court of the United States for the Southern District of Ohio, Eastern Division, in a suit brought by the Attorney General of the United States, enjoined your Company and others from owning and controlling any interest in the Sunday Creek Company, a corporation all the stock of which had been acquired in the interest of your Company and The Toledo and Ohio Central Railway Company, the stock owned by your Company having been pledged under its First Consolidated Mortgage. The stock was accordingly sold for \$50,000, of which amount \$43,136.87 was received by the Trustee under this Company's First Consolidated Mortgage in lieu of the stock released. The Court entered an order on December 10, 1914, approving this sale of the stock and the refunding of debentures of the Sunday Creek Company held by the railroads by the delivery by the purchaser of a like par amount of general mortgage bonds of that Company.

An analysis of the property accounts will be found on pages 12 and 13, by reference to which it will be seen that additions and betterments were made during the year to the net amount of \$164,243.29, due to \$831,826.15 added to cost of equipment, and to \$230,624.20 added to and \$893,207.06 deducted from cost of road, this deduction being made necessary because of the sale—referred to in the last annual report—of the old dock property on the west side of the Maumee River at Toledo to the Pennsylvania Company.

During the past six years your Company's net addition to property accounts has been as follows:

Equipment	\$3,763,008.90
Additions and Betterments	2,592,162.82
	<hr/> \$6,355,171.72

GENERAL REMARKS

The equipment in service June 30, 1915, consisted of:
Locomotives owned..... 148
Locomotives leased under equipment trusts..... 8

Total locomotives	156	No change
Passenger train cars owned.....	86	No change
Freight train and miscellaneous cars owned.....	9,680	Increase 25
Freight train cars leased under equipment trusts.....	5,346	Increase 790
Freight train cars under special trust.....	47	Increase 47

Total freight train cars..... 15,073 Increase 862
The changes during the year in accrued depreciation of equipment account were as follows:

Balance to credit of account June 30, 1914.....	\$1,019,628.37
Amount credited during year ended June 30, 1915, by charges to operating expenses	\$212,304.92
Charges to account for:	
Accrued depreciation on equipment retired during year—81 freight and work cars.....	\$4,221.35
Accrued depreciation on cars changed in class during year.....	282.86
	<hr/> 4,504.21
	<hr/> 207,800.71

Balance to credit of account June 30, 1915..... \$1,227,429.08

The strike by coal miners in the Hocking district, referred to in the last annual report, extended into August of this fiscal year, which, combined with the general business depression throughout the year and with the loss of traffic as a result of the sale by The Chesapeake and Ohio Railway Company of its stock interest in The Kanawha and Michigan Railway Company, brought about a loss of freight traffic and revenues as follows:

	1915.	1914.	Decrease.
Tons of revenue freight carried one mile	1,171,899,998	1,315,425,895	143,525,897
Operating revenues	\$6,181,152.97	\$7,021,145.07	\$839,992.10
Net operating revenue.....	\$1,996,782.97	\$2,217,398.56	\$220,615.59

The Chesapeake and Ohio Northern Railway Company is constructing a bridge across the Ohio River near Sciotoville, Ohio, and a line of railroad which connects the main line of The Chesapeake and Ohio Railway Company with the Norfolk & Western Railway near Waverly, Ohio, and it has obtained trackage rights over the Norfolk & Western Railway from that point to Valley Crossing, near Columbus, Ohio, where it will connect with the tracks of your Company. It is expected that this line will be completed before January 1, 1917.

The revenue train load increased from 1,000 to 1,035 tons, and revenue tons per loaded car from 36.9 to 37 tons.

The new dock and terminal yard on the east side of the Maumee River at Toledo has been in use throughout the year, and the yard now consists of 17.7 miles of track with a working capacity of 1,600 cars. The Kerrs Run extension of the Pomeroy Belt Railway, 1.6 miles, to the new mine of the Peacock Coal Company, was completed. The old light 80-ft. double track girder bridge at Sugar Grove was replaced by a modern heavy 90-ft. bridge of similar type.

The revenue coal and coke tonnage was 6,271,163 tons, a decrease of 14.4%; other revenue freight tonnage was 2,842,376 tons, a decrease of 10.2%. Total revenue tonnage was 9,113,539 tons, a decrease of 13.1%. Freight revenue was \$4,912,982.33, a decrease of 12.3%. Freight train mileage was 1,132,206 miles, a decrease of 13.9%. Revenue ton miles were 1,171,899,998, a decrease of 10.9%. Ton mile revenue was 4.19 mills, a decrease of 1.6%. Revenue per freight train mile was \$4.339, an increase of 1.9%. Revenue tonnage per train mile was 1,035 tons, an increase of 3.5%; including Company's freight, the tonnage per train mile was 1,068 tons, an increase of 3.1%. Tonnage per locomotive, including Company's freight, was 922 tons, an increase of 2.3%. Revenue tonnage per loaded car was 37 tons, an increase of .3%. Tons of revenue freight carried one mile per mile of road were 3,332,101, a decrease of 11%.

There were 1,810,037 passengers carried, a decrease of 16.1%. The number of passengers carried one mile on steam trains was 44,267,279, a decrease of 10%. Passenger revenue was \$832,733.36, a decrease of 8.5%. Revenue per passenger per mile of steam trains was 1.844 cents, an increase of 2.2%. The number of passengers carried on steam trains one mile per mile of road was 125,867, a decrease of 10.1%. Passenger train mileage of steam trains was 708,859, a decrease of 9%. Passenger revenue per train mile of steam trains was \$1.152, an increase of 1.1%; including mail and express it was \$1.311, an increase of 1.2%. Passenger service train revenue per train mile was \$1.371, an increase of 1.6%.

There were 1,196 tons of new 100-lb. rails, equal to 7.6 track miles, and 811 tons of new 90-lb. rails, equal to 5.7 track miles, used in the renewal of existing main tracks.

The average amount expended for repairs per locomotive was \$1,940.75; per passenger train car \$462.54; per freight train car \$35.58.

Appreciative acknowledgment is hereby made of efficient services during the year of officers and employees.

By order of the Board of Directors.

GEO. W. STEVENS,
President.

FRANK TRUMBULL,
Chairman.

GENERAL BALANCE SHEET, JUNE 30, 1915.

ASSETS.		
Property Investment.		
Cost of Road.....	\$28,918,587.52	
Cost of Equipment.....	14,452,155.75	
General Expenditures	17,571.70	
	<hr/> \$43,388,314.97	
Accrued Depreciation of Equipment—Cr..	1,227,429.08	\$42,160,885.89
Securities of Proprietary, Affiliated and Controlled Companies—Pledged.		
Stocks	\$ 108,088.66	
Bonds	300,000.00	408,088.66
Securities of Proprietary, Affiliated and Controlled Companies—Miscellaneous—Unpledged		23,503.44
Other Investments.		
Miscellaneous Investments—Securities—Pledged		761,500.00
		<hr/> \$43,353,977.99
Working Assets.		
Cash	\$ 832,779.71	
Loans and Bills Receivable.....	82,315.36	
Traffic Balances	47,790.34	
Agents and Conductors.....	419,581.84	
Miscellaneous Accounts Receivable.....	351,417.06	
Other Working Assets.....	24,208.21	
	<hr/> \$ 1,758,092.52	
Materials and Supplies.....		763,292.15
Securities in Treasury—Unpledged.		
Stocks	\$ 501.00	
Bonds	1,843,675.00	1,844,176.00
Deferred Assets.		
Unmatured Interest	\$ 6,265.31	
Advances to Proprietary, Affiliated and Controlled Companies	53,698.66	
Advances, Working Funds.....	910.05	
Insurance paid in advance.....	2,437.17	
Cash and Securities in Sinking and Redemption Funds	29,128.58	
Cash and Securities in Insurance Reserve Fund	36,859.14	
Other Deferred Debit Items.....	66,141.69	
	<hr/> 195,440.60	
	<hr/> \$4,561,001.27	
Total		\$47,914,979.26
LIABILITIES.		
Capital Stock		\$11,000,000.00
Funded Debt.		
First Consolidated Mortgage 4½% Bonds, 1999	\$16,030,900.00	
First Mortgage C. & H. V. R. R. 4% Bonds, 1948	1,401,000.00	
First Mortgage Cols. & Tol. R. R. 4% Bonds, 1955	2,441,000.00	
One Year 6% Gold Notes, 1915.....	4,000,000.00	
	<hr/> \$23,872,000.00	
Equipment Trust Obligations.....		2,327,000.00
	<hr/> \$26,199,000.00	
Working Liabilities.		
Loans and Bills Payable.....	\$ 1,100,000.00	
Traffic Balances	455,141.86	
Audited Vouchers and Wages Unpaid....	840,682.18	
Miscellaneous Accounts Payable.....	59,757.09	
Matured Interest, Dividends and Rents Unpaid	371,109.00	
Other Working Liabilities.....	4,659.40	
	<hr/> \$ 2,831,349.53	
Deferred Liabilities.		
Unmatured Interest, Dividends and Rents Payable	\$ 137,170.01	
Taxes Accrued	263,500.00	
Operating Reserves	11,792.60	
Other Deferred Credit Items.....	147,968.26	
	<hr/> 560,430.87	
	<hr/> \$3,391,780.40	
Appropriated Surplus.		
Additions to Property through Income since June 30, 1907.....	\$ 181,409.11	
Funded Debt Retired through Income and Surplus	131,331.90	
Reserve Invested in Sinking Fund.....	817.52	
Reserve Invested in Insurance Fund.....	36,859.14	
	<hr/> \$ 350,417.67	
PROFIT AND LOSS—BALANCE.....		\$ 6,973,781.19
		<hr/> \$ 7,324,198.86
Total		\$47,914,979.26

This Company, jointly with the Toledo and Ohio Central Railway Company, guaranteed in 1901 5% First Mortgage Bonds of the Kanawha and Hocking Coal and Coke Company due 1951 (\$2,842,000 outstanding), and in 1902 5% First Mortgage Bonds of the Continental Coal Company due 1952 (\$1,569,000 outstanding). The Ohio courts, in quo warranto proceedings in which bondholders were not represented, have pronounced these guaranties *ultra vires*.

THE FIFTY-FIRST ANNUAL REPORT OF THE DIRECTORS OF THE CHICAGO, MILWAUKEE & ST. PAUL RAILWAY COMPANY

To the Stockholders.

FOR THE FISCAL YEAR ENDING JUNE 30, 1915

The directors submit to the stockholders the following report of the operations of the Company for the year ending June 30, 1915, and of the condition of its property and finances at the close of that year.

The operations for the year show the following results:

Operating revenues	\$91,435,374.26	
Operating expenses	61,971,701.03	
Net operating revenue	\$29,463,673.23	
Taxes accrued	4,746,721.21	
Operating income	\$24,716,952.02	
Other income:		
Interest on bonds	\$ 342,257.36	
Dividends on stocks	515,191.00	
Int. on other securities, loans and accounts.	1,974,565.02	
Rents—received	487,987.73	
Miscellaneous	329,711.97	3,649,713.08
Gross corporate income		\$28,366,665.10
Deductions:		
Interest accrued on funded debt	\$14,636,297.91	
Rents—paid	871,503.67	
Hire of equipment	173,808.97	
Miscellaneous	716,772.05	16,398,382.60
Net corporate income		\$11,968,282.50

ACQUISITION OF THE GREAT FALLS TERMINAL RAILWAY

The railway of the Great Falls Terminal Railway Company was constructed at Great Falls, Montana, as a terminal facility of the Great Falls-Lewistown Line. There are 3.45 miles of this railway, all of which has been electrified and is being operated very economically with electric locomotives. It was deemed advisable, both on account of economy and efficiency in operation, to take over these terminals and make them a part of the St. Paul System.

Accordingly, the Great Falls Terminal Railway Company conveyed all of its railway property and franchises to this Company by deed dated November 5th, 1914, since which date this Company has operated such railway as a part of its system and as the owner thereof.

SEATTLE, PORT ANGELES & WESTERN RAILWAY

The Seattle, Port Angeles & Western Railway, the outstanding capital stock of which is all owned by this Company, has under active construction a line of railway extending from Fairmount, Jefferson County, Wash., westerly through Port Angeles to Earles, a point in Clallam County, Wash., a distance of approximately 62 miles. That portion of the line west of Port Angeles, approximately 24 miles, has been completed and was placed in operation in January, 1915.

This line taps the rich timber country of the Olympic Peninsula and is proving to be an excellent feeder for the St. Paul System.

MILES OF TRACK, JUNE 30, 1915

Owned solely by this Company:		
Main track	9,617.22	
Second main track	1,023.50	
Third main track	21.72	
Fourth main track	13.11	
Connection tracks	46.98	
Yard tracks, sidings and spur tracks	3,104.48	13,827.01
Owned jointly with other Companies:		
Main track	103.45	
Second main track	6.14	
Third main track	1.94	
Fourth main track	1.93	
Connection track	5.92	
Yard tracks, sidings and spur tracks	175.34	294.72
Used by this Company under contracts:		
Main track	354.94	
Second main track	76.47	
Third main track	1.14	432.55
Total miles of track		14,554.28
Average miles of main track in operation during the year:		
Owned solely	9,603.62 miles	
Owned jointly	103.36 "	
Used under contracts	345.60 "	
Total average miles operated		10,052.58 miles

The lines of road of this Company are located in the following States:	
Wisconsin	1,823.59 miles
Illinois	415.04 "
Iowa	1,868.61 "
Minnesota	1,244.90 "
North Dakota	379.93 "
South Dakota	1,794.89 "
Misouri	140.27 "
Michigan	179.98 "
Montana	1,056.11 "
Idaho	197.37 "
Washington	619.98 "

Total length of main track owned solely and jointly..... 9,720.67 miles

EQUIPMENT

During the year twenty-five locomotives and forty cars of various classes have been purchased or built, as follows:

25 Locomotives	3 Observation Sleeping Cars
1 Dining Car	4 Parlor Cars
2 Mail and Baggage Cars	2 Observation Parlor Cars
2 Passenger and Baggage Cars	2 Cafe Observation Cars
10 Passenger Cars	1 Track Scale Test Car
13 Sleeping Cars	

During the year eleven locomotives and one thousand four hundred and

sixty-one cars of various classes were destroyed by wreck or fire, sold or taken down on account of small capacity, as follows:

11 Locomotives	26 Refrigerator Cars
1 Passenger Car	2 Refrigerator Express Cars
1 Passenger and Baggage Car	2 Vegetable Cars
1 Mail and Baggage Car	15 Ballast Cars
1117 Box Cars	13 Caboose Cars
68 Stock Cars	22 Cinder Dump Cars
179 Flat and Coal Cars	5 Work Train Cars
9 Ore Cars	

The original cost of the equipment retired has been credited to Property Investment—Road and Equipment.

PROPERTY INVESTMENT—ROAD AND EQUIPMENT

Equipment	\$818,501.82
Purchase of Great Falls Terminal Ry.	855,902.47
New Branch Lines and Extensions	2,074,731.86
New Additional Main Tracks and Reducing Grade and Perfecting Line	4,461,992.91
Other Additions and Betterments	7,737,238.07
	\$15,948,367.13
Credit—Property retired or converted	4,451,350.23
Total as shown by detailed statement on page 38 of this report	\$11,497,016.90

IMPROVEMENTS AUTHORIZED

EQUIPMENT

Authority has been given for the purchase or building of additional equipment, as follows:

7 Sleeping-Observation Cars.
2 Lounging-Observation Cars
also to convert 231 forty thousand pounds capacity box cars into cinder-dump cars.

ADDITIONAL MAIN TRACKS

The construction of the second main track and grade reduction work on the Chicago and Council Bluffs Division in Iowa was completed on June 30th, 1915, between Green Island and Manilla, Iowa, a distance of 270 miles. On account of unfavorable business conditions, it was deemed advisable to temporarily suspend the work on the Hastings and Dakota Division, but the work has been resumed and 178.70 miles were completed and placed in operation June 30th, 1915.

On June 30th, 1915, the following new sections of second main track were completed and placed in operation:

Chicago and Council Bluffs Division in Iowa:	
One mile east of Delmar to Lost Nation, Iowa	12.80 miles
Elcoron to Capron, Iowa	40.46 "
Coon Rapids to Manilla, Iowa	31.90 "

Total

Hastings and Dakota Division:	
Hopkins to Cologne, Minn.	23.87 miles
Minnesota Falls to Gt. Northern Tower, Minn.	5.80 "
West of Montevideo, Minn., to Double Track Switch	10.09 "

Total

AUTOMATIC BLOCK SIGNALS

During the year ending June 30th, 1915, installations of automatic block signals have been completed, as follows:

La Crosse Division:	
Portage to North La Crosse, Wis.	104.1 miles
River Division:	
Bridge Switch to Minnesota City, Minn.	30.5 "
Hastings and Dakota Division:	
Summit to one mile east of Milbank, S. D.	23.1 "
Chicago and Council Bluffs Division in Iowa:	
Green Island to Capron, Iowa	152.9 "
Slater to Coon Rapids, Iowa	51.8 "
Idaho Division:	
Center Street, Spokane, to Northern Pacific Crossing	
Spokane	1.4 "

Since June 30th automatic signals have also been placed in service on the Chicago and Council Bluffs Division in Iowa, between Coon Rapids and Manilla. These installations comprise a total of 395.2 miles and make the automatic block practically continuous from Chicago to Minneapolis and from Chicago to Manilla.

The installation of automatic signals on the Hastings and Dakota Division from Hopkins to Cologne, Minnesota, a distance of 21.5 miles, is now in progress and will be completed in the near future.

The installation of automatic signals on the Rocky Mountain Division from Butte Yard to Finlen, a distance of 16 miles, has been authorized, and work will be started in the near future.

ELIMINATION OF GRADE CROSSINGS

The work of depressing the tracks of the Hastings and Dakota Division, from Iliawatha avenue to Hennepin avenue, in the city of Minneapolis, a distance of about three miles, was somewhat delayed during the past year. It includes the elimination of thirty-seven grade crossings. On June 30th, 1915, however, the work was about 64% completed, and it is planned to complete all of this work during the season of 1916.

The elevation of the tracks along the Bloomingdale Road, in the city of Chicago, which includes the elimination of 35 grade crossings and extends for a distance of 2.4 miles, was about 95% completed on June 30th, 1915.

The elevation of tracks in the city of Milwaukee has been somewhat delayed during the past fiscal year. This work extends from Kinnickinnick avenue to Fowler street, and from Clinton street to First avenue, a distance of 1.4 miles, and on June 30th, 1915, was 30% completed. It is estimated that it will take at least two years to complete this work, and when completed 14 grade crossings will have been eliminated in that city.

Considerable progress has been made in connection with the elevation of tracks on the Chicago and Evanston Division from Montrose avenue to Howard avenue, Chicago, a distance of 4.4 miles, and on June 30th, 1915, this work was 30% completed. It will probably take at least two years to complete this track elevation work which will eliminate 36 grade crossings.

NEW LINES AND EXTENSIONS

The line of railway from Lewistown to Great Falls, Montana, a distance of 137 miles, was completed and opened for operations early in September, 1914.

The grading of the Choteau Line, extending from Great Falls to Arzawam, Montana, a distance of 70 miles, is completed, but track laying has been temporarily suspended.

Construction work on the Newwood River Line, a logging road, extending 18.25 miles northwesterly from Merrill, Wis., was completed and the line placed in operation in December, 1914.

TUNNELS

The construction of the Snoqualmie Tunnel, at the summit of the Cascade Mountains, was completed and the tunnel placed in operation on January 17th, 1915. The opening of this tunnel shortens the main line of the Coast Division 3.6 miles, eliminates interruptions from snow slides, and also eliminates 6.4 miles of ruling grade.

ELECTRIFICATION

The electrification of the Puget Sound Lines, which was commenced in April, 1914, has made such progress that the line between Deer Lodge and Three Forks, a distance of 114.4 miles, will be ready for full electric operation during the Spring of 1916. The electrification of the second division, between Three Forks and Harlowton, a distance of 114.2 miles, was commenced in April, 1915, and it is probable that this division will be ready for operation early in 1917.

RESERVE FOR ACCRUED DEPRECIATION

At the close of the fiscal year, ending June 30th, 1914, there was at the credit of Reserve for Accrued Depreciation the sum of \$6,398,789.90.

A certain percentage of the total cost of equipment, aggregating \$1,376,091.46, has been credited to this Reserve for the estimated depreciation of locomotives, passenger train cars, freight train cars and work train cars accrued during the year.

There has been charged to this Reserve an amount of \$177,816.39, representing the accrued depreciation, previously credited, on locomotives and cars destroyed, sold or taken down.

The balance of this Reserve, June 30th, 1915, as shown on page 24, is \$7,597,064.97, which represents the estimated depreciation of rolling stock subsequent to June 30th, 1907.

CAPITAL STOCK

At the close of the last fiscal year the share capital of the Company amounted to \$233,130,300.00 and consisted of \$116,855,400.00 of Common Stock and \$116,274,900.00 of Preferred Stock. It has been increased during this fiscal year by \$506,000.00 of Common Stock issued and sold. The total amount of Capital Stock at the close of this fiscal year is \$233,636,300.00, of which \$434,400.00 is held by the Company.

FUNDED DEBT

At the close of the last fiscal year the Funded Debt of the Company was \$486,881,154.66.

It has been decreased during the fiscal year by \$4,748,000.00 Terminal Mortgage bonds retired.

The amount of bonds at the close of this fiscal year is \$482,133,154.66, of which \$123,893,800.00 are in the Treasury of the Company and \$358,239,354.66 are outstanding.

TREASURY BONDS

At the close of the last fiscal year the amount of the Company's bonds in its treasury was \$153,572,500.00.

It has been decreased as follows:

General and Refunding Mortgage 4½% bonds sold.....	\$589,000.00
General and Refunding Mortgage 5% Convertible bonds sold.....	29,089,700.00
Total decrease	\$29,678,700.00
	=====

At the close of this fiscal year bonds in treasury amounted to \$123,893,800.00, as follows:

General and Refunding Mortgage Bonds, available for the acquisition of additional property or for other additions and betterments	\$107,310,800.00
Bonds certified by trustees, to reimburse the Company for expenditures from earnings for additional property acquired, for other additions and betterments and available for such corporate purposes as the Board of Directors may authorize: General and Refunding Mortgage Bonds....	\$16,424,000.00
General Mortgage Bonds.....	159,000.00
Total	\$123,893,800.00

OPERATING REVENUES

The Operating Revenues for the year were \$91,435,374.26—a decrease of \$2,178,325.72 compared with the previous year.

The revenue from freight traffic was \$63,953,798.62—69.95% of total revenue—a decrease of \$1,361,956.17, or 2.09%.

The number of tons of freight carried was 32,959,392—a decrease of 47,885 tons, or .14%.

The following classes of commodities show an increase compared with the previous year: Products of Agriculture, 580,423 tons; Products of Animals, 205,829 tons; Products of Mines, 559,555 tons. The following commodities show a decrease: Products of Forests, 545,140 tons; Manufactures, 404,937 tons, and Commodities Not Specified, 443,615 tons.

The number of tons of all agricultural products carried during the year was 7,742,673 tons—an increase compared with the previous year of 8.10%. Agricultural products comprised 23.40% of the total tonnage carried, compared with 21.70% of the total tonnage of last year.

The number of tons of commodities other than agricultural products carried during the year was 25,216,719 tons—a decrease compared with the previous year of 628,308 tons, or 2.43% the per cent of the total being 76.51% against 78.30% last year.

The number of tons of revenue freight carried one mile was 8,185,988,375—an increase of 106,298,870, or 1.32%. The revenue per ton per mile was .7813 cent—a decrease of .0265 cent, or 3.28%. The average miles each ton of revenue freight was carried was 248.37 miles—an increase of 3.58 miles, or 1.46%.

The number of tons of revenue freight carried per loaded car was 16,835, against 16,498 last year—an increase of 2.04%. The number of tons of revenue freight per freight and mixed train mile was 390.21, against 379.78 last year an increase of 2.75%. The revenue from freight per freight and mixed train mile was \$3.0486, as against \$3.0678 last year—a decrease of .63%.

The revenue from passenger traffic during the year was \$17,952,428.18—19.63% of the total revenue—a decrease of \$1,008,796.40, compared with the previous year, or 5.32%.

The number of passengers carried was 16,065,456—a decrease of 360,560, or 2.20%. The number of passengers carried one mile was 858,452,321—a decrease of 53,923,494, or 5.91%.

The revenue per passenger per mile was 2.091 cents—an increase of .013 cent, or .63%. The average miles each passenger was carried was 53.43 miles—a decrease of 2.11 miles, or 3.80%.

OPERATING EXPENSES

The Operating Expenses for the year were \$61,971,701.03, a decrease of \$918,600.21, compared with the previous year.

The expenses of Maintenance of Way and Structures were \$10,377,184.60; Maintenance of Equipment, \$13,737,535.32; Traffic Expenses, \$1,756,800.69; Transportation Expenses, \$35,697,961.43; Miscellaneous, \$722,635.21; General Expenses, \$1,862,938.89; and Transportation for Investment—Cr., \$2,183,355.11.

There was an increase in Maintenance of Equipment of \$112,439.68; in General Expenses of \$198,859.92 (due largely to the additional help required in preparing statistics for the Western Advance Rate Passenger and Freight Cases before the Interstate and State Commissions) and Transportation for Investment—Cr., \$364,889.50.

There was a decrease in Maintenance of Way and Structures of \$344,915.08; in Traffic Expenses of \$42,820.78; in Transportation Expenses of \$1,150,972.29; and in Miscellaneous Operations of \$56,081.16.

During the year 39 steel bridges, aggregating 2,980 feet in length, and 12 masonry bridges, aggregating 1,603 feet in length, were built—replacing 4,026 feet of wooden bridges, 407 feet of iron bridges and 150 feet of embankment; and 19,025 feet of wooden culverts were replaced with iron and concrete pipe. About 3 miles of pile bridges were filled with earth, 44 bridges having been completely filled and 43 reduced in length by filling.

SUBSIDIARY COMPANIES

The operation for the fiscal year of the Subsidiary Companies named below show the following results:

These companies are operated independently, and their Revenues and Expenses are not included in the statement of the Chicago, Milwaukee & St. Paul Railway Company, shown on page 7 of this report.

TACOMA EASTERN RAILROAD COMPANY

Operating Revenues	\$405,162.20
Operating Expenses	322,050.46
Net Operating Revenue.....	\$83,111.74
Taxes Accrued	48,775.02
Operating Income	\$34,336.72
Rents Received	\$23,289.45
Hire of Equipment.....	46,658.17
Miscellaneous	337.89
Gross Corporate Income.....	\$104,622.23
DEDUCTIONS:	
Interest Accrued on Funded Debt.....	\$44,200.00
Interest paid Chicago, Milwaukee & St. Paul Ry. Company	140,166.71
Non-Operating Property Expenses.....	29,390.71
Rents Paid	900.00
Miscellaneous	213.25
Net Corporate Deficit.....	\$110,248.44

BELLINGHAM & NORTHERN RAILWAY COMPANY

Operating Revenues	\$197,716.04
Operating Expenses	146,233.90
Net Operating Revenue	\$51,482.14
Taxes Accrued	24,483.51
Operating Income	\$26,998.63
OTHER INCOME:	
Rents Received	\$7,058.71
Hire of Equipment	4,634.28
Sinking Fund	838.57
Gross Corporate Income	\$39,530.19
DEDUCTIONS:	
Interest Accrued on Funded Debt.....	\$20,425.00
Sinking Fund	16,836.25
Hire of Equipment	2,815.00
Rents Paid	2,305.00
Miscellaneous	150.92
Net Corporate Deficit.....	\$12,010.98

GALLATIN VALLEY RAILWAY COMPANY

Operating Revenues	\$113,614.70
Operating Expenses	88,772.81
Net Operating Revenue	\$24,841.89
Taxes Accrued	13,434.25
Gross Corporate Income.....	\$11,407.64
DEDUCTIONS:	
Interest paid Chicago, Milwaukee & St. Paul Ry. Company	\$63,300.00
Hire of Equipment.....	14,144.40
Net Corporate Deficit.....	\$96,036.76

MILWAUKEE TERMINAL RAILWAY COMPANY

Operating Revenues	\$148,877.99	
Operating Expenses	102,927.51	
Net Operating Revenue.....	\$45,950.48	
Taxes Accrued	8,446.83	
Operating Income	\$37,503.65	
Rents Received	1,999.05	
Gross Corporate Income.....	\$39,502.70	
DEDUCTIONS:		
Interest paid Chicago, Milwaukee & St. Paul Ry. Company	\$41,699.71	
Hire of Equipment.....	2,873.75	
Non-operating Property Expenses.....	963.47	
Rents Paid	570.54	\$46,107.47
Net Corporate Deficit.....	\$6,604.77	=====

BIG BLACKFOOT RAILWAY COMPANY

Operating Revenues	\$57,327.61	
Operating Expenses	30,824.56	
Net Operating Revenue.....	\$26,503.05	
Taxes Accrued	2,057.93	
Operating Income	\$24,445.12	
Income from Non-Operating Property.....	1,277.66	
Gross Corporate Income.....	\$25,722.78	
DEDUCTIONS:		
Interest paid Chicago, Milwaukee & St. Paul Ry. Company	\$26,513.94	
Hire of Equipment.....	13,896.73	
Rents Paid	3,296.79	43,707.46
Net Corporate Deficit.....	\$17,984.68	=====

For details of operation, reference is made to the statements of the General Auditor, appended hereto.

By order of the Board of Directors.
August, 1915

A. J. EARLING, President.

GENERAL BALANCE SHEET

ASSETS—JUNE 30TH, 1915

PROPERTY INVESTMENT:		
Road and Equipment.....	\$564,740,361.95	
Reserve for Accrued Depreciation—Cr.	7,597,064.97	
	\$557,143,296.98	
Securities:		
Securities of Controlled Companies—Unpledged:		
Stocks	\$9,026,833.90	
Funded Debt	5,541,000.00	14,567,833.90
Other Investments:		
Advances to Controlled Companies for Construction, Equipment and Betterments	\$34,993,758.54	
Miscellaneous Investments:		
Physical Property	620,741.89	
Investment Securities—Unpledged.....	47,582.05	35,662,082.48
TOTAL CAPITAL ASSETS.....	\$607,373,213.36	
WORKING ASSETS:		
Cash	\$15,426,097.28	
Traffic and Car-Service Balances.....	17,961.28	
Due from Agents and Conductors.....	2,264,099.83	
Miscellaneous Accounts Receivable.....	3,402,908.76	
Materials and Supplies.....	8,258,191.89	
Other Working Assets.....	160,272.08	29,529,531.12
ACCRUED INCOME NOT DUE:		
Unmatured Interest	570,334.99	
DEFERRED DEBIT ITEMS:		
Working Funds	\$166,427.79	
Special Deposits	65,664.44	
Taxes Paid applicable to period subsequent to June 30th, 1915.....	1,056,176.43	
Cash and Securities in Sinking Funds....	534,521.23	
Securities in Insurance Fund.....	2,818,100.00	
Other Deferred Debit Items.....	2,276,504.88	
		6,917,394.77
		\$644,390,474.24

LIABILITIES—JUNE 30TH, 1915

CAPITAL STOCK:		
Common Stock:		
In Hands of Public.....	\$117,356,100.00	
Held by Company.....	5,300.00	\$117,361,400.00
Preferred Stock:		
In Hands of Public.....	\$115,845,800.00	
Held by Company.....	429,100.00	116,274,900.00
Premiums Realized on Capital Stock.....		36,183.87
Total Capital Stock.....		\$233,672,483.87
FUNDED DEBT:		
Mortgage Bonds:		
In Hands of Public.....	\$224,703,200.00	
Held by Company.....	125,884,300.00	\$350,587,500.00
Debenture Bonds:		
In Hands of Public.....	\$131,443,454.66	
Held by Company.....	102,200.00	131,545,654.66
Total Funded Debt.....		\$482,133,154.66
Total Capital Stock and Funded Debt.....		\$715,805,638.53
Less Stock and Bonds <i>unsold</i> , held by the Company		124,236,800.00
TOTAL CAPITAL LIABILITIES		\$591,568,838.53
WORKING LIABILITIES:		
Bills Payable	\$30,280.20	
Traffic and Car-Service Balances.....	554,623.71	
Pay Rolls and Vouchers.....	7,393,079.56	
Miscellaneous Accounts Payable.....	389,248.00	
Unclaimed Dividends	3,279.00	
Interest Coupons not Presented.....	167,830.77	
Matured Funded Debt.....	5,400.00	
Other Working Liabilities.....	266,502.45	8,810,243.69
ACCRUED LIABILITIES NOT DUE:		
Interest Accrued on Funded Debt.....	\$5,459,273.27	
French Government Tax—European Loan of 1910	832,129.93	6,291,403.20
DEFERRED CREDIT ITEMS:		
Insurance Department Fund—Reserve....	\$2,721,272.17	
Other Deferred Credit Items.....	550,730.41	3,272,002.58
APPROPRIATED SURPLUS:		
Reserves from Income or Surplus:		
Invested in Sinking Funds.....		543,611.23
PROFIT AND LOSS—BALANCE:		
Surplus		\$610,486,099.23
		33,904,375.01
		\$644,390,474.24

Railway Age Gazette

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L. B. SHERMAN, Vice-President. HENRY LEE, Sec'y & Treas.
The address of the company is the address of the officers.

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By E. A. SIMMONS, President.

Sworn to and subscribed before Harry E. French, Notary Public for Kings County, N. Y. (No. 15), whose certificate is filed with the County Clerk of New York (No. 13), and whose commission expires March 30, 1916, on September 29, 1915.

PURCHASE OF THE RAILWAY ELECTRICAL ENGINEER

The *Railway Electrical Engineer*, which is now published by the Wray Publishing Company, at Chicago, has been bought by the Simmons-Boardman Publishing Company, the publisher of the *Railway Age Gazette*, *The Signal Engineer* and the *Railway Age Gazette, Mechanical Edition*. Beginning with November it will be issued by the Simmons-Boardman Publishing Company from its New York office, Woolworth Building, New York City. It will not be consolidated with any of the other periodicals of this company, but will be continued as a separate monthly publication. Edward Wray, heretofore publisher of the *Railway Electrical Engineer*, will remain with the paper, becoming business manager.

The use of electricity on steam railways has for some years been fast becoming more varied and extensive. One needs but refer to its increasing adoption for the lighting of trains and in connection with the operation of shop machinery and block signals for an illustration of this statement. Of even greater significance is the progress which has been made in the electrification of steam railways. While the mileage which has been electrified is comparatively small, the number and variety of the pieces of work that have been carried out and that are under consideration are great; and there is ample reason for believing that within the comparatively near future there will be a material increase in the mileage.

It is evident that there is a large field of usefulness for a publication devoted especially to the technical details of the numerous problems raised by the increasing use of electricity on steam railways. It is to this field that the *Railway Electrical Engineer* has devoted itself in the past with much success. It is to this field that, under its new management, it will continue to devote itself; and since, under the new management, it will be able to command the services of a larger staff of experts in the field of railway transportation, it is to be hoped and expected that it will be able to cover its field even more successfully. The readers of the *Railway Age Gazette* will profit also by the addition of a strong electrical engineering staff.

Recently the Interstate Commerce Commission's valuation forces have been making more rapid progress. In part, of course, this

Speed
or
Accuracy

is probably due to the fact that the organization is becoming more skilled, but it must be remembered that it would be folly of the most expensive kind to sacrifice accuracy for speed. One party recently

"valued" a rather difficult line at an average of something faster than four miles per eight-hour day. On an old line, where it is difficult to determine where the original surface of a hill through which a cut has been made was, where ballast may have worked down to a great depth in some places and be comparatively shallow in others, where the only way to determine the proportion of various kinds of ties is to inspect considerable portions of each mile, and where structures are of varying degrees of age and of material and of original cost, it would seem that to cover four miles in an eight-hour day, the cross section party, which was the slowest party, consisting of two I. C. C. inspectors and one railroad man, means either that the commission has secured remarkably efficient men or that guesses are being pretty freely used. All through the hearing before the commission, reported elsewhere in this issue, insistence was placed on the vital necessity for absolute mathematical accuracy in the collection of data. Nothing would be so fatal to a valuation, if it were to be attacked in a court of law, as to show that the commission's data on

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*Illustrated.

which the valuation was based were inaccurate or incorrect. In the interests of all concerned, therefore, it is of utmost importance that accuracy shall not be sacrificed for speed.

In an editorial in the *Railway Age Gazette* for September 24, page 549, on "Railway Returns for the Fiscal Year," it was erroneously stated that the express earnings of the railways per mile had been reduced from \$960 in 1914 to \$302 in 1915. The \$960 item for 1914, as shown in the Interstate Commerce Commission's summary, includes earnings from mail, express and other transportation combined, while for 1915 these three classes of earnings are separated, as follows: Mail, \$249; express, \$302, and other transportation, \$366, making a total of \$917, which is comparable with the \$960 for 1914. Also these three items should have been bracketed in the table published on page 539, to show the true comparison with the 1914 figures.

**Erroneous Statement
as to
Express Earnings**

At the recent convention of the Traveling Engineers' Association favorable action was taken on the recommendation that arrangements be made with the International Railway Fuel Association to hold the conventions of the two associations on consecutive dates for the purpose of enabling those who are members of both associations to attend both conventions with a reduction in the amount of time they are absent from their roads. This is a step in the right direction and shows a disposition on the part of the railroad men to get the most they can out of the time spent away from their offices. Such an arrangement in the case of these associations is especially logical, as there are many men who are members of both organizations, there being numerous subjects considered in the Fuel Association of direct interest to the traveling engineer. The plan should receive the hearty support of the higher mechanical officers, who would find it much to the advantage of their roads to have their men attend both conventions. The making of final arrangements was left to the executive committees of the two associations.

The cab-signal and automatic-stop installation lately put in use on the Western Pacific at Oroville, California, and described on another page of this issue, will command widespread interest; and this notwithstanding the inventor's apparent indifference to some of the demands of conservative signal engineers. It is the first example, anywhere, even for a short distance, of automatic block signaling—maintenance of the space interval between trains without the intervention of signalmen—where no visual roadside signals are provided, and the report of the experience of twenty or more engineers with this arrangement will be awaited with active curiosity by railroad men everywhere. It is also the first serious attempt to employ magnetic induction for an automatic stop. As in some quite respectable experiments made before now, the dangers of the "open circuit" are boldly faced, and large dependence is placed on excellence of material and workmanship and first-class care and inspection; though railroad officers are always demanding appliances which will be safe in spite of deficiencies in these respects. The boldness of the proprietor is evidenced also in the provision of apparatus which, apparently, has been multiplied regardless of expense; and the reduction of the capacity of the railroad by the use of the overlap has for him no terrors. For satisfactory tests the absence of a severely cold climate is a great disadvantage; but in other respects this installation should afford opportunity for making numerous instructive studies, and it is to be hoped not only that thorough studies will be made, but that the world will be given the benefit of them.

**A Signaling
Experiment at
Oroville**

"RAILROAD BANKRUPTCY"

UNDER the above caption the Des Moines Register and Leader refers to an editorial in the *Railway Age Gazette* of October 1, showing that the mileage of railways in the hands of receivers in the United States is now greater than at any past time. The Register and Leader remarks that these statistics were published just when the western rate case had been reopened. We assure our esteemed but somewhat suspicious contemporary that this was entirely a coincidence. It just happened that the receivership record was broken at the very time when the western rate case was being reopened. If it had been broken earlier we would have mentioned the fact sooner. The Register and Leader also comments on the fact that we published the statistics "unaccompanied with any explanation of causes, or suggestion of remedies," and remarks that why this was done "must be left open to conjecture." It need not remain open to conjecture any longer. The *Railway Age Gazette* in every case where a large railway has become bankrupt has presented what it has regarded as the explanation. It has also repeatedly suggested what it believes are the remedies for the conditions which are putting so many railways into the hands of receivers. We supposed that our views on this general subject were familiar to our readers. Since, however, our contemporary apparently desires us to repeat them we shall gladly do so.

Evidently the Register and Leader has not been so diligent a reader of our columns as it must be if it is to keep correctly informed regarding developments in the field of transportation in this country. Because of this lack of diligence on its part it uses language indicating that it assumes that the *Railway Age Gazette* attributes the grief to which all the bankrupt roads have come entirely to government regulation. This assumption is not correct. The *Railway Age Gazette* knows as well as the Register and Leader, and perhaps even better, not only that the troubles of numerous roads are due largely to their own mismanagement, but also some of the forms which this mismanagement has taken. For example, we recognize the fact, and always have, that the Wabash became bankrupt chiefly because it was overcapitalized and because its credit was unwisely used in various ventures, especially in securing a very expensive entrance into Pittsburgh. We have said in past issues that the Rock Island was brought to its present plight largely because the Reid-Moore interests, for their own selfish purposes, piled one holding company on another, thereby putting a strain on the earning capacity of the property which it could not hope to stand, except under highly favorable business conditions, and because these interests made investments of the road's assets in outside properties in which it was neither wise nor righteous for them to make such investments. Likewise, we have pointed out that the necessity for the receivership of the Frisco was produced largely by forms of financial mismanagement which few railway men would care to try to defend.

But it is not a fact, as the Register and Leader implies, that in not a single case has a railway recently become bankrupt without having been wrecked by "bad management or worse." Where, for example, was the "bad management or worse" on the Missouri, Kansas & Texas? The only crime that its management has committed, so far as we have ever heard, is that of issuing more short time notes, to raise money for needed improvements, than it could get renewed. It would not have issued the short time notes if it could have issued bonds at a reasonable rate of interest, and it would not have issued bonds if it could have sold stock at a reasonable price. The management and operation of the property appear actually to have been better when it became bankrupt than they ever were before.

The same thing may be said of many other railways that are now insolvent. There are in this country 82 railways, large and small, in the hands of receivers. Where is the evidence that the plight of every one of them, or of more than a few of them,

is due to mismanagement? It has not been forthcoming. But suppose it is a fact that the railways which are broke are those which have been the poorest managed. Has that any significance? Is it to be assumed that the best managed and strongest will become bankrupt first? Naturally it is the weakest, whether from poor management or other causes, that first go down. If a man has a cold it usually settles in the weakest part of his organism. Is the fact that it settles in a weak spot any reason for neglecting it? People die from pneumonia or tuberculosis who proceed on that theory. So if the fact that the railways which are considered the weakest are going into the hands of receivers is not recognized as indicating a serious condition for our entire railway system, the ultimate results will be disastrous for all the railways.

The Register and Leader says that "if there were any predisposing cause for universal railroad bankruptcy outside of the bond and stock operations of the railroad speculators" the *Railway Age Gazette* would doubtless set it forth, "with great clearness and force." There is such a "predisposing cause" and since our contemporary both wants and needs light on the subject we shall take pleasure in shedding it. In numerous instances there have been special reasons, taking more particularly the form of financial mismanagement, why individual roads have gone into the hands of receivers. But there have also been extremely strong and unfavorable "predisposing causes" affecting almost all of the roads, and these influences have been more or less largely responsible for the failure of every road that has become bankrupt. Furthermore, unless the force of these influences is mitigated there will be a steadily increasing number of roads turned over to the courts for operation. Since the Register and Leader has mentioned the western rate case, we shall refer especially to figures for the roads directly interested in that case.

In its opinion in the western rate case (page 521), the Interstate Commerce Commission quotes statistics introduced by the carriers showing that in the six years from 1907 to 1913 the increase in the cost of road and equipment of 41 western roads was \$1,070,000,000, and that the increase in their net operating income was only \$12,300,000. The increase in net operating income was only sufficient to yield 1.2 per cent on the increase in cost of road and equipment. In the same opinion (page 521) the commission gives figures compiled by itself for 26 western roads showing that during the same six years the increase in their investment in road and equipment was \$990,000,000, and that the increase in their net operating income was only \$7,300,000. Therefore, the increase in net operating income was sufficient to yield a return of only 7/10 of 1 per cent on the increase in property invested. In the same opinion the commission specifically vouches for the correctness of the statistics of the roads regarding increases in property investment since 1907. In other words, the increase in net returns was far less than adequate to pay bare interest on the added investment. Advancing a year further, we find that between 1907 and 1914 the increase in cost of road and equipment of 41 western railways was \$1,235,876,642, while between the same years there was an actual decrease in their net operating income of \$23,599,435. In other words, after increasing the investment in their properties \$1,235,000,000 they had less net money with which to pay a return on investment than they had before. It should be noted that these figures are not affected by the financial management of the roads, whether good or bad. They are based on actual investment, actual earnings, actual expenses and actual taxes, and have no reference to capitalization, and it is hard to see how the relations between them could have been different, no matter how different the financial management of individual properties might have been.

Why has the operating income of these roads been declining while the investment in them has been increasing? Here are some of the reasons. Between 1907 and 1914 the average annual wage per railway employee in the western district increased 22.6 per cent. During the same period taxes per mile on the western lines increased from \$226.24 to \$426.67, or over 70 per cent. It

is easy to see the effect of these increases in wages and taxes on the financial position of the 41 roads that are parties to the western rate case. Between 1907 and 1914 the total operating revenues per mile of these roads increased from \$8,704 to \$9,267, or 6.4 per cent. Their operating expenses and taxes increased, meantime, from \$6,084 to \$7,110, or 16.8 per cent. The result was that their operating income declined from \$2,620 to \$2,157, or 17.3 per cent. It will be noted that this reduction in net took place in spite of the fact that there was an increase in gross, and this increase in gross merely reflects the fact that the railways handled more traffic and rendered more service per mile to the public at the end of the period than at its beginning.

Now, turning to the cases of individual properties, let us examine the figures of certain of the roads which have become bankrupt. Perhaps they also will throw some light on the nature of what the Register and Leader has so happily called the "predisposing cause for universal bankruptcy." If we should find that these individual roads enjoyed an increase in their net return and become bankrupt in spite of that, this would be conclusive reason for attributing their downfall solely to financial mismanagement. But as a matter of fact, in every case they have had heavy reductions in their *net return from operation*, as indeed has been true of a very large majority of the railways in western territory, regardless of whether they have been well or ill managed financially.

The following comparisons are all for the years 1907 to 1914. The operating revenues per mile of the Missouri Pacific increased from \$6,378 to \$6,790, or 6.4 per cent. Its operating expenses and taxes increased from \$4,754 to \$5,954, or 25 per cent, and in consequence its operating income decreased from \$1,624 to \$836, or 48 per cent. The operating revenues per mile of the St. Louis & San Francisco increased from \$7,735 to \$8,540, or 10.4 per cent. Its operating expenses and taxes increased from \$5,059 to \$6,585, or 36 per cent, and its operating income decreased from \$2,676 to \$1,955, or 26.9 per cent. The operating revenues per mile of the Wabash increased from \$10,904 to \$11,933, or 9.5 per cent. Its operating expenses and taxes increased from \$8,468 to \$11,095, or 31 per cent, and its operating income decreased from \$2,436 to \$838, or 65 per cent. The operating revenues per mile of the Rock Island lines increased from \$7,821 to \$8,313, or 6.2 per cent. Their operating expenses and taxes increased from \$5,696 to \$6,859, or 20 per cent, and their operating income decreased from \$2,125 to \$1,454, or 31 per cent. The Missouri, Kansas & Texas had a different experience from any of these roads. It had a decrease in total earnings per mile as well as in net return. Its operating revenues per mile declined from \$8,523 to \$8,241, or 3.3 per cent. Its operating expenses increased from \$5,753 to \$6,469, or 12 per cent, and its operating income decreased from \$2,770 to \$1,772, or 36 per cent.

The foregoing figures make it clear that these roads were not reduced to bankruptcy, as is so often implied, solely by financial mismanagement. They suffered during these seven years reductions in the net return per mile available for capital purposes varying from 27 to 65 per cent; and all the railways involved in the western rate case suffered an average reduction of 17 per cent. There are a few strong roads that have come through in fine shape, but a large majority would be suffering from the effects of the heavy reduction in their net return if the financial management of all had been as good as that of the best. Now, why did these reductions in net return occur when operating revenues were increasing? Simply because wages and taxes increased and the regulating authorities would not allow the increases in rates that were required to offset the unavoidable increases in outgo.

The Register and Leader, by implication, called on the *Railway Age Gazette* not only to state the causes of "railroad bankruptcy," but also to suggest the remedies. We are not averse to trying to do so. The Register and Leader doubtless will be surprised to find that one of the remedies we suggest is that the Interstate Commerce Commission be given some form of authority to regulate the issuance of railroad securities which will make impossible such financial mismanagement as has oc-

curred on the Rock Island, the Frisco, the Wabash and other roads. It may also be surprised to learn that we began advocating this kind of legislation before the Hadley Railroad Securities Commission made its report, which probably was before it was advocated by the esteemed Register and Leader. But, as the facts clearly show, no amount of regulation of securities in the past would have prevented financial distress on the part of many railways, simply because their financial distress is due mainly to the circumstance that their expenses and taxes have been increasing faster than their earnings. Regulation of the issuance of securities would not have prevented the reduction of net return from operation in the past, and it would not cause an increase in net return from operations in the future. The only thing which will make the net return of most of the railways adequate is the application of the second remedy we suggest, viz., an increase in rates; and the needed increase in rates cannot be obtained except with the consent of the regulating authorities. Because the regulating authorities have refused the needed increase in rates in the past they must shoulder their share of responsibility for the fact that there are now more miles of railways in the hands of receivers than ever before. If they continue to refuse it they will have to shoulder their share of responsibility for the additional bankruptcies that will occur.

When allusion is made to the unsatisfactory condition to which the railways of the country have been brought some people grow red in the face and shout, "Regulation!" But that is not the entire explanation. It is only part of it. Other people, when the same subject is mentioned, get red in the face and bellow, "Wall street!" That is not the entire explanation, either. The trouble is due mainly to a combination of regulation and Wall street, with a dash of labor unionism to add spice. This, at least, is the explanation of the *Railway Age Gazette*. If the Des Moines Register and Leader, or any other authority, can offer a better one it would be both welcome and useful.

GRADE CROSSING ELIMINATION

THE railroads entering the city of Chicago have spent, to date, about \$75,000,000 for the elimination of grade crossings within the city limits. It is understood that this work is to be continued until all tracks in the city have been elevated, at an ultimate cost to the companies of more than \$150,000,000. Without question, the roads have enjoyed some return for the money expended in the way of economies of operation from increased speed of trains, elimination of crossing watchmen, and also from a reduction in damage claims. The inference that these savings represent a reasonable return on the investment is, however, without foundation. It is doubtful if the most reasonable estimate of the savings would be over 25 per cent of the interest charge. The reports of the Chicago Track Elevation Commission have cited a number of material advantages accruing to the public, among which are mentioned the saving in time to people using the streets and the reduction in fire hazard owing to the elimination of delays to fire-fighting apparatus, but these are advantages which are too intangible to be measured in figures of dollars and cents.

It is clear, therefore, that this vast outlay requires justification in terms not expressed in dollars and cents, and is to be justified presumably by the reduction attained in loss of life and limb from grade crossing accidents. Unfortunately, there are no records of grade crossing accidents available antedating the inception of track elevation. The earliest authentic records are for the year 1899, after the raising of the tracks had been in progress for seven years. As shown in the accompanying diagram, there has been a noticeable reduction in the number of these accidents, and it is but fair to point out that this reduction does not represent the full effect, since it has taken place during an enormous increase in the population.

Granting that we cannot measure lives in cash, and assuming

that separation of grades in Chicago has been amply justified by the results attained, it will be interesting to note the lack of interest of the public in measures to reduce accidents from other causes. The question arises, whether money being spent in Chicago for track elevation would not cause a greater reduction in accidents if expended along other lines.

In 1914, 31 persons were killed and 111 were injured by trains crossing city streets. In the same year 100 others were killed and 148 were injured by being hit or run over by trains at points not on public streets. By far the most of these were trespassers, many of whom were on the tracks that have been elevated, yet these accidents concern the city so little that it offers the railroads almost no assistance or even encouragement in their efforts to reduce trespassing. That there has been an enormous increase in accidents to pedestrians because of automobiles is generally known, but the situation thus created does not often receive forcible expression and actual statistics such as we give below for the city of Chicago are rarely given publicly.

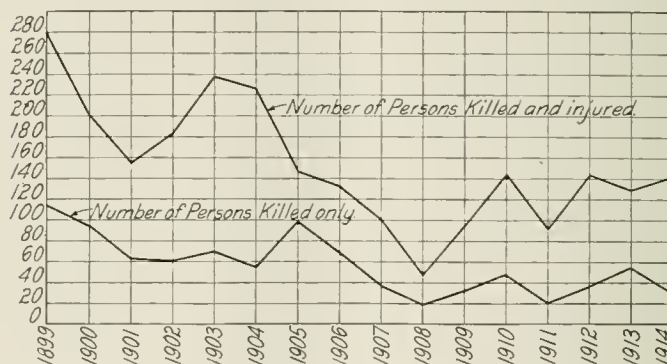
COMPARISON OF CASUALTIES TO PERSONS AT GRADE CROSSINGS OF RAILROADS AND STREETS, WITH CASUALTIES TO PEDESTRIANS WHO WERE STRUCK OR RUN OVER BY VEHICLES ON STREETS*

Year	Grade Crossing Accidents		Run Over or Struck by Vehicles	
	No. Killed	No. Injured	No. Killed	No. Injured
1905	99	48	34	602
1906	68	65	45	643
1907	38	62	48	774
1908	20	27	53	878
1909	33	63	57	1124
1910	48	96	52**	946**
1911	20	72	103	1843
1912	37	107	75	2530
1913	54	77	86	3012
1914	31	111	143	3455

* Not including street cars.

** Record is for automobiles only. Record for other vehicles was not available.

In comparison with the figures for street vehicle accidents, those for the grade crossing accidents are insignificant, yet the appalling increase in the former during the last 10 years has



Record of Casualties at Grade Crossings of Streets and Railroads in Chicago for 16 Years

excited no demand for remedial measures other than suggestions to introduce auto-dodging into the curriculum of the public schools and the passing of traffic regulations that are violated daily by most of the motorists.

A large part of the growing demand for elimination of grade crossings is a direct result of the increase in the use of motor vehicles, particularly in rural districts. In many cases, as for instance on the Long Island Railroad, conditions have become serious, not because of an increase in the railroad traffic, but on account of the marked change in the character and density of the highway traffic. Notwithstanding this, the railroad is receiving scant co-operation from the public in its efforts to prevent accidents.

The public habit of requiring the railroad to "pay the piper" is especially evident in connection with this problem. Grade separation agitation in rural communities generally subsidizes very quickly when it becomes apparent that the state commission proposes to place a material portion of the burden of expense on the town or county. Plans for track changes which promise numerous damage claims against the city must be discarded for

others which reduce the potential damages, although they result in much greater expense to the railroad. Park boards insist that track elevation structures must beautify the boulevards (at the railroad's expense) as well as separate the grades.

That the railways must do their part notwithstanding apathy on the part of the people concerning other related matters can be illustrated no better than by a comparison of conditions on a well-known Chicago boulevard with those on a line of railroad parallel to the boulevard less than three blocks away. The railroad tracks are being elevated at a cost of \$3,000,000. Assuming that this work is justified, the fact remains that the trains are short, the crossings are well protected by gates and watchmen, and to cross the tracks involves small delay and occasions no alarm. Not so with the boulevard. The traffic is continuous and at only one crossing is it ever interrupted for the benefit of traffic on the cross street. At all the other streets within three miles the pedestrian is able to cross only by "making a run for it" and a timid individual may have to wait minutes for a sufficient lull in the traffic to venture off the curb. The hazards to the pedestrian in crossing this boulevard are much greater than those incurred in crossing the railroad; but no one has yet suggested elevation of the boulevard.

THE VALUATION HEARING AT WASHINGTON

ONE fundamental difficulty with the valuation of railroads is that there is no generally agreed on definition of value. In a sense, the brief and the oral argument presented by the President's Conference Committee of the railroads to the Interstate Commerce Commission, in the hearing on the principles which govern in the federal valuation of railroad property, was an attempt to get before the commission a description of what must be included as value, which cannot be taken away without due process of law. Some of the questions asked by the commissioners and by representatives of the state commissions might be taken as indicating that they thought that the railroad companies were attempting to play a game of "heads I win, tails you lose," in their definition of value. Thus, if a railroad received a right-of-way free 30 years ago, it claims that the determining factor in value—not, of course, the sole factor, but still the determining factor—is the estimated cost of that right-of-way were it to be acquired today through purchase or condemnation proceedings; while, on the other hand, it claims a higher value for land which is to be used for railroad purposes than would be the value of that land were it to be bought for agricultural or other purposes.

Again, in the question of depreciation and appreciation the railroad company claims that the added value which comes with the seasoning of a railroad roadbed should be an element in determining its value and that this appreciation should be allowed for; while, on the other hand, it claims that no allowance should be made for depreciation based on a theoretical estimate of the length of life of classes of material which are being continually renewed in the ordinary course of maintenance.

If, however, a careful study is made of the brief filed by Pierce Butler and his associates on behalf of the Presidents' Conference Committee, it will be seen that any such construction put on these arguments is erroneous. In the first place, it must be remembered that all that Mr. Butler is trying to do is to enumerate and describe the elements which go to make up value. There is no attempt made to urge on the commission an acceptance of any theories as to what weight should be given to these elements or as to how they should be combined to finally determine value. It must be remembered that there are three cost figures which the commission is to report to Congress. These are original cost, the cost of reproduction new and the cost of reproduction less depreciation. Now, if we keep to cost and try to avoid as much as possible the use of the word value, the position taken by the carrier's counsel would seem to be entirely logical. The railroad companies do not contend that in determining value the original cost of right-of-way cannot be taken into consideration. On the other hand, they specifically furnish the figures for the deter-

mination of this original cost as nearly as possible. What they do argue is that when a distinct cost, the cost of reproduction new, is to be determined the original cost has no bearing whatsoever on the facts. Regardless of what may be the theories of any one as to the right of a railroad company to participate in the increment in general values which takes place with the passage of time and the growth of population, these theories are not and should not be a factor in determining a question of fact, namely, what would be the cost of reproduction new of a given railroad property? This is something that is so, regardless of whether the man who determines it is a socialist or a firm believer in the sacredness of the rights of property.

CHICAGO & NORTH WESTERN

THE Chicago & North Western had to handle almost as much business in 1915 as in 1914, notwithstanding the fact that the company received \$3,780,000 less revenue in 1915 than in 1914. The really remarkable thing, however, is that in handling almost as great an amount of business the company was able to save in expenses \$3,930,000, so that its net operating revenues were actually slightly greater in 1915 than in 1914.

The explanation of the decrease in revenues is that the company received a ton-mile rate lower by 3.45 per cent in 1915 than in 1914 and the average passenger journey was shorter by 2.76 per cent and receipts per passenger per mile were less by 1.09 per cent. The explanation of the lower freight rate is in part presumably the result of the difference in the proportion of the various classes of commodities carried and like the lower passenger rate is the result of the working of the Minnesota rate case decision.

The Chicago & North Western operates 8,108 miles of road, of which 907 miles have second track, and included in this 907 miles is 104 miles which has third track and 95 miles which has fourth track. As will be seen from the map, the company has a double-track main line of heavy traffic density from Chicago to Omaha and a line in connection with the Chicago, St. Paul, Minneapolis & Omaha mostly double track from Chicago to Minneapolis. It has a network of lines in Wisconsin, another network in Iowa, and a main line and branches extending into the Dakota wheat country and across the northern part of Nebraska into Wyoming.

In 1915 the company handled 6,216,000,000 ton-mile of revenue freight, which was a decrease of less than a quarter of one per cent from the ton mileage handled the year before. Freight revenue amounted to \$51,924,000, a falling off of \$2,066,000, or 3.8 per cent as compared with the year before. The revenue per ton per mile was 8.4 mills in 1915 as against 8.7 mills the year before.

The total number of passengers carried amounted to 33,080,000, a decrease of less than one per cent as compared with the previous year. Passengers one mile was less by 3.68 per cent, the average distance traveled per passenger being 34.17 miles as against 35.14 miles the year before. Apparently this means a falling off in through passenger business, due presumably to the unsettled business conditions and economies which they necessitated. It is hard enough to reduce passenger train mileage to meet a falling off in local business and it is almost impossible to reduce train mileage to correspond with the falling off in through business; that is why passengers carried rather than passenger mileage is a criterion of passenger business in this case and why the statement that there was almost as much business that had to be handled in 1915 as in 1914 is justified despite the smaller passenger mileage. The average rate per passenger per mile was 1.82 cents as compared with 1.84 cents, a decrease of 1.09 per cent.

Total operating expenses amounted to \$56,372,000, a decrease, as previously mentioned, of \$3,930,000 as compared with the year before. More than half of this decrease is accounted for by a saving in transportation expenses, the total transportation expenses in 1915 being \$29,753,000, or \$2,196,000 less than in the

previous year. This is a real achievement, to cut down transportation expenses while doing as big a business as heretofore in the face of the present trend of prices. The largest single item of saving was in fuel for train locomotives, which cost \$5,083,000 in 1915, a decrease as compared with the previous year of \$964,000. The total freight train mileage was 17,251,000, which was less by 5.81 per cent than in the previous year, and the trainload of all freight east of the Missouri river was 480 tons, an increase of 8.44 per cent over the previous year, and for the whole road 443 tons, an increase of 7.68 per cent. Two other large items of saving were in payments for loss and damage to freight and injuries to persons. Payments on these two accounts in 1915 amounted to \$1,827,000, a decrease of \$458,000.

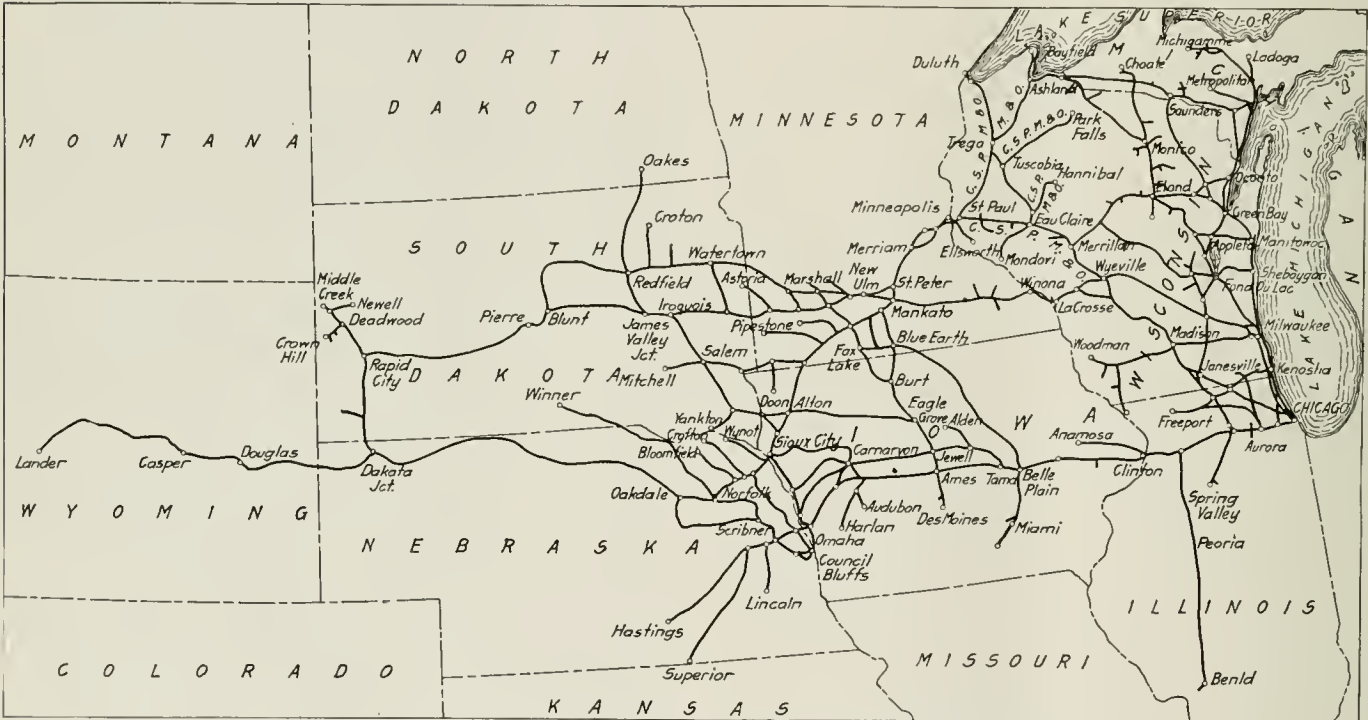
The remainder of the saving in expenses was made in a smaller expenditure for maintenance of way and structures. The expenditure on this account in 1915 was \$10,451,000, which was less by \$1,762,000 than the previous year, the larger items of saving being in roadway maintenance and track laying and surfacing, in rails, in ties, and in maintenance of structures.

There was no cut in maintenance of equipment expenses,

ever, on the North Western is pursued it will in a short time bring up the depreciation reserve to a very much larger figure.

The Chicago & North Western is, of course, one of the financially very strong roads of the United States. In 1915 a total of \$8,185,000 was spent for additions and betterments to property, of which \$4,769,000 was for equipment and the remainder for extensions, track elevation, buildings and betterment of roadway, etc. Notwithstanding this large additional investment in its property, the outstanding securities showed a net decrease of \$4,298,000. The company sold \$10,000,000 general mortgage 5 per cent bonds, due 1987, and redeemed \$12,669,000 7 per cent bonds which matured February 1, 1915, and various other small issues. At the beginning of the year there was \$19,459,000 cash on hand and at the end of the year \$9,778,000. There were no accounts and bills payable, and total current liabilities amounted to \$10,753,000 as against total current assets of \$19,386,000, which included, of course, the cash mentioned above.

As was pointed out last week in the comments on the Chicago, Milwaukee & St. Paul's annual report, the crops in much of the territory reached by the North Western are far and away the



The Chicago & North Western and the Chicago, St. Paul, Minneapolis & Omaha

which totaled \$12,649,000 in 1915, or \$290,000 more than in the previous year. A saving was made of \$224,000 in repairs of locomotives, the total in 1915 being \$4,111,000; but this was much more than offset by very largely increased charges for depreciation, \$605,000 being charged for depreciation of locomotives, which is more by \$122,000 than was charged in the previous year, and \$1,360,000 for depreciation of freight cars, which is more by \$436,000 than was charged in the previous year. The Interstate Commerce Commission's new rules for charging depreciation, under which the railroad company is ordered to charge a rate sufficient to extinguish the cost of equipment by the time it is retired, were in effect in 1915. The balance to the credit of the equipment reserve accounts at the beginning of the year was \$6,089,000 and at the end of the year, after debits for accrued depreciation on equipment retired, a credit of \$8,149,000. This is not a large amount compared with a road which has been very liberal in its depreciation charges, as, for instance, the Atchison, Topeka & Santa Fe, which at the end of 1915 had \$23,953,000 reserved for accrued depreciation. The Santa Fe, of course, operates 11,136 miles of road as against the North Western's 8,108. If the present policy, how-

best that have ever been harvested and the outlook, therefore, for the present year is particularly good. The purchase by the North Western of 40 locomotives and 5,000 freight cars puts it in a good position to take advantage of increased traffic.

The following table shows the principal figures for operation in 1915 compared with 1914:

	1915	1914
Average mileage operated.....	8,108	8,071
Freight revenue	\$51,923,861	\$53,989,475
Passenger revenue	20,528,443	21,540,543
Total operating revenues.....	80,779,675	84,559,335
Maintenance of way and structures.....	10,450,739	12,213,095
Maintenance of equipment.....	12,648,935	12,358,488
Traffic expenses	1,288,448	1,331,856
Transportation expenses	29,753,444	31,949,238
Miscellaneous expenses	604,058	665,516
General expenses	1,764,487	1,783,383
Transportation for investment—Cr.....	138,539	.....
Total operating expenses.....	56,371,573	60,301,575
Taxes	4,516,943	4,252,790
Operating income	19,883,905	20,004,969
Gross income	22,683,904	23,245,927
Net income	11,914,049	12,306,142
Sinking funds	204,054	200,473
Dividends	10,899,615	10,899,615
Surplus	810,380	1,206,055

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA

THE Chicago, St. Paul, Minneapolis & Omaha operates 1,753 miles of road. It is a subsidiary of the Chicago & North Western, and the operation of the two properties is in close harmony. The Omaha forms a natural part of the North Western system, providing feeder and main lines in Wisconsin, Minnesota, and extending down into the corner formed by Iowa, South Dakota and Nebraska.

The Chicago, St. Paul, Minneapolis & Omaha is a granger road with the greater part of its freight traffic such as would originate or be destined for an agricultural country. It has very little heavy loading traffic and little that can move in through full tonnage train loads. It is highly competitive territory where it is often necessary to give frequent freight service to get the business.

Total operating revenues in 1915 amounted to \$17,841,000, a decrease of \$369,000 as compared with the previous year; but, unlike the North Western, all of this increase was accounted for by a falling off in passenger revenues, total freight revenue amounting to \$11,523,000, or \$96,000 more than in the previous year. Operating expenses amounted to \$12,108,000, a decrease of \$727,000 as compared with the previous year. Rental payments and interest charges were somewhat higher, as were also taxes, so that the net available for dividends amounted to \$2,219,000, an increase of \$197,000 over the previous year. The company paid 7 per cent dividends on both its preferred and common stock, calling for \$2,087,000.

The saving in expenses was very largely made through smaller expenditures for maintenance of way, the total in 1915 being \$1,957,000, or \$670,000 less than in the previous year. There was \$229,000 spent for ties, or a little less than half as much as was spent in the previous year, and smaller expenditures for bridges, trestles and culverts, and roadway maintenance and track laying.

Transportation expenses cost \$6,738,000, or \$195,000 less than in the previous year. The ton mileage of revenue freight totaled 1,336,000,000, an increase compared with the previous year of 3.24 per cent, and the number of passengers carried totaled 4,768,000, a decrease of 2.34 per cent. Passengers carried one mile decreased by 5.39 per cent, the average passenger journey being but 52.92 miles as against 54.63 miles in the previous year. Like the North Western, the Omaha showed a lower ton-mile rate and passenger-mile rate, due in part, of course, to the Minnesota rate decision. The average ton-mile rate in 1915 was 8.6 mills as against 8.8 mills in the previous year, and the passenger-mile rate was 1.975 cents as against 2.031 cents in the previous year.

Like the North Western, the Omaha made a substantial gain in its trainloading, the total trainload in 1915 being 360 tons as against a trainload of 331 tons in 1914, an increase of 8.91 per cent. There was no change in the amount of stock or bonds outstanding during the year and \$565,000 was spent for additions and betterments, against which, however, was charged the original cost of equipment retired, leaving a net expenditure on property account of \$73,000.

The following table shows the principal figures for operation in 1915 compared with 1914:

	1915	1914
Average mileage operated.....	1,753	1,748
Freight revenue	\$11,523,103	\$11,427,563
Passenger revenue	4,983,700	5,415,710
Total operating revenues.....	17,841,348	18,210,083
Maintenance of way and structures.....	1,956,803	2,627,189
Maintenance of equipment.....	2,476,957	2,303,125
Traffic expenses	344,363	357,570
Transportation expenses	6,737,697	6,932,903
Miscellaneous expenses	178,411	182,462
General expenses	433,205	431,169
Transportation for investment Cr.....	10,839	.....
Total operating expenses	12,107,598	12,834,117
Taxes	1,015,029	972,283
Operating income	4,713,887	4,702,684
Gross income	5,069,382	4,762,508
Net income	2,219,085	2,021,615
Dividends	2,086,910	2,086,910
Surplus	132,175	*65,295

* Deficit.

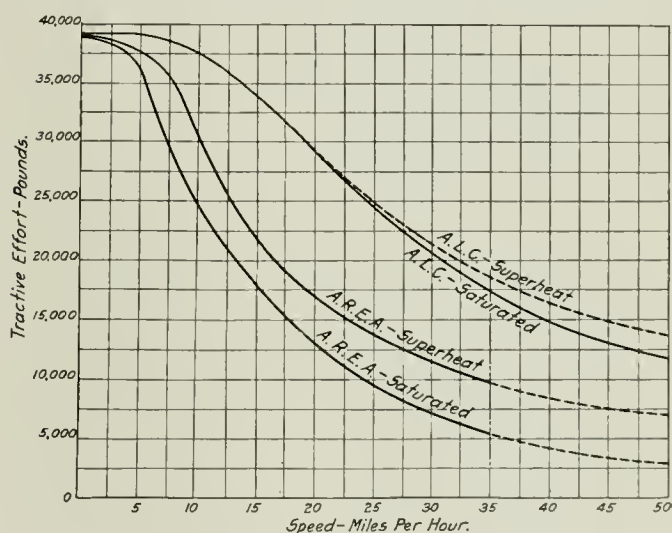
Letters to the Editor

SUPERHEATER LOCOMOTIVES AND GRADE REVISION

CHELSEA, Mass.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In your issue of September 10, 1915, page 469, there appears an article on "Superheater Locomotives and Grade Revision." The author has presented a very interesting summary on the effect of superheating the steam in present saturated steam locomotives and its bearing on the question of grade revision. However, the basis of the computations and the results therefrom are so unusual that to the practical man who is in close touch with locomotive performance and the effect of superheated steam, the figures as presented serve to open the question of doubt, with a result of making the conclusions of the author of the article questionable. The method adopted by the American Railway Engineering Association and published in its Manual for 1911, was used for calculating the drawbar-pull of



Traction Effort Curves for Typical Locomotives on Basis of A. R. E. A. and American Locomotive Company Formulas

the assumed locomotive. The locomotive is of Consolidation type, with the following principal characteristics:

Grate area, sq. ft.....	50
Heating surface, sq. ft.....	3,318
Diameter of drivers, ins.....	63
Steam pressure, lb. per sq. in.....	200
Coal consumption (while working steam) per hr., lb.....	4,000
Coal, B. t. u. value.....	11,000
Cylinders, in.....	22 x 30
Wt. of locomotive and tender in working order, lb.....	344,000

The author also assumes that train resistance in pounds per train remains constant between the speeds of 4 and 30 m. p. h., i. e., that a 32.5 ton car will have a true train resistance of 5.4 lb. per ton at speeds of 4 to 30 m. p. h. As a matter of fact, very few support this theory, as compared with the more accepted one that resistance increases with speed for the same car weight, i. e., the resistance for a 32.5 ton car at 30 m. p. h. should be about 50 per cent greater than the resistance at 5 m. p. h.

In the chart shown herewith there are drawn four locomotive traction effort curves. The two curves marked "A.R.E.A." were plotted direct from the calculations presented for saturated and superheater locomotives in the article to which reference has been made. The two curves marked "A.L.C." are plotted from calculations which resulted from using the method suggested by the American Locomotive Company. From inspection of these curves it is evident that there is a wide divergence in the

basic theories for determining tractive effort at a speed of say 35 m. p. h., also that the difference in tractive effort due to superheating varies. According to the A.R.E.A. calculations for tractive effort at a speed of 5 m. p. h., the gain in tractive effort due to superheating is 3,966 lb. or 11.8 per cent. At a speed of 8 m. p. h. the increase in tractive effort, due to superheating is 8,452 lb., or 29.9 per cent. If this is so, why is it in actual practice under comparable conditions impossible to get a superheater locomotive to haul more tons up a five-mile grade, where sustained maximum tractive effort and a speed of 5 m. p. h. is required? It is true that differences instead of totals are dealt with here, but it was on this basis that the computations were made as presented in the article referred to. Adding to this an increased fuel economy of 35 per cent, due to application of brick arch and superheater, the steam locomotive would represent itself as the most efficient power plant.

At a speed of 35 m. p. h., the "A.R.E.A." curve gives an increase in tractive effort due to superheating of 73.3 per cent, while the "A.L.C." curve gives an increase of only 6.5 per cent. It is evident there is a wide variation in the theoretical results obtained from superheating. At this speed the "A.R.E.A." curve for tractive effort for a saturated steam locomotive shows 5,672 lb. From a practical point of view such figures will not substantiate service requirements. By allowing 91 tons weight on drivers, 12 tons on the truck and 70 tons for weight of tender of the assumed locomotive the resistances at 35 m. p. h. would be:

Machine friction	at 22.2 lb. per ton.....	2,020 lb.
Truck friction	at 8.0 lb. per ton.....	96 lb.
Tender friction	at 8.0 lb. per ton.....	560 lb.
Atmospheric friction	at V^2 lb. per ton.....	408 lb.
	3	Total..... 3,084 lb.

This leaves 5,672 — 3,084 = 2,588 lb. tractive effort available on level tangent track. This available drawbar-pull would handle 323 tons at 32.5 tons per car, or approximately 10 cars. Now in all fairness is it not ridiculous to think a large consolidation type saturated steam locomotive of 39,000 lb. tractive effort is only capable of handling 323 tons at a speed of 35 m. p. h. on level tangent track? It might be well to recall the action of comparable freight locomotives, when, due to a passenger engine failure, their service was required at the head of a passenger train whose schedule speed required higher running speeds than 35 m. p. h. Also in the case of time freight trains, do such theoretical calculations bear out practical service runs?

To answer such questions I will call on the man who constantly is in touch with the actual operation of steam locomotives, both saturated and superheated in every-day service.

M. E.

FACTOR OF ADHESION

SCRANTON, PA.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In your issue of June 25 last a letter of mine comments on a previous article by E. F. Givin on the above subject, in which he makes a plea for the locomotive with a low factor of adhesion. Again on page 454 of your issue of September 15, in an interesting contribution, he presents his case more in detail.

My contention was that as conditions naturally varied, not only with each road and each division, but with each subdivision of service, that when practical the power should be specialized to meet a particular set of conditions.

Among other variable factors, that of adhesion holds a place of some importance. It seems to me, however, that it is not vital, as is for instance boiler capacity, and should not be permitted, more than a score of other debatable points, to unduly influence design. A profound respect for all these important, and often conflicting requirements, suggests caution in a final pronouncement.

In the example cited by Mr. Givin, in your issue of September 10, I am unable to reach his ultimate conclusion. Let us analyze

this case. Briefly, he contends that, of two units, alike in all respects except in tractive effort, the one with the lower factor of adhesion (four) would handle increased tonnage over the sister engine with a factor of five, in practically inverse ratio of the factors. Or to put it in another way, the tonnage rating is based on tractive effort, which in the engine of low adhesion is 25 per cent in excess of its opponent. Immediately following is the statement that a locomotive can handle considerably more tonnage than it will start. I believe this latter is a generally accepted fact.

I concur, therefore, in the primary conclusion that, for certain service, say drag freight, starting ability is the factor that should determine tonnage rating. With modern power, built to usual proportions, this ability is determined by adhesion, and not by tractive effort. This is evidently where our opinions differ.

Given perfect rail conditions, and even admitting the liberal use of sand, it requires great skill to start full tonnage, without slipping, especially if working with superheat. Usual proportions include a factor of adhesion ranging from four to five, the ratios under discussion, and I believe there does not exist such an engine which is unable to slip its wheels under any rail conditions. This result is accentuated by careless handling. I believe that any experienced engineman will endorse these two last statements.

If this be admitted, and there seems to be abundant evidence to support it, we arrive at a practical condition, which discredits the theoretical data advanced in Mr. Givin's argument. This data may be correct too, as far as it goes, but like all such experimental information, must be accepted with some reservation, and used with judgment, and such modification as experience warrants.

For instance, the element of high temperature, probably lacking in the experiments which resulted in the factors submitted, is very much in evidence practically. Therefore, I conclude that the two machines under discussion would each start and handle the same tonnage, their ability in this direction being determined by the total weight on drivers and not by tractive effort. This would continue until a certain critical speed was attained, which might be higher for the engine of excess power, though it is probable that here the boiler capacity would be the determining factor. In any case the speed, if on the level, would probably be well over 50 m.p.h. for both. This is sufficient for the character of the service.

So far I have shown only equality for the engine of lower power. I now wish to present some points of superiority. If a locomotive cannot use its full tractive effort for starting a load, the excess is not only valueless for that purpose, but becomes an embarrassment. The human factor has to be given consideration. Not every engineer is equally skillful or even tempered, and many a train has been stalled by the engineman using poor judgment and losing his temper, when he could not "hold her down." The higher factor of adhesion gives an engineman increased confidence and coolness, and his ability to handle his train is improved in direct proportion.

Fluctuation in the tractive effort is a most important factor in determining the ability of a steam locomotive to hold the rail. In the common two-cylinder type this variation is reduced as the cut-off is advanced, resulting in a more even turning moment of adhesion, and it again scores.

In maintenance, the high factor engine, being comparatively free from the jars and strains, due to frequent slippage, will make a better showing in shop repairs and probably appear less frequently on the machinery failure sheets.

The larger cylinder volume and more frequent racing of the engine with excess power, mean increased steam consumption, while creating fire conditions that reduce boiler capacity and efficiency.

Many other minor reasons are available, but I believe those above are sufficient to defend the position I have taken on this subject.

GORDON BAXTER

Delaware, Lackawanna & Western.

How French Hospital Trains Help to Save the Wounded

The French Have Equipped 250 Trains and Perfected an Organization for Carrying Wounded to Hospitals

By WALTER S. HIATT

Our Special European Correspondent.

As the war goes on the railroad stands out more and more clearly as the inalienable servant of the warring armies. In the beginning it served in its normal capacity as a carrier of troops and supplies, as has already been told in these columns. It remains to be told how France has organized, reorganized, and now perfected, an intricate hospital train service, about which revolves every other service for the wounded. If the lives of more soldiers have not been lost, if the predicted epidemic of disease, say of cholera, has not raged in the trench country and back into France—and I have the word of Dr. Alexis Carrel, of the Rockefeller Auxiliary Hospital at Compeigne for it—it has been due to the careful and rapid transportation of troops all this past summer. Be it understood that the greatest enemy of the wounded soldier is not the bullet or shell, but the infection which sets in as soon as he is wounded, the bullet or shell hav-

ing carried into the flesh soiled pieces of his clothing. It then becomes a race against time and distance to get the man into a real hospital where his wound can be washed and disinfected. As now organized the staffs of the hospital trains undertake to wash the soldiers' wounds *en route* if necessary.

The wonderful part about this service is the minimum of cost for operation. Although no less than \$160,000,000 is being spent for the wounded this year by the seventh direction, \$114,860,000 having already been spent for the first nine months of the year, aside from a sum equally as great spent by private charity, but a comparatively small part of this money has gone into the hospital trains. In large part the money has gone and is going for the supplies needed by the 15,000 physicians at the front or behind the lines, to purchase automobile ambulances, to buy stretchers and medicines, and to keep up the 800,000 beds for the wounded located in public and private hospitals, châteaux, homes, hotels, at the watering places, and, indeed, under almost every roof reared to the sky of sunny France.

The organization controlling these trains is particularly remarkable in that it was born of a necessity which no one but railroad men could understand until the past spring. Literally millions upon millions of men and women, mindful of their own loved ones, have been and are giving of their time and their money to the wounded. But while everybody could visualize the need for stretchers, for additional hospitals, or for motor ambulances for use on the battlefields, or to meet trains at interior railway stations, and to carry the wounded to the hospitals, but few could understand that it was a matter of life and death to fit trains properly for the carrying of the wounded during a brief 10 or 20 hours. So it was only this spring that there came any public realization of the need of organizing the work of the trains. The work that had been done had been carried on by a few railroad men and train surgeons clamoring for money from public or private sources. Finally they were understood and each city of France began to contribute money, then a few Americans contributed money, and now, with the service in good order, funds are available from other quarters.

A NEW FACTOR IN RAILROADING

The hospital train on a large scale is really a new factor in railroading. Before this war and as early as 1889, M. de la Morandiere, an engineer of the old Western Railway of France, built some model cars which were shown at the French International Exposition. Later a few trains were built in Belgium and Switzerland primarily for the purpose of transporting sick people to the medicinal springs at Lourdes in the south of France. The cars on some of the Swiss trains, which have been used several times this year to transport exchanged French and German wounded home over neutral territory, may be compared to some of the tourist or emigrant sleeping cars found west of Chicago. They are corridor cars, with center aisles, and two rows of beds on either side, each bed having running water nearby. One of the curious features is a large mirror provided for each bed.

At the beginning of the war, by August 20, 1914, only the seven hospital trains mentioned above were in use. The half-million or so soldiers wounded during August, September, and early October of 1914, were lucky to get to any kind of a train,

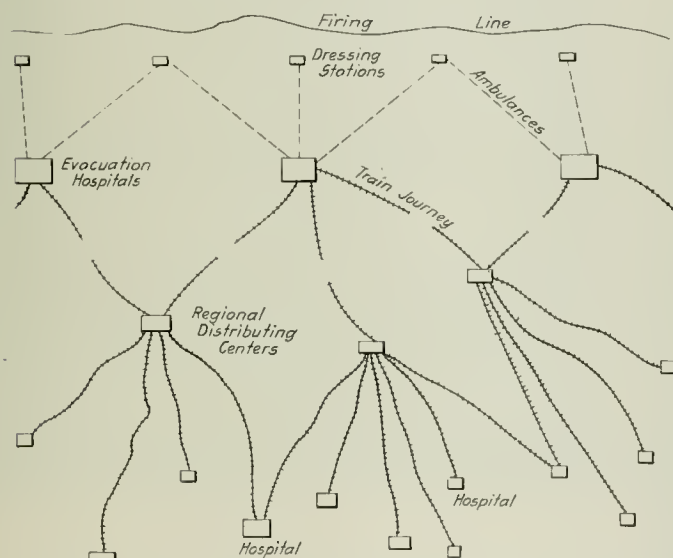


Diagram Showing How the Wounded Are Distributed to Hospitals in the Various Parts of France

ing carried into the flesh soiled pieces of his clothing. It then becomes a race against time and distance to get the man into a real hospital where his wound can be washed and disinfected. As now organized the staffs of the hospital trains undertake to wash the soldiers' wounds *en route* if necessary.

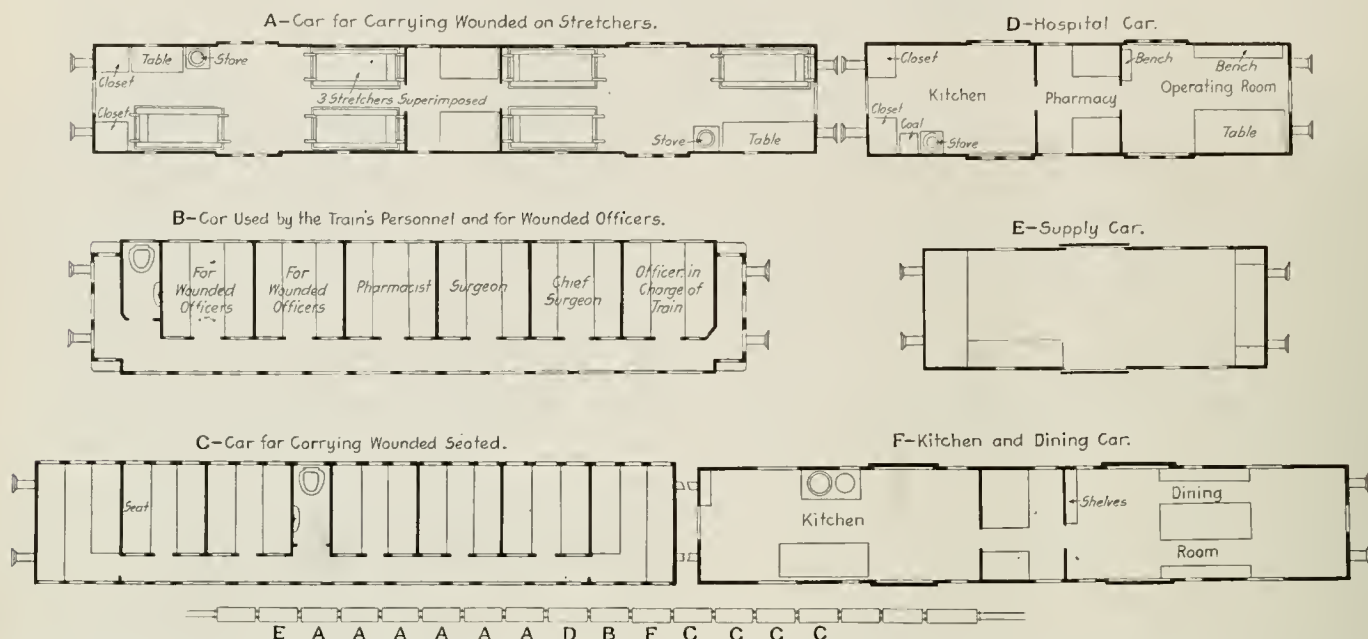
Beginning before the war with seven hospital trains, kept almost for show, since nobody could foresee the need for hundreds of trains and thousands of specially equipped cars, sufficient to carry a half million wounded a month, there have been slowly prepared in France no less than 250 thoroughly equipped hospital trains, composed of 4,000 cars or one-thirteenth the total number of passenger cars used on all the roads of the United States. Each train is composed on an average of 16 cars which form an indivisible unit, carrying from 200 to 400 wounded, according as they are sit up or lie down. The total capacity of these 250 trains is about 100,000 wounded. It is estimated that to date, including German wounded, who are treated as well as the French, nearly 1,500,000 men have been carried from the front to the hospitals in France in these trains.

TRAINS LIKE HOSPITAL SHIPS

Each train is as perfectly organized as a hospital ship. Each has its number, each has red cross emblems painted on every

though in the latter month no less than 600 had been improvised. If they were put on a train, it was composed of some of the 400,000 freight cars, hastily filled with straw or of the 35,000 passenger cars where the badly wounded at best had to lie on a cushioned seat. They were shoved therein and moved slowly

cited this August in the Chamber of Deputies, during an attack on the hospital service of the army, by a deputy who told how 1,400 wounded were sent into one of the 18 hospital regions of France when in this region there was no room for more. The train surgeons ran from village to village and from hospital to



This train consists of 16 cars, the first car, designated C, being the second car behind the tender. It carries 296 wounded men, including 108 on stretchers in the six cars (18 to a car), designated A; 176 seated in the four cars designated C and 12 officers in Car B. Although it is not so designated in the plan, the first car of the train is probably for the nurses. A hospital car similar to the one here marked D was described in the issue of August 20.

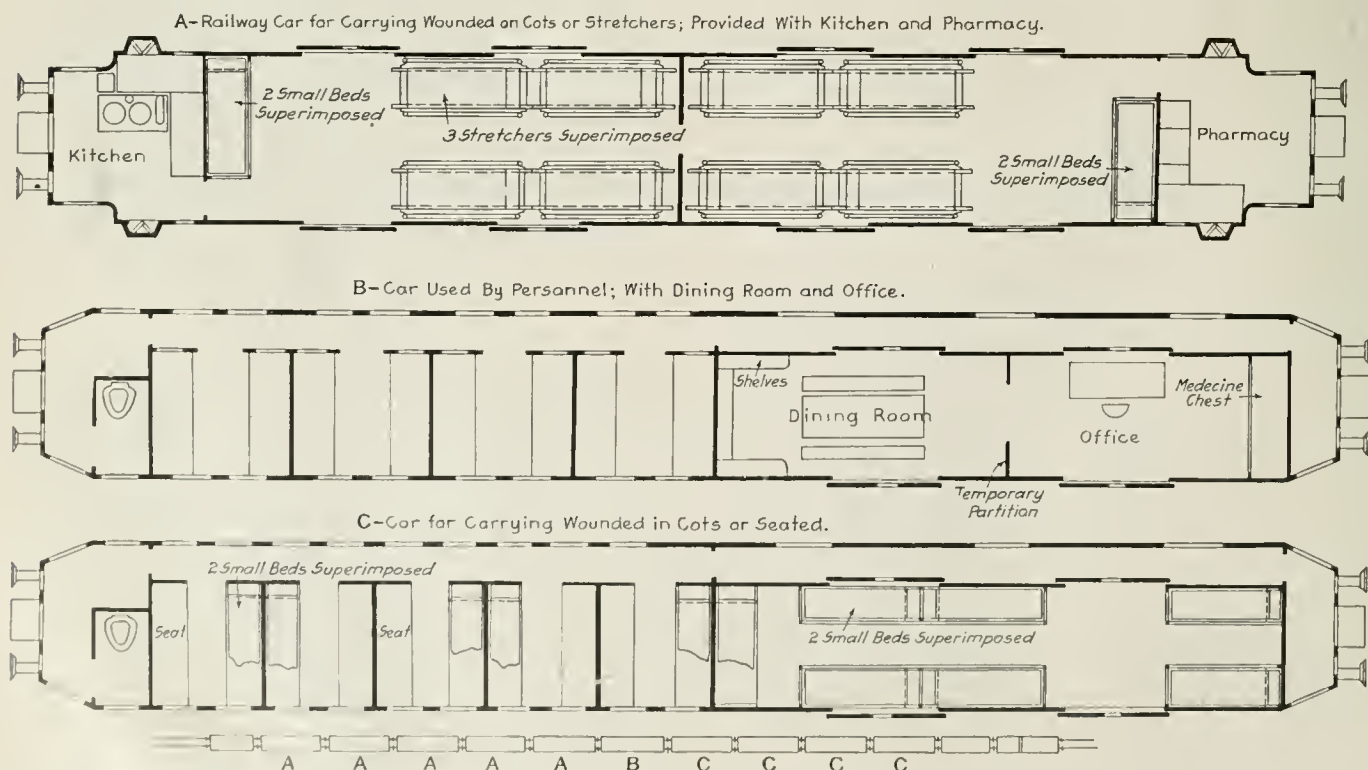
Plan of a Typical French "Sanitary Train"

to some hospital. Often they went for two or three days without water or nourishment or medical treatment. Many died from the jolting, even in the cushioned passenger cars where the jar was still too severe to be borne by the badly wounded.

The conditions existing as late as October 1, 1914, were

hospital, asking beds for the 1,400 wounded in their care, but were told everywhere that there were no more beds, and finally had to take the train into the neighboring region.

The period of these wandering trains of cars unequipped for carrying the wounded, however, has passed. Scientific study of



This 12-car train, made up of remodeled passenger train cars, each approximately 65 ft. in length, carries 296 wounded men, 120 on stretchers, 116 on beds and 60 seated. The five cars designated A each carry 24 on stretchers and 4 on beds; the four cars designated C each carry 24 on beds and 15 seated. The nurses' car is presumably the one immediately behind the tender.

Plan of a French Ambulance Train Improvised from Passenger Train Cars

the conditions has brought about mechanical improvements that are notable, considering the means at hand. One of these improvements, that of a train surgeon, Dr. H. L. Beltzer, will doubtless find world-wide application, because of the possibility of adapting it to any type of railroad car or field automobile.

DETAILS OF TRAIN ORGANIZATION

Through the courtesy of the Minister of War I was lately given an opportunity to see just how this service is organized on which the lives of so many thousands of wounded depend.



A Surgeon's Device for Carrying Wounded That Avoids Rebuilding Continental Passenger Cars

Before the wounded are finally distributed in the 18 hospital regions of France, they pass through several stages of handling. Beginning at the firing line, which is divided into 16 ambulance divisions for the entire French army and where each division makes its preparations for battle just as much as does an army general, the wounded men are gathered up by company, battalion, and regimental stretcher carriers and taken to a temporary field station, possibly not more than a mile from the trenches.

There they are placed in automobile ambulances according to the nature of their wounds, and directed toward a center for treatment or discharge, known as the hospital of evacuation. This ambulance transportation service is of the greatest importance. The automobiles work in groups of 11, but four of them being used primarily for carrying the wounded. Five are each fitted up for a special surgical use. One serves solely as a sterilization organ, carrying in it antiseptic washes and boilers for heating water. A second is used for radiographic purposes. In it photographs are taken showing the nature of the wounds, and a surgeon may immediately proceed to an operation, if the case is urgent. A third five-ton truck carries medicinal and surgical supplies, with electric searchlights large enough to light a tent or wagon where the surgeons are working. Two other heavy trucks are fitted to carry stretchers and

coverings sufficient for 100 wounded. Another truck carries the camp equipment for the nurses, including their cooking utensils, and their supplies of cotton and bandages. This last truck also serves as a supply carrier for provisioning the other ten ambulances. There are no less than 60 men detailed to such a group, including a chief surgeon, 7 assistants, 26 nurses and 17 chauffeurs. Not a few of these Red Cross helpers are Americans, there being a total of 2,000 Americans helping all over France.

These motors discharge their wounded at a point behind the lines, known as the evacuation center. The wounded are here tagged according to the gravity of their condition, a white card for a slight wound, a red for a serious wound, and a blue for a wound of medium gravity. Each wounded man is provided with a paper stating his condition, his company, his name, and the place where he was wounded and is directed with his effects toward a general distribution railroad center. This intermediate transportation is made either by train, by automobile ambulance or by hospital canal boat, according to circumstances. There are 19 of these great railway distribution centers placed at intervals all over France, the total governed by nine divisional stations, which are in turn governed by the seventh direction of the Minister of War. The 19 distribution centers discharge their wounded in 18 regions, one or more centers to a region.



A Car in Permanent Train No. 5, Showing the Arrangement of Beds

The wounded arrive at these centers in one of three kinds of trains, permanent rolling hospitals, semi-permanent, or improvised. The permanent trains handle the badly wounded (*grand blessés*) exclusively, the semi-permanent the wounded which must lie down but are not yet considered in a very serious condition, and the improvised trains the wounded which are able to sit upright.

Arrived in one of the 18 regions, the wounded are then distributed according to their wounds in hospitals specially adapted for their treatment. The seriously wounded, say about the body, are sent to practically any general hospital, but those suffering from nervous shock, or eye wounds are generally directed to Paris, where the largest number of special hospitals are located.

Those soldiers who are suffering from typhoid fever, are likely to be sent to the watering places, like Vichy or Biarritz. This division of regions into centers of special treatment forms at once one of the most complicated and interesting details of the whole method of railroading the wounded.

THE HOSPITAL TRAIN AS A UNIT

There are special railroad experts detailed at the office of the seventh direction of the Minister of War who keep in touch with every hospital car and train in France, just as a chief train dispatcher does with his freight and passenger trains. Every morning these experts receive reports showing the position of trains unloading in the various regions and indicating the trains needed at the front. When a battle is being prepared at one or more points along the front, they make their preparations just as does the chief surgeon of the army corps involved. These railroad experts, taken from their ordinary duties with some one of the individual companies, know that an attack involving so and so many men means that they will have to provide so and so many trains at the evacuation hospitals to carry away the wounded. Hence there are always reserve trains on hand ready to carry the wounded back to life.

By special permission I was able to visit two of these re-



A Stretcher Frame Adapted for Use in Motor Ambulances or Freight Cars

serve trains, semi-permanent No. 22 and permanent No. 5. This latter train, in charge of Doctors Jacob and Paillard, had been in service nearly 14 months at the time I visited it. During that period it had carried 4,100 seriously wounded men and lost but five of them. The train had just been disinfected by having its interior washed with alkaline water and *eau de javel*, and fumigated with sulphur smoke. The trench flies that had followed the train were driven away by a free use of cresyl. All trace of the wounded passengers had been removed and the beds were fresh and sweet as could be desired. The train consisted of 16 cars, several being of the corridor type, with connecting platforms, unlike the old type of French car. There were 256 beds in the eight cars of the train set aside for the wounded, these being placed on either side of the corridor. The hospital crew of the train consisted of 33 men, including a chief surgeon, an assistant surgeon, a provision officer, a sergeant and 28 nurses. Eight of the cars were used for hospital purposes, other than the transport of wounded. One of them, placed in the center of the eight transport cars, was a pharmacy and operating car, a freight car made over at the expense of W. B. Hardy, of Chicago. On its side, near the red

cross emblem, was painted the American flag. At the end of the train trailed the car in which lived the 28 nurses. At the head, next the engine, there was a provision car, a short box car fitted up with closets for linen and blankets, and drawers for the storing of wine, sugar, rice, coffee, meats and vegetables. Behind it came a car for the surgeons and a kitchen car containing also space for the storing of dirty linen and cotton, this material having to be burned so infectious disease might not be spread.

A NOTABLE INVENTION FOR SHOCK PREVENTION

The visit to semi-permanent train No. 22 was of special interest, because there I was shown a new kind of hospital bed that is being adopted on the English and French hospital trains. The big obstacle to carrying the wounded soldiers comfortably has been the lack of the proper kind of beds. There are comparatively few sleeping cars and even these are too heavy for the carrying of large numbers of wounded. There were, however, large numbers of third class passenger cars of the corridor type. They were rather heavy, but the chief obstacle to their use was that they had to be cleared of their old transverse seats and provided instead with iron cots. One of the illustrations shows the installation of such cots in permanent train No. 5. All this took time, money and workmen; and these three elements were lacking. Besides this, there is a further objection in the case of the very badly wounded to the use of a sleeping car, or to the use of beds at all, because they have to be moved from their stretchers in order to be placed in the car and this not only may mean loss of time, but horrible suffering.

Dr. H. L. Beltzer, the surgeon in charge of train No. 22, last spring devised a frame support for stretchers which is about the simplest thing yet found for the transportation of wounded men either in ambulances or railroad cars. A view of one of these frames is shown herewith. In its simplest form the frame makes it possible to utilize any English or continental passenger car without a single change in the seating arrangement without injuring the car in any manner, and without installing in it a single bed. When the stretcher is placed in the frame, its handles are fitted into a set of iron rings, each held by a wrought iron spring, and these springs take up any kind of shock, whether up or down or backward or forwards. When the train arrives at its destination, there is no shifting of the wounded man, when he is loaded into an ambulance. The stretcher goes with him right to the hospital. In other words, the device means that a man can be carried from the battlefield to a hospital hundreds of miles away without a change of bed.

The device, with certain adaptations, also has the widest application for any kind of freight car. It could also be used in American cars. Dr. Beltzer showed me his operating car and one or two other cars which he had fitted up with a series of slightly different frames provided with strong springs and planted in the very center of the car, each frame supporting six stretchers, three stretchers to a side, the nurses having room to pass the frames on either side of the car. Dr. Beltzer has carried many wounded men in this manner, keeping them on their stretchers either from the battle field or the motor ambulances, and during the 10, 20 or 30 hours they have spent in the freight cars on the train, they felt no shock of any description. In some test cases he made at Havre for English hospital officers, he had engines bump the cars severely without disturbing the occupants of the frames.

REMOVAL OF BELGIAN RAILWAYS.—The Belgian Government has addressed to all neutral States a protest against the action of the Germans in removing the permanent way of Belgian railways. The Belgian Government points out that the decision of the German authorities will necessarily hamper the trade and business of a large part of the population, and protests energetically against this fresh violation of the laws and customs of war.

American Locomotive Builders and Foreign Trade

Manufacturers Must Be Allowed to Combine for Foreign Selling; Testimony Before Federal Trade Commission

By WALDON FAWCETT

Railway equipment and supplies "Made in the U. S. of A." can continue to hold a place in the foreign market only if American manufacturers are allowed to combine for foreign selling. This, in substance, is the information given to the new Federal Trade Commission by leaders in the field of railroad outfitting. Moreover, contrary to the impression in some quarters, the situation with respect to American-made locomotives is represented to be much the same as with regard to rails, signal apparatus and shop machinery.

"We have done fairly well," said Charles M. Muchnic, vice-president of the American Locomotive Sales Corporation, in discussing the foreign sales of his concern, "but we cannot make much further progress unless we are allowed to co-operate." The same view has been advanced by other manufacturers of rails, rolling stock, etc., who have appeared in person before the new "supreme court of business," or have communicated their views in writing.

Waldo H. Marshall, president of the American Locomotive Company, was the witness who initiated, on the part of the Trade Commission, the new line of thought to the effect that American railway supply houses may need that same latitude with respect to "team work" abroad that seems essential in other lines. This aspect of the situation came as a revelation to the Federal body because several witnesses from other fields of industry had taken it upon themselves to say that whereas the Baldwin Locomotive Works and similar concerns might need no smoothing of the pathway of foreign selling, these leaders in the railway field were in a far more fortunate position than manufacturers in some other lines.

But even the American Locomotive Company finds limitations placed upon its selling campaigns, President Marshall pointed out. Said he: "Our company is a pretty fair sized one and we do carry sales expenses entirely for ourselves in certain parts of the world where we think the volume of business that we can obtain is going to be sufficient to justify that expense, but there are other parts of the world in which we would like to get some business and where we feel that we cannot afford to have our own representatives. The cost, year in and year out, would be far greater than any profits we would ever get on that business.

"Even with companies of our size, selling expense is quite a question at all times. We have had our own men at three different points in South America, besides agency connections and banking connections. In South Africa we cover the situation pretty well. In China, Japan, Korea, etc., we have our own men. But in other parts of the world, for instance in Australia, we would not think of having any representative direct from home. We get into some of those territories and feel that the only way in which we can afford to cover them at all is by some arrangement with a commission house, and we try to get a house that handles lines of goods that would make them more or less familiar with machinery so that they can represent us fairly well. But, after all, they are only transmitters, you might say, of information between the two parties because they do not understand locomotive construction enough to furnish any engineering information except as they may get it from us. Then there are other places where we cannot afford to pay any commissions at all—on any fixed basis plus a commission—and unless the party is willing to take it entirely on a commission basis we have to do without representation."

The purpose of the Federal Trade Commission in taking up, as the first work following the completion of its organization, this current investigation of foreign trade conditions is to ascertain whether there should be recommended to Congress at its

next session the amendment of the Sherman and other anti-trust laws now on the statute books. The need for prompt consideration of the problems involved is realized by reason of the competitive conditions likely to prevail in almost all fields following the close of the present European war. As matters stand to-day American manufacturers of railway equipment and all other articles of commerce must face in every foreign mart a united opposition—that is, competitors banded together for the purpose of curtailing selling expenses and preventing reckless price cutting through bidding against one another. American firms have been deterred from joining hands to meet such competition through fear of the anti-trust laws which supposedly prohibit combinations of all kinds. The proposition then, that is before the newly-created Federal Trade Commission for recommendation to Congress, is whether the hampering laws should be so amended as to allow combinations of American manufacturers in the export trade through continuing to prohibit such pools or agreements in the domestic field.

While the locomotive builders are speaking two words for themselves before the Federal Commission in urging that joint selling agencies be sanctioned, they are incidentally saying one word for the smaller manufacturers in the field of railway equipment and supplies—the latter presumably being more seriously handicapped than the locomotive firms. Speaking of the need of permitting American manufacturers in the railway field to combine, Vice-President Muchnic said: "I believe that unless such permission is granted the small manufacturer will be unable to get his share of the foreign business. At the present time most of the exports in railway materials and iron and steel products are made by large manufacturers, and it seems to me that this in itself is convincing proof of the necessity of co-operation between manufacturers.

"The principal reason why the large manufacturer is able to command a large share of the export trade is because of the capital he commands and of the well-trained sales organization which it has taken years of persevering effort to develop. It is utterly impossible for the small manufacturer to command either the capital or such foreign sales organizations, and therefore, unless the situation, as it is at present, is changed, the small manufacturer will eventually be barred from participating in any part of the foreign trade."

Whereas the locomotive men have urged that they be given a free hand in making sales arrangements overseas they have, one and all, made it clear that joint selling to be effective must be allowable to the various firms in the railway field and not restricted to non-competing firms. "You might think," explained Mr. Marshall, "that if selling combinations are to be effective it would be very easy for manufacturers in different lines—perhaps that are non-competitive entirely—to choose a representative, and perhaps let him conduct the business for ten different concerns in a certain country, but that presents a very difficult situation for the reason that it is hard to get one man that knows enough about ten different lines of goods to represent them effectively and intelligently. The better way would be to allow those who are competitive at home, or who are very nearly competitive at home, to get together and in that way they can get representation that will be intelligent and efficient and cover their lines of goods thoroughly."

In answer to a question from one of the commissioners, the locomotive builder declared his belief that under such an arrangement there would be confidence on the part of the various participating concerns that each would get a square deal from the selling agent. "That is one reason," he explained, "why I

think the arrangement should be more or less voluntarily entered into, and my idea is that in most lines of trade they would not be necessarily large organizations. They would be of moderate size."

The Comite des Forges of France was cited to the Federal Trade Commission as, perhaps, an ideal example of co-operation between locomotive builders. The French combine was portrayed as fixing prices on the various types of locomotives and apportioning the aggregate orders in proportion to the output of the various plants. "After an experience of over ten years this arrangement has worked out entirely satisfactorily, as far as I know, to the government, the purchasers, and the manufacturers," said Mr. Muchnic in commenting on the French system. It is his idea that if such a plan could be established in the industry in the United States there would result "not a rivalry of prices among the manufacturers, but an effort on the part of each one to turn out a better product than his competitor."

In the capacity of compiler of facts for Congress the Federal Trade Commission has, this past few weeks, manifested an exceptional curiosity as to the status of the American export trade in locomotives and railway rolling stock, and in the nature and extent of the foreign competition encountered. Information supplied to the commission by the witnesses above quoted and others is to the effect that under normal conditions fully 90 per cent of the output of all locomotive shops in Great Britain goes to foreign countries, while in the case of Germany 50 to 60 per cent of the total production is shipped abroad, as compared with exports from the United States that represent 8 to 10 per cent of the total output. "So we have hardly touched the possibilities of the export trade as compared with the Europeans," commented one of the executives who appeared before the trade inquisitors.

When one of the commissioners asked whether British builders can turn out a locomotive more cheaply than can an American concern there was opened up an extended discussion of what were put forward by the practical locomotive men as the two main factors that to-day enter into the export trade in American locomotives and railway supplies. One of these is the circumstance that foreign trade in railway equipment will follow investments. The other is that the volume of our export trade will be, to a great extent, measured by our success in inducing foreigners to adopt American railroad standards. "Our principal work in developing our foreign business," explained Mr. Muchnic, "has been not so much in meeting the competition of foreign builders as to prevail upon foreign engineers to accept our types of locomotives."

To drive home his point he cited the situation in Argentina where he said fully 90 per cent of the railroads belong to British companies, and it is tacitly understood by the local engineers, as well as the London boards, that no foreign manufacturer will be allowed to supply equipment unless it is a question of urgent need and delivery. This situation in South America is reputed to cut American builders off from orders for 250 to 300 locomotives per year.

Many of the foreign orders for locomotives that have come to the United States were landed, the commissioners were told, because of the ability of firms here to make prompt delivery. Emphasis was also laid on the fact that present-day conditions with respect to the acceptance of American standard equipment on roads built and operated by foreign engineers, are but temporary—as temporary as the present European war. For instance, it is only because the foreign-built and foreign-managed roads in South American, China, India, etc., cannot now obtain equipment constructed to the English, French, German or Belgian standards, to which they have heretofore subscribed, that they are, for the time being, impelled to accept the American standard type of construction. But on the other hand there was cited the success of American equipment firms in securing repeat orders from the government-owned roads of Argentina and Brazil, and despite the fact that foreign standards are predominant on the neighboring privately-owned railroads where close relations exist between the consultant engineers and the supply houses.

"We must not only have American investments, but we must have American engineers to manage the railways in South America," declared one of the executives. "The prejudice of foreign engineers is indescribable. They look upon any product from any other country than their own as absolutely worthless." In illustration of the dangers of foreign influence there was cited the situation that has lately developed in Brazil on the railway system which Mr. Farquhar established some 10 or 12 years ago by the consolidation and development of a number of small railways partly owned by French, Belgian, English and Brazilian companies. With the inauguration of the new enterprise an American staff was installed and American manufacturers supplied all the rolling stock, but the continued adherence to American standards is represented to be now in jeopardy, owing to a change of management.

A concrete example of what American investments will do for American sales of railway equipment is to be found, the commission has been informed, in the situation on the Hukuang Railways of China, a system financed by four groups of bankers—American, French, English and German—with the result that an agreement was reached that in the purchase of equipment such as rails, bridges, cars and locomotives the standard of the country of a successful bidder is to be accepted. Heretofore, so the Trade Commission has been informed, American firms have supplied locomotives to practically all the Chinese railroads operated by the government and to roads dominated by Japanese engineers, but to none of the lines controlled by the British and Germans.

The extent to which German bankers have co-operated with German supply houses to beat American competition was brought out by the president of the American Locomotive Company, in explaining the need of better credit arrangements in the export field. Speaking of the experiences of his firm in the Latin-American field he said: "If we had to deal through a German bank we felt that practically everything that occurred in regard to our transaction which could be found out from the outside was known to our competitors. The amount of money that we were paid for our locomotives was known to that bank to the last dollar. If there were public tenders it might have been known anyway; but if there were private tenders they had the advantage of all that knowledge. They often knew all that we paid for freight, and everything of that kind, and we felt that at times we saw the evidence of that knowledge when it came to the next bidding."

Developing this aspect of the subject he said: "I do not believe that America's export business will ever be of satisfactory volume until the banking arrangements are such—the credits and so on—that our people will invest in foreign countries. In South America if English capital has gone to build railroads, then when the money came to be spent for new equipment it would naturally be spent at home. And we know of cases where they have paid higher prices at home—where they did it knowingly and openly to favor the home market—because the capital came from that country. That has given the English and German manufacturers large advantages in certain countries."

That the credit problem complicates, in the estimation of President Marshall, the whole selling proposition was disclosed when he remarked: "I do not think that the small concern can afford to send out a man of large enough caliber to represent them alone, intelligently, in the foreign field, for he not only must know his business as a salesman, as he would know it at home, but he must be big enough and broad enough, at the present moment, at least, to be depended upon to some considerable extent in regard to credits." Reverting later to this subject of selling railway equipment he commented: "The more intricate the manufactured article that is shipped abroad, the more necessity there is for intelligent representation of it in the foreign market."

RUSSIAN RAILWAYS AND THE WAR.—The Russian Minister of Ways of Communication is asking for extra credit amounting to about \$2,400,000 to strengthen the railways owing to the war.

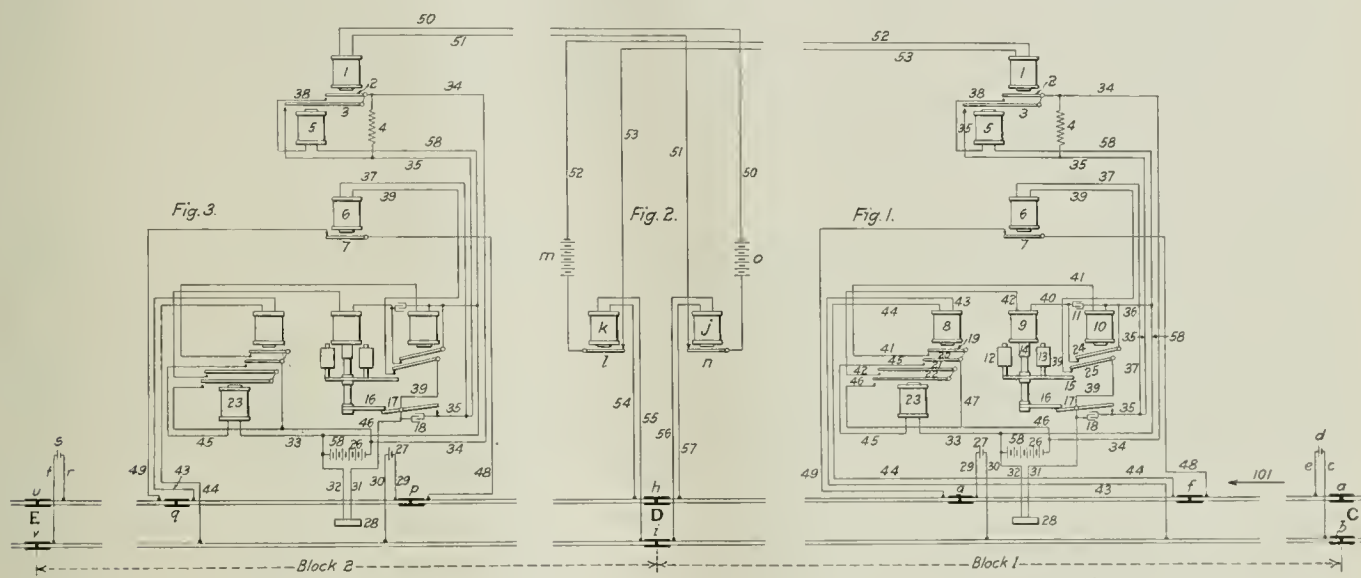
Cab Signals and Automatic Stops on the Western Pacific

Five Miles Block Signaled; No Disks, No Semaphores.
Automatic Train Stops Controlled by Magnetic Induction

At Oroville, Cal., on the Western Pacific, 66 miles north of Sacramento, the National Safety Appliance Company, of San Francisco, has installed on five miles of the road, single track, an automatic block system which works wholly by audible and visual indications in the locomotive cab and by automatic train stops, no visual roadside signals being provided, except small light signals, one at each automatic stop location, called markers. These are for the information of any engineman who has been stopped. A red light indicates that the track magnet is still in condition to apply brakes, while green indicates that the section ahead has been cleared and that the train can proceed. Twenty locomotives have been equipped with the

magnet boxes clear the gage line of the track 10 inches, and midway between the rails there is a space of $8\frac{1}{2}$ inches. Each magnet box is 6 inches wide. The receiving coils, on the locomotive, are fixed to a cross-bar attached to the rear end of the leading truck of the tender, as shown in Fig. 11. Each coil passes over its corresponding track magnet with a clearance of 3 inches.

Each track magnet is enclosed in a separate substantial water-tight metal box, and the receiving coils are equally well protected. The roadside batteries, for energizing the track magnet, controlled by the track circuit as in ordinary automatic block signaling, are of 10 volts capacity. The track



Figs. 1, 2 and 3—Automatic Stop Circuits for Two Block Sections, Single Track

apparatus. The system works by magnetic induction. There are no moving parts on the roadway and none on the locomotive, other than relays, signal valves, and the air-pressure mechanism for applying brakes.

A section of the road, about two miles long, is shown in Fig. 5. The letters G, Y and R indicate respectively the points at which green, yellow and red light indications are given in the cab. For example, a train moving west from B2 toward C1, C2 and so on, when the track beyond D4 is occupied, will receive a yellow indication at B2, indicating caution; a red indication at C1, indicating stop, and, if these are not heeded, will have its brakes applied at C2. This leaves the distance from C2 to D4 in which to bring the train to a stop. If the track is clear, a green indication is given at B2, assuring a clear road to C2, and a green indication at C2 indicates clear through the next block. The de-energizing of the track relays provides also for giving caution and stop signals, and for automatic stop impulses to trains coming from the opposite direction.

The apparatus consists principally of "track magnets," fixed to the ties, and energized by roadside batteries "receiving coils," carried on the locomotive, and engine apparatus consisting of relays (four), storage battery, air valves for applying brakes and giving audible cab signals, and three electric lights. There is a registering apparatus which counts the operations of the automatic stop.

The track magnets are fixed between the rails, one to give the clear indication, one for caution, one for stop, and one for the train stop apparatus. The photograph, Fig. 9, shows a location where only three are required. On each side the

magnets are normally de-energized, and are energized only when a locomotive approaches within 66 feet.

The proprietors have sent us the drawings, Figs. 1, 2, 3, 4, 6 and 7, with accompanying descriptive matter, from which we take the following:

Fig. 4 shows a track-magnet in place and directly over it a receiving coil (a a) connected in series with a relay (b) and a

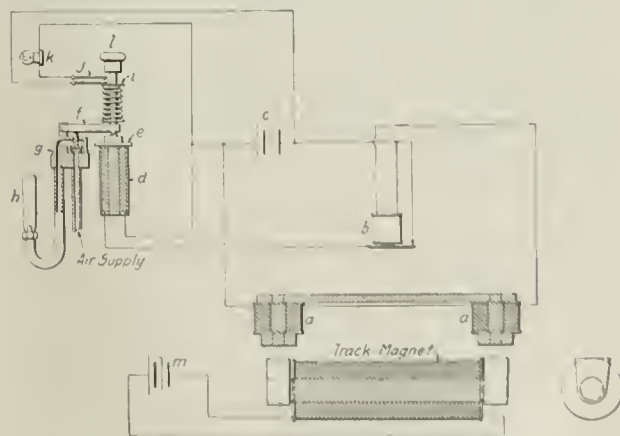


Fig. 4—Circuits on Locomotive

battery (c) and other engine-cab apparatus (d, e, f, g, h, i, j, k, l). The receiving coil and the coils of relay b are of relatively high resistance and use but .028 amp. current constant for each set. The relay magnets are powerful and the contact is not

opened by engine vibrations. The current from battery *c* is not essential to perfect relay operation, but is used to give protection against the breaking or loosening of any wire or connection.

As the engine moves and the receiving coil passes through the field of the energized track-magnet, a current is generated in it which is more powerful than, and flows in opposite direction to, the current from battery *c* normally circulating in the receiving coil and relay. This induced current momentarily reverses the magnetism of relay *b*, permitting its armature to drop (though it is immediately re-attracted to normal position), opening the circuit to the cab apparatus. This interruption of the circuit de-energizes momentarily the iron-clad magnet *d*, causing the release of its armature *e*, which normally is held to the poles of the magnet. Lever *f* is then lifted by the air pressure from the engine main air reservoir, and the air unseats the valve and flows through the valve casing to pipe *g*, thus causing whistle *h* to blow. At the same time the disk *i*, attached to the armature stem, and rising with it, closes the contact at *j* and lights the lamp *k*. The armature of magnet *d* is now too far away to be attracted by the magnet, and is restored to normal position only when knob *l* is depressed. Pressing this knob opens contact *j*, thus cutting out the signal light, and it reseats the air valve. The engine has passed beyond the track magnet and armature *e* is held down by current from *b* and the supply of air is cut off from the signal whistle, stopping it.

The foregoing description applies to each of the three sets of apparatus provided for the operation of the regulation signals—clear, caution and stop—and each set consists of the apparatus described, namely, receiving coil, relay, electrically controlled air valve, signal whistle and colored lamp. A fourth set of the same apparatus, omitting the lamp, is provided to actuate the automatic stop and is operated in the same manner as described except that valve *g* is a vent instead of a supply valve. The alarm whistle of the automatic stop is located in the base of the automatic stop valve apparatus. When the automatic stop has been operated, pressure on knob *l* restores the vent valve to normal position, but the service application of brakes has been made and the brakes cannot be released until the train is stopped, when the engineman must get down on the ground and close a valve.

Provision is made for operating in either direction on the same track, the necessary reversal of the operation of the receiving coils, when an engine has been turned around, being provided for by a reversing switch.

The track magnet, Figs. 4 and 14, is fixed in a heavy case, 15½ in. long, 5 in. wide and 5 in. high (extreme height from ties 7 in.). The cover is flanged over sides and ends and is bolted down on water-tight gaskets. The leadout wires run through insulated water-tight stuffing boxes. The magnet requires an energizing circuit of 5 amperes at 10 volts. Normal operation takes current for 15 seconds only. Protection against loose brake-rods, etc., is afforded by a pine block 48 in. long, covered with a ¼ in. steel plate, as shown in the photograph, Fig. 9.

The locomotive receiving coil (Figs. 10 and 11) consists of two cores of Norway iron, wound in the form of a circular bobbin. The cores project through the bobbins and are fixed at the lower end to pole-faces. The projecting upper ends of cores are secured to a connecting iron bar. Connecting wires pass through a pipe attached to the lower parts of the coil cases. The coil cases are of cast brass and 4½ in. in diameter. The length over all of the encased apparatus is 18½ in., the distance between coil cases being 9½ in.

Four receiving coils form an engine set, one each for the clear, the caution, and the stop signals, and one for automatic stop operation. These receiving coils are arranged in pairs, bolted, pole-faces down, to an iron cross-bar (Fig. 11), which is supported by brackets extending back from the forward truck of the tender. Receiving coils will receive magnetic impulse from

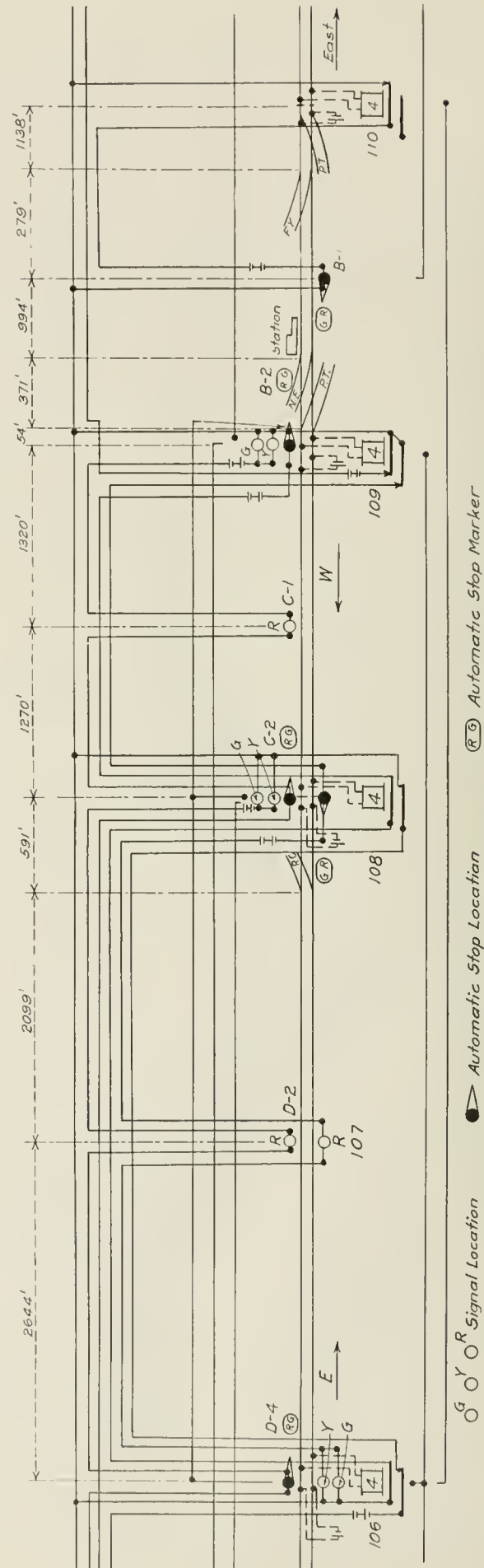


Fig. 5—Circuits for Cab Signals and Automatic Train Stops; Oroville, California, Western Pacific

their respective track-magnets even should they be 2 in. off centers. Wires from the receiving coils are connected through a substantial connecting plug to the iron relay box bolted to the side sill of the tender.

The air valves (Fig. 12 and *g* Fig. 4) are located in the engine cab with the restore knobs convenient to the engine-man's hand. A locked and water-tight case contains these four valves, three for the signal lamps and whistles, and the fourth

out preventing the engineman from giving an emergency application.

Description and Operation—The brake pipe is connected with application cylinder 1 by suitable pipe and fittings. In this cylinder a chamber is formed by the two piston heads 2 and 3, piston head 3 fitting into the small end of the cylinder, and both heads fitting airtight in normal position. Piston rod 4 is

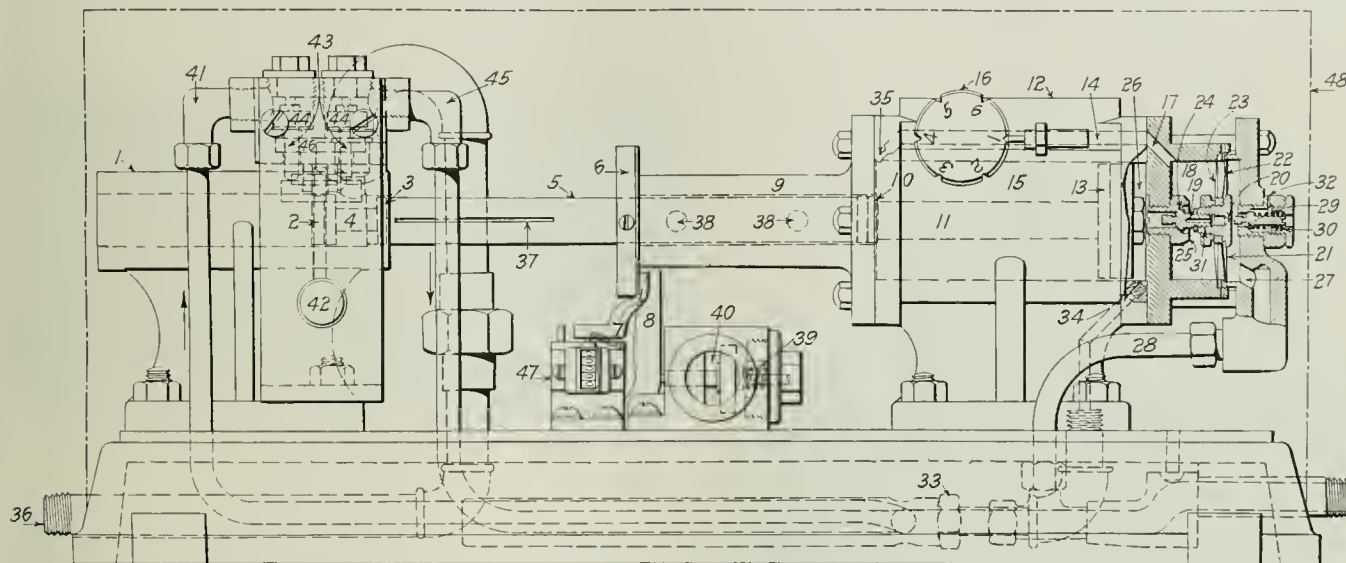


Fig. 6—Brake Applying Apparatus

for the automatic stop. Each of the four valves has the connections, etc., indicated in Fig. 4, by the letters *d*, *e*, *f*, *g*, *h*, *i*, *j*, *k*, *l*.

The valve magnet is connected with the engine relay and with the 2-cell Edison storage battery of 2.5 v. and 125 ampere hours capacity, as shown in Fig. 4. Each valve takes a constant current of .25 amp.

The valve casing is 13¼ in. wide, 12 in. high and 5¼ in. thick. Height over all (case, knobs and whistles) 20¾ in.

Outside the lower right-hand corner of the valve case is a

fastened to application tube 5, each having the same diameter. Disk 6 is fastened to application tube 5 and bears against levers 7 and 8. Lever 7 is held against disk 6 by a spring which operates application counter 47 when disk 6 is moved from the normal position shown. Application tube 5 passes through cylinder 9 and is connected with piston head 10 by a loose joint which eliminates strain due to any unevenness of cylinders. Piston head 10 fits airtight for the entire length of its cylinder (9) and is fastened to piston rod 11, which passes through graduating cylinder 12. The other end of rod 11 is fastened to

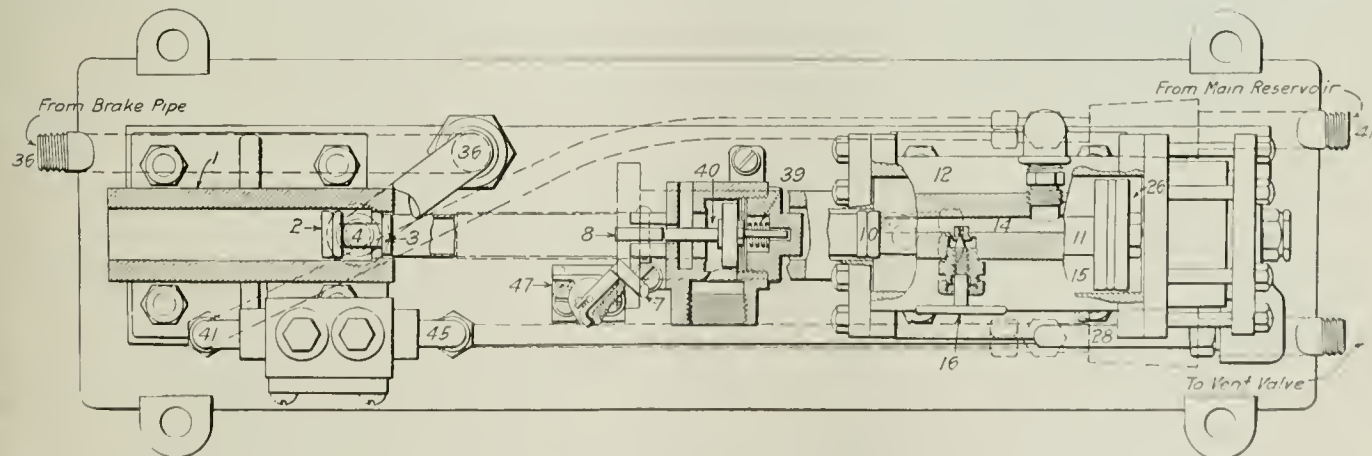


Fig. 7—Brake Applying Apparatus Plan

reversing switch. When the switch point is on one extreme end of the quadrant, connections are made for moving in one direction. The center is neutral, with current switched off, allowing valves to go to "danger." When the point is on the other end of quadrant, connections are made for moving in the opposite direction.

THE AUTOMATIC TRAIN STOP

This is illustrated in Figs 6, 7 and 13. It is worked by compressed air. The connections are such that it applies the brakes only when stop signals have been disregarded, and it is designed to give only the regular service application of brakes, yet with-

piston head 13, which fits airtight the entire length of cylinder 12. Main reservoir air pressure is connected by suitable pipe and fittings to the main air passage 14 in the upper part of graduating cylinder 12. The air in chamber 15, formed by piston heads 10 and 13, is supplied from passage 14 through restricted port 35, the air flow being regulated by application adjustment needle valve 16. The pressure in chamber 15, acting on the larger area of piston head 13, forces it to the extreme right or normal position, carrying with it piston head 10, of smaller diameter.

The diaphragm valve takes its supply from the main air pass-

age 14, through passage 17 into chamber 18, thence through passage 19 and restricted port 20, of fixed capacity, into chamber 21. As the air pressure builds up in chamber 21, diaphragm 22 is deflected toward chamber 18, carrying with it diaphragm 23, which is of smaller area than diaphragm 22. This causes valve 24 to close into seat 25, thus shutting off pressure from chamber 26. Air pressure in chamber 21 flows through passage 27 into controlling pipe 28, and thence by suitable pipe and fittings to the venting valve connected with the controlled air valve in the cab (Fig. 12).

The opening of the valve, when a stop is to be made, reduces

the deflection of the diaphragms and the remaining pressure escapes to the atmosphere by valve 29 through port 32. All this results in unseating valve 24, allowing pressure to flow from passage 14 through 17, 18 and 24 (open) into chamber 26. This chamber is filled, and air escaping through restricted port 34 (of fixed capacity) causes whistle 33 to blow. The air



Fig. 9—Track Magnet

capacity of passage 34 is very much less than the capacity of valve 24, hence pressure is built up in chamber 26. When the pressure in chamber 26 equals the pressure in chamber 15, its superior force against the greater area of piston 13 causes piston 10 to move toward application cylinder 1. At the same time the pressure in chamber 15 is forced back through restricted passage 35. The speed of the movement of these pistons is regulated by application adjustment valve 16, which controls the flow of pressure forced from chamber 15.

The movement of piston 10 carries with it piston head 13, piston rod 11, application tube 5, with disk 6, piston head 3, piston rod 4, and piston head 2. This operation causes piston head 3 to travel with application tube 5 into the larger portion of cylinder 1, from which the brake-pipe pressure, entering at 36, passes into application cylinder 5, through slot 37, and thence exhausts to atmosphere through holes 38, which are normally covered, in cylinder 9. The speed of travel of application tube 5 and attached pistons is so regulated—by the

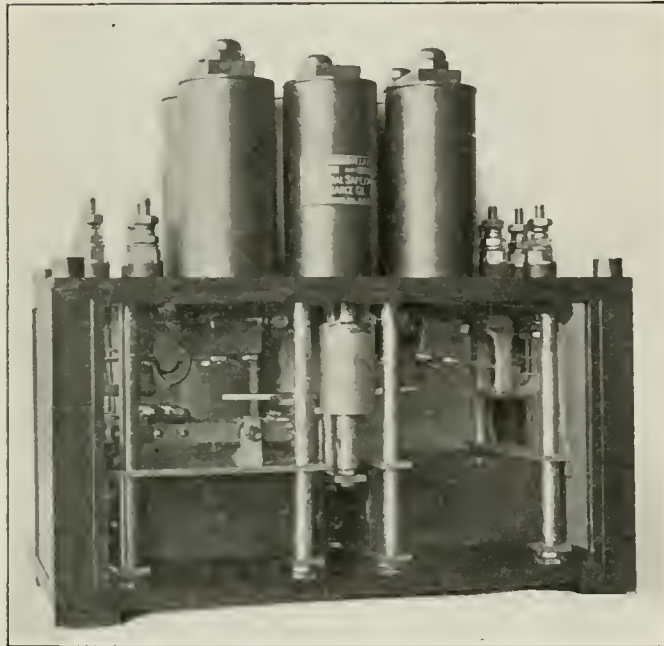


Fig. 8—Time Limit Relay

[See 8, 9 and 10, Fig. 1]

the pressure in chamber 21, causing the diaphragms to deflect toward chamber 21. The port 20 then closes into contact with valve stem 29, thus shutting off the supply from chamber 18 and forcing valve 29 against spring 30 until diaphragm stud 31 is in contact with the valve seat stud of valve 29. This controls

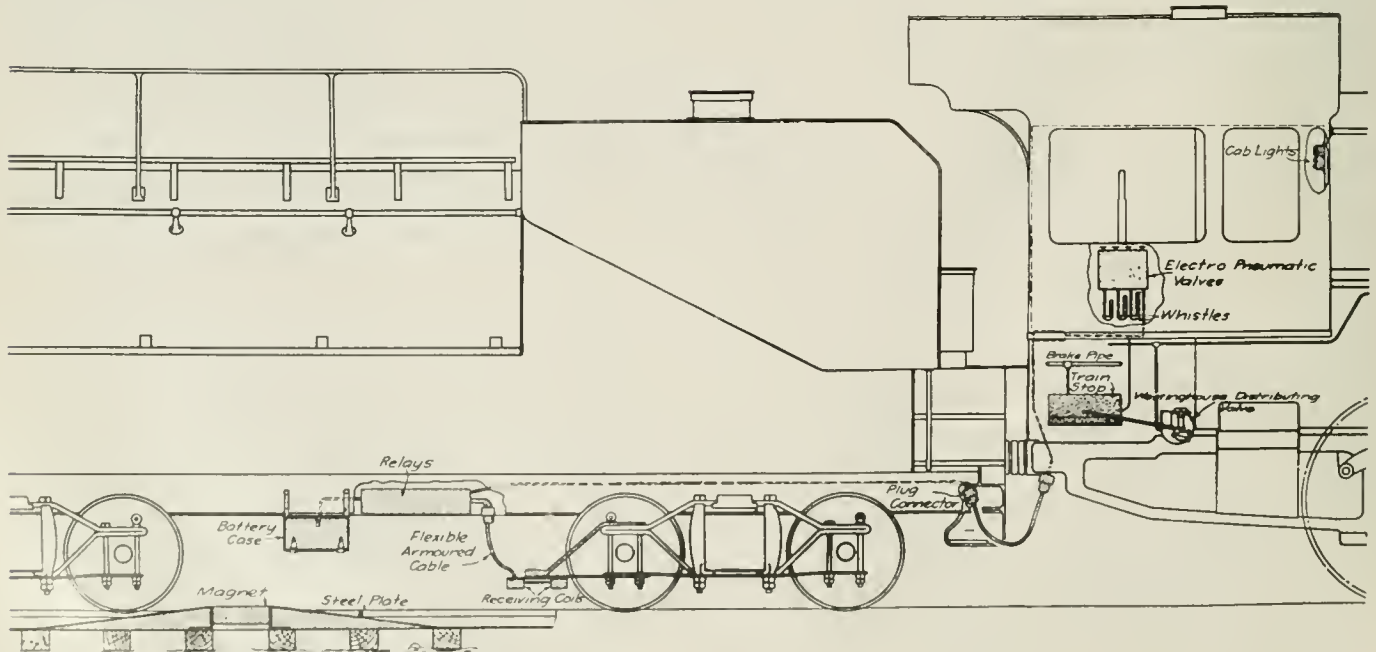


Fig. 10—Automatic Stop and Cab Signal—National Safety Appliance Company

adjustment of needle valve 16—as to reduce the brake-pipe pressure only to the extent requisite for a service application of brakes.

Valve 40 is connected by suitable pipe and fittings to the exhaust port of the engine distributing valve. When disk 6 moves, in company with tube 5, to which it is attached, lever 8 is released, permitting spring 39 to close valve 40, thus shutting off the distributing valve exhaust and preventing the engine-man from releasing the brakes until the automatic stop mechanism is again restored to normal position. Restoration can be made only by first pressing the electric vent valve knob in the cab and then pushing release valve button 42 on the tandem or duplex valve, which button (42) can only be reached from the ground.

The tandem or duplex valve is back of the plate carrying its valve button 42 and is shown in dotted lines. This valve takes its air supply from the pipe supplying graduating cylinder 12, the air entering at 41. When release button 42 is pressed in, it raises valve stems 43, allowing the air entering at 41 to pass valve seats 44 and through chamber 46 to outlet 45, thence through connecting tubing to controlling pipe 28 and through passage 27 into chamber 21, there building pressure superior to the escapement to atmosphere through the small port 32. The increased pressure in chamber 21 causes diaphragms 22 and 23 to deflect toward chamber 18, increasing its pressure to the closing of valve 24, thus cutting off the supply of chamber 26 and so to whistle 33, which quickly exhausts the air pressure in chamber 26. Pressure in chamber 26 being exhausted, the pistons will move

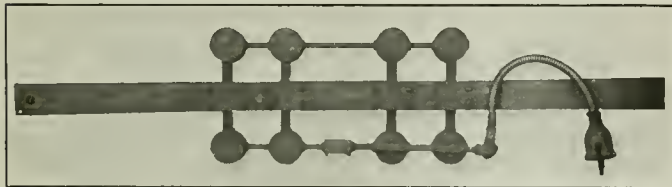


Fig. 11—Receiving Coils on Locomotive—Top View

back at once to their normal position, valve 40 reopened and the engine-man can release the brakes and proceed, subject to the signal indication of the automatic roadside marker at each automatic stop location. Whenever a train is stopped by the operation of the automatic stop device, record is made by the automatic application counter 47.

The entire automatic stop mechanism is kept free from dirt by a tight cover, outlined by line 48. This is sealed.

When two or more locomotives are used in the same train, and the automatic stop is operative only on the leader, the standard double-heading cock under the brake valve (in the cab) is displaced by a three-port cock, one port of which controls the brake pipe pressure to the automatic brake valve, one the main reservoir pressure to the automatic stop, and the other the brake pipe pressure to the automatic stop. Hence, when this cock—normally sealed open to prevent wrong use—is closed on all locomotives except the leader, both the automatic brake valve and the automatic stop are cut out.

ROADSIDE APPARATUS

Figs. 3, 2 and 1 show the automatic stop circuits in the roadside apparatus of two complete blocks. The operation of the clear, caution and stop signals is controlled in exactly the same manner.

Block 1 is insulated from adjacent rail sections at *a, b, h, i*. Block 2 is insulated at *h, i, u, v*. At each signal location two more insulating joints are used, *f, g, p, q*. These joints do not break the main track circuit, which is shunted around them by wires 48 and 49 through contact lever 7 of protective relay 6. The disarrangement or failure of any of the apparatus, batteries or wiring, will cause this protective relay to drop its armature, thus opening the track circuit and causing the display of stop signals.

Block 1 is supplied with track battery at *d*, which through wires

56 and 57 energizes the track relay, Fig. 2, which, by means of line wires 50 and 51, controls line relay 1, Fig. 3.

Block 2 has its track battery at the far end, and through wires 54 and 55 controls track relay *k*, Fig. 2. This relay, by means of line wires 52 and 53, controls line relay 1, Fig. 1.

Suppose two trains from opposite directions enter the blocks, as shown, at the same instant. Relays *j* and *k*, Fig. 2, drop their armatures, causing the line relays 1, 1 in turn to open. Referring now to Fig. 1, line relay 1, opening, closes contacts 38 and 35. Armature 2, through wires 34 and 38, closes magnet 5 and locks armature 3 against contact 35.

The circuits just mentioned are now in condition to energize the train-stop track-magnet; but no further movement of any part takes place until the forward truck of the engine passes insulating joint *f*, assuming a train moving in the direction of arrow 101. At insulating joint *g* a local track battery 27 is connected to the rails by wires 29 and 30. Current from this battery is prevented from disturbing the main track circuit by insulating joints *f* and *g*, two rail lengths apart. At *f* wires 43 and 44 run

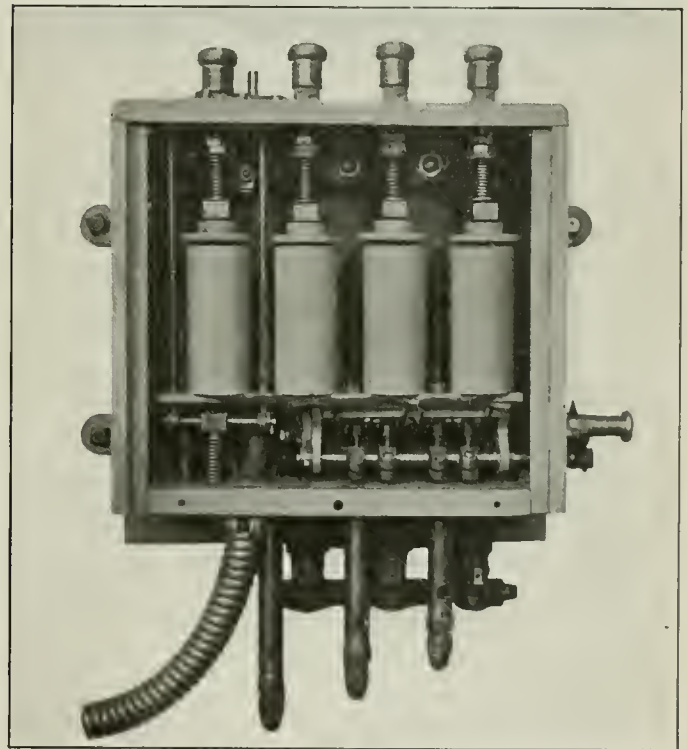


Fig. 12—Air Valves

to magnet 8 of the time limit relay and normally battery 27 holds up armatures 19, 20, 21 and 22 of relay 8, thus holding contacts 41, 42, 45 and 46 open. The forward truck of the engine, as it passes joint *f*, shunts magnet 8. Armature 20 is connected by wires 47 and 46 with one pole of battery 26, and when it drops it closes a circuit through wires 33 and 45 to magnet 23. The action of this magnet is to lock armatures 21 and 22 securely against contacts 42 and 46.

As armatures 21 and 22 drop, current travels from battery 26 through wire 46 to armature 22, thence to armature 21, thence through contact and wire 42 to solenoid 9, thence through wire 40 to armature 24, thence through wires 36 and 58 to the other pole of the battery. The action of this solenoid is to instantly draw up its core 14, to which is attached a frame connected to the pistons of two dashpots 12 and 13, and which also carries two projections 16 and 15. Arm 16 normally depresses lever 17; the action of 15 is to lift armatures 24 and 25 to a point where they can be retained by magnet 10, which cannot attract them from the distance at which they are normally set. As the core 14 reaches the end of its travel the circuit of solenoid 9 is broken by reason

of armature 24 being attracted and held by magnet 10, the circuit of 10 being closed through armature 19 and wires 47 and 46 to one pole of the battery and through wire 41, magnet 10, wires 36 and 58 to the other pole.

As the plunger 14 rises the projection 16 allows the right hand end of lever 17 to descend, closing the circuit to the track magnet 28. This circuit is through wire 32 from battery 26, thence through magnet and wire 31 to lever 17, to wire 35, to armature 3 of relay 1, thence by wire 34 to the other pole of the battery.

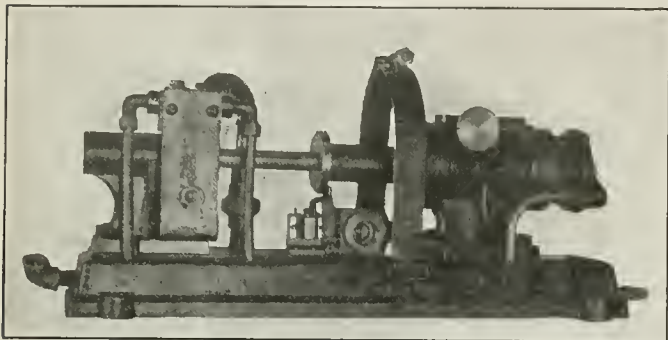


Fig. 13—Brake-Aplying Apparatus

Dashpots are so arranged that their retarding action takes place on the downward movement of the plunger 14, current remaining on the track magnet until the projection 16 has again depressed the lever 17, thus opening the circuit of the track wire in the external circuit will produce the same result. Should magnet. The magnet box contacts cannot be set for another operation until the train has cleared the short rail section from *f* to *g*, allowing current to again pass through magnet 8, which attracts its armatures, thus breaking the circuit of magnet 10, which allows armatures 24 and 25 to return to their normal position.

To recapitulate, reading Figs. 3, 2 and 1, from right to left, and following the behavior of the relays in the operation of the two automatic stops arranged for opposing train movements, we note, first, that the track circuits are shown as extending from *C* to *D*, and from *D* to *E*. These circuits include standard neutral type relays *k* and *j*, controlling line relays 1, 1, which in turn control the automatic stop magnets on the ties, 28, 28.

Suppose two opposing trains entering the blocks as shown, one at *C* and the other at *E*: as the trains enter the blocks,

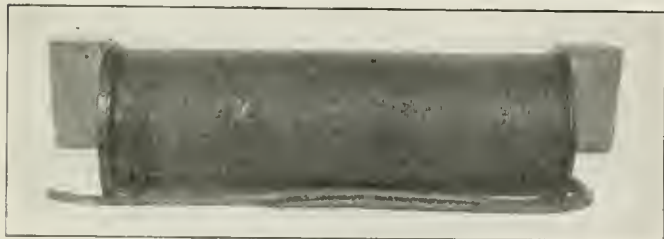


Fig. 14—Track Magnet

the track battery is shunted and relays *k* and *j* open, thus opening the circuits of line relays 1, 1. Thus the westbound train, moving in the direction of the arrow, 101, opens the circuit of battery *o*, Fig. 2, wires 50 and 51, and actuates the proper instruments to stop the eastbound train by application of the brakes at 28, Fig. 3; while the eastbound train protects itself against the westbound, in the same manner, by opening the circuit of battery *m*, Fig. 2. No further movement of the roadside instruments will take place until the forward truck of the engine—assuming that an engine from the east, moving in the direction of the arrow, 101, is the first to arrive—moves on to the short insulated section of track *f*, *g*. As soon as the

engine enters this short section (the length of two rails), relay 9, Fig. 1, lifts 16 and allows the right hand end of lever 17, to drop and close the circuit to energize the track magnet 28, thus transmitting the impulse to the receiving device on the engine and setting in operation the apparatus for applying brakes. The eastbound train will be stopped in the same way, there being room for each train to be brought to rest before reaching *D*. The time-limit relays are so adjusted that they energize the track magnet 28, only for a sufficient time to communicate an impulse to the slowest train, after which they automatically cut out the track magnet until the train clears the insulated rail section, *f*, *g* (or *p*, *q*), upon which they reset themselves ready for the next operation.

The foregoing paragraph, it will be remembered, refers only to an automatic stop. In a complete system relay *j* might have other contacts, arranged to protect the westbound train from eastbound trains, farther back, by giving warnings at suitable distances; or to set stop-apparatus, or signaling apparatus, in its own rear.

The action of the protective relay 6 is as follows:

With the line and time-limit relays in their normal position, relay 6 is connected across the open contact between lever 17 and wire 35 by means of wire 39 to armature 25, thence by wire 39 to lever 17, thence by wire 31 to track magnet 28, thence by wire 32

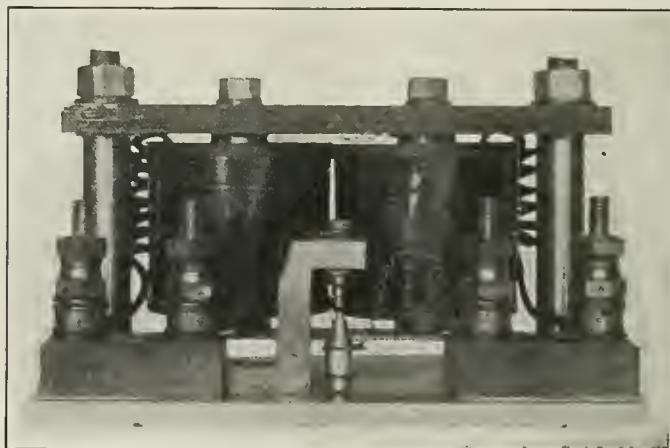


Fig. 15—Locomotive Relay

to one pole of battery 26. The other side of the circuit is from 6 by wire 37 to wire 35, thence to a high resistance 4 bridged across the terminals of armature 3 and contact 35, thence by wire 34 to the other pole of the battery. The relay 6 is of high resistance and the resistance connected in series with it at 4 reduces its operating current to an amount just sufficient to enable it to securely retain its armature 7. Any diminution of the voltage of the battery 26 below its normal safe operating point will weaken magnet 6, thus dropping armature 7, which will open the track circuit and set the proper stop signals. The breaking of any the track battery 27 or its connections 29 or 30 fail; or if wires 43 or 44 leading to magnet 8 should be broken (causing plunger 14 to be operated) then relay 6 will be cut out by the opening of the contact between armature 25 and wire 39. The opening of these contacts in the ordinary course of delivering a signal produces no effect, as the track circuit has already been opened by the entrance of a train into the block.

The condensers at 11 and 18 are connected across the contacts shown to dissipate the inductive spark occurring on breaking the circuit. Auxiliary carbon contacts (not shown) are also provided between lever 17 and contact 35 to further protect the contacts against sparking.

This system has been developed and installed by the National Safety Appliance Company, of San Francisco, as before stated; and the general arrangement, as well as most of the appliances, has been designed by W. S. Levin, chief engineer of that company.

Interstate Commerce Commission Hearing on Valuation

Railroads Urge the Commission to Co-operate with Them in Establishing Fundamental Principles to Be Used

On Thursday and Friday of last week the Interstate Commerce Commission heard oral argument on valuation matters conducted by Pierce Butler and other counsel for the President's Conference Committee of the railroads. The oral argument was based on a brief of 544 pages which the counsel had previously filed with the commission. There were a few members of the state commissions present, and Director Prouty, of the valuation work, was present. The commissioners, Director Prouty and Milo R. Maltbie, now employed by the commission, asked questions, but no witnesses were heard. The representatives of the state commissions, after the railroad companies' oral argument was completed, asked for ninety days in which to file a brief and also asked for a hearing at which they could present oral argument. The Interstate Commerce Commission gave them 60 days in which to file a brief, but did not set any date for oral argument.

The following is an abstract of the brief and oral argument presented by the railroads' counsel:

Under the act of Congress of March 1, 1913, the Interstate Commerce Commission is required to ascertain and report on the value of the constituent parts of the transportation system subject to the act to regulate commerce. This system comprises, roughly, 250,000 miles of line and with securities outstanding in the hands of the public totaling, approximately, \$15,330,000,000. The act requires the railroads to co-operate with and aid the commission in the valuation.

REASONS FOR THE ENACTMENT OF THE VALUATION ACT

In the year following the creation of the Interstate Commerce Commission it urged the necessity for valuation, and in 1913, and again in later years urged Congress to pass an act which would require a valuation. Summarizing the various references in the Interstate Commerce Commission's annual report to valuation, the principal reasons which the commission advanced for urging it were:

(1) To obtain a trustworthy estimate of the relations existing between the present worth of railroad property and its cost to its proprietors.

(2) In determining whether rates as fixed by the government are confiscatory.

(3) In connection with railway taxation.

(4) In the ascertainment of a proper depreciation reserve.

(5) In testing the accuracy of the balance sheets of the carriers.

(6) As a help in the organization of railway statistics in general.

(7) In determining whether the railroads are under or over capitalized.

The Adamson bill contained in its title the words "physical valuation," but the body of the bill was not limited to the physical valuation, and the Senate struck out the word physical in the title when it amended the bill. The Senate committee reporting on the bill, said, "These terms [governing all elements of value attaching to the property of common carriers for rate-making purposes] accepted by recognized authority, are: (1) The original cost to date; (2) cost of reproduction new; (3) cost of reproduction less depreciation; (4) other values and elements of value, that is, intangible values.

COST OF REPRODUCTION NEW

In arriving at reproduction cost, the weight which the figures may have as evidence of *value* should not control or substantially affect the methods employed or the conceptions adopted for making the estimate. Reproduction estimates should be based

on reasonable prices and present methods of doing the work. Everything now in existence except the road which is to be the subject of the investigation is to be assumed to be in existence in getting at this cost of reproduction new. The historical construction of the property or similar properties may be an aid in determining the present cost of reproduction insofar as it shows overhead costs, costs incidental to accidents, etc. A plan of engineering should be laid out exactly as if a new road were to be constructed. The procedure should be the same in making estimates of costs as would be the case if the work was actually to be done. Thus means of transportation other than the property of the railroad to be reproduced will be available and means of transportation over the railroad itself will develop with the progress of the work. Allowance must be made for the seasoning of a railroad property and where there is appreciation as in the case of roadbed such appreciation should be taken into account.

It is the cost of reproduction new of the identical and not of another or substituted stretch of road that is required by the law. Original records of grading quantities when corroborated furnish better evidence than present measurement. In determining the cost of reproduction new, there must be taken into consideration present or original conditions, ascertainment of grading quantities to be included in the reproduction inventory and the time required to reproduce the property. Furthermore, the form and manner in which the road shall be reproduced must be determined and the overhead charges estimated, these charges to include engineering contingencies, interest during construction, taxes and promotion organization and administration. Allowance must also be made for materials on hand and working capital.

THE DETERMINATION OF UNIT PRICES

The prices to be used in the valuation should be arrived at by a consideration of prevailing prices. Price tendencies and conditions affecting labor and material markets during a reasonable period of time next preceding and at the date as of which the valuation is to be made, should also be used, due consideration being given to the existence or non-existence of active railroad construction during the period. The importance of the subject of unit prices is so great and so many different elements enter into a proper consideration of it, some of which depend on local conditions and peculiar circumstances, that no prices ought to be applied even tentatively by the government valuation forces without the fullest consultation with representatives of the company whose property is to be valued. [Director Prouty stated that in the west so much difficulty had been experienced in getting an agreement between the forces of the commission and the railroad company that work along certain lines was being carried on and reports on it made by subordinates without submission of these reports of the railroad company's engineers. This method was very urgently objected to by counsel for the roads.]

APPRECIATION AND DEPRECIATION

Appreciation includes both seasoning and adaptation, and both of these should be taken into consideration. A newly built railroad has no greater length of life than an old railroad properly maintained. The only depreciation, therefore, which should be taken into consideration is that due to neglect of maintenance. The element of accrued depreciation, that is, the loss of service life in the simple properties of a railroad, the same being still in place and in useful serviceable condition, should not be considered as an element of depreciation, because, as has been demonstrated, this element does not affect the value of the rail

road and the sole and only purpose of the valuation act is to ascertain the value. An attempt to estimate accrued depreciation is nothing but a guess and the result obtained is worthless. The amount of deferred maintenance, however, can be ascertained through personal inspection and the courts have held that in determining the cost of reproduction less depreciation, the only depreciation involved is that which actually exists at the time and which is capable of measurement; in other words, deferred maintenance.

A proper condition for economical operation should be determined for each piece of road and on the basis of this depreciation should be figured. In other words, if the estimated life of a rail is 15 years, no depreciation should be figured against rail which has been in track for five years so long as the railroad company is renewing each year the rails that need to be renewed and thus keeping its track up to the proper operating standard. Property should be inspected jointly by representatives of the valuation forces and of the railroad company and every reasonable effort made to agree, first, on the question of whether there is any deferred maintenance and, secondly, on the amount of it, if any. The only purpose of determining depreciation is to ascertain whether or not the value of the property has been preserved and only to the extent that it has not been preserved is there depreciation. Property should be classified as follows:

Items and groups of properties which appreciate.

Items for which cost of reproduction less depreciation and cost of reproduction new are the same.

Track.

Machinery, tools and equipment.

Remaining classes.

LAND

The same principle should be used in determining the value of land used for railroad purposes that is now used in condemnation proceedings. Railroad property is private property. The value that is required to be found is the entire value. It is not within the power of Congress to provide that any value or element of value shall be excluded from consideration in any case to which the provisions of the fifth and fourteenth amendments of the constitution apply for the protection of private property. It makes no difference how the railroad company came to acquire the land which it has so long, of course, as it acquired it legally. The value to be determined is the value which should be assigned if the property were to be taken under condemnation proceedings. There is a theory known as the trustee theory which assumes that there exists between the public and every railroad the relation of principal and agent, or of beneficiary and trustee. No such relation exists. The public does not owe a railroad the money that the latter has invested in its property, nor has it any legal or moral right to appropriate the rewards of success. The right to regulate the charges of those engaged in a public calling or to regulate the selling prices of commodities rests on the power of police and not on ownership, legal or equitable, of the property. Some of the advocates of the trustee theory frankly admit that the law is settled against them and they insist that the Supreme Court must reverse itself. Manifestly, the commission has no power either to reverse the court or amend the constitution.

The value of land for terminal purposes or for right of way cannot be determined without also taking into consideration the use for which it is to be put. The right of way of a railroad is more valuable than an equal acreage of land lying adjacent to it used for agricultural purposes.

[Commissioner Hall asked what would be the line of argument in a case where, when the railroad was built, the land was not under irrigation and was bought for \$1.25 an acre. Later irrigation was introduced and the value of land for agricultural purposes increased to \$100 an acre. Counsel for the railroads maintained that the value which should be taken was the value that would have to be taken if all other conditions were the same as they are now, except that the railroad was not there. In other words, that if a road were now to be built

through this territory, the price which would have to be paid for land would be at least as high as its value for agricultural purposes. It was conceded, however, that there might be a conceivable case in which land for railroad purposes would be less valuable than for some other purposes, but it was argued that in this case the railroad would not be built and that, therefore, if a railroad was built it was evidence that the land for railroad purposes was more valuable, or at least as valuable, as the land for other purposes.]

It is the property and not the cost of it of which the owner may not be deprived without due process of law. The Minnesota cases do not condemn the reproduction method of valuing land when reasonably applied. The court condemned the particular method used in the Northern Pacific case, because of defects it found therein and which are specified in the opinion. The phrase "the fair average of the normal market value of land in the vicinity having a similar character," and again the phrase "the fair average market value of similar land in the vicinity without additions by the use of multipliers or others to cover hypothetical outlays" are not to be read to mean market value for general—not including railway—purposes. These phrases mean prices which the company would now have to pay to carve an equivalent right-of-way out of adjacent lands having a similar character and value.

A compilation was made by counsel for the railroads showing land acquired by railroads for building extensions, branch lines and double track, etc., in the last ten years and a general average was then made to compare the cost which the railroad company had to pay for land, for railroad purposes, with that which would have had to have been paid for the same land for other purposes. The price which would have had to have been paid for all the land for other purposes was approximately 40 per cent of the price which the railroad company had to pay. It is the experience of railroad companies in recent times which should be made the basis of the estimate as to how much more land is worth for railroad purposes than for other purposes.

[The question was asked as to whether, if the Pennsylvania Railroad did not exist today, it would not be very easy to obtain land grants, cheap right-of-way, etc., for the building of this road. Counsel for the railroads replied that it is impossible to go off into pure speculation, that the best answer to the question is to be found in the experience of railroads which are today building a new line, extensions or branches, and this experience shows that the railroad has to pay very considerably more than would some one who was acquiring the land for other purposes.]

"USED FOR PURPOSES OF A COMMON CARRIER"

The law broadly divides the property of a railroad into two classes, that which is for the company's purposes as a common carrier and that for purposes other than those of a common carrier. Furthermore, the second class includes both property owned and property used for purposes as a common carrier; thus the Armour Car Lines could not be valued under the law as the property of that company because the law applies only to common carriers and that company is not a common carrier. All property, therefore, used by an operating carrier, whether owned by it or not, must be included in the inventory of the operating carrier. All joint facilities should appear in the reproduction inventory of each carrier and in addition to the original cost, cost of reproduction new and cost of reproduction less depreciation, a full statement as to the ownership of the facilities, a full statement as to the use made of the facilities by each carrier using same, together with the rates and obligations in that regard, and a full statement as to whether carriers pay for the facilities and in what amounts, and the consideration for such payments should be shown. When all these facts are properly before the commission, then will be the time to formulate the rule for the determination and apportionment of such value.

ADDITIONS PAID FOR EARNINGS

All the property of the carrier, whether paid for out of cap-

ital or earnings, or whether received as a gift, is to be included in the value on which the carrier is entitled to return. The assumption that a surplus of earnings is prima facie evidence of unreasonable rates in the past, is wholly wrong. There is no necessity for the company to actually pay out in dividends surplus and then ask its stockholders to invest an amount equal to the dividend in the property to make the investment of surplus a new investment and an investment of property which belongs to the stockholder. The only equitable assumption is that the rates charged are reasonable and that the fact that a particular railroad company can earn a surplus is because it is economically located and operated, and that good business judgment has been used in its management. Additions and betterments made out of earnings or surplus are, of course, subject to taxation on the same principles and to the same extent as if they had been paid for out of capital, and the Supreme Court of Washington has specifically pointed out in a recent case that there cannot be one value for purposes of taxation and another value for the purpose of establishing reasonable rates.

OTHER VALUES AND ELEMENTS OF VALUE

The other elements of value which may be called the intangible values, but which nevertheless are as substantial and as real as any physical values, may be divided as between values which attach to specific pieces of property, units or parts of property and values which attach to the property as a whole. Each particular case must be studied to determine the value which attaches to specific pieces of property; thus if a railroad company owns a piece of right-of-way or terminal which renders all the service which the owning carrier can require therefrom, and in addition the owner receives a substantial revenue from some other railroad, this value should be taken into consideration.

There are five classes of values which attach to the property as a whole and can be valued together.

1. That element of value which results whenever the separate articles of physical property constituting a railroad are joined together, not simply by a unity of ownership, but in a unity of use.

2. Going concern value is that element of value, in addition to the sum of the values of its component parts, which results from the fact that the plant is in operation and has an established business—i. e., in active and successful operation earning revenue.

3. That element which represents the earning capacity of the property due to its favorable location with reference to command of traffic, including the existence of traffic producing industries along its lines, its advantage of connections with other carriers, the potential traffic in its tributary territory and all other features bearing upon its present and prospective traffic earning capacity.

4. That element of value resulting from economy of operation, due to gradient, alignment and other physical characteristics, climatic conditions, adequacy of terminals, equipment and other facilities, fuel supply, efficiency of operating organization and all other features bearing upon the cost of operation and maintenance.

5. That element of value represented by franchises and privileges.

EXPORTS OF RAILS FROM THE UNITED KINGDOM.—The exports of rails from the United Kingdom in August showed some increase as compared with the corresponding month of 1914, although they were not up to the level of August, 1913. The change observable was due, to some extent, to an increased colonial demand, the shipments to South Africa rising to 4,742 tons, as compared with 180 tons; those to Australia to 13,848 tons, as compared with 6,227 tons; and those to New Zealand to 2,314 tons, as compared with 1,070 tons. The deliveries to British India declined, however, to 3,595 tons, as compared with 8,303 tons.

THE GRETNNA COLLISION

The disastrous collision on the Caledonian Railway at Quintinshill, May 22, last, when a train filled with troops ran at high speed into a local passenger train, was reported in the *Railway Age Gazette*, June 11, pages 1227 and 1242. The report of the Board of Trade inspector, Lieut. Col. E. Druitt, just at hand, gives the total casualties as 473 (227 killed and 246 injured), by far the largest record for a single train wreck that we can recall. The number of killed is 66 more than the number reported in June, but it includes 28 persons who at first were included in the list of injured. This total includes 82 bodies recovered but not recognizable because of the effects of the fire. The inspector expresses the hope that few if any of the persons fatally burned were conscious when the fire reached them. Of the total number of killed 215 were in the troop train, 7 in the express train which ran into the wreck a minute after the collision occurred, and 2 in the local passenger train. The number of employees killed was 3 and of injured 4.

Discussing the cause of the collision, the inspector recounts various things done or omitted which led up to the fatal error, or which were potentially dangerous; but he devotes his principal paragraph to the use of track circuits as safeguards against the giving of false clear signals at interlockings. But, he says, if a place like Quintinshill is to be fitted with track circuits, "it means that every signal box on a main line is to be fully provided with this device, on both tracks, between the home and starting signals; and Quintinshill would be one of the last places to be so fitted, for it is little more than a block post and all the tracks are in full view of the signalman."

The error of the signalman, in forgetting the presence, within a hundred feet of his window, of a standing passenger train, from which he had himself alighted a few minutes before, is, in view of the results, staggering. There was no question concerning incompetence, or liquor drinking or distraction by any unusual circumstance. There were two or three trainmen in the cabin but no nonsense or anything to disturb the signalman. There were some contradictions in the testimony, which the inspector could not clear up, but the main fact was not affected by them. Concluding his observations on this branch of the subject the inspector says:

"The means provided at the present time by the company for reminding signalmen of any vehicles standing within their control at such a place as Quintinshill should have been sufficient, if the signalmen concerned had only carried out the ordinary simple rules of block working and regulations laid down for the purpose, and paid proper attention to their duties. Also, it is much to be regretted that some signalmen do not look out of their signal-boxes to see if the line over which an approaching train is to run is clear of any obstacle before lowering the signals. It takes only a brief interval to do so, and many collisions could be prevented if this simple precaution was always taken. Had Tinsley looked along the up line on this occasion, he could not have helped seeing the 6:10 local train standing only a short distance away."

The inspector devotes a page to the fire, which, starting from coals spilled out of two or more fireboxes, became uncontrollable in a few minutes. There was no water supply available, even the tenders of the locomotives having been emptied by being ruptured in the collision. Fire engines from Carlisle, ten miles away, reached the scene *three hours* after the collision. The inspector repeats former recommendations that all passenger cars be lighted by electricity, at the same time saying that this fire was not due to the use of other illuminants.

GERMAN STEEL PRODUCTION.—The total German production of steel ingots and steel castings, including Luxemburg, in 1914, amounted to 14,973,106 tons, as against 18,949,929 tons in 1913. The figures for steel finished products, including rails, girders, sections, forgings, etc., were 13,011,438 tons in 1914, as against 16,518,950 tons in the preceding year.

Pennsylvania Track Elevation Through Wilkinsburg, Pa.

Five Tracks Are Being Raised Through Suburb East of Pittsburgh, Work Carried on Under Heavy Traffic

The Pennsylvania Railroad is now completing the elevation of its main line through Wilkinsburg, a suburb of Pittsburgh, work which has been carried on under exceptionally heavy traffic. Wilkinsburg is located on the main line of the Pittsburgh division, seven miles east of Pittsburgh, between the Brilliant cutoff connection and Port Perry. This portion of the line carries all passenger and freight traffic coming from the East for Pittsburgh or beyond, including all through freight traffic which is diverted via the Brilliant cutoff to avoid congestion in the Pittsburgh terminals. In addition there is a heavy suburban traffic which alone requires 70 trains daily.

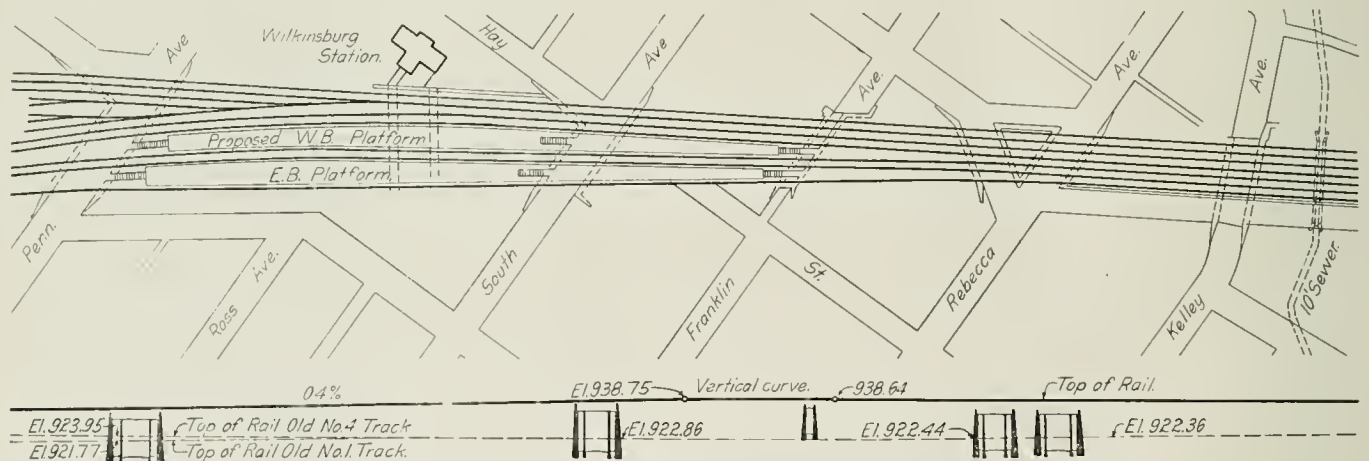
The present layout provides for five tracks, two eastbound and two westbound, with a service track in the middle to serve a yard located between the two double track main lines just west of Wilkinsburg. All structures have been laid out, however, to permit ready revision in the future for the addition of a double track freight line along the north side, which will connect with the cutoff. The present work is a continuation of grade separation recently completed in the city of Pittsburgh immediately west, and naturally follows that work, for, although the borough of Wilkinsburg is separated from Pittsburgh politically, there is no real physical separation, and the density of the population in the former approximately equals that of the adjoining portion of the larger city. The conditions leading to

of the borough of Swissvale on overhead viaducts, so that the matter of grade separation in that vicinity has already been solved.

The new profile provides for a 0.4 per cent grade rising eastward from the previous work in Pittsburgh for a distance of 2,400 ft., reaching a summit on a vertical curve at Franklin avenue and then descending for 5,400 ft. on a 0.3 per cent grade, which reaches the old grade line a few hundred feet east of the Edgewood station. There are four street and three pedestrian subways, besides the old subways at Kelly avenue and Race street, and the passenger and baggage subways required for a new passenger station at Wilkinsburg.

SUBWAYS

Commencing on the west the first subway is that at Penn avenue, one of the most important streets in the city of Pittsburgh, and a part of the original Pittsburgh and Greensburg turnpike, now to be incorporated in the proposed Lincoln highway. The situation is complicated by the junction of Penn avenue with Pitt street within the limits of the subway, because the latter must be provided for in the subway north from the intersection. South of the intersection Pitt street has been closed as far as the railroad right of way line, but will be connected to Penn avenue south of the railroad by a short street



General Plan and Profile of the Track Elevation Through Wilkinsburg

grade separation in Wilkinsburg were emphasized by the fact that most of the important streets crossed the tracks at an angle of $57\frac{1}{2}$ deg., thereby increasing the danger at the crossings under the prevailing heavy traffic on both the railroad and the streets. In three cases street intersections were located on the railroad tracks.

While not as rough as much of the country in the vicinity of Pittsburgh, the location of the railroad through Wilkinsburg presents considerable irregularity in topography which had been taken advantage of in the past to provide two subways under the tracks in natural depressions. One at Kelly avenue is used by a street car line, with the crown of the roadway about 26 ft. below the old base of rail level, the street also crossing under Pennwood avenue, which parallels the tracks along the south right of way line from Rebecca avenue to Lincoln avenue. The other subway is at Race street, Edgewood, near the east end of the present project. East of the Race street subway the railroad is in a cut for some distance crossed by numerous streets

parallel with the south right of way line. The subway has been built to provide eventually for 11 tracks, and gives a head room of 15 ft. In Penn avenue, which is 60 ft. wide, there are lines of supports at the curbs and on the center line of the street, forming two roadways having a clear width of 17 ft. each. In Pitt street, which is 50 ft. wide, there are lines of supports at the curbs only, leaving an unobstructed driveway 30 ft. clear.

The first seven tracks from the south end of the subway are supported on an all-reinforced concrete structure consisting of two mass abutments with reinforced concrete bents for intermediate supports covered by reinforced concrete slabs. Each bent consists of a row of columns surmounted by semi-circular arches, the columns being spaced to bring one arch under each track, a design commonly used in structures of this kind, and worked out in this case with exceptionally good proportions. In a number of cases the distance, center to center of tracks, is considerably more than the ordinary track spacing, and in such instances for the sake of economy, an open space has been left

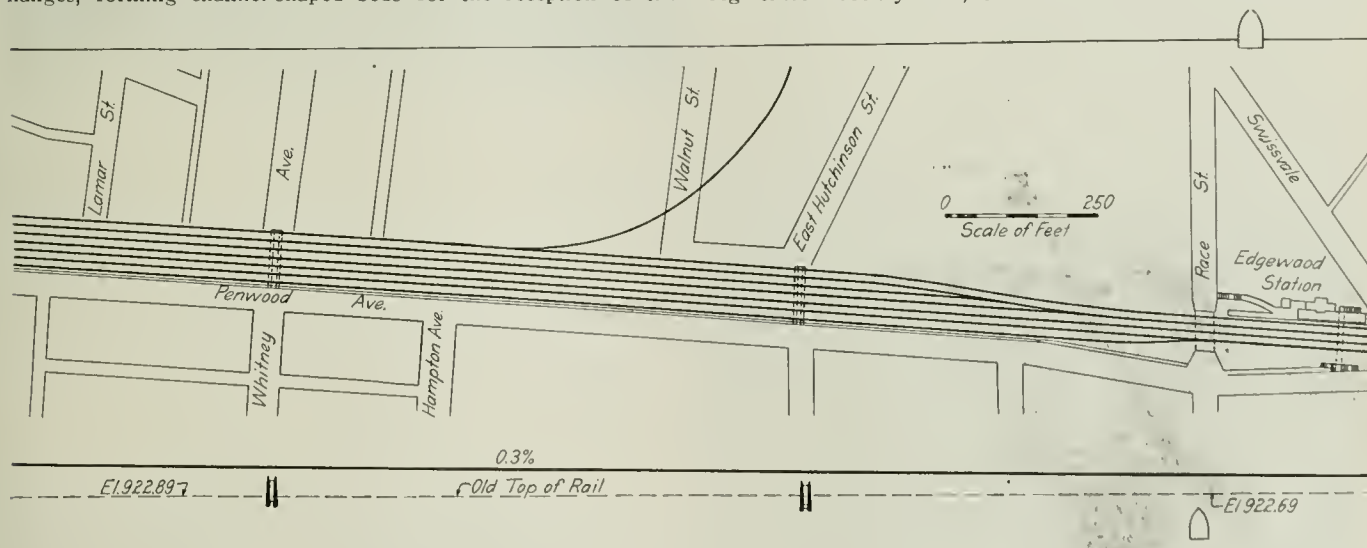
between the slabs of adjacent tracks, also breaking the continuity of the bents beneath. This was accomplished in a simple way by cutting through the arch in the plane of the face of the slab, a width of slab being selected that would cut off the arch at or near the crown. The same treatment was used at the ends of the bent on the south parapet of the structure, the effectiveness of this treatment being well shown in one of the accompanying photographs. The slabs which serve as the superstructure of the subway follow the standard practice of the Pennsylvania Railroad. The abutments are of mass concrete with a stepped back, and have the exposed faces broken up into horizontal courses 24 in. deep by the use of V-molds. This has the advantage that it breaks up the surface and tends to conceal any irregularities in the texture or shade of the concrete finish.

Owing to the complications resulting from the intersection of Pitt street with Penn avenue under the subway it was necessary to adopt steel construction for the four north tracks. In fact, these conditions resulted in the use of some rather heavy girders and columns, one of the latter carrying a concentration of 1,335,000 lb. The columns and the sway bracing between them are inclosed in concrete to give an appearance similar to that of the concrete bents at the other end of the subway, the arches between the posts being three-centered instead of semi-circular on account of the wider spacing of the steel columns. The floor, which is of the ballast type, consists of transverse I-beams encased in concrete. Where the tracks and the girders are spaced 13 ft. center to center, the beams are 18 in. 55 lb. I-beams, spaced 2 ft. center to center. The concrete encasement has a minimum depth of 2 in. over the tops of the I-beams, and extends up the sides of the girders to the under side of the top flanges, forming channel-shaped beds for the reception of the

curbs on both streets. It will provide eventually for seven tracks with a spacing of 22 ft. between the first and second, and 25 ft. between the third and fourth tracks (counting from the south) to allow for platforms for the new Wilkinsburg station. In all other cases the spacing of the tracks is 13 ft. The minimum head room of the subway is 14 ft.

At Franklin avenue there is a pedestrian subway 7 ft. 6 in. high and 16 ft. wide with a concrete slab cover. Wood street and Rebecca avenue also intersect near the center line of the right of way, but a rearrangement was made, relocating the end of Wood street to intersect Rebecca avenue south of the tracks. This gave two separate subways of seven tracks each, with 14½ ft. head room, and both of the same width and the same type of construction as the South avenue subway. Wood street and Rebecca avenue also have a connection north of the tracks by a new short street 30 ft. wide parallel to the tracks. By this arrangement there is a triangle of embankment approximately 110 ft. on a side between the two subways and the new street, which is entirely surrounded by retaining walls and abutments. It was concluded that this was a more satisfactory solution than a single subway structure of sufficient length to embrace both streets.

As stated previously, there has been a subway at Kelly avenue for some time, passing under the tracks and also under Pennwood avenue. The latter was formerly on a level with the tracks all the way from Rebecca avenue to near Race street, but is now separated from them for the entire distance by a retaining wall varying from 6 ft. to 16½ ft. in height, the difference in grade at Kelly avenue being 16 ft. It was unnecessary to make any change in the old structure, which is a 40-ft. segmental masonry arch, on account of the increased embank-



General Plan and Profile of the Track Elevation Through Wilkinsburg

ballast which is pitched toward the center under the ties to afford drainage. The entire top surface is covered with a membrane waterproofing, protected under the tracks by ½ inch of cement mortar and a course of bricks laid flat to give a thickness of about 2 in. Up the sides of the troughs the protection consists of a thin shell of reinforced concrete. In order to save material and reduce the dead load the concrete encasement is not solid to the bottom of the I-beams, but is hollowed out on the under side between them to form rectangular troughs 15 in. deep. All concrete work in the floor is reinforced with wire mesh. The outside girders on the north side of the structure are encased in concrete and paneled to give an appearance similar to the parapet of the concrete slabs on the south side.

The subway at South avenue and Hay street is similar in layout to the Penn avenue subway, but the superstructure is all of structural steel. There are intermediate supports at the curb lines only, leaving an unobstructed driveway 30 ft. wide between

ment load, but the structure was extended on the north end to provide for two additional tracks. On account of the greater height available this extension was made a semi-circular arch instead of a segmental arch, and as shown in one of the accompanying photographs, the use of V-grooves to break up the concrete surfaces, has been used with a pleasing effect. To avoid overloading the arch ring the retaining wall between the tracks and Pennwood avenue was not supported on the arch, but was designed to span across the opening from supports on either side carried on concrete piers.

Between Kelly avenue and Race street the tracks have not been elevated a sufficient amount to permit the construction of any regular street subways, but two pedestrian subways, 8 ft. wide by 7½ ft. high, have been provided, one at Whitney avenue and one at Hutchinson avenue. These subways are entirely of concrete, and with the exception of the south end of the Whitney avenue subway, stairways were necessary to get

down to the level of the subway floors. As shown in the accompanying photograph the entrances to the subways are protected by suitable hand railings and lamp posts. Adequate illumination was also provided for the interior.

At Race street there is an old four-track 40-ft. segmental arch subway of ashlar masonry, which adjoins the Edgewood suburban passenger station. No change is required at this sub-



East-Bound Platform, Wilkinsburg Station

way other than to raise the parapet and wing walls about 8 ft. and connect the southwest wing wall with the new Penawood avenue retaining wall. The track elevation will result in no material changes in the Edgewood station at this time.

THE WILKINSBURG STATION

One of the most important features of the project is the new Wilkinsburg passenger station. The site of the old station at Franklin avenue and Wood street was deemed unsuitable, so



Whitney Avenue Pedestrian Subway

a new site was selected at the intersection of Ross avenue and Hay street. The building is to be located in the center of a triangular plot bounded by the embankment retaining wall, Hay street and a 20-ft. alley, known as Sawyer way. It is symmetrical with and faces down Ross avenue, giving it a conspicuous location. It consists of a central portion 34 ft. by 50 ft., occupied entirely by the general waiting room, with symmetrical

wings on either side. The east wing contains the ticket office and a waiting room and toilet room for women. The west wing contains a news-stand and a waiting room and toilet room for men. On the track side three wide doors communicate with a lobby 16 ft. by 36 ft., from which access is had by a closed corridor, to a 12-ft. tunnel under the tracks leading to the platform stairways. A covered platform between the station proper and the railroad retaining wall, serves as a baggage room, from which a separate 12-ft. tunnel leads to baggage truck elevators. Brick with stone trim will be used for the exterior of the building, and with adequate space around the same for treatment with lawns and shrubbery, it will give a pleasing appearance.

The arrangement of the platform facilities for the station were complicated by the fact that the immediate location of



Kelly Avenue Subway—North Extension

the westbound track does not conform to the proposed future arrangement, when the two freight tracks will be provided on the north side. This made it necessary to provide a temporary wooden platform for the westbound tracks and three sets of stairways and elevators, one for the eastbound platform and one each for the two locations for the westbound platform. The platforms vary from 15 ft. to 37 ft. in width on account of the curves in the tracks, and are between 900 and 1,000 ft. long.

Communication with the street has been effectively worked out. There are stairways to the Penn avenue and South avenue subways and the pedestrian subway in Franklin avenue as well as stairways both east and west from the station subway. The latter has an outlet on the south side which connects by a walk



Race Street Subway

with Pitt street and South avenue. The stairways are of concrete, between concrete retaining walls extended into the embankment from the subway abutments. The steps are fitted with flat type Universal safety treads, built monolithic with the

concrete. The platforms are of the high type, involving some interesting details. The permanent eastbound platform consists of a reinforced concrete slab $8\frac{1}{2}$ in. thick, spanning between transverse concrete beams 9 ft. center to center. These beams are supported on three rows of reinforced concrete posts, extending through the fill and in turn resting on concrete piles. A $1\frac{1}{2}$ in. asphalt mastic cover serves as a wearing surface and as waterproofing. As the tops of these platforms are 4 ft. 4 in. above the base of rail, there is a clear space of 3 ft. 6 in. between the top of the fill and the under side of the slab, which has been partly screened by building false arches between the outside columns. Similar construction is used for the platforms



North Elevation, Penn Avenue Subway

over the South avenue subway, except that the transverse concrete beams rest directly on the top flanges of the track girders and instead of single arch openings between the beams, three openings are provided 2 ft. wide with semi-circular tops. These openings assist materially in lighting the subway underneath

SEWER CONSTRUCTION

An independent project, carried on simultaneously by the track elevation forces is the reconstruction of a large masonry storm sewer just east of Kelly avenue. This sewer consisted of a semi-circular arch 6 ft. wide carried on 4-ft. bench walls for a length equal to the width of the right of way and joined on either end by a 10 ft. sewer. The borough of Wilkesburg has required the railroad to enlarge the old sewer to 10 ft. to correspond with the portions outside of the right of way, maintaining that the 6-ft. section was no longer adequate, owing to the faster runoff to be obtained with the great increase in the relative proportion of the drainage area covered by impervious



South Elevation, Penn Avenue Subway

surfaces, in consequence of the construction of pavements and buildings. As the invert of the sewer is 50 ft. below the new track level, tunneling was obviously the only feasible method for reconstruction. The material encountered being clay, it was necessary to follow the heading very close with the timbering. The procedure adopted was to take down the old arch, widen out and take down the bench on one side and rebuild it 4 ft. further out. By this scheme one bench was saved. The new arch ring is of reinforced concrete. A 30 in. cast iron pipe sanitary sewer under the invert of the storm sewer offered a simple means of drainage during construction, as temporary

holes cut in the top of the sanitary sewer readily served as catch basins.

CONSTRUCTION

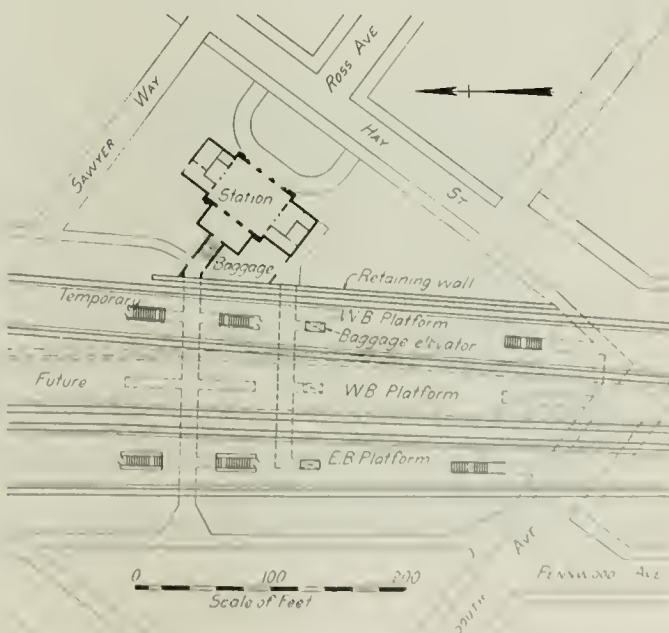
The foundations for the structures were sufficiently good to permit the use of natural foundation, except in such cases where the line traversed ravines or gullies subsequently filled. At such points it was out of the question to carry foundations down to the original ground surface, and the use of wood piles was not



Details of the Penn Avenue Subway, Stairway to Platform

permissible, because of the low level of the ground water, in all, a situation naturally suggesting the use of concrete piles. Simplex, reinforced concrete piles were selected and proved satisfactory, both as to ease of construction and quality of the finished product. Two piles uncovered by chance in the sewer tunnel, were found to be in excellent condition, showing perfect form and sound concrete. The piles were loaded to 30 tons each, and were driven with a 3,000 lb. drop hammer, the fall of the hammer not exceeding 15 ft.

A uniform finish was secured on the concrete surfaces of the walls and subways by rubbing with carborundum brick as

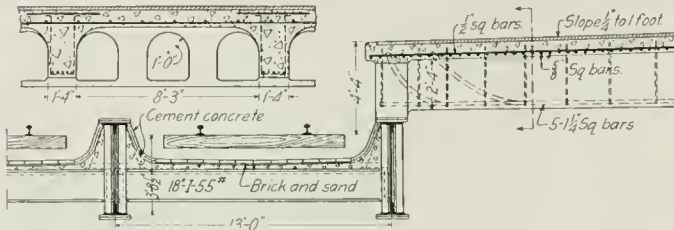


Layout of Wilkesburg Passenger Station

soon as the forms were removed. In the subways the lighting was greatly improved by the use of white surfaces, secured by applying a wash consisting of "Skim Coat" mixed with neat cement immediately after the rubbing was finished. The white

surface also adds materially to the appearance of the structures.

Owing to lack of head room for falsework, it was necessary to cast the slabs for the Penn avenue subway away from the site and to set them in place after they had been cured. The old freight yard at Hay street and Rebecca avenue was selected for this purpose. The slabs were set by two 100-ton wrecking cranes, several of the slabs weighing 70 tons. The setting of the slabs, as well as the erection of the structural steel work, was done by company forces. All masonry work is being built by the Dravo Construction Company, of Pittsburgh, which also



South Avenue and Hay Street Subway—Details of Track Floor and Platform

has the contract for the excavation, depressing the streets and grading for the new passenger station grounds and the new freight yard west of Penn avenue.

An interesting and rather unusual feature of the work was the doing of all filling by contract, including the raising of the tracks. The John F. Casey Company was the contractor for the filling, which was made entirely with granulated slag delivered on cars by the railroad company. The work is also out of the ordinary, because of the expensive method of filling which it was necessary to pursue on account of the extremely heavy traffic, which precluded the withdrawal of any track from service for more than a few minutes at a time. The tracks were raised in lifts small enough to permit the passage of trains at all times. At Penn avenue they were raised in place on filling which had to be removed later to provide for the subway. This method was superseded at the other streets by the use of cribs of cross ties to support the falsework deck for the tracks. These cribs were built up as the tracks were raised, and were replaced

and Hutchinson avenues. The company will eventually raise the tracks to a 0.3 per cent grade line.

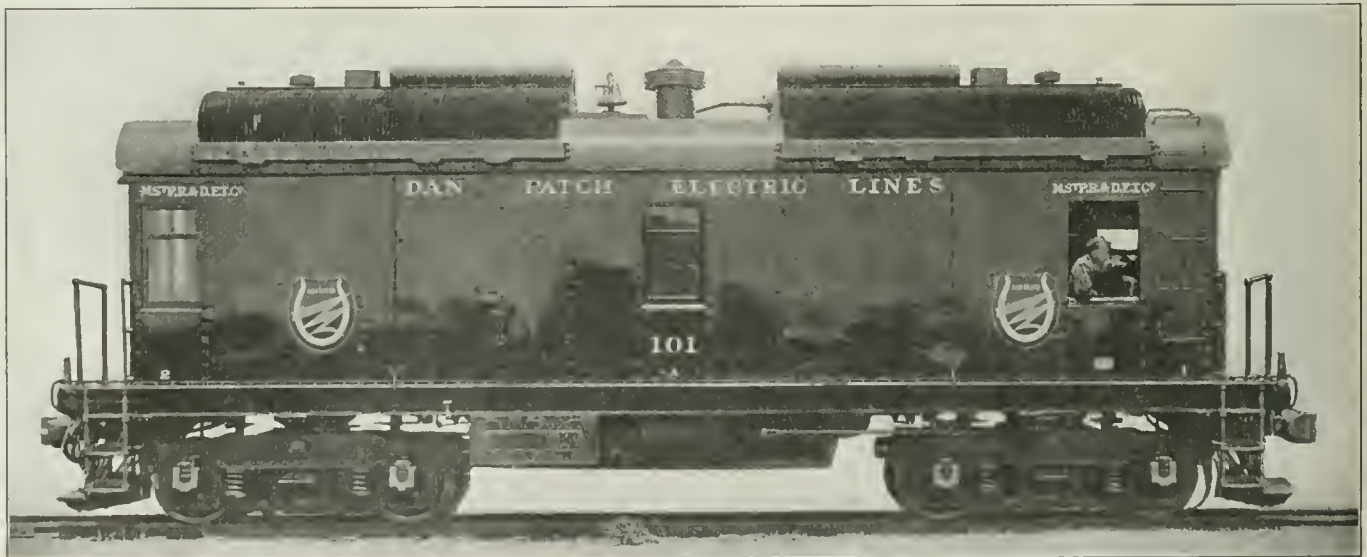
The work is being handled under the direction of A. C. Shand, chief engineer, Pennsylvania Railroad, and under the immediate supervision of F. M. Sawyer, assistant engineer, Johnstown, Pa. A. L. Ware is engineer in charge at Wilkesburg.

60-TON GAS-ELECTRIC LOCOMOTIVE

The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, operating what is popularly known as the "Dan Patch" electric lines, has recently put in service three 60-ton gas-electric locomotives for freight, passenger and terminal service. These are somewhat similar in design, although heavier than the 57-ton gas-electric locomotive,* which has been in successful operation daily for the past year or more from Minneapolis to Mankato, Minn. The four gas-electric locomotives, as well as 13 gas-electric motor cars which the railway has purchased, were designed and built by the General Electric Company. This is said to be the first railroad in the world operated entirely with gas-electric service.

The railway extends south from Minneapolis to Mankato, a distance of 107 miles. About midway of the line a branch runs northeast from Northfield to Randolph, 7 miles distant. The severest grade on the present line is 2 per cent. About 25 miles south of Minneapolis, at Orchard Gardens station, several thousand acres of farm land have been divided into 5 and 10-acre tracts by the company, and are being sold to residents of Minneapolis and St. Paul, many of whom have erected houses and travel to and from their places of business in the city each day.

Four through trains daily each way, one of which is a limited parlor car train, constitute the normal passenger schedule. The limited makes the run of 107 miles, including four stops, in 3 hr. 25 min.; the other trains require 4 hr. 5 min. for the trip. This service is supplemented by local trains between certain points of the line and the terminals, and by excursion trains during the summer season as occasion requires. One 70-ft. gas-electric motor car, seating 89 passengers, normally



60-Ton Gas-Electric Locomotive for the Dan Patch Electric Lines

after the final lift had been made by frame bents on mud sills. The granulated slag proved to be a very efficient material for filling. It packed very hard almost immediately with little or no subsequent settlement. East of Rebecca avenue the contractor's work covered filling only a 0.5 per cent grade line, which is sufficient to clear the pedestrian subways at Whitney

makes the run; when travel is somewhat heavy, a trailer is added to this; and for excursions and extra heavy traffic, a train is made up of trailer cars drawn by a 60-ton gas-electric locomotive.

The new 60-ton locomotives are double ended and are built

* See *Railway Age Gazette*, November 14, 1913, page 916.

with the box type of cab extending nearly the entire length of the underframe; all the weight is on the drivers. The truck clearances allow for 100 ft. minimum radius curvature. The power plant consists of two generating sets similar to the one used in the gas-electric motor cars. Only an engineer is required to operate the locomotive.

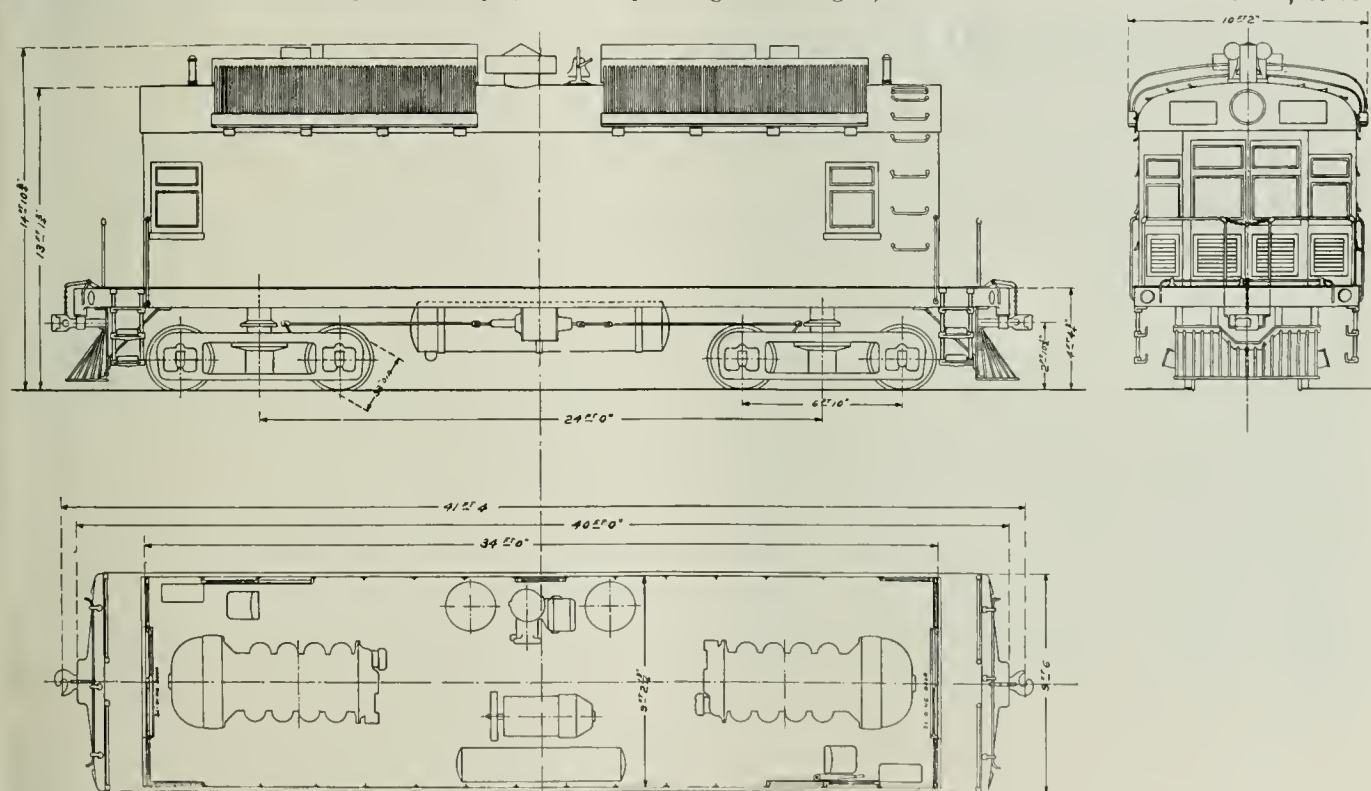
The box cab is of all-steel construction, and both ends are removable to permit the installation of the apparatus. The interior is not divided into compartments. The generating sets and the controllers are installed in each end, while the auxiliary lighting set, air compressor and storage tanks are grouped in the central section. The operator's seat at the side of each end of the cab affords a clear view ahead of both sides of the track.

The underframe of the locomotive consists of 10-in., 30 lb. channels, which extend the entire length of the platform, and are tied together by heavy end frame cast steel buffers and bolster plates, each channel being riveted to the webs of the end frame castings and bolted to the top and bottom bolster plates. The bolsters are built up of 12-in. by 1½-in. steel plates.

from either end, in accordance with the requirements of the trailing train load.

Compressed air for starting is taken from the main reservoirs of the air brake system, which are built with surplus capacity. The two main single-cylinder air compressors are driven from the crankshafts of the main engines, have a displacement of 22.5 cu. ft. of free air per min. at the rated speed and are fitted with automatic governors to maintain a constant pressure. Greater flexibility of control and economy of operation result through electrical transmission of the energy. The engines can rotate at normal speed irrespective of the speed of the locomotive and deliver their maximum power, a feature of great advantage on grades, in case of snow storms or other emergency conditions involving sudden, heavy current demands.

There is also an auxiliary gas-electric set, the function of which is to furnish power for lighting the cab, headlights and train coaches, and for pumping an initial charge of air to fill the tanks and start the main engines. This set is started by hand. It consists of a vertical, 750 r. p. m., 4-cylinder, 4-cycle gasolene engine, which is direct-connected to a 5 kw., 65-volt,



General Arrangement of the Gas-Electric Locomotive for Use on the Dan Patch Electric Lines

Cross sills are riveted in where it is necessary to support equipment hung below the frame.

The two four-wheel swivel trucks are of the plate frame swing bolster type, designed for heavy freight work and conform to M C B standards. The side frames are built up of steel boiler plate. The truck bolster, of the swinging type, is built up of channels and pressed steel plates.

Each of the two gas-electric generating sets for the power plant equipment is composed of a 175 hp., 550 r. p. m., 8-cylinder, 4-cycle gasolene engine of the "V" type, which is direct-connected to a 600-volt, commutating pole, compound-wound electric generator with an outboard bearing supported by brackets bolted to the magnet frame. The cylinders are 8 in. by 10 in. Ignition is accomplished with low tension magnetos and the sets are started by air pressure in the same way as in the gas-electric motor cars, with the additional feature that after one set is running, the second may be started from the first electrically. The control is so arranged that either one or both of the generating units may be used to operate the locomotive

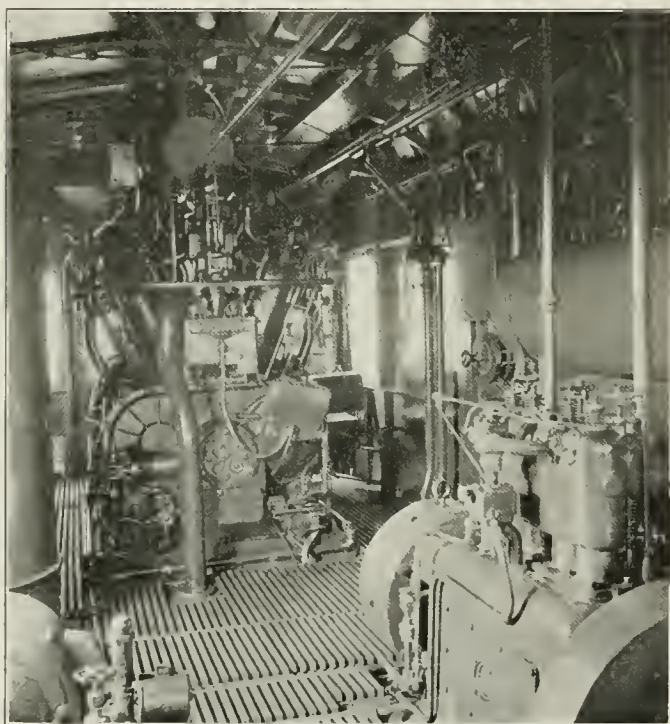
commutating pole, compound-wound, electric generator. The cylinders are 3 in. by 6 in., and ignition is effected by a high tension magneto. The air compressor on the 65-volt circuit is a 2-cylinder, motor-driven, and has a piston displacement of 25 cu. ft. per min. when pumping against a tank pressure of 90 lb per sq. in. Air is taken from the cab interior through screens, and is delivered to the three reservoirs, each 87½ in. by 18 in., installed at one side of the cab in the center and connected in series, thereby affording an opportunity for radiation of heat and condensation of moisture before entering the brake cylinders. After starting the main engines, the governor on this motor-driven set cuts it out and all air is supplied by the air compressors on the main engine.

Mounted on the axles with nose suspension are four GE-205-D, 600-volt, series, commutating pole, oil-lubricated, box frame, railway motors having an hourly rating of 100 hp. each. All four axles are therefore driving axles, a forged pinion being mounted on each armature shaft and meshing into a corresponding cast steel split gear mounted on the axle. The gear ratio

is 58 to 17 teeth, a reduction of 3.41, which is especially adapted for freight and terminal switching service, as it affords maximum tractive effort at starting and at low speeds. The motors are ventilated by a special vacuum system in conjunction with the engines.

The control of the motor equipments is similar to that of the standard gas-electric motor cars, a type P-53 controller being installed in each end. Two motors are, however, connected permanently in parallel and these two pairs, operated like single motors, are placed progressively in series and parallel. The controller provides seven running stops in series and six in parallel, without rheostats in the main circuit. There are also two additional points for shunting the series fields, making a total of 15 efficient running points.

Inasmuch as electrical energy is transmitted directly, there are no losses through the intervention of mechanical change-speed gearing. To produce the smooth and rapid acceleration, the speed changes of the motors are effected by governing the



Interior of Cab of Gas-Electric Locomotive

voltage through varying the strength of the generator fields, which is accomplished by the movement of one handle on the controller. Separate handles are provided for throttling the engine and for reversing the motors. The latter is accomplished instantly by changing the motor connections in the usual manner, without stopping the engines, which always rotate in the same direction. This allows the train to be brought to a stop quickly, independent of the brakes, in an emergency.

The principal data and dimensions applying to the locomotive are as follows:

Track gage	4 ft. 8½ in.
Total weight	120,000 lb.
Weight per axle	30,000 lb.
Maximum tractive effort	32,200 lb.
Length between knuckle faces of couplers	41 ft. 4 in.
Length over cab	34 ft.
Height over-all	14 ft. 10¼ in.
Width over-all	10 ft. 2 in.
Total wheel base	24 ft.
Rigid wheel base	6 ft. 10 in.

RAILWAY EXTENSION IN GREECE. The first rail of the Loussa-Salonika Railroad was recently laid at Pappapouli. By this line Athens and all ancient Greece will be in communication with the rest of the mainland of Europe.

LEGITIMATE FREEDOM FOR RAILROADS

[J. J. Hill in New York Times]

The railroad is the least common multiple of all national industry. Its expansion is an indispensable condition of growth. Like every other activity in the world requiring the investment of capital, it not only will not grow, it will contract if laws and regulations prevent it from earning a reasonable profit. If the railroad had existed at the time our Constitution was framed, there is little doubt that the states would have been forbidden to legislate concerning it, exactly as they were to tax imports. As in the case of the tariff, the regulation of railways should be in the hands of an expert nonpartisan commission, on which both they and the public should have fair representation, with power to act subject only to review by the courts.

As for the foreign carrying trade, American ships need only the same freedom from hampering regulations that those of other countries enjoy to restore the old precedence of our merchant marine. With ocean and land carriers free to make joint rates on export business to get the trade, as those of other nations are not merely permitted but encouraged to do, our foreign trade would take the same precedence that events have given to our international financial position.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE

The tables on the two pages immediately following show the number of freight cars in service on all of the important railroads of the country in 1913 and 1914 and in 1900 and 1914. It will be noted that narrow-gage cars are excluded, as well as non-revenue cars, but that cars used to carry company freight are included. The railways are grouped under the heads of New England roads, trunk line roads, Southern classification roads, Central classification roads and Western classification roads.

The tables show the number of cars in service, the number of cars per mile of road, average length of haul, freight cars per thousand freight car miles and per thousand ton miles, the average rate per ton per mile, and the freight cars in service per thousand dollars of freight earnings.

The table does not show the capacity of cars and, of course, roads which show a decrease in the number of cars may have cars with a larger total capacity despite the smaller number.

ENGLISH RAILWAYMEN AND THE WAR.—The chairman of the English Railway Executive Committee has recently issued a list showing that to August 31, 1915, the total number of men from the railways of the United Kingdom who had enlisted was 92,658, that being no less than 14.9 per cent of the total of 621,588 men employed on the railways of the United Kingdom at the beginning of the war. The enlistments from the staffs of a number of the important railways are given herewith:

Company	Total number of men employed at commencement of war	Total number of men who have enlisted to August 31, 1915	Percentage of men enlisted to total number employed
Caledonian	23,766	2,794	11.8
Great Central	34,505	5,021	14.55
Great Eastern	33,676	4,889	14.5
Great Northern	34,458	4,479	13.0
Great Western	79,150	13,965	17.6
Lancashire & Yorkshire	37,812	6,191	16.37
London, Brighton & South Coast	16,269	2,205	13.55
London & North-Western	93,106	16,317	17.52
London & South-Western	24,270	2,988	12.23
Metropolitan	3,249	572	17.5
Metropolitan District	2,499	769	30.0
Midland	74,964	10,983	14.65
North British	24,858	2,500	10.06
North-Eastern	54,462	7,866	14.44
*South-Eastern & Chatham	23,092	2,689	11.64
Railway Clearing House	3,090	713	23.07

* The figure of 2,689 represents men who had enlisted to July 31, 1915.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE ON RAILROADS OF THE UNITED STATES—1913 AND 1914.

Note.—Narrow gauge cars excluded.
Non-revenue cars excluded.
Company freight included.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE—ON RAILROADS OF THE UNITED STATES—1913 AND 1914.																	
Note.—Narrow-gauge cars excluded. Non-revenue cars excluded. Company freight included.	Miles.		Frt. equipment.		In-crease.	De-crease.	Per cent. of change.	Frt. cars per mile of road.		Average length of haul.		Per 1,000 rev. ton miles.		Rate per ton mile. (Dollars)		Freight cars per \$1,000 frt. earnings.	
	1913.	1914.	1913.	1914.				1913.	1914.	1913.	1914.	1913.	1914.	1913.	1914.	1913.	1914.
NEW ENGLAND RAILROADS:																	
Boston & Maine.....	2,302	2,302	24,155	23,064	.....	191	0.82	10.5	10.4	106.82	106.46	106	107	.00899	.01054	.01057	0.84
Bangor & Aroostock.....	568	625	5,279	5,193	.....	86	1.63	9.3	8.3	132.05	126.93	296	246	.0215	.01146	.01225	2.15
Central Vermont.....	536	536	3,310	3,065	.....	245	7.40	6.2	5.7	73.96	79.09	112	103	.0104	.0090	.00920	1.12
Maine, Central.....	1,205	1,200	9,347	9,640	298	.....	3.13	7.7	7.9	96.40	96.40	160	158	.0142	.01086	.01050	1.31
New York, New Haven & Hartford.....	2,114	2,003	36,185	35,713	.....	472	1.30	17.1	17.8	96.43	87.40	163	173	.0145	.01345	.01415	1.06
Total.....	6,675	6,675	78,276	77,575	.....	701	0.90	11.6	11.6	99.88	99.25	167	157	.0143	.01112	.01133	1.29
TRUNK LINE RAILROADS:																	
Baltimore & Ohio.....	4,478	4,478	88,610	86,974	.....	1,645	1.86	19.9	10.4	197.53	193.50	103	106	.0062	.00560	.00564	1.10
Buffalo, Roch. & Pittsburgh.....	586	586	17,181	17,438	257	.....	1.50	29.8	29.8	163.40	161.00	179	189	.0084	.00461	.00462	1.83
Central R. R. Co. of New Jersey.....	676	676	23,790	23,790	.....	122	0.51	35.4	35.1	72.56	72.80	162	169	.0096	.00882	.00877	1.09
Chesapeake & Ohio.....	2,310	2,349	42,691	43,555	864	.....	2.02	18.4	18.5	266.00	255.00	123	117	.00412	.00400	.00400	1.55
Delaware and Hudson Company.....	904	904	19,028	18,830	.....	178	0.93	21.0	20.9	146.80	137.48	109	111	.0058	.00663	.00690	0.94
Delaware, Lackawanna & Western.....	985	985	28,384	28,249	.....	135	7.44	28.8	28.6	171.82	176.76	105	108	.0074	.00727	.00743	0.96
Erie.....	2,258	2,257	49,119	52,775	3,656	.....	7.44	21.7	23.4	188.61	194.83	101	107	.0064	.00574	.00576	1.11
Lehigh Valley.....	1,451	1,440	43,400	45,583	2,174	.....	5.01	29.0	31.7	168.76	163.68	126	140	.0070	.00632	.00642	1.18
New York Central & Hudson River.....	3,753	3,774	78,748	77,202	.....	1,546	1.96	21.0	20.5	198.39	199.02	985	995	.0061	.00609	.00609	1.29
New York, Ontario & Western.....	566	568	6,568	6,351	.....	217	3.30	11.6	11.2	145.58	145.30	106	108	.0070	.00702	.00783	0.90
Pennsylvania.....	4,111	4,512	148,073	146,429	.....	1,644	1.11	36.0	32.4	152.72	163.38	115	118	.0060	.00583	.00589	1.09
Philadelphia & Reading.....	1,120	1,120	42,651	40,730	.....	1,921	4.50	41.8	36.4	93.92	95.12	132	130	.0074	.00705	.00705	1.04
Western Maryland.....	543	661	7,944	9,416	1,172	.....	14.75	14.6	13.9	100.00	113.07	135	135	.0073	.00579	.00554	1.27
Total.....	23,618	24,312	596,327	597,042	715	.....	0.12	25.2	24.5	158.64	159.30	122	126	.0070	.00629	.00633	1.17
SOUTHERN CLASSIFICATION:																	
Atlantic Coast Line.....	4,617	4,661	28,920	29,539	619	.....	2.14	6.3	6.3	156.27	155.59	131	125	.0142	.01203	.01217	1.18
Central of Georgia.....	1,924	1,924	10,112	10,104	.....	8	0.08	5.2	5.2	146.97	150.40	132	128	.0104	.01040	.01083	1.15
Florida East Coast.....	642	642	1,370	1,819	449	.....	32.77	2.1	2.6	161.65	164.16	104	98	.01712	.01735	.01735	1.54
Louisville & Nashville.....	4,923	4,937	45,269	46,480	1,211	.....	2.67	9.2	9.4	171.00	171.00	116	114	.0082	.00779	.00778	1.05
Mobile & Ohio.....	1,119	1,122	10,606	10,776	170	.....	1.60	9.5	9.6	230.10	224.80	99	98	.0062	.00660	.00656	1.08
Nashville, Chat. & St. Louis.....	1,231	1,231	10,078	10,189	111	.....	1.10	8.2	8.3	150.00	151.00	118	127	.0108	.01054	.01054	1.08
Norfolk & Western.....	2,035	2,036	42,699	47,483	4,784	.....	11.20	21.0	23.3	270.81	269.28	99	98	.00424	.00424	.00420	1.12
Norfolk Southern.....	843	843	2,896	3,329	433	.....	14.95	5.1	3.0	87.50	85.63	225	198	.0202	.01584	.01584	1.28
Seaboard Air Line.....	3,074	3,084	16,845	17,629	784	.....	4.65	5.5	5.7	147.80	151.28	111	115	.0097	.00909	.01069	1.00
Southern Railway Co.....	7,036	7,033	48,746	47,161	1,585	.....	3.25	6.0	6.7	155.43	154.61	117	110	.0086	.00982	.00983	1.08
Virginian Railway.....	503	503	7,023	7,106	173	.....	2.46	14.0	12.3	353.47	354.77	107	104	.0045	.00343	.00342	1.34
Total.....	27,673	28,070	224,564	231,705	7,141	.....	3.18	8.1	8.2	184.64	184.78	117	116	.0097	.00983	.00942	1.09
CENTRAL CLASSIFICATION:																	
Chicago, Ind. & Louisville.....	617	618	6,022	6,703	.....	219	3.16	11.2	10.8	138.29	135.74	162	147	.0099	.00745	.00730	1.48
Cincinnati, Hamilton & Dayton.....	1,015	1,015	6,962	6,949	.....	153	1.59	9.3	9.3	121.31	123.16	130	117	.0067	.00529	.00502	1.30
C. C. & St. L.....	2,014	2,014	24,224	30,954	6,730	.....	27.78	12.0	13.0	154.50	162.80	98	99	.0050	.00547	.00531	1.07
Grand Rapids & Indiana.....	575	575	3,207	3,056	.....	115	4.71	5.6	5.3	96.32	93.82	99	93	.0062	.00705	.00705	0.98
Lake Erie & Western.....	966	966	2,796	2,681	.....	115	4.11	3.1	2.9	123.49	121.27	95	99	.0037	.00648	.00656	0.59
Lake Erie & Michigan Southern.....	1,853	1,852	57,693	56,071	.....	1,622	2.81	31.1	30.3	155.50	153.70	110	132	.0077	.00648	.00584	1.50
Michigan Central.....	1,800	1,800	25,681	25,032	.....	649	2.53	14.3	13.9	148.00	149.00	97	91	.0068	.00678	.00652	1.11
New York, Chicago & St. Louis.....	523	523	11,957	11,435	.....	522	4.36	22.9	21.9	197.00	206.00	78	73	.0058	.00514	.00514	1.21
Pennsylvania Company.....	1,750	1,757	62,073	58,925	.....	3,148	5.07	35.5	33.5	177.75	178.76	138	153	.0071	.00569	.00586	1.25
P. C. & St. Louis.....	1,472	1,472	30,210	29,920	.....	290	0.66	20.5	20.3	110.97	115.13	98	99	.0083	.00627	.00590	1.14
Pere Marquette.....	2,322	2,322	17,727	15,868	.....	1,859	10.49	7.6	6.8	173.63	166.42	125	117	.0083	.00603	.00611	1.48
Vandalia.....	876	876	8,821	8,120	.....	701	7.95	10.1	8.9	105.48	111.90	108	98	.0068	.00658	.00617	1.14
Total.....	15,732	16,131	260,913	258,214	.....	2,690	1.03	16.6	16.0	134.27	133.98	106	106	.0067	.00610	.00612	1.17
WESTERN CLASSIFICATION:																	
Atchison, Topeka & Santa Fe.....	10,771	10,961	66,213	65,230	.....	983	1.48	6.1	5.9	311.33	292.25	99	97	.0068	.01002	.01007	0.89
Chicago & Alton.....	1,033	1,033	11,667	13,803	2,136	.....	18.31	12.1	12.4	165.51	170.63	99	123	.0062	.00537	.00537	1.56
Chicago & Eastern Illinois.....	1,225	1,283	26,210	26,004	.....	206	0.70	20.6	20.3	150.73	152.43	202	200	.0107	.00520	.00510	2.30
Chicago & Northwestern.....	7,976	8,071	60,429	65,093	4,664	.....	7.71	7.0	8.1	140.12	143.85	177	193	.0096	.0104	.00870	1.11
Chicago, Burlington & Quincy.....	9,139	9,264	55,735	65,157	9,422	.....	16.91	6.1	7.0	263.30	265.91	98	98	.0063	.0075	.00729	0.87
Chicago Great Western.....	1,496	1,496	10,891	10,643	.....	248	2.28	7.3	7.1	224.42	217.65	107	100	.0075	.00722	.00732	1.11
Chicago, Milwaukee & St. Paul.....	9,613	9,681	62,216	63,361	1,145	.....	1.84	6.5	6.5	246.23	244.70	99	92	.0062	.00666	.00698	1.11
Chicago, Rock Isl. & Pacific.....	8,048	8,205	44,064	45,674	1,610	.....	2.29	5.6	5.6	224.76	219.50	97	101	.0070	.00700	.00700	1.07
Chicago, St. Paul, Minn. & Omaha.....	1,747	1,748	12,560	11,911	.....	658	5.23	7.2	6.8	153.91	152.85	179	177	.0099	.00860	.00860	1.03
Colorado & Southern.....	1,871	1,866	10,714	10,594	.....	120	1.12	5.7	5.7	154.06	143.05	132	152	.0093	.01033	.01033	1.05
Denver & Rio Grande.....	2,555	2,583	18,370	17,936	.....	434	3.36	7.2	6.9	128.45	126.78	170	176	.0122	.00944	.01194	1.02
Denver, C. & Atlantic.....	638	627	3,309	3,196	.....	113	3.41	5.3	5.1	75.37	80.93	184	173	.0127	.00865	.00804	1.47
Illinois Central.....	7,750	7,528	53,595	55,394	1,799	.....	3.36	6.9	7.4	227.02	224.59	114	126	.0061	.00765	.00765	1.02
Kansas City Southern.....	4,763	4,760	56,326	59,437	3,111	.....	5.57	7.1	7.4	242.56	240.83	104	104	.0064	.00665	.00577	1.32
Minn. & St. Louis.....	827	827	5,847	5,567	.....	280	4.76	7.1									

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE ON RAILROADS OF THE UNITED STATES—1900 AND 1914.

Note.—Narrow-gauge cars excluded. Non-revenue cars excluded. Company freight included.	Miles.		Frt. equip-ment.	In-crease.	De-crease.	Per cent. of change.	Frt. cars per mile of road.		Average length of haul.		Per 1,000 rev. ton miles.		Rate per ton mile. (dollars)		Freight cars per \$1,000 frt. earnings.			
	1914.						1900.	1914.	1900.	1914.	1900.	1914.	1900.	1914.	1900.	1914.		
	1900.	1914.					1900.	1914.	1900.	1914.	1900.	1914.	1900.	1914.	1900.	1914.		
NEW ENGLAND ROADS:																		
Boston & Maine.....	1,787	2,302	12,230	23,964	11,734	.....	6.8	10.4	66.99	106.46	.126	.107	.0146	.0091	.01440	.01057	1.02	0.86
Boston & Albany.....	354	625	3,091	5,193	2,102	.....	68.00	8.7	8.3	89.62	126.93	.246	.0539	.0215	.01420	.01225	3.79	1.76
Central Vermont.....	513	536	2,006	3,065	1,059	.....	52.79	3.4	5.7	94.97	79.09	.063	.103	.0079	.00880	.00920	0.90	1.01
Maine Central.....	816	1,209	3,586	9,640	6,054	.....	168.82	4.4	7.9	81.11	96.40	.163	.158	.01130	.01130	.01050	1.09	1.29
New York, New Haven & Hartford.....	2,008	2,003	13,116	35,713	22,597	.....	172.29	6.5	17.8	85.36	87.40	.076	.173	.0097	.01451	.01415	0.67	1.09
Total.....	5,478	6,675	34,029	77,575	43,546	.....	127.97	6.5	11.6	83.61	99.25	.107	.157	.01264	.01133	1.49	1.20	
TRUNK LINE ROADS:																		
Baltimore & Ohio.....	3,170	4,478	61,708	86,974	25,266	.....	40.94	19.3	19.4	194.81	193.50	.128	.106	.0068	.00412	.00564	1.96	1.15
Buffalo, Rochester & Pittsburgh.....	472	586	8,858	17,438	8,580	.....	96.86	18.7	29.8	136.16	161.00	.139	.189	.0097	.0088	.00452	1.99	1.90
Central of New Jersey.....	639	678	15,002	23,790	8,788	.....	58.58	23.4	35.1	77.88	72.80	.153	.110	.0118	.00871	.00877	1.36	1.14
Cheapeake & Ohio.....	1,476	2,349	17,270	43,555	26,285	.....	132.27	21.6	18.5	302.00	255.00	.082	.117	.0058	.00343	.00409	1.71	1.51
Delaware & Hudson.....	665	904	13,030	18,850	5,820	.....	41.53	28.8	28.6	94.46	137.48	.147	.111	.0114	.00789	.00690	1.54	1.00
Delaware, Lackawanna & Western.....	947	985	27,287	28,249	962	.....	14.17	21.3	23.4	151.00	176.76	.108	.104	.0074	.00808	.00743	1.79	0.99
Erie.....	2,104	2,457	46,225	52,775	6,550	.....	40.25	35.7	33.7	188.08	163.68	.101	.107	.0089	.00559	.00576	1.60	1.23
Lehigh Valley.....	1,382	1,440	34,954	45,583	10,629	.....	30.41	25.3	31.7	188.08	163.68	.135	.140	.0106	.00542	.00642	1.97	1.36
New York Central & Hudson River.....	2,817	3,774	59,180	77,202	18,022	.....	30.40	21.1	20.5	163.00	193.02	.144	.095	.0088	.00560	.00632	1.72	1.21
New York, Ontario & Western.....	480	568	5,899	6,351	452	.....	7.66	12.3	11.2	142.38	145.30	.144	.108	.0121	.00816	.00784	1.49	0.92
New York, Ontario & Western.....	480	568	5,899	6,351	452	.....	7.66	12.3	11.2	142.38	145.30	.144	.108	.0121	.00816	.00784	1.49	0.92
Pennsylvania Railroad.....	3,716	4,512	80,385	146,429	66,044	.....	82.16	21.6	32.4	89.42	95.12	.139	.118	.0067	.00540	.00589	1.25	1.13
Philadelphia & Reading.....	1,000	1,120	31,824	40,730	8,906	.....	27.99	31.8	36.4	89.42	95.12	.139	.118	.0067	.00540	.00589	1.25	1.13
Western Maryland.....	279	661	691	9,116	8,425	.....	121.25	2.5	13.9	51.02	113.07	.098	.073	.0038	.00734	.00554	0.53	1.32
Total.....	19,176	24,312	402,313	597,042	194,729	.....	48.40	21.0	24.5	153.16	159.30	.098	.126	.00633	.00633	1.55	1.23	
SOUTHERN CLASSIFICATION:																		
Atlantic Coast Line.....	1,759	4,661	5,378	29,539	24,161	.....	44.26	3.6	6.3	121.90	155.59	.125	.125	.0143	.01401	.01217	1.02	1.19
Central of Georgia.....	1,196	1,924	5,041	10,104	5,063	.....	100.44	4.2	5.2	148.86	150.40	.107	.128	.0183	.01096	.01083	1.26	1.10
Florida East Coast.....	696	696	1,819	1,819	.....	.....	.....	.....	2.6	.....	164.16	.068	.068	.0121	.01735	.....	0.70	.....
Louisville & Nashville.....	3,007	4,937	23,402	46,480	23,078	.....	98.61	7.7	9.4	163.00	171.09	.096	.114	.0090	.00758	.00778	1.13	1.08
Mobile & Ohio.....	876	1,122	5,389	10,776	5,387	.....	99.96	6.2	9.6	159.63	224.80	.096	.085	.0076	.00590	.00670	1.33	1.00
Nashville, Chattanooga & St. Louis.....	1,189	1,231	5,328	10,189	4,861	.....	91.23	4.4	8.3	151.00	151.00	.113	.127	.0096	.00880	.01054	1.10	1.10
Norfolk & Western.....	1,551	2,036	18,656	47,483	28,827	.....	154.52	12.0	23.3	253.41	269.28	.085	.098	.0068	.00430	.00420	1.58	1.23
Norfolk Southern.....	1,47	843	409	3,329	2,920	.....	711.93	3.2	3.9	57.42	85.63	.119	.198	.0161	.01720	.01518	0.91	1.22
Seaboard Air Line.....	(1901)2,604	3,084	8,335	17,629	9,294	.....	111.51	3.2	5.7	153.32	151.28	.119	.115	.0136	.01880	.01099	1.14	1.02
Southern Railway.....	6,306	7,033	26,814	47,161	20,347	.....	75.88	4.2	6.7	168.82	154.61	.107	.110	.0116	.00916	.00983	1.27	1.05
Virginia Railway.....	18,635	28,070	98,752	231,705	132,953	.....	134.63	5.3	8.2	157.04	184.78	.105	.116	.0119	.01002	.00991	1.19	1.09
Total.....	546	618	5,440	6,703	1,263	.....	23.21	9.9	10.8	153.00	135.74	.155	.147	.0141	.0096	.00757	1.86	1.45
Chicago, Indianapolis & Louisville.....	546	618	5,440	6,703	1,263	.....	23.21	9.9	10.8	153.00	135.74	.155	.147	.0141	.0096	.00757	1.86	1.45
Cincinnati, Hamilton & Dayton.....	652	1,015	7,838	9,449	1,611	.....	20.55	12.0	9.3	108.96	123.16	.117	.117	.0122	.0063	.00502	2.00	1.32
C. C. & St. Louis.....	1,891	2,381	15,484	30,954	15,470	.....	99.91	8.2	13.0	169.30	162.80	.094	.099	.0083	.00583	.00531	1.42	1.32
Grand Rapids & Indiana.....	575	575	3,015	3,056	41	.....	1.36	5.2	5.3	90.12	93.82	.140	.093	.0156	.0062	.00707	1.88	0.97
Lake Erie & Western.....	725	906	5,549	2,681	2,868	.....	51.68	7.6	2.9	153.51	121.27	.137	.059	.0110	.0037	.00656	1.89	0.59
Lake Shore & Michigan Southern.....	1,411	1,852	19,558	56,071	36,113	.....	180.94	14.1	30.3	178.00	153.70	.067	.132	.0055	.00614	.00584	1.09	1.21
Michigan Central.....	1,635	1,800	14,219	25,032	10,813	.....	76.04	8.6	13.9	193.50	149.00	.059	.091	.0070	.0078	.00592	1.19	1.25
New York, Chicago & St. Louis.....	513	523	6,743	11,935	4,692	.....	69.58	13.1	21.9	297.00	206.00	.059	.073	.0055	.00478	.00514	1.16	1.23
Pennsylvania Company.....	1,396	1,757	43,967	58,925	14,958	.....	34.01	31.5	33.5	77.95	78.76	.177	.153	.0135	.00590	.00586	2.30	1.50
P. C. C. & St. Louis.....	1,407	1,472	12,884	29,920	17,036	.....	132.22	9.1	20.3	111.14	115.13	.056	.099	.0052	.00620	.00629	0.84	1.14
Pere Marquette.....	1,821	2,322	7,944	15,868	7,924	.....	99.75	4.3	6.8	112.64	166.42	.121	.117	.0124	.00802	.00611	1.55	1.44
Vandalia.....	727	910	5,922	8,120	2,198	.....	37.12	8.1	8.9	74.46	111.90	.131	.106	.0119	.0065	.00617	1.66	1.10
Total.....	13,306	16,131	148,962	258,214	109,251	.....	73.34	11.2	16.0	143.63	133.98	.112	.106	.0102	.00645	.00612	1.57	1.25
WESTERN CLASSIFICATION:																		
Atchison, Topeka & Santa Fe.....	7,426	10,961	27,486	65,230	37,744	.....	137.32	3.7	5.9	349.19	292.25	.073	.097	.0079	.00976	.01007	0.81	0.89
Chicago & Alton.....	855	1,033	9,386	13,803	4,417	.....	47.06	10.9	12.4	176.16	172.63	.135	.123	.0148	.00976	.00906	1.87	1.56
Chicago & Eastern Illinois.....	711	1,283	8,206	26,004	17,798	.....	216.89	11.5	20.3	144.70	150.43	.132	.200	.0096	.00794	.00606	1.90	1.60
Chicago & Northwestern.....	5,210	8,071	40,846	65,093	24,247	.....	59.36	7.8	8.1	151.30	133.85	.108	.193	.0106	.0101	.00830	1.28	1.21
Chicago, Burlington & Quincy.....	7,546	9,264	42,287	65,157	22,870	.....	54.08	5.2	7.0	254.87	265.91	.087	.098	.0111	.0075	.00851	1.29	1.04
Chicago Great Western.....	930	1,496	42,287	65,157	22,870	.....	54.08	5.2	7.0	254.87	265.91	.087	.098	.0111	.0075	.00851	1.29	1.04
Chicago, Milwaukee & St. Paul.....	6,423	9,681	35,740	63,361	27,621	.....	77.28	5.2	7.5	189.07	217.65	.087	.100	.0081	.0072	.00729	1.13	1.04
Chicago, Rock Island & Pacific.....	3,647	8,205	17,150	45,674	28,524	.....	166.32	4.7	5.6	213.00	210.50	.093	.092	.0106	.0066	.00929	1.14	0.97
Chicago, St. Paul, Minn. & Omaha.....	1,557	1,748	10,253	11,911	1,658	.....	16.17	6.6	6.8	160.55	152.83	.149	.177	.0135	.00990	.00860		

General News Department

The Brotherhood of Railroad Trainmen has addressed to the general managers of all railroads entering Chicago a request for an increase of pay of 5 cents an hour for switchmen.

Telephones have been put in use for train despatching on the Ohio division of the Baltimore & Ohio Southwestern between Cincinnati and Parkersburg, 195 miles. Telephones were already in use on the lines from Cincinnati to Seymour, Ind., and from Seymour to Louisville.

A hurricane which passed over New Orleans and vicinity September 29 is reported to have caused upward of 300 deaths, mostly in situations remote from cities, and money damage roughly estimated at \$1,000,000. The roadbed of the Louisville & Nashville was seriously damaged at many places along the line from New Orleans to Ocean Springs, Miss., 83 miles. Long bridges at Bay St. Louis and at Rigolets were badly damaged.

One of the 50 electric locomotives being delivered by the General Electric Company to the Chicago, Milwaukee & St. Paul for use on the line between Harlowton, Mont., and Avery, Idaho, was placed on exhibition this week at the Union Station in Chicago. These locomotives are to be put in service sometime in November. The locomotives weigh 260 tons each, have 8 pairs of driving wheels, are 112 ft. long over all and are designed for operation with direct current at 3,000 volts.

A press despatch October 3 from Imlay, Nev., reports damage by earthquake shocks for a hundred miles along the line of the Southern Pacific. Several water tanks toppled from their high supports and one at Lovelock crushed the end of a dwelling. People fled from their homes in night clothing at many places. Slow orders were issued to all trains when the third shock was felt at 11 o'clock on the night of the third. At Golconda, Nev., a piece of track sank five inches. All the towns named are between Sparks and Battle Mountain.

The United States Civil Service Commission announces examinations, November 2, for eight positions under the department of valuation of the Interstate Commerce Commission, all of them being places in which special weight will be given to experience in valuation and unit cost work. Each candidate must be between 25 and 45 years old and the salaries, in all of the positions, range from \$1,800 to \$2,700 yearly. The positions are: Senior architect, second grade; senior structural engineer, second grade; senior electrical engineer, second grade; senior mechanical engineer, second grade; senior telegraph engineer, second grade; senior telephone engineer, second grade; senior signal engineer, second grade, and senior civil engineer, second grade.

C. W. Galloway, general manager of the Baltimore & Ohio, proposes to send letters, embodying suggestions for personal safety, to automobilists who take risks at crossings. This was decided upon because of the alarming increase in accidents during the past year, when 29 automobiles were struck by trains on the Baltimore & Ohio, an increase of 17 accidents and 23 deaths. Observations will be taken from time to time at busy street crossings, and, with the co-operation of State authorities, license numbers will be secured and owners addressed personally. At Uniontown, Pa., on September 12, 729 automobiles crossed the railroad tracks at Fayette street between 6 o'clock in the morning and 6 at night, and only 28 were stopped to ascertain whether or not a train was approaching, 24 of them being stopped by a train using the crossing; and of the 701 vehicles violating the rules, 705 did not even slacken speed. "It is horrifying," says Mr. Galloway, "to contemplate the disregard which some drivers have for their own safety. . . . Trainmen are trained to be mindful of their personal safety and the safety of others. They are impressed with the importance of sounding whistle signals at highway crossings and when approaching stations, yet there are automobilists who will approach railroad tracks without signalling or ascertaining in any way whether it is safe to cross. Engineers serve for years before they are entrusted with the operation of a locomotive, while automobilists, sometimes with

an hour's instruction, jeopardize the lives of themselves and others by recklessly crossing tracks."

Completion of Hell Gate Arch

Work on the Hell Gate Bridge (New York Harbor) of the New York Connecting Railroad, which was the subject of an illustrated description in the *Railway Age Gazette*, September 3, page 422, has now progressed so far that the two halves of the great arch were joined together on October 1. On that day Samuel Rea (president of the Pennsylvania), as president of the New York Connecting Railroad Company, sent the following message to Gustav Lindenthal, chief engineer in charge:

"I heartily congratulate you as designer and chief engineer of the East River arch bridge upon the closing of that great arch to-day. I deeply regret I cannot be present to witness the physical linking in New York City of the New Haven and Pennsylvania systems. It is now over 25 years since, with our friend, the late Oliver W. Barnes, we decided that a bridge and railroad crossing the East River at this point should be constructed to connect the New England railroads with the trunk lines serving the West and South, and Mr. Barnes organized the New York Connecting Railroad Company, which was acquired later by the Pennsylvania and New Haven companies.

"Within eighteen months I hope we shall see the completion of the New York Connecting Railroad and of the Seventh avenue subway in Manhattan, which will conclude the Pennsylvania Railroad Company's comprehensive programme for terminal development in and through New York City, adopted thirteen years ago under the presidency of A. J. Cassatt. With these projects completed, full opportunity will be afforded to measure the benefit of the New York terminal improvements to the public, the country at large and the company."

Hearing on Locomotive Rules

At a hearing before the Interstate Commerce Commission, at Washington, September 28 and the four following days, the proposed standard rules for the inspection of locomotives and tenders were the subject of testimony by representatives of the railroad, and members of the Enginemen's Brotherhood; also by Chief Inspector Frank McManany. As to 58 rules on which there was agreement among all interested, a joint recommendation was submitted to the commission, with a request for the early issuance of an order. A large part of the time of the hearing was taken up with a discussion of the proposed rules requiring automatic bell-ringers and headlights of high intensity, both of which were advocated by the enginemen and opposed by the railroads. The roads were allowed 30 days in which to file a brief, and the other side 15 days for counter briefs, and then the roads will have 10 days in which to reply.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the *Railway Age Gazette* for each month.

- AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.
- AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, October 26-27, 1915, French Lick Springs Hotel, French Lick Springs, Ind.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burtitt, S. W. 4th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, Chicago.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lighty, C. & N. W., Chicago. Next convention, October 1-3, 1915, Detroit, Mich.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Walter Hunt, 290 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 290 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.

Traffic News

The Chicago, Milwaukee & St. Paul has recently introduced a new plate service in the dining cars of all trains except the Pioneer Limited, by which passengers who do not care for full portions can obtain half orders at a considerable reduction in price.

The Baltimore & Ohio has opened its large new storage warehouse at Pittsburgh, Pa., at Second avenue and Try street. The warehouse is seven stories high and absolutely fireproof. Each floor has windows on all four sides and is well lighted and can also be well ventilated, and commodious elevator service is provided.

Following the suggestion of the governor of the state, the Public Service Commission of Pennsylvania has made a study of the main route of the "Lincoln highway" through that state, 331 miles, with a view to improving the safety of the road at crossings of railways; and it finds, according to the estimates of the engineer of the commission, that to abolish all of these grade crossings will cost \$8,340,000.

The Baltimore & Ohio reports the arrival in Baltimore of a single shipment of lumber from Hoquiam, Wash., filling 100 cars. This lumber was cypress—3,000,000 feet—to be used in the construction of the plant of the United States Industrial Alcohol Company, at Curtis Bay, Baltimore. The lumber came over the Chicago, Milwaukee & St. Paul to Chicago and made the journey through in 17 days.

Traveling Passenger Agents

The American Association of Traveling Passenger Agents, at its meeting in Boston this week, chose William D. Woods, of St. Louis, president for the ensuing year and G. G. Noble, of Philadelphia, vice-president. The meeting next year will be held at Philadelphia.

Panama Canal Blocked for a Month

The landslide which blocked the Panama Canal at Gold Hill, September 20, has been followed by others, and it is announced this week that vessels cannot pass through before November 1.

At least 1,000,000 yards of earth must be removed. On Tuesday the steamer Finland from New York was waiting, with 300 passengers aboard, and another vessel of the same line was waiting on the Pacific side. Both these vessels have also large cargoes of freight. The quantity of freight in vessels waiting to pass through the canal is so great that it could not be transported over the Panama Railroad in less than a month. Colonel Chester Harding, engineer in charge of the canal, has recommended that tolls already paid by waiting vessels be refunded.

ELECTRIFICATION IN ENGLAND.—It is stated that experiments have been commenced on the electrified section of the North-Eastern Railway from Shildon to Newport, and the company hopes to open the line to traffic by the end of the month. This will constitute the first application in the British Isles of electric locomotives to heavy goods traffic, though, as is well known, this system has worked successfully in the United States and on the Continent, notably in Italy. Two small electric locomotives have, however, been in operation for ten years from the Quay-side, Newcastle, to Trafalgar sidings, their use being due to a desire for cleaner working in the tunnel. The line now electrified was decided on for the first experiments because there are no steep gradients or any great obstacles to electrification. Also the traffic is almost entirely heavy goods, feeding the blast furnaces at Erimus sidings, Newport, near Middlesbrough, so that the working results will be easily ascertainable. An overhead system is employed, with two bow collectors on each engine. Altogether there will be ten locomotives, of which nine are already built at the company's Darlington works and tested. They are eight-wheeled, with a motor driving each axle, and can each haul a load of 1,000 tons. Power will be supplied at 1,500 volts to the overhead conductors, which will be about 17½ ft. above rail level.—*The Engineer, London.*

- ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.
- ASSOCIATION OF RAILWAY ELECTRIC ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual meeting, October 18-24, 1915, Chicago.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915. Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.
- RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.
- RAILWAY REAL ESTATE ASSOCIATION.—Frank C. Irvine, 1125 Pennsylvania Station, Pittsburgh, Pa. Next meeting, October 13, 1915, Chicago.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, October 19-21, Colorado Springs, Colo.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Booddy House, Toledo.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The hearings before Examiner Hines of the Interstate Commerce Commission at Chicago, on proposed advances on a number of commodities in Western trunk line and Southwestern Tariff Committee territory, were concluded on October 4.

Commercial organizations of Madison, Beloit, Janesville, Stoughton and Watertown, Wisconsin, have filed a complaint with the Interstate Commerce Commission alleging discrimination against them in favor of Chicago, Rockford and Freeport, and other Illinois cities, Milwaukee, Wis., and Dubuque and Clinton, Iowa.

Examiner Gutheim held a hearing at Chicago, beginning on September 29, on the application of the railroads operating steamboat lines on the Great Lakes for authority to make general advances in the lake-and-rail rates, equal in cents per hundred pounds to the advances on all-rail rates resulting from the decision of the Interstate Commerce Commission in the five per cent case. Representatives of some of the principal commercial associations appeared in opposition to the advances. C. C. McCain, chairman of the Trunk Line Association, and H. S. Noble, assistant general manager of the Mutual Transit Company, were among the principal witnesses for the railroads.

STATE COMMISSIONS

The hearing before the Texas Railroad Commission on the application of the railroads of the state for a general increase in freight rates which has been in progress for several weeks at Austin, Tex., was concluded on September 30.

The Railroad Commission of Montana has ordered reductions in the rates for transportation of slack coal from the Bear creek district over the Montana, Wyoming & Southern, and the Northern Pacific. For different distances the rates on slack coal must be from 10 to 25 cents lower than those on lump coal.

The New York State Public Service Commission, Second district, in an opinion by Commissioner Carr, has refused to authorize the discontinuance of passenger service on the Mahopac Falls Railroad, operated by the New York Central as a branch of the Harlem road, though it appears that such passenger operation is at a loss. It is held that the commission is without power to permit a railroad corporation to cease to perform the functions for which it was chartered. Commissioner Carr points out that, while the commission is without power to permit the railroad to discontinue service, called for in its charter, should trains be taken off, a complaint would then bring squarely before the commission the question of whether or not the road was rendering adequate service.

The Maryland Public Service Commission, in an opinion by Commissioner Henry, has dismissed the application of the Chesapeake & Curtis Bay Railroad for authority to exercise its franchise to operate its short railroad on the northerly side of Curtis Bay, Baltimore, and to issue \$50,000 capital stock. The commission finds that there is no public necessity for the road. The track lies entirely on the land of the United States Asphalt Refining Company, and the line is operated as a plant facility by that company. The cost of operation is about \$18,000 a year, and the commission finds that the asphalt company is proposing to incorporate as a common carrier mainly or wholly for the purpose of securing through freight rates with the Baltimore & Ohio and other roads. Commissioner Henry says that the industries in that section already have ample facilities and another common carrier should not be established; it is "better to hold to strict accountability responsible carriers, capable of meeting the reasonable requirements of business, than to try to establish conditions whereby such carriers may be forced to divide rates with mere plant facilities, incapable of general service, and which can only live by sapping the vitality of other roads."

Report on Phoenixville Accident

John P. Dohoney, investigator of accidents, has made his report to the Pennsylvania Public Service Commission on the accident in a tunnel on the Philadelphia & Reading, at Phoenixville, Pa., September 28, when nine workmen were killed and nine others injured. The work train, on which these men were employed, had just entered the tunnel, on the southbound track, and had stopped when a southbound passenger train, running on the northbound track, and moving at about ten miles an hour, ran into the men, who were walking along the track and, as it appears, struck more than one-third of the gang of fifty. The principal explanation given is that the conductor of the work train had given proper notice or instructions to the foreman and the workmen before entering the tunnel; but the State inspector says that this notice, if heard at all, was misunderstood; and that a written order should have been given to the foreman, explaining the proposed movement. The workmen were all foreigners, mostly Italian. They had been engaged for two weeks in the work of widening the tunnel.

PERSONNEL OF COMMISSIONS

J. H. Prior, assistant chief engineer of the Illinois Public Utilities Commission, has been appointed chief engineer of that commission, with headquarters at Springfield, Ill. Mr. Prior received his education at the Armour Institute of Technology and at the University of Chicago. From 1905 to 1914 he was engineer of design of the Chicago, Milwaukee & St. Paul, including its Puget Sound extension, with headquarters at Chicago. In that capacity he made two of the earliest valuations of railroad properties required by State authorities, these being valuations of the structures of the St. Paul in Minnesota in 1906 and in South Dakota in 1907. His present appointment dates from September 9.



J. H. Prior

COURT NEWS

In the United States District Court at New York City, October 4, the Grand Jury returned an indictment against the Delaware, Lackawanna & Western charging violation of law in failing to collect demurrage on coal consigned to the Delaware, Lackawanna & Western Coal Company. The shipments on which the indictment is based were made between October, 1912, and October, 1914, and the demurrage charges involved amount to \$298.

"Passenger"

The Pennsylvania Supreme Court holds that a workman who boards a laborers' train without permission for the purpose of securing employment is not a passenger and cannot recover for injuries sustained by reason of a defective handlebar.—*Schifalacqua v. Atlantic City R. Co.* (Pa.), 95 Atl. 260.

Hours of Service—Offices "Continuously" Operated

The Circuit Court of Appeals, Sixth Circuit, holds that a telegraph office operated from 4:30 a. m. to 9:30 p. m., subject to negligible intermissions, and a telegraph office operated from 6:30 to 11 p. m., subject to negligible intermissions, are not offices operated only during the daytime, but are offices operated during the day and night, within the hours of service act.—*United States v. Grand Rapids & Indiana* (C. C. A.), 221 Fed. 667.

Reasonable Notice of Claim Always Essential

In an action for damages to a shipment of livestock under a contract providing that any claim for damage should be made within five days, it was undisputed that the damage to the stock was not ascertainable within that time, and it was held by the South Carolina Supreme Court that the stipulation was unreasonable and void. But that fact did not excuse the shipper from giving reasonable notice. The question of whether reasonable notice was given, the facts being undisputed and susceptible of only one reasonable inference, was a question of law for the court. The mere fact that the railroad company's veterinary surgeon examined the stock and reported the result of his examination to one of the company's officers was not enough to warrant a reasonable inference of a waiver of the stipulation.—*Crawford v. Southern Ry. Co.* (S. C.), 86 S. E. 19.

Injury to Freight from Inherent Qualities—Presumptions

Injury from inherent qualities, the Georgia Court of Appeals holds, is somewhat in the nature of damage resulting from the act of God; and in the more recent development as to the rules in regard to the liability of carriers it has been held that they are not liable for loss or damage due to the inherent qualities of the goods carried. When the goods composing a shipment are of such intrinsic character as to be self-destructive, or incapable of safe transportation, the presumption that damage which accrues in the course of the transportation was due to the negligence of the carrier is rebutted by showing that the damage was due to the inherent qualities of the shipment. It is only when it is shown that the carrier actually receipts for a shipment as in good order that the presumption becomes conclusive.—*Capital City Oil Co. v. Central of Georgia* (Ga.), 86 S. E. 57.

Crossing Accident—Contributory Negligence

The California Supreme Court holds that a person approaching a track, which is itself a warning of danger, must take advantage of every reasonable opportunity to look and listen. He has no right to depend upon the custom of engineers to give appropriate signals, or even upon a duty to give such signals enjoined by law. The driver of a motor car, on a clear afternoon, approached a crossing, and came to a stop about 35 ft. from the track, where obstructions made it impossible to see trains approaching. Hearing no noise and seeing no smoke, he started to cross the track on a down-grade, and first saw a train at a point about 17 ft. from the rail, the first point at which his view in that direction was unobstructed. He then endeavored to stop his car and was struck. It was held that he was guilty of contributory negligence as a matter of law, and could not recover for his injuries.—*Griffin v. San Pedro, L. A. & S. L.* (Cal.), 151 Pac. 282.

Hours of Service—"Emergency"—Telegraph Operator

An operator of the Atlantic Coast Line working from 4 p. m. until midnight at a continuously operated office at Kenly, N. C., was subpoenaed as a witness in an action tried on May 26, and obtained permission from the chief dispatcher at Rocky Mount to obey the subpoena, with the understanding that he would return to Kenly about 2:30 p. m. The case was not reached for trial until about 4 p. m., and about 1 p. m. the operator wired the dispatcher that he would be delayed; and the next train from Rocky Mount to Kenly did not reach Kenly until 10 p. m. The operator reached Kenly about 7:30 p. m. but, when requested to return to duty, reported that he was sick. One of the other operators therefore worked from 8 a. m. until 8 p. m., and the other from 8 p. m. until 8 a. m. on the morning of the 27th. The Federal District Court, E. D., North Carolina, holds that the excessive hours of the first of these operators was due to an emergency, and the railroad was not liable for the statutory penalty. "Emergency" it held to be synonymous with "exigency," meaning something arising suddenly, out of the current of events; any event or occasional combination of circumstances calling for immediate action or remedy; a pressing necessity; a sudden and unexpected happening, or an unforeseen occurrence or condition. But as it did not appear that the chief dispatcher was not promptly notified that the opera-

tor was sick, and there was no suggestion that he did not have an extra operator at Rocky Mount, it was held that there was no emergency or casualty excusing the company's act in allowing the second operator to work three hours, on the morning of the 27th, more than the hours allowed by statute.—*United States v. Atlantic Coast Line Co.*, 224 Fed. 160.

Width of Roundhouse Doorway

An engineer and hostler at a roundhouse attempted to mount a moving engine which was being brought out by his fireman at a point from three to eight feet within the doorway, and was caught between the tender and the doorway and killed. The engine was of the large modern type, and the clearance between its overhang and the side of the doorway was but eight inches, while in newer roundhouses a larger clearance was provided. The deceased was not directed nor required to mount the engine at that point, and the danger of doing so was obvious. In an action for his death the Circuit Court of Appeals, Second Circuit, held that the width of the doorway being sufficient for all ordinary and proper uses, the railroad was not chargeable with negligence because it was not made wider.—*Hogan v. New York Central* (C. C. A.), 223 Fed. 890.

Hours of Service—Station Agent Acting as Telegrapher

A railroad company discharged one of its three operators at a station operated continuously, and after making inquiries to obtain an additional operator, instructed the station agent to work three hours a day as agent, and six hours as telegraph operator, and that he should not work in excess of nine hours. The agent found himself required by the exigencies of the situation to work 12 hours a day as agent in addition to 5 hours as operator. The Circuit Court of Appeals, Ninth Circuit, holds this to be a violation of the hours of service statute, as the agent was within the prohibition of the statute, and under the circumstances it was not a harsh application of the statute to hold that the company had knowledge of all the acts of all its officers and agents, especially as it would seem that it was charged with actual knowledge of the agent's excessive service.—*Oregon-Washington R. & N. Co. v. United States* (C. C. A.), 233 Fed. 596.

Revocation of License to Use Waiting Room

In an action for injuries in being ejected from a waiting room, it appeared that plaintiff went to the station between one and two a. m., and found, on offering to buy a ticket, that the first available train left at seven a. m., and that the ticket agent had left for the night. Plaintiff said that the telegraph operator, who was in charge of the station, told him that he could remain in the waiting room until the train was due, but that within an hour he told him that it was against the rules of the company for him to remain there, and ordered him out, using profane language. Going out in the dark, he walked off the unlighted platform on to the track and was injured. The telegraph operator told another story, but for the purposes of the case the plaintiff's testimony was considered. The Alabama Supreme Court held that the company was properly allowed to prove an order of the Alabama Railroad Commission requiring station rooms to be open at least an hour before train time. That order established, *prima facie*, at least, one hour as a reasonable time. It was held that the plaintiff was entitled only to such provision as the law required for the general public. He had no right to expect or demand the use of the company's waiting room for five or six hours in advance of the departure of the first train on which he could take passage. Although he had been allowed to remain in the room, that indulgence was a mere license, which might be withdrawn at any time, provided there was no trenching upon the reasonable time which must be allowed to persons intending to become passengers. For the agent, in revoking the plaintiff's license, which he had a right to do, to swear at him, was no assault; it might be considered as a grievous breach of good manners, but was not an injury for which the law undertakes to furnish redress, at least in an action counting solely on bodily injuries. For the injuries from falling off the platform the railroad was not liable, the plaintiff being merely a licensee.—*Widener v. Alabama Great Southern* (Ala.), 69 So. 558.

Railway Officers

Executive, Financial, Legal and Accounting

A. L. Burford has been appointed assistant general attorney of the St. Louis Southwestern, with headquarters at St. Louis, effective October 1.

Theodore F. Brown, assistant auditor of the Star Union Line at Pittsburgh, Pa., was retired on a pension on September 1, after nearly 53 years' service.

L. F. Linney has been appointed auditor of the Pacific & Idaho Northern, with headquarters at New Meadows, Idaho, vice T. Cox, resigned. Effective October 1.

C. E. Schaff, receiver of the Missouri, Kansas & Texas, announces the following appointments: C. N. Whitehead, vice-president, as assistant to the receiver; W. A. Webb, vice-president in charge of operation, chief operating officer; C. Haile, vice-president in charge of traffic, chief traffic officer; G. T. Cutts, controller, chief accounting officer; Frank Johnson, general treasurer, treasurer for the receiver; E. T. Nelson, treasurer in Kansas, assistant treasurer and paymaster for the receiver; J. B. Barnes, assistant secretary and assistant treasurer, agent for the receiver. J. M. Bryson retains his position as general counsel. All of these officers will have headquarters at St. Louis, Mo., except W. A. Webb, whose office is at Dallas, Tex.; E. T. Nelson, whose office is at Parsons, Kan., and J. B. Barnes, whose office is at New York, N. Y.

Operating

The title of E. W. Grice, assistant to president of the Chesapeake & Ohio at Richmond, Va., has been changed to general superintendent of transportation.

George B. Johnson, superintendent of the joint track division of the Texas & Pacific at Ft. Worth, Tex., has been appointed chief dispatcher of the new Ft. Worth division with headquarters in the same city.

Clarence C. Beeth, whose appointment as superintendent of the Eastern division of the El Paso & Southwestern has been announced in these columns, was born on October 5, 1874, at Muncie, Ind. He enjoyed a common school education, and on January 1, 1890, entered the employ of the Atchison, Topeka & Santa Fe. He remained with this road successively as telegraph operator, agent, train dispatcher and chief dispatcher until January 1, 1909, when he resigned as chief dispatcher at Dodge City, Kan., to become trainmaster of the El Paso & Southwestern at Tucumcari, N. M. He remained in this position until September 1, 1915, when he was promoted to superintendent of the Eastern division, with headquarters at the same place.

H. Hulatt has been appointed manager of telegraph of the Grand Trunk and the Grand Trunk Pacific, vice A. B. Smith, resigned on account of ill health. Mr. Hulatt will report to the vice-president in charge of operation of the Grand Trunk at Montreal, Que., and to the vice-president and general manager of the Grand Trunk Pacific at Winnipeg, Man. Mr. Hulatt was born in London, Eng., and entered the service of the Grand Trunk Pacific in 1907, and was Mr. Smith's principal assistant in the construction of the Grand Trunk Pacific telegraph lines. In January, 1913, he was appointed commercial and traffic superintendent of the telegraph department, with headquarters at Winnipeg, in charge of lines west of Fort William, Ont.

Traffic

Leo Feit, chief clerk of the freight department of the Wheeling & Lake Erie at Cleveland, Ohio, has been appointed chief of the tariff bureau.

S. Y. Henderson, commercial agent of the Ocilla Southern at Hawkinsville, Ga., has been appointed general freight and passenger agent, with headquarters at Hawkinsville.

H. McFarlane has been appointed assistant traffic manager of the Pacific & Idaho Northern, with headquarters at New Meadows, Idaho, vice E. D. Perkins, resigned. Effective October 1.

Edward F. Lee, soliciting freight agent of the Western Maryland at Baltimore, Md., has been appointed commercial agent with office at Baltimore, succeeding C. B. Oakley, who has been transferred to St. Louis.

Frank Wisner Robinson, whose appointment as traffic manager of the Oregon-Washington Railroad & Navigation Company was announced last week, was born at Cherryville, Kan., on May 22,



F. W. Robinson

1874. He entered railway service on April 1, 1889, and until September, 1899, was employed in the passenger and freight accounting departments of the Union Pacific. From September, 1899, to January 1, 1906, he was in the freight traffic department of that road at Omaha, Neb.; from January 1, 1906, to January 1, 1910, he was chief clerk to the director of traffic of the Union Pacific - Southern Pacific System at Chicago; from January 1 to August 1, 1910, assistant general freight agent of the Oregon-Washington Railroad & Navigation Company at Portland,

Ore.; from August 1, 1910, to May 15, 1912, general freight agent of the same road; from May 15, 1912, to February 20, 1913, assistant to director of traffic of the Union Pacific-Southern Pacific System, and from February, 1913, to November 1, 1915, assistant traffic manager of the Oregon-Washington Railroad & Navigation Company.

Russell S. Underwood, formerly manager of the Mount Jewett Route, operated by the Baltimore & Ohio and the Erie, has been appointed special representative of the freight department of the Baltimore & Ohio, with headquarters at Baltimore, Md.

R. F. Hill has been appointed assistant general freight and passenger agent of the Toronto, Hamilton & Buffalo with office at Hamilton, Ont. He entered the service of this company in July, 1906, and served in the office of the master mechanic at Hamilton until the following September, when he was transferred to the general freight and passenger agent's office. He subsequently served for three years as stenographer and then consecutively as soliciting freight agent and rate clerk. In May, 1915, he was appointed chief clerk and now becomes assistant general freight and passenger agent of the same road as above noted.

Engineering and Rolling Stock

F. O. Haymond, superintendent of the Bingham & Garfield, with headquarters at Magna, Utah, has been appointed also assistant superintendent of the motive power and car departments.

W. B. Combs, master mechanic of the Macon, Dublin & Savannah, at Macon, Ga., having resigned to accept service with the government, the office of master mechanic has been abolished, and L. B. Jones has been appointed general foreman in charge of the mechanical department.

Curtis C. Westfall has been appointed engineer of bridges of the Illinois Central, with headquarters at Chicago, vice Maro Johnson, engineer of bridges and buildings, assigned to special work. Frank R. Judd has been appointed engineer of buildings, with headquarters at Chicago. Effective October 1.

A. C. Watson, division engineer of the Pennsylvania Lines West with headquarters at Logansport, Ind., has been appointed division engineer of the Cleveland & Pittsburgh division with headquarters at Cleveland, vice E. F. McCrea, deceased. J. K. Sherman, assistant engineer at Pittsburgh, has been appointed division engineer with headquarters at Zanesville, Ohio, vice W. E. Guignon, transferred. Effective October 1.

Frederick Knight Bennett, recently appointed valuation engineer of the Minneapolis & St. Louis, with office at Minneapolis, Minn., entered railway service in the spring of 1895 as rodman on the Lehigh Valley. He was continuously in the service of this road until March, 1909, as assistant engineer on maintenance, assistant engineer, engineering department, assistant engineer in charge of office and accounts, supervisor of tracks, and division engineer. From March, 1909, until June, 1911, he was engineer in charge of reconstruction on the Missouri Pacific; from June, 1911, to June, 1912, he was assistant engineer with the engineer maintenance of way of the same road, at Kansas City, Mo.; from June, 1912, to June, 1913, assistant engineer with the chief engineer at St. Louis, Mo.; June, 1913, to June, 1914, division engineer of the Missouri, Kansas & Texas; June, 1914, to March, 1915, assistant engineer of valuation of the Great Northern, at St. Paul, Minn., and Spokane, Wash.; March, 1915, to September 1, 1915, division supervisor of the Minneapolis & St. Louis, eastern division.



F. K. Bennett

Purchasing

William D. Stokes has been appointed assistant general storekeeper of the Illinois Central, with headquarters at Memphis, Tenn., vice William S. Morehead, transferred. Mr. Morehead has been appointed division storekeeper at McComb, Miss., vice Frank P. Dugan, transferred. Mr. Dugan has been appointed division storekeeper at Vicksburg, Miss., vice Eugene D. Meissonnier, resigned. Appointments effective October 1.

OBITUARY

B. E. Rice, general industrial agent of the Norfolk Southern with office at Norfolk, Va., died on September 27, at Washington, D. C., at the age of 58.

Lowell M. Palmer, of Brooklyn, N. Y., who died at Stamford, Conn., September 30, at the age of 70, was prominently identified with transportation for many years, having been proprietor of important freight terminal docks in Brooklyn. He was also engaged in lightering, and it is said that it was his boat line that first carried freight cars by floats to Brooklyn.

THE MANILA RAILWAY.—All the steam railway lines in Luzon are owned and operated by the Manila Railway Company. From the report of its annual meeting in London it appears that the operations during the last fiscal year showed a decreased revenue. This is attributed primarily to the short rice crop, which reduced the freight business directly and to the European war, which affected both the freight and passenger business by limiting the spending power of the agricultural population. At the same time there was an increase in operating expenses, mainly owing to the opening of traffic over a considerable mileage of new line. The company has contracts with the Philippine Government for the construction of several new lines, with a guarantee of the bond issues; and work on certain of these lines had reached sections which could not be remunerative in themselves and would be chiefly sources of expense until the portions of the lines beyond them were completed and opened. Since the beginning of the war, moreover, it had been impossible to sell the guaranteed bonds, and the company therefore determined for the present to reduce its construction to the minimum necessary to link up certain sections as yet disconnected, an arrangement which was agreed to by the Philippine Government. In spite of these difficulties the report emphasizes the fact that the financial situation of the company is in general quite satisfactory.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE CENTRAL OF GEORGIA is inquiring for prices on 8 Mikado type and 4 Pacific type locomotives.

THE SIOUX CITY TERMINAL has ordered one six-wheel switching locomotive from the American Locomotive Company. This locomotive will have 19 by 24 in. cylinders and a total weight in working order of 117,000 lb.

THE ILLINOIS CENTRAL, reported in the *Railway Age Gazette* of September 10 as inquiring for prices on 50 Mikado type locomotives, has changed its inquiry to 47 Mikado type locomotives and 3 Santa Fe type locomotives for hump yard switching service.

THE CHICAGO JUNCTION has ordered two superheater six-wheel switching locomotives from the American Locomotive Company. These locomotives will have 20 by 26 in. cylinders, 51 in. driving wheels, a total weight in working order of 149,000 lb., and a steam pressure of 180 lb.

CAR BUILDING

THE ATLANTIC COAST LINE is in the market for 200 40-ton flat cars.

THE MISSOURI, KANSAS & TEXAS is inquiring for 50 steel underframes.

THE ERIE has ordered 200 automobile cars from the Pressed Steel Car Company.

THE RUSSIAN GOVERNMENT is reported to be contemplating the purchase of 7,000 freight cars.

THE TENNESSEE COPPER COMPANY is in the market for 12 50-ton steel underframe flat cars.

THE AMERICAN STEEL & WIRE COMPANY has ordered 50 tank cars from the German-American Car Company.

THE CAMPBELL'S CREEK COAL COMPANY has ordered 100 gondola cars from the American Car & Foundry Company.

THE EMLENTON REFINING COMPANY, Emlenton, Pa., has ordered 100 gondola cars from the American Car & Foundry Company.

THE NEW YORK CENTRAL is reported to have ordered 500 freight cars for the Michigan Central from the Haskell & Barker Car Company, in addition to a similar order for a like number of cars reported in the *Railway Age Gazette* of August 20.

THE WHEELING & LAKE ERIE has ordered 750 gondola cars from the Standard Steel Car Company, and 200 steel automobile cars from the Western Steel Car & Foundry Company. These cars were incorrectly reported in last week's issue as having been ordered by the Western Maryland.

IRON AND STEEL

THE BOSTON & MAINE is in the market for 25,000 tons of rails.

THE CHICAGO & NORTH WESTERN has ordered 15,000 tons of rails from the Illinois Steel Company.

THE BALTIMORE & OHIO has ordered from 10,000 to 15,000 tons of rails from the Pennsylvania Steel Company.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS has ordered 8,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

THE SOUTHERN has ordered 10,000 tons of rails from the Tennessee Coal, Iron & Railroad Company, and 2,000 tons from the Pennsylvania Steel Company.

THE INTERBOROUGH RAPID TRANSIT has ordered 200 tons of steel from Levering & Gerrigues, for a subway station at Long Island City.

Supply Trade News

H. G. Prout has resigned from his position as president of the Hall Switch & Signal Company.

The directors of the Westinghouse Air Brake Company have declared the regular quarterly dividend of \$2 a share.

The Cincinnati Screw Company, Twightwee, Ohio, has purchased the plant and equipment of the Cincinnati Screw & Tap Company, and will start full operation shortly.

The Gibraltar Manufacturing Company, which for the last two years has had a selling arrangement with Mason, Davis & Co. for the sale of the Gibraltar bumping post, has terminated that arrangement and opened offices at 332 Monadnock Block, Chicago, where it will handle this business on its own account.

Robert E. Belknap, district sales manager of the Pennsylvania Steel Company at Chicago, has been transferred to the New York office as district sales manager, succeeding R. W. Gillespie, recently appointed general manager of sales. Thomas Blagden, Jr., has been appointed assistant sales manager at New York, and R. W. Reid, who has been assistant sales manager in the New York district, has been appointed district sales manager at Steelton, Pa.

Charles M. Schwab, president of the Bethlehem Steel Company, is understood to be negotiating with the directors of the Pennsylvania Railroad for the purchase of the latter's controlling interest in the Pennsylvania Steel Company. A conference was held in New York on Tuesday, but none of the details have been made public. On January 1, 1915, the outstanding stock of the Pennsylvania Steel Company consisted of \$20,560,800 preferred and \$10,750,000 common. The Pennsylvania Company (Pennsylvania Lines West) on December 31, 1914, owned \$9,158,300 of the preferred and \$7,388,900 of the common. The steel company is a New Jersey corporation. It controls: the Pennsylvania Steel Company of Pennsylvania, which operates a plant at Steelton, Pa., for the manufacture of rails, railway materials, structural work; the Maryland Steel Company, operating a plant at Sparrow's Point, Md.; the Penn-Mary Coal Company, and the Spanish-American Iron Company owning ore properties in Cuba.

The Westinghouse Electric & Manufacturing Company announces the following awards received at the Panama-Pacific Exposition: The grand prize on the 4,000 hp., 650-volt d.c. double unit Pennsylvania electric locomotive mounted on a turntable under the dome of the Transportation Palace. The medal of honor on alternating current and direct current industrial motor and control apparatus, on precision instruments, on Le Blanc condensers, on motor-generator sets for moving picture machines and on high voltage oil switches. The gold medal on a number of different classes of apparatus among which are steam turbines, alternating and direct current generators, alternating and direct current railway motors, transformers, rectifiers, starting, lighting and ignition systems, switchboards and accessories, and mining locomotives. The Westinghouse Electric & Manufacturing Company was also awarded the gold medal for the most complete and attractive installation in the Palace of Transportation. It also received a number of silver and bronze medals.

Alva C. Dinkey, president of the Carnegie Steel Company, has resigned from that position to become president of the Midvale Steel Company. Mr. Dinkey has been in the steel business for something like 36 years. He was born at Weatherly, Pa., on February 20, 1866, and received his education in the public schools of Weatherly and Braddock. On May 21, 1879, he became a water boy in the Edgar Thompson Steel Works, remaining in these works until 1885 when he secured a position as machinist with the Pittsburgh Locomotive Works, Allegheny, Pa. From 1889 to 1893 he served as secretary to the superintendent of the Homestead Steel Works of the Carnegie Steel Company. In 1893 he was made electrician and in 1898 superintendent of the electric light and power plant. The following year he was appointed assistant to the general superintendent of the

Homestead works, succeeding to the position of general superintendent in 1901. On August 1, 1903, he was elected president of the Carnegie Steel Company and has occupied that position up to the present time. Mr. Dinkey is a member of the American Society of Electrical Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers and a number of other important societies.

The Midvale Steel & Ordnance Company was incorporated in Delaware on October 5 with a capital stock of \$100,000,000 to engage in the manufacture of iron, steel and all other metals and articles of commerce manufactured out of such metals, to buy and sell firearms, shrapnel, ordnance and ammunition of every kind and description, to buy, sell, manufacture and deal generally in articles of machinery used in the manufacture of ordnance and ammunition, and to produce ores and minerals and manufacture and deal in the products and by-products thereof. The incorporators were: Herbert E. Latter and Norman P. Coffin of Wilmington, Del., and Clement M. Egner of Elkton, Md. The capital stock of the new company will be issued in \$2,000,000 shares of only one class of \$50 par value. Of the total of \$100,000,000, \$70,000,000 will be issued to provide working capital and to purchase over 98 per cent of the capital stock of the Midvale Steel Company, Nicetown, Pa.; all of the capital stock of Worth Brothers, Coatesville, Pa.; all of the property and business of the Coatesville Rolling Mill Company, and all the capital stock of the Remington Arms Company, of Delaware (a separate organization from the Remington Arms & Ammunition Company, Ilion, N. Y.), which is working on a contract of 2,000,000 rifles for the British Government at Eddystone, Pa. The company has also under option 300,000,000 tons of iron ore. The following are the directors and officers of the Midvale Steel & Ordnance Company: Directors—William E. Corey, Albert H. Wiggins, Samuel F. Pryor, Ambrose Monell, Frank A. Vanderlip, Alva C. Dinkey, Samuel M. Vaclain, William P. Barba, Percy A. Rockefeller, Charles H. Sabin, Marcellus Hartley Dodge and Frederic W. Allen. Officers—president, W. E. Corey; vice-president, A. C. Dinkey; secretary and treasurer, William B. Dickson.

The Carnegie Steel Company

Homer D. Williams, general superintendent of the Duquesne Steel Works, has been elected president of the Carnegie Steel Company, succeeding Alva C. Dinkey, resigned to become president of the Midvale Steel Company, and William Whigham, formerly assistant to the president of the Carnegie Steel Company, has been elected a vice-president. Edward Hamilton, assistant general superintendent of the Duquesne Works, succeeds Mr. Williams as general superintendent.

Mr. Williams, the new president of the company, has been in the steel business since 1880. He was born at Johnstown, Pa., on August 19, 1863, and was educated in the public schools at that place. In 1880 he entered the laboratory of the Cambria Steel Company as a carbon boy. In 1885, however, he left to take a special course at Lehigh University in chemistry and metallurgy. For a short period he was chemist in the Joliet Works of the Illinois Steel Company and for two years chemist at the Colby Mine at Bessemer. He later served five years as superintendent of the Bessemer department and rail mill of the Colorado Fuel & Iron Company. In 1897 he entered the service of the Maryland Steel Company, but in 1899 was placed in charge of the Bessemer department of the Homestead Steel Works of the Carnegie Steel Company. In 1902 he became general superintendent of the works, but in 1903 was transferred to a similar position at the Duquesne Steel Works and it is the latter position he leaves to take up his new duties.

Mr. Whigham has served as assistant to the president of the Carnegie Steel Company since 1905. He was born at Camden, Pa., on January 4, 1866, and graduated from Stevens Institute of Technology with the degree of mechanical engineer in 1888. In 1890 he became a draftsman with Thomas Carlin's Sons, Allegheny, Pa., in 1892 taking a similar position with Julian Kennedy and later with the Carnegie Steel Company. In 1897 he became steam engineer of the Homestead Works of the company and in 1901 superintendent of the Howard Axle Works. In 1905, as noted above, he was made assistant to the president of the company.

Railway Construction

ARKANSAS ROADS (ELECTRIC).—Surveys are being made, it is said, to build an electric line from Guion, Ark., north to Melbourne, about 10 miles. A. C. Veach, Gravette, Ark., is the promoter.

ATCHISON, TOPEKA & SANTA FE.—The Railroad Commission of the state of California on September 20 ordered this company to build a standard-gage line, connecting the gap between Temecula, in Riverside county, Cal., and Oceanside, in San Diego county. Such a line would provide direct rail connection between San Bernardino, Riverside, and the interior of Riverside county and the port of San Diego. The commission suggests two routes which may be followed, one from Temecula to Fallbrook, 12 miles, and the other from Temecula via Rainbow Valley to Oceanside, 33 miles.

BEAVER, MEAD & ENGLEWOOD.—The grading on this road has been nearly completed, and the track laying, now in progress, is about three-fourths done. The railway when completed will extend from Forgan, Okla., in a southerly direction to Beaver. The maximum grade is 1 per cent, and there are three bridges, one 14-ft. frame structure, which has been completed, a 70-ft. piling bridge, and a 350-ft. pile trestle. The Beaver Construction Company, of Beaver, is doing the work. A locomotive and a combination coach and box car have been purchased. L. A. Walton, Beaver, Okla., chief engineer.

BELLEVUE & WESTERN.—This company has been incorporated to build a railway from Graniteville, Mo., to Bellevue, a distance of about three miles. Capital, \$40,000; among the incorporators are William R. Orthwein and Louis Hudson, of St. Louis, and J. H. Long, of Bellevue.

CHICAGO, MILWAUKEE & ST. PAUL.—This road is filling in 14,000 ft. of timber trestles between Seattle, Wash., and Tacoma. The work is being done by company forces and will require 215,000 cu. yd. of fill.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—According to press reports, surveys are now being made for carrying out double tracking work between Somerset, Ky., and Flat Rock. (July 23, p. 181.)

LONG ISLAND RAILROAD.—This company has applied to the New York Public Service Commission, First district, for permission to build and operate a two-track branch line from Flushing, Long Island, to Creedmore, in the borough of Queens, 5.4 miles. The company has also asked the commission to determine the manner in which the proposed line shall cross certain streets and the tracks of a surface car line. The new branch will provide a more direct route from the borough of Manhattan to Creedmore than by the existing branch line, which leaves the main line at Floral Park.

The Woodside-Winfield cut-off, in the borough of Queens, which was built by the Long Island, to eliminate a number of grade crossings, besides improving the alignment by cutting out 150 degrees of curvatures, will be put in operation on October 17.

MIDLAND & NORTHWESTERN.—Residents of Midland, Tex., have entered into an agreement with the Texas & Pacific, it is said, to build a railway from Midland northwest to Seminole, 60 miles. The Texas & Pacific is to furnish the rails and equipment, and T. J. O'Donnell, banker and stockman of Midland, and associates are to furnish the right of way and provide all labor for the construction of the proposed line, which is to be operated by the Texas & Pacific. The town of Midland has raised a bonus of \$100,000 in aid of the project and other large donations will be made by the towns of Andrews, Shafter Lake and Seminole.

NORFOLK & WESTERN.—A contract has been let recently to J. J. Boxley & Co., Roanoke, Va., for double tracking two miles of this road between Berton, Va., and Eggleston, on New river, and the work has already been started.

SAVANNAH & NORTHWESTERN.—Surveys are reported being made for a proposed extension from St. Clair, Ga., northwest

to either Thomson, Camak or Norwood, about 30 miles. The company now operates a line from Savannah northwest to St. Clair, 108.6 miles.

SOUTH CAROLINA ROADS (ELECTRIC).—According to press reports, the Chamber of Commerce of Sumter, S. C., is interested in a project to build a line from Sumter, S. C., east to Shiloh, thence via Turbeville to Olanta, about 32 miles. E. I. Reardon, Sumter, is secretary of a committee in charge of surveys, rights of way, etc., and R. F. McLellan is chief engineer.

SOUTHERN RAILWAY.—Contracts for double tracking work on additional sections of this road were let recently, it is said, as follows: To W. W. Boxley & Co., Roanoke, Va., for the section from Arrowhead to Elma, 20 miles; to the Hall-Crawford Construction Company, Macon, Ga., for the section from Sycamore to Gretna, 4 miles, and to Robert Russell, Danville, Va., for the section from Whittle to Dry Fork, 9.7 miles. (October 1, p. 622.)

TEXAS ROADS.—Arrangements are being made, it is said, to build a line from Ballinger, Tex., where a connection is to be made with the Gulf, Colorado & Santa Fe west to a crossing of the Kansas City, Mexico & Orient at Bronte, thence to Robert Lee, about 40 miles. T. H. Wheelis, Chicago, Ill., and associates are said to be back of the project.

TORRINGTON-THOMASTON TRACTION.—Incorporated with \$300,000 capital to build from Torrington, Conn., south to Thomaston, 10 miles. H. Mann, president, Torrington; H. M. Guernsey, vice-president, Thomaston, and G. B. Goodwin, treasurer, Torrington.

RAILWAY STRUCTURES

ALBANY, N. Y.—The Delaware & Hudson Company, co-operating with officers of the city in plans to beautify "The Plaza" has notified the mayor of its willingness to put up an addition, 184 feet long, to its large new office building. The extension is designed to be built south of the large central tower, and to be five stories high, corresponding to the architectural design of the present structure. It will cost about \$225,000.

AURORA, ILL.—The new terminal building of the Aurora, Elgin & Chicago (Electric), at Main street and Broadway, has been opened. The South Broadway transfer station has been discontinued and all transferring from interurban to city cars is now done in the new station. The sixth floor of the building is occupied by the general offices of the company, which were moved here from Wheaton, Ill. The second, third, fourth and fifth floors have been sublet as office suites.

BALTIMORE, MD.—The Pennsylvania Railroad has given a contract to Arthur McMullin, New York, for building the new concrete pier at Canton, Md. The improvements will cost about \$200,000. (Aug. 27, p. 409.)

CLEVELAND, OHIO.—The New York Central, Pennsylvania Lines, Cleveland & Pittsburgh and the Cleveland, Cincinnati, Chicago & St. Louis have accepted the ordinance providing for the erection of the proposed new union passenger terminal.

DESHLER, OHIO.—The Baltimore & Ohio and the Cincinnati, Hamilton & Dayton are building a joint passenger station here, which will cost approximately \$10,125. The building is in the process of construction, and is about half done. George Georgenson, Hamilton, Ohio, contractor. (Sept. 3, p. 449.)

EVANSVILLE, IND.—The Illinois Central will soon let a contract for the construction of a two-story freight house here. It will be a brick structure, 40 ft. by 170 ft., with a basement under part of the building, and office room on the second floor. The present freight house, a frame building, will be extended 100 ft.

FREEMONT, ILL.—The Illinois Central has let the contract for three washroom buildings (mentioned last week), and a pump house, to T. S. Leake & Co., of Chicago. The buildings will be one-story structures with brick walls, concrete floors and composition roofs. In compliance with the state law similar buildings have been put up at East St. Louis, Ill., and Clinton, and are now in the course of construction at Carbondale and Burnside (Chicago). The largest structures will be two two-

story buildings at Burnside, with facilities for 1,500 and 1,000 men, respectively, dimensions of 53 ft. by 95 ft. and 43 ft. by 86 ft. Each of the other three points has or will have two buildings, except East St. Louis, which has a third building which was remodeled from a frame structure. The Drumm Construction Company, of Chicago, did the work at East St. Louis, the Harbeck Company had the contract at Clinton, and is doing the work at Carbondale, and Joseph E. Nelson & Sons, of Chicago, have the contract for the buildings at Burnside.

FT. WAYNE, IND.—The municipality has let a contract to the Moellering Construction Company of this city for its portion of the work to be done in the elevation of tracks over Osage street. The estimated cost of the work is \$26,850. The New York, Chicago & St. Louis and the Lake Shore & Michigan Southern will do their part of the work with company forces, at an approximate cost of \$66,737 to the former road and \$17,400 to the latter.

MACON, GA.—The Central of Georgia has given a contract to the Virginia Bridge Company for fabricating and erecting a steel viaduct over the tracks of the Georgia Southern & Florida, also over Fourth, Fifth, Hazel and Ash streets, Macon. The structure will include one 60-ft. deck span, one 45-ft., thirty-five 30-ft., thirteen 20-ft. deck spans and three 45-ft. through spans on steel bents, and will require about 935 tons of structural steel. The work includes about 1,400 cu. yd. of plain concrete masonry, 100 cu. yd. of reinforced concrete, and 120,000 ft. board measure of timber and ties. The total estimated cost of the whole, including tracks, filling, etc., will be about \$165,000.

MARSHALL, TEX.—Fire destroyed the coach and paint shop, a storeroom and several passenger coaches and freight cars of the Texas & Pacific on October 1.

NONCONNAH, TENN.—The Illinois Central will build a steel structure, 176 ft. by 1,200 ft., equipped for repairing wooden cars. The contract for the construction work has not yet been let, but about 1,000 tons of steel have been ordered from the American Bridge Company.

PHILADELPHIA, PA.—The Pennsylvania Railroad has given a contract to the McNichol Paving & Contracting Co., for building a 1,500-ft. concrete retaining wall on the north side of Lehigh avenue, from Tulip to Aramingo streets, in Philadelphia.

A contract is reported let by the Department of Public Works to Peoples Brothers at \$34,500 for building a bridge on the line of Fifty-fourth street over the tracks of the Philadelphia, Baltimore & Washington. It is to be a reinforced concrete structure, 60 ft. wide and 146 ft. between abutments. The Pennsylvania Railroad will pay part of the cost of this bridge.

VANCOUVER, B. C.—Work on the Vancouver terminals of the Canadian Northern Pacific is now under way. To date 2,060,000 yd. out of a total of 3,250,000 to be reclaimed at the head of False creek have been filled in. Bids are being received on a reinforced concrete sea wall, which will be built to close the head of the creek from tide water. The specifications include the following quantities: foundation excavation (wet) 450 cu. yd., concrete 4,950 cu. yd., reinforcing steel 305,000 lb., concrete piles 15,900 l. ft., creosoted fir piles 12,200 l. ft., asphalt 2,820 sq. yd., rock fill 15,500 cu. yd., square timber No. 1 common 19,500 f. b. m., iron in timber including U-bolts 5,500 lb., 255 spring coils.

ACCIDENTS IN THE STREETS OF LONDON.—From a government return it appears that 637 fatal accidents were caused in the metropolitan police district last year by vehicles in the streets. Non-fatal accidents numbered 25,239. Compared with the previous year's return, the fatal accidents have grown from 579 to 637 and the non-fatal from 18,944 to 25,239. The increase may be due in some measure to the darkening of the streets during the last quarter of the year. In the city of London there were 19 fatal accidents, as compared with 17, and 1,253 non-fatal as against 1,210 in the previous year. Dr. Waldo, the city coroner, who quotes these figures, attributes the comparative fewness of traffic accidents in the city to the excellence of the city police, the thorough and prompt manner in which means are taken for preventing accidents, and the superior legal powers in regard to traffic which the city possesses. The coroner, however, pleads for still more street refuges, more police at traffic points, and more life-guards or fenders for heavy motors. *The Engineer, London.*

Railway Financial News

BOSTON & MAINE.—Stockholders of the Fitchburg Railroad, which is leased to the Boston & Maine, have voted to cancel their authorization of \$2,500,000 bonds made in 1914 and which bonds were never issued, and to authorize a sale of \$3,175,000 bonds, the proceeds to be used to pay at maturity \$500,000 4 per cent bonds due July 1, 1916, and to pay off floating debt and the obligations to the Boston & Maine for improvements made under the terms of the lease.

CANADIAN PACIFIC.—General Frank S. Meighen has been elected a director, succeeding Sir William Van Horne, deceased.

CHICAGO & NORTH WESTERN.—See comments on the company's annual report elsewhere in this issue.

CHICAGO, ROCK ISLAND & PACIFIC.—Both stockholders' committees have agreed on the following as candidates for the vacancies to be filled on the board of directors at the annual meeting on October 14 and these candidates have agreed to serve: Edmond D. Hulbert, president, Merchants Loan & Savings Bank, Chicago; Charles G. Dawes, president, Central Trust Company, Chicago; John R. Moron, president, Atlas Portland Cement Company; Judge Nathaniel French, Davenport, Iowa; William B. Thompson, director, Federal Reserve Bank, New York, and J. W. Burdick, president, West Penn Steel Company.

Under order of the court the receiver has paid all principal and interest, due October 1, on equipment obligations, the total payment amounting to about \$3,000,000.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.—See comments on the company's annual report elsewhere in this issue.

DELAWARE & HUDSON.—The New York Public Service Commission has authorized the Delaware & Hudson to issue \$14,451,000 5 per cent 20-year convertible bonds. (See *Railway Age Gazette* of October 1, 1915, p. 623.)

MARYLAND & PENNSYLVANIA.—No interest is to be paid on the \$900,000 income bonds, the interest not having been earned. Interest payments are made in April and October, and the last payment of 2 per cent was made in April, 1914. The yearly rate from 1902 until 1914 was 4 per cent.

MISSOURI, KANSAS & TEXAS.—The protective committee for the first and refunding 4 per cent bonds, consisting of A. J. Hemphill, Charles A. Peabody, W. A. Day and A. A. Jackson, has taken as an additional member Colgate Hoyt, of Colgate Hoyt & Co., New York.

A protective committee consisting of F. N. B. Close, Robert C. Drayton, R. Walter Leigh, William W. McClench and John W. Stedman, with P. D. Bogue, secretary, has been formed for the Texas & Oklahoma first mortgage 5 per cent bonds. The committee asks only the filing of names and addresses and amounts of holdings.

NEW YORK, NEW HAVEN & HARTFORD.—Judge Hunt, in the United States district court, has denied the application of Charles F. Brooker, Lewis Cass Ledyard, Henry K. McHarg, Charles M. Pratt and Frederick F. Brewster for a separate trial from Edward D. Robbins in the Sherman anti-trust suit which has been brought against directors and former directors of the New York, New Haven & Hartford. The court granted the request of Alexander Cochrane, who entered the New Haven board in 1909. Mr. Cochrane's case was considered to be in the same class as that of George F. Baker, T. DeWitt Cuyler, Theodore N. Vail, Francis T. Maxwell and Edward Milligan. These defendants have already been granted a separate trial.

CHINESE RAILWAY ACCOUNTS.—Steps have been taken by the Minister of Communications at Peking to have the accounting systems devised by the Unification of Accounts Commission introduced on the various Chinese railways. In accordance with this decision the Minister of Communications has notified the various railways that inspectors of accounts will be sent to the different railways from time to time to examine the accounts and to keep in close touch with the accounting work.

[ADVERTISEMENT]

ANNUAL REPORTS

CHICAGO AND NORTH WESTERN RAILWAY COMPANY, FIFTY-SIXTH ANNUAL REPORT

REPORT OF THE BOARD OF DIRECTORS

To the Stockholders of the Chicago and North Western Railway Company:
The Board of Directors submit herewith their report of the operations and affairs of the Chicago and North Western Railway Company for the fiscal year ending June 30, 1915.

The Interstate Commerce Commission having prescribed new classifications of accounts, effective July 1, 1914, the results for the preceding year shown in this report have been partially revised for the purpose of comparison.

Average number of miles operated, 8,107.82.	
OPERATING REVENUES:	
Freight	\$51,923,860.74
Passenger	20,528,443.46
Other Transportation	6,694,249.64
Incidental	6,633,121.46
Total Operating Revenues	\$80,779,675.30
OPERATING EXPENSES (69.78 per cent. of Operating Revenues)	56,371,573.04
Net Revenue from Railway Operations	\$24,408,102.26
RAILWAY TAX ACCRUALS (5.59 per cent. of Operating Revenues)	\$4,516,943.10
UNCOLLECTIBLE RAILWAY REVENUES	7,254.64
	4,524,197.74
Railway Operating Income	\$19,883,904.52
NON-OPERATING INCOME:	
Rental Income	\$ 484,441.71
Dividend Income	1,600,227.00
Income from Funded Securities	5,505.83
Income from Unfunded Securities and Accounts, and Other Items	709,825.41
Total Non-Operating Income	2,799,999.95
Gross Income	\$22,683,904.47
DEDUCTIONS FROM GROSS INCOME:	
Rental Payments	\$1,066,043.00
Interest on Funded Debt	9,595,615.81
Other Deductions	108,196.57
Total Deductions from Gross Income	10,769,855.38
Net Income	\$11,914,049.09
DISPOSITION OF NET INCOME:	
Sinking Funds	\$ 204,053.75
Dividends—	
8% on Preferred Stock	1,791,600.00
7% on Common Stock	9,108,015.00
Total Appropriations	11,103,668.75
Balance Income for the year	\$ 810,380.34

The results as compared with the preceding fiscal year were as follows:
Freight Revenue decreased..... \$2,065,614.69
Passenger Revenue decreased..... 1,012,099.33
Other Transportation Revenue decreased..... 563,402.66
Incidental Revenue decreased..... 138,542.73
Total Operating Revenues decreased..... \$3,779,659.41
Operating Expenses decreased..... 3,930,002.26
Net Revenue from Railway Operations increased..... \$ 150,342.85
Railway Tax Accruals increased..... \$264,152.81
Uncollectible Railway Revenues increased.. 7,254.64

271,407.45
Railway Operating Income decreased..... \$ 121,064.60

Of the Operating Expenses for the current fiscal year \$32,920,365.11, or 58.40 per cent., was paid employes for Labor, as compared with \$34,098,916.25, or 56.55 per cent., paid during the preceding fiscal year. The decrease of \$1,178,551.14 in the amount paid is accounted for as follows:
Decrease account less time worked..... \$1,226,711.22
Increase account higher rates of compensation..... 48,160.08

FREIGHT TRAFFIC

The details of Freight Traffic for the year ending June 30, 1915, compared with the preceding year, were as follows:

	1914	1915	Amount	Per
				Cent.
FREIGHT REVENUE	\$53,989,475.43	\$51,923,860.74	\$2,065,614.69	3.83
				Decrease
TONS OF REVENUE FREIGHT CARRIED	43,309,643	40,399,215	6.72	Dec.
TONS OF REVENUE FREIGHT CARRIED ONE MILE	6,220,944,171	6,216,280,599	.22	Dec.
AVERAGE REVENUE RECEIVED PER TON	\$1.25	\$1.29	3.20	Inc.
AVERAGE REVENUE RECEIVED PER TON PER MILE	.87 of a cent	.84 of a cent	3.45	Dec.
AVERAGE DISTANCE EACH REVENUE TON WAS HAULED	143.85 miles	153.87 miles	6.97	Inc.
MILEAGE OF FREIGHT AND MIXED TRAINS	18,314,329	17,250,535	5.81	Dec.
AVERAGE NUMBER OF TONS OF ALL FREIGHT CARRIED PER TRAIN MILE:				
East of Missouri River	442.36	479.68	8.44	Inc.
West of Missouri River	205.95	203.49	1.19	Dec.
Whole Road	411.48	443.10	7.68	Inc.

AVERAGE NUMBER OF TONS OF ALL FREIGHT CARRIED PER LOADED CAR MILE	20.31	21.11	3.94	Inc.
AVERAGE FREIGHT REVENUE PER TRAIN MILE	\$2.95	\$3.01	2.03	Inc.

PASSENGER TRAFFIC

The details of Passenger Traffic for the year ending June 30, 1915, compared with the preceding year, were as follows:

	1914	1915	Amount	Per
				Cent.
PASSENGER REVENUE	\$21,540,542.79	\$20,528,443.46	\$1,012,099.33	4.70
				Decrease
REVENUE PASSENGERS CARRIED	33,389,428	33,079,550	.33	Dec.
REVENUE PASSENGERS CARRIED ONE MILE	1,173,435,140	1,130,297,641	3.68	Dec.
AVERAGE FARE PAID PER PASSENGER	65 cents	62 cents	4.62	Dec.
AVERAGE RATE PAID PER PASSENGER PER MILE	1.84 cents	1.82 cents	1.09	Dec.
AVERAGE DISTANCE TRAVELED PER REVENUE PASSENGER	35.14 miles	34.17 miles	2.76	Dec.
MILEAGE OF PASSENGER AND MIXED TRAINS	21,537,781	21,372,414	.77	Dec.
AVERAGE PASSENGER-TRAIN REVENUE PER TRAIN MILE	\$1.27	\$1.22	3.94	Dec.

MAINTENANCE OF WAY AND STRUCTURES

The total Operating Expenses of the Company for the year ending June 30, 1915, were \$56,371,573.04; of this amount \$10,450,739.45 was for charges pertaining to the Maintenance of Way and Structures. Included in these charges is a large part of the cost of 59,969 tons of steel rails, the greater portion of which was laid in replacement of rails of lighter weight in 441.23 miles of track; also the cost of 2,583,111 new ties.

The charges for Maintenance of Way and Structures also include a portion of the cost of ballasting 49.08 miles of track with crushed stone, 146.34 miles with gravel, and 21.44 miles with cinders; the erection, in place of wooden structures, of 55 new steel bridges on masonry, aggregating 3,550 feet in length and containing 3,885 tons of bridge metal; and the replacement of other wooden structures with masonry arch and box culverts and cast-iron pipes, the openings being filled with earth. The wooden structures replaced by permanent work aggregate 8,929 feet in length.

The charges on account of Maintenance of Way and Structures for the year ending June 30, 1915, compared with the preceding year, were:

	1914	1915	Decrease
COST OF RAILS:			
New steel rails	\$1,212,258.90	\$698,965.82	\$513,293.08 Dec.
Usable and re-rolled rails	996,460.61	842,610.97	153,849.64 Dec.
Less value of old rails and other items	\$2,208,719.51	\$1,541,576.79	\$667,142.72 Dec.
Net charge for rails	\$724,355.98	\$350,268.91	\$374,087.07 Dec.
COST OF TIES	1,762,313.18	1,547,651.05	214,662.13 Dec.
COST OF BALLAST	227,056.25	117,254.77	109,801.48 Dec.
COST OF OTHER TRACK MATERIAL	539,118.33	375,613.88	163,504.45 Dec.
ROADWAY AND TRACK LABOR AND OTHER EXPENSES	5,073,539.12	4,486,656.40	586,882.72 Dec.
Total Charges for Roadway and Track	\$8,326,382.86	\$6,877,445.01	\$1,448,937.85 Dec.
Other Charges Account Maintenance of Way and Structures were:			
BRIDGES, TRETTLES AND CULVERTS	937,863.85	833,833.69	104,030.16 Dec.
ROAD CROSSINGS, FENCES, ETC.	331,200.62	296,673.21	34,527.41 Dec.
SIGNALS AND INTERLOCKERS	434,770.48	419,141.63	15,628.85 Dec.
BUILDINGS, FIXTURES AND GROUNDS	1,229,186.84	995,745.24	233,441.60 Dec.
DOCKS AND WHARVES	53,975.41	88,452.05	34,476.64 Inc.
SUPERINTENDENCE	522,712.02	515,022.78	7,689.24 Dec.
ROADWAY TOOLS AND SUPPLIES	150,540.57	130,502.96	20,037.61 Dec.
SUNDRY MISCELLANEOUS CHARGES	226,462.07	293,922.88	67,460.81 Inc.

Total Charges Account Maintenance of Way and Structures..... \$12,213,094.72 \$10,450,739.45 \$1,762,355.27 Dec.
The above charges for Maintenance of Way and Structures for the current year amount to 18.54 per cent of the total Operating Expenses, as compared with 20.25 per cent for the preceding fiscal year.

MAINTENANCE OF EQUIPMENT

The charges on account of Maintenance of Equipment for the year ending June 30, 1915, compared with the preceding year, were as follows:

	1914	1915	Increase or Decrease
LOCOMOTIVES	\$4,831,466.36	\$4,740,217.79	\$91,248.57 Dec.
PASSENGER-TRAIN CARS	1,252,013.63	1,268,877.15	16,863.52 Inc.
FREIGHT-TRAIN CARS	5,445,489.09	5,873,407.23	427,918.14 Inc.
WORK EQUIPMENT	145,882.97	156,987.57	11,104.60 Inc.
SHOP MACHINERY AND TOOLS	229,921.15	170,396.43	59,524.72 Dec.
SUPERINTENDENCE	359,527.39	354,854.54	4,672.85 Dec.
SUNDRY MISCELLANEOUS CHARGES	94,187.14	84,194.47	9,992.67 Dec.

Total Charges Account Maintenance of Equipment..... \$12,358,487.73 \$12,648,935.18 \$290,447.45 Inc.
The above charges for Maintenance of Equipment for the current year amount to 22.44 per cent of the total Operating Expenses, as compared with 20.49 per cent for the preceding fiscal year.

RESERVE FOR ACCRUED DEPRECIATION ON EQUIPMENT

At the close of the preceding fiscal year there was a balance to the credit of the Equipment Reserve Accounts of..... \$6,089,239.37
During the year ending June 30, 1915, there was credited to the Equipment Reserve Accounts on account of charges to Operating Expenses for Accrued Depreciation..... 2,323,461.58

And there was charged during the year against the above amount the Accrued Depreciation previously credited this account on Equipment retired or transferred from one class of service to another..... 263,281.48

Leaving a balance to the credit of the Equipment Reserve Accounts on June 30, 1915, of..... \$8,149,419.47

TRANSPORTATION EXPENSES

The Transportation Expenses of the Company for the year ending June 30, 1915, were \$29,753,444.06, or 52.78 per cent of the total Operating Expenses. Of this amount \$19,268,640.36, or 64.76 per cent, was charged for labor; \$5,842,571.64, or 19.64 per cent, was charged for fuel for locomotives; and \$4,642,232.06, or 15.60 per cent, was charged for supplies and miscellaneous items. The decrease in the Transportation Expenses for the year ending June 30, 1915, as compared with the preceding fiscal year, was \$2,195,793.88, or 6.87 per cent, distributed as follows:

Decrease in amount charged for labor..... \$ 547,529.01
Decrease in amount charged for fuel for locomotives..... 1,063,155.48
Decrease in amount charged for supplies and miscellaneous items..... 585,109.39
Total..... \$2,195,793.88

CAPITAL STOCK

There was no change during the year in the Capital Stock and Scrip of the Company.

The Company's authorized Capital Stock is Two Hundred Million Dollars (\$200,000,000.00), of which the following has been issued to June 30, 1915:

Common Stock and Scrip held by the Public..... \$130,117,028.82
Common Stock and Scrip owned by the Company..... 2,338,502.15

Total Common Stock and Scrip..... \$132,455,530.97
Preferred Stock and Scrip held by the Public..... \$22,395,120.00
Preferred Stock and Scrip owned by the Company..... 3,834.56

Total Preferred Stock and Scrip..... 22,398,954.56

Total Capital Stock and Scrip, June 30, 1915..... \$154,854,485.53

FUNDED DEBT

At the close of the preceding fiscal year the amount of Funded Debt, exclusive of Bonds in the Treasury and Due from Trustee, was..... \$214,879,000.00

The above amount has been decreased during the year ending June 30, 1915, by Bonds and Equipment Trust Certificates redeemed or transferred, as follows:

C. & N. W. Ry. Consolidated Sinking Fund Currency of 1915, 7%, matured February 1, 1915, viz.:
Redeemed..... \$12,669,000.00
Unpresented and transferred to "Current Liabilities"..... 163,000.00
Total..... \$12,832,000.00

C. & N. W. Ry. Equipment Trust Certificates of 1912, 4½%, redeemed, viz.:
Series A..... \$300,000.00
Series B..... 300,000.00
Series C..... 400,000.00
Total..... 1,000,000.00

C. & N. W. Ry. Sinking Fund of 1879, 6%, redeemed..... 6,000.00

C. & N. W. Ry. Sinking Fund of 1879, 5%, redeemed..... 183,000.00

M. L. S. & W. Ry. Extension and Improvement Sinking Fund Mortgage, 5% redeemed..... 26,000.00

C. & N. W. Ry. Sinking Fund Debentures of 1933, 5%, redeemed..... 251,000.00

Total Funded Debt Redeemed or Transferred..... 14,298,000.00

\$200,581,000.00

And the above amount has been increased by Bonds sold during the year, as follows:

C. & N. W. Ry. General Mortgage Gold Bonds of 1987, 5%, sold to re-imburse the Company for past expenditures made for construction and in redeeming matured bonds..... 10,000,000.00

Total, June 30, 1915..... \$210,581,000.00

Net Decrease during the year..... 4,298,000.00

BONDS IN THE TREASURY AND DUE FROM TRUSTEE

At the close of the preceding fiscal year the amount of the Company's Bonds in the Treasury and due from Trustee was..... \$4,173,000.00

The above amount has been increased during the year ending June 30, 1915, as follows:

C. & N. W. Ry. 5% Sinking Fund Bonds of 1879, Redeemed..... \$59,000.00

M. L. S. & W. Ry. 5% Extension and Improvement Sinking Fund Mortgage Bonds, Redeemed..... 17,000.00

C. & N. W. Ry. 5% Sinking Fund Debentures of 1933 Redeemed..... 131,000.00

C. & N. W. Ry. General Mortgage Gold Bonds of 1987 Due from Trustee in Exchange for Bonds Retired, viz.:

C. & N. W. Ry. Consolidated Sinking Fund Currency, 7% \$12,669,000.00

C. & N. W. Ry. Sinking Fund Bonds of 1879, 6%..... 6,000.00

C. & N. W. Ry. Sinking Fund Bonds of 1879, 5%..... 124,000.00

M. L. S. & W. Ry. Extension and Improvement Sinking Fund Mortgage, 5%..... 38,000.00
C. & N. W. Ry. Sinking Fund Debentures of 1933, 5%.. 124,000.00
Total..... 12,961,000.00

C. & N. W. Ry. General Mortgage Gold Bonds of 1987, Due from Trustee on Account of Construction Expenditures Made During the Year..... 1,000,000.00
Total..... 14,168,000.00
\$18,341,000.00

The Bonds on hand and due from Trustee have been decreased during the year, as follows:

C. & N. W. Ry. General Mortgage Gold Bonds of 1987, 5% Sold to Reimburse the Company for Past Expenditures Made for Construction and in Redeeming Matured Bonds..... \$10,000,000.00
M. L. S. & W. Ry. Extension and Improvement Sinking Fund Mortgage, 5% Bonds, Retired..... 29,000.00
C. & N. W. Ry. 5% Sinking Fund Debentures of 1933, Retired..... 4,000.00
C. & N. W. Ry. 4½% Equipment Trust Certificates of 1913, Retired..... 400,000.00
Total..... 10,433,000.00

Total, June 30, 1915..... \$7,908,000.00

Net Increase during the year..... \$3,735,000.00

CONSTRUCTION

The construction charges for the year ending June 30, 1915, were as follows:

ON ACCOUNT OF ELEVATING TRACKS, viz.:
In River Forest, Illinois..... \$142,738.84
Greenfield Avenue north, Milwaukee, Wis. 285,188.73
Total..... \$427,927.57

ON ACCOUNT OF EXTENSIONS, viz.: Miles
Kingston Extension, Wisconsin.... 15.60 \$94,515.11
Koeppen Extension, Wisconsin.... 7.19 96,956.29
Total..... 191,471.40

SUNDRY CONSTRUCTION:
Land for Transportation Purposes..... \$ 97,224.99
Buildings and Fixtures..... 459,039.15
Bridges, Trestles and Culverts..... 692,157.60
New Sidings, Yard Tracks and Spurs to Industries..... 227,333.74
Crossings and Signs..... 61,530.87
Signals and Interlockers..... 52,532.94
Reduction of Grade between Nelson and Peoria, Illinois..... 289,482.40
Betterment of Roadway and Track..... 694,869.53
Shop Machinery..... 50,490.41
Miscellaneous Construction, including Fences, Wharves and Docks, and other items..... 94,201.65
Total..... 2,718,863.33

EQUIPMENT:
40 Steam Locomotives, 5,000 Freight-train Cars, 70 Passenger-train Cars, and 260 Work Equipment Cars..... \$6,292,698.95
Improvement of Equipment..... 403,681.03
Total..... \$6,696,379.98

Less Original Cost of Equipment Retired, as follows:
30 Locomotives..... \$236,780.30
2,639 Freight-train Cars... 1,420,108.78
26 Passenger-train Cars... 190,725.47
285 Work Equipment Cars..... 47,754.46
Other Items..... 32,169.29
Total..... 1,927,538.30
4,768,841.68

Account Cost of Milwaukee, Sparta and North Western Railway..... 14,340.44
Account Cost of Des Plaines Valley Railway..... 10,602.87
Account Cost of St. Louis, Peoria and North Western Railway..... 53,273.65
Total..... \$8,185,320.94

LANDS

During the year ending June 30, 1915, 3,663.84 acres and 88 town lots of the Company's Land Grant lands were sold for the total consideration of \$41,698.01. The number of acres remaining in the several Grants June 30, 1915, amounted to 327,530.81 acres, of which 18,790.19 acres were under contract for sale, leaving unsold 308,740.62 acres.

Appended hereto may be found statements, accounts, and statistics relating to the business of the fiscal year, and the condition of the Company's affairs on June 30, 1915.

By order of the Board of Directors

WILLIAM A. GARDNER, President

PROFIT AND LOSS ACCOUNT, JUNE 30, 1915

Dr.
Depreciation accrued prior to July 1, 1907, on equipment retired or changed from one class to another during the current fiscal year..... \$884,174.69
Net loss on property sold or abandoned and not replaced..... 110,485.45
Debt discount extinguished through surplus..... 145,867.20
Miscellaneous Debits..... 20,023.23
Balance Credit, June 30, 1915, carried to Balance Sheet..... 35,875,758.00
Total..... \$46,096,308.57

Cr.
Balance, June 30, 1914..... \$35,998,882.89
Balance Income for year ending June 30, 1915, brought forward from Income Account..... 810,380.34
Donations..... 114,611.90
Miscellaneous Credits..... 72,433.44
Total..... \$36,096,308.57

CHICAGO, SAINT PAUL, MINNEAPOLIS AND OMAHA RAILWAY COMPANY, THIRTY-FOURTH ANNUAL REPORT

REPORT OF THE BOARD OF DIRECTORS

To the Stockholders of the Chicago, Saint Paul, Minneapolis and Omaha Railway Company:

The Board of Directors submit herewith their report of the operations and affairs of the Chicago, Saint Paul, Minneapolis and Omaha Railway Company for the fiscal year ending June 30, 1915.

The Interstate Commerce Commission having prescribed new Classifications of Accounts, effective July 1, 1914, the results for the preceding year, shown in this report, have been partially revised for the purpose of comparison.

Average number of miles operated, 1,752.81.

OPERATING REVENUES:

Freight	\$11,523,103.44
Passenger	4,983,699.89
Other Transportation	1,022,194.88
Incidental	312,349.47

Total Operating Revenues	\$7,841,347.68
OPERATING EXPENSES (67.86 per cent of Operating Revenues)	12,107,597.51

Net Revenue from Railway Operations	\$ 5,733,750.17
Railway Tax Accruals (5.69 per cent of Operating Revenues)	\$1,015,028.61
UNCOLLECTIBLE RAILWAY REVENUES	4,834.59

Railway Operating Income	\$ 4,713,886.97
NONOPERATING INCOME:	
Rental Income	\$269,811.98
Dividend Income	46,351.00
Income from Funded Securities	15,220.00
Income from Unfunded Securities and Accounts and other items	24,111.61

Total Nonoperating Income	355,494.59
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Gross Income	\$ 5,069,381.56
DEDUCTIONS FROM GROSS INCOME:	
Rental Payments	\$ 673,696.23
Interest on Funded Debt	2,152,312.50
Other Deductions	24,288.17
Total Deductions from Gross Income	2,850,296.90

Net Income	\$ 2,219,084.66
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DISPOSITION OF NET INCOME:

Dividends—	
7% on Preferred Stock	\$ 787,976.00
7% on Common Stock	1,298,934.00
	2,086,910.00

Balance Income for the year	\$ 132,174.66
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The results as compared with the preceding fiscal year were as follows:

Passenger Revenue decreased	\$432,010.30
Other Transportation Revenue decreased	48,848.70
	\$480,859.00
Freight Revenue increased	\$ 95,540.20
Incidental Revenue increased	16,583.09
	112,123.29

Total Operating Revenues decreased	\$368,735.71
Operating Expenses decreased	726,519.41

Net Revenue from Railway Operations increased	\$357,783.70
Railway Tax Accruals increased	\$ 41,745.78
Uncollectible Railway Revenues increased	4,834.59
	46,580.37

Railway Operating Income increased	\$311,203.33
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Of the Operating Expenses for the current fiscal year \$6,599,357.35, or 54.51 per cent, was paid employees for labor, as compared with \$6,966,716.33, or 54.28 per cent, paid during the preceding fiscal year. The decrease of \$367,358.98 in the amount paid is accounted for as follows:

Decrease account less time worked	\$306,417.18
Decrease account lower rates of compensation	60,941.80
	\$367,358.98

PASSENGER TRAFFIC

The Details of Passenger Traffic for the year ending June 30, 1915, compared with the preceding year, were as follows:

	1914	1915	Amount	Per Cent
PASSENGER REVENUE	\$5,415,710.19	\$4,983,699.89	\$432,010.30	7.98
			Percentage of Decrease	
PASSENGERS CARRIED	4,881,961	4,767,826		2.34 Dec.
PASSENGERS CARRIED ONE MILE	266,685,999	252,305,000		5.39 Dec.
AVERAGE FARE PAID PER PASSENGER	110.93 cents	104.53 cents		5.77 Dec.
AVERAGE RATE PAID PER PASSENGER PER MILE	2.031 cents	1.975 cents		2.76 Dec.
AVERAGE DISTANCE TRAVELED PER PASSENGER	54.63 miles	52.92 miles		3.13 Dec.
MILEAGE OF REVENUE PASSENGER AND MIXED TRAINS	4,510,639	4,349,764		3.57 Dec.
AVERAGE PASSENGER TRAIN REVENUE PER TRAIN MILE	\$1.40	\$1.34		4.29 Dec.

FREIGHT TRAFFIC

The details of Freight Traffic for the year ending June 30, 1915, compared with the preceding year, were as follows:

	1914	1915	Amount	Per Cent
FREIGHT REVENUE	\$11,427,563.24	\$11,523,103.44	\$95,540.20	.84
			Percentage of Increase or Decrease	
TONS OF REVENUE FREIGHT CARRIED	8,466,632	8,794,488		3.87 Inc.
TONS OF REVENUE FREIGHT CARRIED ONE MILE	1,294,143,291	1,336,106,367		3.24 Inc.
AVERAGE REVENUE RECEIVED PER TON	\$1.35	\$1.31		2.96 Dec.

AVERAGE REVENUE RECEIVED PER TON PER MILE .....	.88 of a cent	.86 of a cent	2.27 Dec.
AVERAGE DISTANCE EACH REVENUE TON WAS HAULED	152.85 miles	151.93 miles	.60 Dec.
MILEAGE OF FREIGHT AND MIXED TRAINS	4,255,990	4,026,069	5.40 Dec.
AVERAGE NUMBER OF TONS OF ALL FREIGHT CARRIED PER TRAIN MILE	330.67	360.13	8.91 Inc.
AVERAGE NUMBER OF TONS OF ALL FREIGHT CARRIED PER LOADED CAR MILE	19.39	20.39	5.16 Inc.
AVERAGE FREIGHT REVENUE PER TRAIN MILE	\$2.69	\$2.86	6.32 Inc.

MAINTENANCE OF WAY AND STRUCTURES

The total Operating Expenses of the Company for the year ending June 30, 1915, were \$12,107,597.51; of this amount \$1,956,803.49 was for charges pertaining to Maintenance of Way and Structures. Included in these charges are \$130,942.38 for steel rails, \$229,376.56 for ties, and the cost of re-balling 24.01 miles with gravel and cinders, also part cost of replacing 1,934 feet of wooden bridging with permanent work.

During the year 11,408 tons of new steel rails and 6,446 tons of usable and re-rolled steel rails were laid in track, a greater portion of which replaced rails of lighter weight; 372,974 ties of all descriptions were laid in renewals.

The details of the charges to Maintenance of Way and Structures for the year, compared with the previous year, were as follows:

COST OF RAILS:	1914	1915	Increase or Decrease
New steel rails	\$392,057.11	\$362,580.63	\$29,476.48 Dec.
Usable and re-rolled rails	143,572.52	138,315.69	5,256.83 Dec.
	\$535,629.63	\$500,896.32	\$34,733.31 Dec.
Less value of old rails and other items	366,663.79	369,953.94	3,290.15 Inc.
Net charge for rails	\$168,965.84	\$130,942.38	\$38,023.46 Dec.
COST OF TIES	525,024.76	229,376.56	295,648.20 Dec.
COST OF BALLAST	51,996.80	20,270.06	31,726.74 Dec.
COST OF OTHER TRACK MATERIAL	89,442.67	117,233.06	27,790.39 Inc.
Carried forward	\$835,430.07	\$497,822.06	\$337,608.01 Dec.
Brought forward ...	\$835,430.07	\$497,822.06	\$337,608.01 Dec.
ROADWAY AND TRACK LABOR AND OTHER EXPENSES	860,749.04	774,745.18	86,003.86 Dec.

Total Charges for Roadway and Track	\$1,696,179.11	\$1,272,567.24	\$423,611.87 Dec.
Other Charges Account of Maintenance of Way and Structures were as follows:			

BRIDGES, TRETTLES AND CULVERTS	295,994.49	159,950.88	136,043.61 Dec.
ROAD CROSSINGS, FENCES, ETC.	70,010.91	64,003.35	6,007.56 Dec.
SIGNALS AND INTERLOCKING PLANTS	30,288.21	28,082.14	2,206.07 Dec.
BUILDINGS, FIXTURES AND GROUNDS	244,206.25	207,458.28	36,747.97 Dec.
DOCKS AND WHARVES	2,636.23	Cr. 96.30	2,732.53 Dec.
SUPERINTENDENCE	111,551.70	107,451.21	4,100.49 Dec.
ROADWAY TOOLS AND SUPPLIES	23,742.73	24,502.41	759.68 Dec.
SUNDRY MISCELLANEOUS CHARGES	152,578.97	92,884.28	59,694.69 Dec.

Total Charges Account of Maintenance of Way and Structures	\$2,627,188.60	\$1,956,803.49	\$670,385.11 Dec.
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The above charges for Maintenance of Way and Structures for the current year amount to 16.16 per cent of the total Operating Expenses, as compared with 20.47 per cent for the preceding fiscal year.

MAINTENANCE OF EQUIPMENT

The charges on account of Maintenance of Equipment for the year ending June 30, 1915, compared with the preceding year, were as follows:

	1914	1915	Increase or Decrease
LOCOMOTIVES	\$915,313.10	\$975,126.79	\$59,813.69 Inc.
FREIGHT-TRAIN CARS	923,035.34	1,061,967.59	138,932.25 Inc.
PASSENGER-TRAIN CARS	287,841.23	265,800.71	22,040.52 Dec.
WORK EQUIPMENT	33,067.42	35,127.09	2,059.67 Inc.
SHOP MACHINERY AND TOOLS	33,788.02	31,300.56	2,487.46 Dec.
SUPERINTENDENCE	63,083.97	68,929.43	5,845.46 Inc.
SUNDRY MISCELLANEOUS CHARGES	46,995.43	38,704.54	8,290.89 Dec.

Total Charges Account of Maintenance of Equipment	\$2,303,124.51	\$2,476,956.71	\$173,832.20 Inc.
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The above charges for Maintenance of Equipment for the current year amount to 20.46 per cent of the total Operating Expenses, as compared with 17.95 per cent for the preceding fiscal year.

TRANSPORTATION EXPENSES

The Transportation Expenses of the Company for the year were \$6,737,697.17, or 55.65 per cent of the Total Operating Expenses. Of this amount \$3,639,774.85, or 54.02 per cent, was for labor; \$1,922,464.65, or 28.53 per cent, was for fuel for locomotives; and \$1,175,457.67, or 17.45 per cent, was for supplies and miscellaneous items.

The total decrease in the charges as compared with the preceding year was \$195,205.38, distributed as follows:

Decrease in amount charged for labor	\$188,447.73
Decrease in amount charged for fuel for locomotives	121,627.28
Increase in amount charged for supplies and miscellaneous items	114,869.63
	\$195,205.38

By order of the Board of Directors,
WILLIAM A. GARDNER,
President.

Railway Age Gazette

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*Illustrated.

An editorial on the licensing of structural engineers in Illinois, in the *Railway Age Gazette* of September 10, called attention to the fact that the law provides for the granting of licenses to engineers from other states in which similar laws are in effect, and stated further that no such law has been passed by any other state.

The Licensing of Engineers

A. A. Woods, superintendent on the Queen & Crescent, calls attention to the fact that the state of Louisiana passed a law in 1908, requiring a license for the practice of civil engineering and surveying. This statute does not define the terms "civil engineering" or "surveying," nor does it state what is to be understood as constituting the "practice" of these professions. The fact that the candidates for licenses in civil engineering are to be examined only in "natural philosophy or physics," in

addition to the branches mentioned for surveyors, throws no further light on the subject other than to indicate unlimited discretion on the part of the board of examiners. It is not known what attitude will be taken by the Illinois board concerning the holders of licenses in Louisiana. This example illustrates the variety of conditions to which the railroads crossing state lines would be subjected, if other states should follow the example of Illinois and Louisiana.

The British Board of Trade report of the returns of the railways of the United Kingdom for the calendar year 1914 is contained in a single page, which is published elsewhere in this issue. Only a few of the most important figures, such as those for mileage, capitalization, earnings and expenditures are given, in place of the usual volume of statistics comprising 100 or more pages, and it is announced that, in consequence of the war, no further returns will be published for the year. Total revenues amounted to \$677,731,860, including the estimated amount receivable under the government's guaranty, given when it took control of the roads for military purposes on August 5, of compensation for any decrease in net receipts for the period during which the government retained possession of them, as compared with the corresponding period of the previous year. The gross earnings were \$1,715,000 less than in 1913, but approximately \$50,000,000 more than in 1912. Expenses, on the other hand, increased \$4,145,000, so that the net income was \$5,861,000 less than in 1913, but almost \$18,000,000 more than in 1912. Some indication of the volume of traffic is afforded by the train mileage figures, which show a decrease of 5,518,000 miles as compared with 1913, most of which was in freight, although there was a large increase over previous years with the exception of 1913. Under the exigencies of military traffic, however, these figures probably include a large empty mileage. The ratio of expenses to revenues was 63.3, in 1914, against 62.6, in 1913, and the percentage of net income to paid-up capital was 3.79, in 1914, against 3.90, in 1913. The total paid-up capital in 1914 amounted to \$6,518,338,920, or \$275,000 a mile, an increase for the year of about \$35,045,000, while the main line mileage during the year increased only 10 miles to 23,701, and the mileage of single track increased 258 miles.

The constitutional convention of New York state, which has recently adjourned, submits to the people an amendment which, if adopted, will make the public service commissionerships constitutional offices; in other words, partisan legislatures cannot abolish the commissions on the whim of a moment. As everybody is agreed that "regulation has come to stay," this is a salutary change. The proposed amendment leaves the powers of removal and appointment just as they are now; the members' terms of office, five years, remain unchanged, and the objections to the amendment, voiced in some newspapers, based on the argument that the reasonable powers of the legislature and the governor will be curtailed, is groundless. It will be remembered that these two commissions were created in Governor Hughes' time one to have supervision over the public utilities of New York City, the other over the public utilities of the rest of the state. The commissioners are appointed by the governor; the salary is \$15,000 a year, and the original idea was to get the best men available regardless of political affiliations. This ideal, however, has not been lived up to, and for the last few years the commissionerships have been considered political plums at the disposal of the governor. This bad condition is little improved. The responsibility of a governor, in making appointments like these, is akin to that of the President in appointing judges for the federal courts, but only rarely do the citizens of New York elect a governor who appreciates this. If governors would

New York's Public Service Commissions

make appointments to commissions from men best fitted to hold such positions and not as rewards for political support, then truly government regulation would have an opportunity which it seldom has had in this country. It might be the very legitimate ambition of a railroad man, a professor of economics, or an engineer, to step from competitive work into the judicial-administrative capacity of public service commissioner. While the salary would not be comparable to that of the vice-president of a large railroad or to the earnings of a successful engineer, it would carry a dignity, a responsibility and an authority in somewhat the same way that an appointment to the Supreme Court does; and that ought to go far toward making up for money loss.

RAILROAD BANKRUPTCY

A SIXTH of the mileage of all the railroads in the United States is being operated by receivers and 66 per cent of all the roads in receivers' hands is in the Southwest. There is only approximately 32 per cent of the railroad mileage for the entire United States shown in the accompanying map, which covers the Southwest and some additional territory, while 66 per cent, or nearly 28,000 miles out of the total of approximately 42,000 miles of road that are in receivers' hands, is shown on this map.

The following is a list of all the roads now being operated by receivers:

RECEIVERSHIPS JANUARY 1, 1915			
	Miles	Outstanding Stock	Total Funded Debt
Apalachicola Northern	102	3,000,000	2,000,000
Arkansas, Louisiana & Gulf.....	61	1,230,100	1,230,000
Arkansas Southeastern	30	500,000	500,000
Atlanta, Birm. & Atlantic.....	645	35,000,000	18,533,000
Beaumont, Sour Lake & West.	118	85,000	2,007,251
Birm., Columbus & St. Andrews... 38		4,500,000	250,000
Boyer City, Gaylord & Alpena.... 90		501,200	175,000
Buffalo & Susquehanna.....	91	10,000,000	7,059,000
Cape Girardeau Northern.....	104	110,000	1,500,000
Chicago & Eastern Illinois.....	1,282	25,817,800	63,155,000
Chicago, Anamosa & Northern..... 36		112,000	(Not Pub.)
Chicago, Peoria & St. Louis.....	245	4,000,000	2,000,000
Cincinnati, Bluffton & Chic.....	52	1,125,000	1,500,000
Cincinnati, Hamilton & Dayton.... 1,015		8,248,575	62,135,640
Colorado Midland	338	10,000,000	9,532,000
Columbus & Southern.....	23	2,000,000	500,000
Dansville & Mt. Morris.....	15	50,000	150,000
Denver, Laramie & No. Western.... 56		29,072,800	1,500,000
Fitzgerald, Ocilla & Broxton..... 23		300,000	150,000
Florida, Alabama & Gulf.....	25	.....	.....
Florida Central	47	50,000	500,000
Ft. Worth & Rio Grande.....	235	(See St. L. & S. F.)	.....
Gould Southwestern	25	51,000	.....
Greenville & Knoxville.....	23	260,000	460,000
International & Great Northern.... 1,106		4,823,000	24,594,500
Iowa & Omaha Short Line.....	14	.....	175,000
Kane & Elk.....	15	75,000	9,000
Kansas City & Memphis.....	58	852,000	796,000
Kansas, Southern & Gulf.....	10	1,000,000	.....
Liberty White	50	300,000	250,000
Louisiana & Northwest.....	121	2,300,000	2,180,000
McCrary & Beedeville So.	12	.....	.....
Macon & Birmingham.....	97	500,000	500,000
Marietta, Columbus & Cleveland... 49		250,000	250,000
Missouri & North Arkansas.....	365	8,340,000	8,340,000
Missouri, Oklahoma & Gulf.....	329	8,261,000	8,261,000
Muscataine North & South.....	54	1,000,000	890,000
New Berlin & Winfield.....	8	30,000	33,800
New Orleans, Mobile & Chic.	402	8,075,300	12,699,500
New Orleans, Texas & Mexico..... 287		(See St. L. & S. F.)	.....
Ocala Northern	54	.....	.....
Ohio & Kentucky.....	40	300,000	425,000
Ohio River & Columbus.....	24	501,000	85,000
Opelousas, Gulf & Northeastern.... 57		1,421,475	1,143,000
Orange & Northwest.....	62	(See St. L. & S. F.)	.....
Pere Marquette	2,322	26,186,590	63,672,000
Pittsburgh, Shawmut & Northern... 291		15,000,000	14,655,600
Rome & Northern.....	20	1,000,000	.....
St. Louis & San Francisco.....	4,747	41,985,762	295,499,358
St. Louis, Brownsville & Mex. 528		(See St. L. & S. F.)	.....
St. Louis, San Frans. & Texas..... 242		.....	.....
Salt Lake & Meur.....	14	300,000	250,000
San Ant., Fred. & Northern.....	25	.....	.....
San Antonio, Uvalde & Gulf.....	316	230,000	3,663,000
Sharpsville	21	350,000	.....
Tennessee Ry.	54	1,000,000	1,129,000
Tennessee Central	293	7,941,450	12,379,900
Texas Mexican	161	2,500,000	1,380,000
Toledo, St. Louis & Western.....	450	19,947,600	28,027,000
Trinity & Brazos Valley.....	303	304,000	8,760,000
Valdosta, Moultrie & Western..... 42		100,000	300,000
Virginia & Kentucky.....	5	119,100	35,500
Wabash	2,514	92,801,986	115,156,496
Wabash, Chester & Western.....	65	1,250,000	690,000
Wabash, Pittsburgh Terminal.....	63	10,000,000	30,236,000
West Side Belt R. R.....	22	1,080,000	383,000
Wheeling & Lake Erie.....	459	36,980,000	15,000,000
Williamsville, Greenville & St. L. ... 35		525,000	525,000
Wisconsin & Michigan.....	123	956,000	3,518,245
Total, January 1, 1915.....	21,048	\$434,599,738	\$830,728,790

RECEIVERSHIPS SINCE JANUARY 1, 1915

	Miles	Outstanding Stock	Total Funded Debt
Algoma Cent. & Hudson Bay.....	332	\$10,000,000	\$10,080,000
Atlantic Northern	17	150,000	100,000
Boca & Loyalton.....	55	1,200,000	418,000
Chic., Rock Island & Pacific.....	7,847	74,877,200	215,255,000
Crooked Creek R. R. & Coal Co..... 18		112,500	112,500
Florida Ry.	59	1,166,000	1,189,965
Georgia & Florida.....	350	8,750,000	8,452,000
Inverness Ry. & Coal Co.....	61	7,500,000	2,131,000
Kansas City, Ozark & Southern.... 15		.....	.....
Missouri, Kansas & Texas.....	3,865	76,300,300	120,073,000
Missouri Pacific	7,285	83,251,085	161,910,500
Pacific & Idaho Northern.....	90	2,929,800	1,816,000
Western Pacific	946	87,779,800	123,119,000
Total since January 1, 1915.....	20,940	\$354,016,685	\$644,656,965
Total, January 1, 1915.....	21,048	\$434,599,738	\$830,728,790
Total since January 1, 1915.....	20,940	354,016,685	644,656,965
	41,988	\$788,616,423	\$1,475,385,755

Total Mileage, 41,988; Total Capitalization, \$2,264,002,178

It will be noted that the only roads of any importance that are in receivers' hands and are not at least in part on the map of the Southwest are the Western Pacific, operating 946 miles; the Colorado Midland, operating 338; the Georgia & Florida, operating 350, and the Algoma Central & Hudson Bay, operating 332 miles. A part of the Pere Marquette is shown on the map, but most of it is not.

With the problem before bankers and railroad managements, of restoring the bankrupt railroads to a condition of solvency, it becomes essential that the conditions which brought about bankruptcy should be studied and analyzed in a spirit of entire candor. A successful termination of the conditions which now exist can be arrived at only if the causes which brought about these receiverships are removed. It is believed that a study of the accompanying map will help in this analysis.

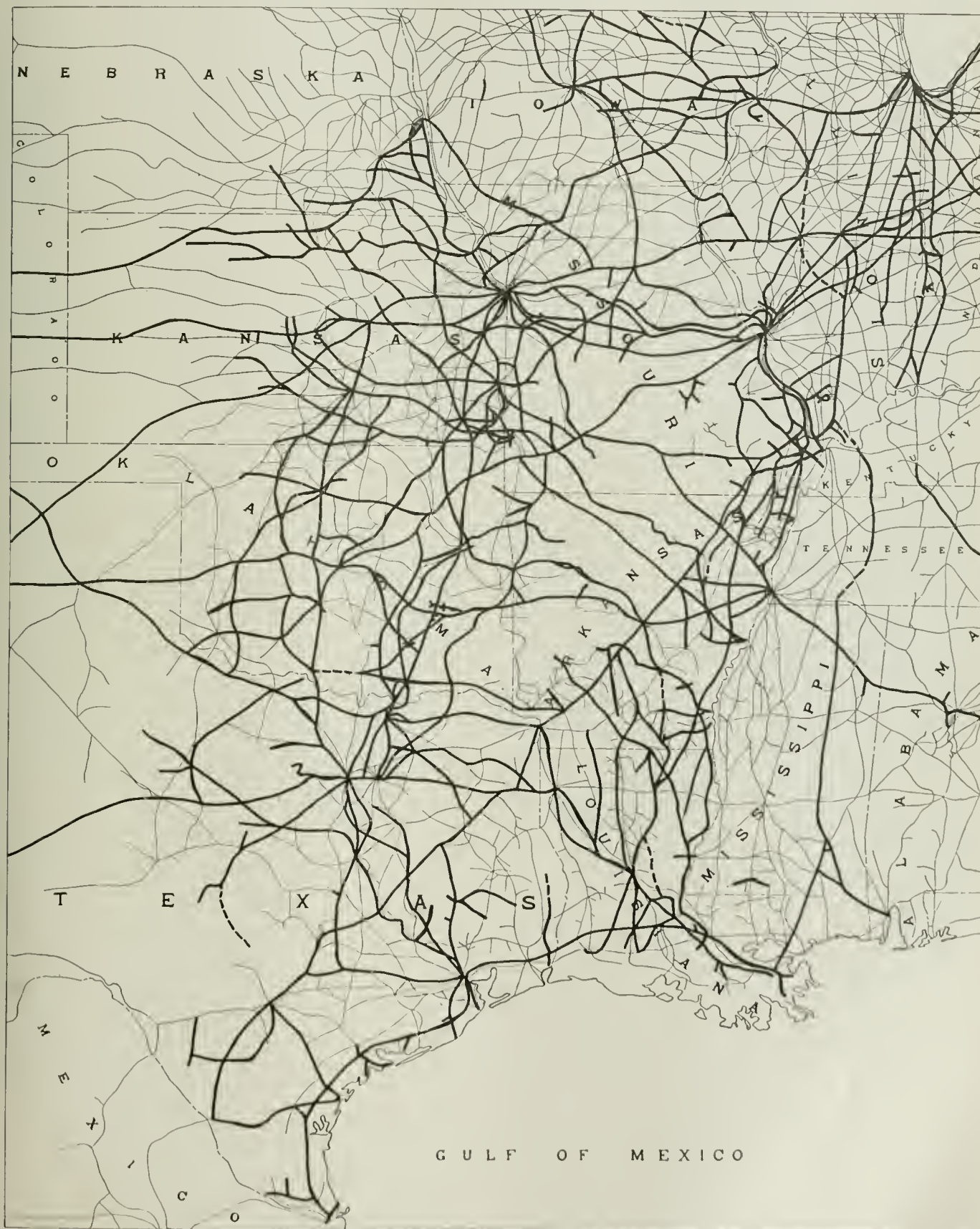
If the roads which are in the hands of receivers and are not shown on this map have certain features in common with the southwestern roads, this might be some clue to the facts which we are trying to get at. The condition of the Western Pacific doubtless is due mainly to the fact that it is a new road in a territory which is largely undeveloped. That might be said of certain individual lines of some of the southwestern roads that are in the hands of receivers, but it is obviously not a characteristic of all the roads, or of any appreciable portion of them. The Pere Marquette, only a very small part of which is shown on the map, lies largely in Michigan. Its bankruptcy was due in part to the fact that when the company was reorganized following a previous bankruptcy the reorganization was not drastic enough; that means that the earning power of the company was overestimated. Competitive conditions may have something to do with this, but the most important factor is the restrictions which are placed on rates by the state of Michigan. The Pere Marquette also has too large a proportion of funded debt to stock. The roads in the hands of receivers in the Southwest all have the last two characteristics. They have been the victims of pernicious state regulation and they all have too large a proportion of their capital securities in the form of bonds or fixed interest-bearing notes. The southwestern states have indulged in railway regulation to a greater extent than any other three states in the union. It is unlawful to double-head a freight train in Texas so as to obtain the economies of heavier trainloading. This is only one instance of state regulation, but it is mentioned as a sample of the length to which the southwestern states have gone in attempting to cripple the earning power of their railroads.

A factor which has been much commented on in connection with the receiverships in the Southwest has been the refusal of the bankers to renew maturing obligations. In some instances this may have been due to enforced conservatism on the part of the bankers, but in other instances it is not true. Take the case of the Missouri Pacific. Kuhn, Loeb & Co. stood ready to give the strongest kind of financial support, but smallness of the earning power of the road necessitated so drastic a reduction in fixed charges that security holders could only be compelled

to make the sacrifice through the medium of railway receivership.

No one can study the history of the roads of Texas with an open mind and not come to the conclusion that state regulation, as it has been practiced in the past there, is directly responsible for the failure of any Texas road to be profitable to its owners.

No one can study with an open mind the laws of Missouri, Oklahoma and Arkansas and not be convinced that state restrictions on railroad operation have been one of the principal causes of the conditions which now exist in the southwestern states.



Map of the Railroads of the Southwest Showing by Heavy Lines the Roads in Receivership

If the Southwest had been experiencing a long period of business depression, if there had been crop failures, if a city like Dallas had had a boom and it had gone flat and this had been characteristic of other cities throughout this region; if prices for agricultural products had been abnormally low, we might assign any one of these as a prime cause of the disproportionate railroad mileage in the hands of receivers in the Southwest; but no one of these conditions has existed. The farmers have been growing rich; real estate values in the cities have increased phenomenally; building has been going on in the Southwest even when the East was in a state of stagnation; prices for agricultural products have been high and steady, with the exception, of course, of cotton; the railroad business is the only business, barring lumber, that has gone from bad to worse in the Southwest.

Is it any wonder, therefore, that bankers are reluctant to put new capital into the railroads of this section of the country? Let each man who has a savings bank account or a life insurance policy ask himself whether he really hopes that part of the assets of his savings bank or life insurance company is invested in southwestern railroad securities. Would the trustee of an estate be justified in buying southwestern railroad bonds? These questions are quite vital. It is not a matter of speculation as to the future; it is a matter of an unbiased study of the past.

The Southwest is not so amply supplied with railroads that there need be no new railroads built to develop the country; but who would have the temerity to try to promote a new road on the face of the accompanying map? But more immediate than this question is that of who will have the courage to underwrite a reorganization of the companies now in the hands of receivers.

Too large a proportion of fixed charges has been an important factor in all of the southwestern receiverships. To induce bondholders to accept stock in payment for their claims it will be necessary to give this stock a fair prospect of earning a substantial return, 7 per cent at least in average years, and a prospect of having very much more than this in prosperous years so as to offset the certainty that it will have to forego profits in years of bad crops or a business depression. If you are to reduce the fixed charges by persuading part of the debtors of the company to become owners with the business risks that ownership must assume, you have got to hold out prospects of business profits which are higher than would be the interest ordinarily demanded by a lender on security. All the unbounded optimism that is to be found in Oklahoma and Texas cannot persuade an investor that a southwestern railroad company's securities look good unless there is some substantial assurance that the railroads as well as other forms of industry are to be allowed to participate in the prosperity of that country. Optimism, even enthusiasm, over the Southwest is justified, but it is obvious that the railroads have not heretofore gotten their share of the wealth which they have been such an important factor in creating.

While the Southwest is worse than the rest of the country in regard to its railroad situation, figures for the entire United States make a far from good showing. Making a rough estimate based on the net operating income as shown by the figures compiled by the Bureau of Railway Economics for the fiscal year ended June 30, 1915, and taking the capitalization of the railroad companies at the beginning of that fiscal year, the net operating income of only between 40,000 and 45,000 miles of road will apparently show 6 per cent or more on the total face value of outstanding securities. In other words, the mileage of railroads which are earning 6 per cent or better on the total of their securities is only about as great as the mileage of railroads which are bankrupt. Six per cent is not a sufficient return to hold out to an investor to induce him to subscribe for stock, and yet nearly five-sixths of the mileage of railroads in the United States will not show 6 per cent in 1915, according to our estimates.

"HEALTHY RIVALRY AND STRIVING"

THE order of the Interstate Commerce Commission requiring the railways to dispose of their boat lines on the Great Lakes is having an effect very different from that anticipated by Congress when it passed the law under which the commission's order was issued, and by the commission itself when it made its decision. The law (the Panama Canal Act) provided that if the commission considered that any water service other than through the canal which was being rendered by railways "is being operated in the interest of the public and is of advantage to the convenience and commerce of the people," it might extend indefinitely the time during which the railways might continue to render it.

The commission, in its opinion on May 7, 1915, which was written by Chairman McChord, held, in effect, that the service being rendered by the lake boats owned by railways was not in the interest of the public. It said, "On a water course where boats and boat lines are free from domination or control by the railroads, and where they are left to survive as their merit or the ingenuity of their owners makes possible, there will be, and always is, a healthy rivalry and striving between such boat lines and with paralleling railroads for all suitable and available traffic. * * * The condition is one which results in the beneficial use of the waterways accruing to the shippers."

Thus confident was the commission in the expression of its views, although there were facts on every hand to contradict them. Now it is found that instead of promoting competition between the lake lines and the rail lines, the order has thus far resulted only in curtailment of boat line service and higher water rates; and a still further curtailment will result after December 15, the date on which the railroads are required to cease operating boat lines on the lakes. Several of the boats already disposed of by the roads are to be taken out of the lake service entirely, and, so far as is known, no independent service is forthcoming to take their place.

That the divorce of the lake and rail line does not present a pleasing prospect to the shippers is indicated by the petition which the Chicago Board of Trade, probably the most important organization of shippers interested in lake transportation, has just filed with the Interstate Commerce Commission, asking for permission to intervene in the rehearing asked by the Lehigh Valley and for a postponement of the order until the commission shall have heard further evidence on behalf of the shippers. The Board of Trade has also asked similar organizations in other cities to join it in seeking a postponement of the order until they can present their reasons for desiring a continuance of the boat service by the railways.

The Board of Trade says in its petition that for many years, "there has been for the most part, adequate facilities in the way of boats" for shipments from Chicago to Buffalo and other lake ports; that "the rates have been regulated largely by the supply and demand for transportation," but that the disposal by the railroads of their interest in a number of boats "has had the effect of decreasing the supply of said boats and enormously advancing the charges for transportation of grain via water," and that "the disruption and curtailment of said means of water transportation will be destructive of the business of and highly injurious to many cities and towns." "Unless immediate action is taken," the letter to other organizations says, "the shippers will either have no boat line service at all, or an irregular and unsatisfactory service, with perhaps rates no lower, and possibly higher than are being paid at the present time. The result will be an increased cost to the consumers, producers and shippers."

For many years a great majority of the service on the lakes has been rendered by vessels owned by large industrial corporations and handling only their freight, and by boat lines controlled by the railways. The amount of service rendered by so-called "independent" lines—that is, lines owned neither by the big industrial corporations nor by the railways—has been extremely small. In other words, the service to the public has

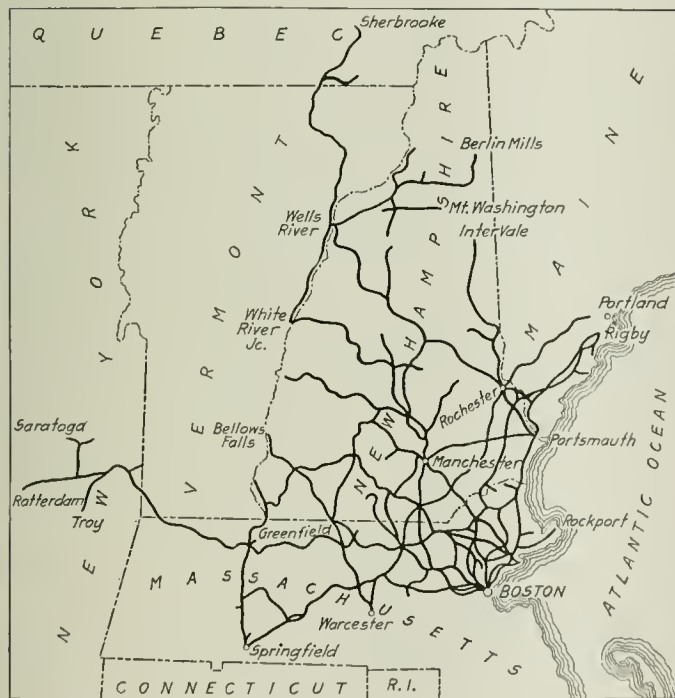
been rendered almost solely by railway boat lines. It has been assumed by many that if the competition of railroad boats were withdrawn there would at once spring up independent lines to render adequate service. But, as already indicated, the independent boat lines are no more forthcoming than is sufficient good service on our improved rivers and other inland waterways.

The reason why this is the case is that every good business man who seriously investigates the subject soon becomes convinced that an independent boat line on an inland waterway cannot ordinarily compete with the paralleling railroads in soliciting traffic and rendering satisfactory service in handling it. Perhaps this fact, which long has been patent to many of those who have studied the relations between rail and water transportation in this and other countries, will now be brought home by the hard logic of experience to those in high places who sometimes regulate first, and find out afterward the conditions to which the regulation is to be applied.

BOSTON & MAINE

EVERY officer and every employee of the Boston & Maine ought to read at least so much of the company's annual report as is contained in the last two paragraphs of the president's remarks. President Hustis says:

"No business, much less one performing public service, can



The Boston & Maine

produce its best results while doubt or uncertainty as to its future exists. Despite such a condition there is encouragement in the fact that there has been an improvement in the service as well as in the net results of operation.

"The helpful attitude of the public and the press generally, and the loyalty and faithful service of officers and employees, have contributed to and made these results possible. It is, therefore, in no perfunctory spirit that the board expresses its appreciation."

Throughout the report there is a note, not exactly of optimism, but of confidence to meet whatever difficulties the future may have in store, that is better than optimism.

The Boston & Maine operates 2,252 miles of steam railroad, of which but 707 miles is owned and the remaining 1,545 miles is leased. The majority of the Boston & Maine \$12,655,000 stock was owned by the New York, New Haven & Hartford through the medium of the Boston Railroad Holding Company. This stock is now deposited with a board of trustees approved of

by the United States courts in accordance with the settlement of the anti-trust suit brought against the New York, New Haven & Hartford.

There are three principal problems for which the Boston & Maine management has to find a solution. The company had at the beginning of the fiscal year which ended June 30, 1915, \$24,310,000 floating debt in the form of notes, all of which were due on or before March 2, 1915. The company's interest charges on its funded debt amount to \$1,755,000 and on its unfunded debt to \$1,272,000. In addition to this, however, the leases of the lines which it operates but does not own call for \$5,589,000 annually. The fixed charge, therefore, on the leased roads is at the rate of \$3,600 per mile, which is more than can be earned under present conditions with any margin of safety. Most of the leases run for very long terms and the only way in which the rentals can be decreased is through some compromise between the Boston & Maine and stockholders of the leased lines. A part of this problem is in the laws of the New England states in which the road operates, which, as at present on the statute books, make a voluntary reorganization impossible. The third problem is the profitable operation of the railroad.

The management was able to persuade the holders of the great majority of the notes representing floating debt to extend these notes not only once, but twice, and as the situation now stands there are \$17,337,000 notes outstanding, which amount will be further reduced to \$13,500,000 under the plan which the noteholders have accepted of receiving a part of what is due them in Maine Railway Companies' notes, but which \$13,500,000 will fall due March 2, 1916.

The legislation necessary to permit a reorganization of the company was secured in Maine and Massachusetts, but not in Vermont or New Hampshire. The management is hopeful, however, that a way will yet be found to keep the property intact. The plans to accomplish this presumably call for some sacrifices on the part of the stockholders of the leased roads, but it is hoped that these stockholders will agree to share something of the burden which must be borne by the other Boston & Maine security holders.

A very good start has been made in the operating problem, notwithstanding the fact that 1915 was a year of business depression in New England. Total operating revenues of the Boston & Maine amounted to \$46,673,000 in the fiscal year ended June 30, 1915, a decrease as compared with the previous year of 3.09 per cent. The falling off in revenue was equally distributed between freight and passenger service. Total operating expenses amounted to \$35,910,000, a decrease as compared with the previous year of 7.58 per cent. The operating ratio was reduced from 80.68 in 1914 to 76.94 in 1915. The company failed by only \$334,000 of earning a net sufficient to meet its interest charges and rentals. In 1914 there was a deficit of \$2,045,000. The saving in expenses was made through a reduction of 14.54 per cent in maintenance of equipment expenses and 9.99 per cent in transportation expenses. Maintenance of equipment cost \$6,695,000 in 1915. Repairs per locomotive mile cost 8.51 cents. This was a reduction of 6.79 per cent as compared with the previous year. The repairs of freight cars cost \$2,457,000 in 1915, a decrease of \$534,000. It is safe to say that nearly if not all of the reduction in maintenance of equipment expenses was due to the more economical performance of the work, the same or higher standards of repairs being held to in 1915. The fact that the Billerica shops of the Boston & Maine were in operation during all of the 1915 fiscal year and only part of the 1914 fiscal year is one factor that made the saving in maintenance of equipment expenses possible; and the other was better and more economical work done by the mechanical department.

Transportation expenses amounted to \$20,178,000, a decrease as compared with the previous year of \$2,240,000, or about 10 per cent. The ton mileage of revenue freight carried totaled 2,416,000,000, a decrease of 8.30 per cent, and the total number of passengers carried was 43,472,000, a decrease as compared with the previous year of 7.57 per cent. The average trainload

of revenue freight was 333 tons in 1915, an increase as compared with the previous year of 19.06 per cent. All of this increase in trainloading was due to heavier tonnage pulled behind the drawbar, the mileage of loaded cars being 153,000,000, a decrease of 7.92 per cent as compared with the previous year, while the mileage of empty cars amounted to 58,000,000, an increase of 1.63 per cent.

The principal savings in transportation expenses were in fuel for train locomotives, which cost \$3,644,000 in 1915, or \$587,000 less than in the previous year; a decrease in the wages of yard conductors and brakemen, which cost \$1,096,000 in 1915, or \$210,000 less than in the previous year; and reductions in the amounts paid for station employees, fuel for yard locomotives, train enginemen and trainmen.

One specific economy which has been effected deserves mention. The amount of materials and supplies on hand was reduced from \$5,702,000 in 1914 to \$4,139,000 in 1915. This result was obtained through the establishment of a stores department and the vesting of this department with the necessary authority and responsibility.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated.....	2,252	2,252
Freight revenue.....	\$27,042,879	\$27,912,397
Passenger revenue.....	15,502,197	16,111,548
Total operating revenues.....	46,673,049	48,160,286
Maint. of way and structures.....	7,195,081	6,700,913
Maintenance of equipment.....	6,695,420	7,835,146
Traffic expenses.....	443,690	466,600
Transportation expenses.....	20,193,692	22,434,904
Miscellaneous expenses.....	200,170	248,878
General expenses.....	181,720	1,169,778
Total operating expenses.....	35,909,772	38,856,319
Taxes.....	1,978,223	2,059,017
Operating income.....	8,779,110	7,245,050
Gross income.....	9,983,584	9,151,645
Net loss.....	334,462	2,044,742

ATCHISON, TOPEKA & SANTA FE

THE tonnage of agricultural products carried by the Atchison, Topeka & Santa Fe in 1915 was 6,932,000 and formed 26.57 per cent of the total tonnage of revenue freight carried, comparing with 5,000,000 tons of agricultural products carried

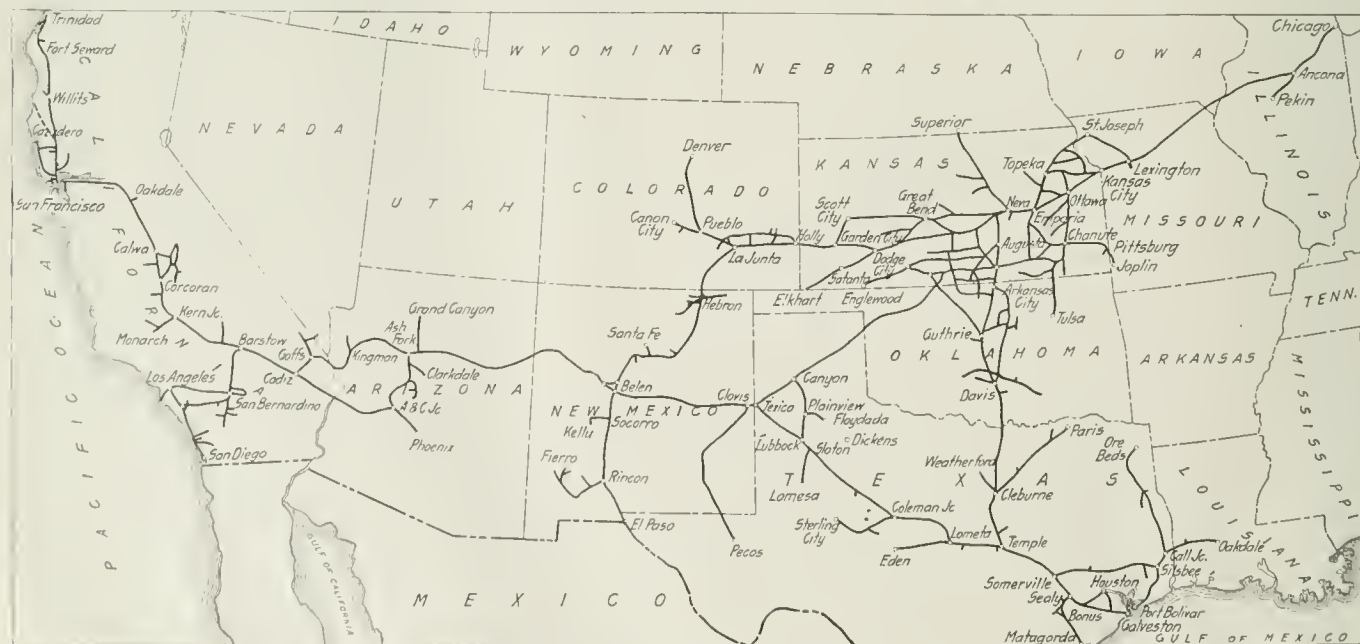
tural products in western Texas and western Oklahoma was phenomenal, and also that the Kansas and Oklahoma wheat was largely exported through Galveston, giving the Santa Fe the longest possible haul, combined to make both the gross and net earnings of the company the largest in its history.

The Atchison, Topeka & Santa Fe operates 11,136 miles of railroad. While it has a large mileage in the Southwest, unlike some of the other large roads which serve that territory, it has a very profitable through business and a very profitable business in California. The development of the property has been conservative, but remarkably good judgment has been shown and no time has been wasted in getting into new territory which was being developed.

In the fiscal year ended June 30, 1915, the company earned \$117,666,000 from operation, an increase as compared with the previous year of \$6,556,000. Operating expenses amounted to \$76,092,000, an increase of \$2,622,000. This gave the company an operating ratio of 64.67 in 1915 as against 66.12 in 1914. The business handled increased in greater proportion than the revenue. The total ton mileage of revenue freight was 8,263,000,000 as against 7,316,000,000. The average revenue per ton per mile was 9.47 mills as against 10.07 mills the year before. The number of passengers carried one mile was 1,342,000,000, as compared with 1,310,000,000 the year before. The average revenue per passenger per mile was 2.074 cents as against 2.175 cents in the previous year.

This increase of 12.33 per cent in freight business and 2.41 per cent in passenger business was handled with an increase in transportation expenses of approximately 2½ per cent. The average total trainload of freight was 442 tons in 1915, an increase as compared with the previous year of 5.13 per cent. The success in holding down transportation expenses is all the more noteworthy in view of the fact that the Santa Fe was very liberal in putting on additional passenger service, the passenger train mileage being increased by 4.98 per cent to accommodate the increase of 2.41 per cent in passenger mileage.

The Panama-Pacific Exposition created some traffic, which, however, was probably offset to a considerable extent by economies in traveling expenses of people affected by the business depression in the East. Much of the Panama-Pacific Exposition



The Atchison, Topeka & Santa Fe

in 1914, which formed 19.97 per cent of the total tonnage carried in that year. The average length of haul of all freight in 1915 was 317 miles as against 292 miles the year before. The fact that the wheat crop of Kansas was the largest in the history of the state and that the yield of nearly all classes of agricul-

business is done at excursion rates, which leave small margin for profit.

In connection with passenger business special mention should be made of the new union passenger station at Kansas City, which was opened on November 1, 1914. President Ripley says

of this: "The new facilities constitute one of the largest and most complete passenger terminals in the country and represent a very large investment. The heavy fixed charge which this investment entails and the maintenance and operation of these extensive facilities place a large expense upon the Kansas City railroads, all of whom are using the new station; however, the new facilities are a great accommodation to the public and, of course, materially improve operating conditions at Kansas City."

The Santa Fe is liberal in its expenditures for maintenance. In 1915, \$16,514,000 was spent for maintenance of way, an increase compared with the previous year of \$1,089,000. This is at the rate of \$1,486 per mile of road as compared with \$1,403 the year before. There was spent on maintenance of equipment \$19,765,000, an increase as compared with the previous year of \$551,000. In addition to this ample maintenance expenditure, the company spent \$12,041,000 for additions and betterments to its property and its equipment. Of this, \$4,248,000 was for construction or acquisition of new lines, \$5,116,000 for additions and betterments to fixed property, and \$2,464,000 for additions to equipment.

Furthermore, the Santa Fe has been very liberal in its charges for depreciation on equipment. The amount accrued on this account, after charging out the depreciation on equipment destroyed, is now \$23,953,000.

The Atchison is one of the soundest railroad companies financially in the entire United States. Its policy of making additions and betterments from income has been farsighted, the stockholders having taken only a part of the profits which belong to them and have invested a considerable proportion of the remainder each year in betterments. Of the total face value of securities outstanding less than half is funded debt, the funded debt at the end of 1915 amounting to \$310,975,000, and the stock to \$314,663,000. With an expenditure of more than \$12,000,000 in 1915 on property account, there was a decrease in the amount of funded debt outstanding of \$2,218,000 and an increase in stock outstanding, due to the conversion of convertible bonds into stock, of \$4,678,000.

The Atchison, Topeka & Santa Fe is pre-eminently a road belonging to investors. No single financial interest controls the company and its policy is dictated by the efforts of the management to conduct the company's affairs in the interests of its security holders, large and small. Notwithstanding all the facts and circumstances in the company's favor, the rate of return earned on property investment was but 5.40 per cent in 1915; and, as President Ripley points out, the fact that the company is able to pay a 6 per cent dividend on its common stock is only because it pays slightly more than 4 per cent on its funded debt. When the governments of England and France are offering their notes at a better than 5 per cent basis, there does not appear to be any immediate possibility of any railroad company, no matter how strong, being able to sell new bonds on a 4 per cent basis.

Is it any wonder that President Ripley is a pessimist on the railroad situation in general and an optimist on Atchison? This year's Atchison annual report is both good reading to Atchison security holders and a warning so plain as to be unmistakable in regard to the railroad situation in general and, of course, especially to roads west of Chicago.

The principal figures for operation in 1915 and 1914 were:

	1915	1914
Average mileage operated.....	11,115	10,909
Freight revenue	\$80,504,393	\$73,638,388
Passenger revenue	27,823,064	28,497,233
Total operating revenues.....	117,665,587	111,109,770
Maintenance of way and structures.....	16,514,468	15,425,730
Maintenance of equipment.....	19,764,535	19,213,343
Traffic expenses	2,649,175	2,521,774
Transportation expenses	34,827,705	33,899,108
General expenses	2,476,595	2,409,379
Total operating expenses.....	76,091,554	73,469,334
Taxes	5,497,317	5,525,585
Operating income	36,051,401	32,114,851
Gross income	39,048,551	34,289,204
Net income	24,130,892	20,183,965
Dividends	17,550,017	17,400,440
Appropriated for additions and betterments....	6,513,397	2,719,318

NEW BOOKS

Official Handbook of the Panama Canal. 58 pages. 6 in. by 9 in. Illustrated. Published by Government Printing Office, Washington, D. C.

In this book the United States government has brought together some very interesting material regarding the construction and operation of the Panama Canal and the traffic passing through it. It contains chapters showing the distances saved in trade routes between important points by the canal route, how a vessel is handled through the canal, facilities for shipping, savings in cost of operation by use of the canal taken from specific instances, tolls, use of the canal by sailing ships, the effect of the canal on the navy, various features of construction, and traffic routes. The chapter on shipping facilities especially gives a large amount of official information which is valuable to shippers making use of the canal route.

Fuel Association Proceedings. Edited by C. G. Hall, secretary of the association. 398 pages, 6 in. by 9 in. Published by the association, C. G. Hall, McCormick building, Chicago, secretary. Price \$1.00, bound in red morocco, and 50 cents, bound in paper.

This is the report of the seventh annual convention of the International Railway Fuel Association. This year the association considered the use of pulverized fuel on locomotives in a very comprehensive manner, and has, it is believed, the most complete information ever printed on this subject. The discussion contains many practical suggestions from the experiences of those who have used powdered fuel in stationary boiler service. A very complete report was made of the locomotive stoker situation. Other papers were presented on coal preparation, smoke prevention, fuel stations, fuel oil for locomotive use, storage of coal and the arrangement of front ends, ash pans, grates, etc.

Statistics of Railways of the United States 1904 to 1914. Bulletin No. 81, issued by the Bureau of Railway Economics, Washington, D. C.; 67 pages. 6 in. by 9 in. Bound in paper.

This is the third edition of the Bureau's annual series of compilations of statistics of the United States by ten-year periods. Bulletin No. 66, giving the statistics for the years 1900 to 1912, was issued last year and Bulletin No. 75, giving the figures for the years 1903 to 1913, was issued in March of this year. In publishing Bulletin No. 81, covering the figures for the period 1904 to 1914, the Bureau gives the most complete information yet available regarding railway results in the fiscal year 1914, compiled with the purpose of presenting in a form adapted for convenient reference the principal aspects of railway operation as shown by the official statistics.

The railway tabulations are based upon official data published by the Interstate Commerce Commission for each fiscal year, and tabulations concerning population and area are based upon the reports of the Census Bureau. The statistics are published in 76 tables, classified under the following heads: Population and Area; Railway Mileage; Capital Securities and Dividends; Revenues, Expenses and Taxes; Employees and Compensation; Equipment; Freight Traffic Statistics; Passenger Traffic Statistics and Accidents, the various tables under each head giving the principal details for each year. Where such division is suitable the figures are reduced to a mileage basis. The arrangement of the tabulations renders this bulletin of especial advantage from the standpoint of convenient reference because it brings together in comparable form the figures for 11 years, thus doing away with the necessity for consulting the different volumes of the Interstate Commerce Commission's statistics, and also because it includes the official figures for many of the most important details of the 1914 operations in advance of their publication by the Interstate Commerce Commission.

An especially convenient feature of the arrangement is the recasting of the figures for years prior to 1911, according to the three districts—eastern, western and Southern, which the commission has used since 1911, in place of the ten territorial groups used before that time. This makes it possible to obtain an accurate comparison of statistics for the various years without the necessity of combining the group figures.

Letters to the Editor

ELECTRIC LOCOMOTIVES ON THE BALTIMORE & OHIO

WASHINGTON, D. C.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In the paper entitled "Electric Motive Power in the Operation of Railroads" by E. H. McHenry, published in the *Railway Age Gazette*, October 1, page 602, there appears the statement that "the first commercially practical engines of this kind were operated by the Baltimore & Ohio through its Baltimore tunnel in 1905." This is evidently a misprint, as the first electric locomotives were put in operation by this road in its belt line tunnel under the city of Baltimore in 1895.

HUGH G. BOUTELL.

AN ANSWER TO "A CLERK'S PLEA"

MUNHALL, Pa.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The article, "A Clerk's Plea," by M. S., in your issue of September 10, is worthy of consideration by employee and employer alike—because both are vitally interested, or concerned—and his remarks apply to all clerical work, in large corporations as well as railroad offices.

Broadly and generally speaking, the vital principle involved (the lack of which is probably the cause of much of the incompetency of the men, as well as the ignorance of the employer as to their competency or incompetency) is co-operation. Co-operation, fully exemplified, will promote harmony, greater accuracy and efficiency, eliminate "dead timber" and suggest better wages. It is absolutely necessary among the men themselves, as it will suggest closer co-operation between them and their immediate superior; if there be a lack of this virtue between the superior and his men, it probably is because the superior, in his wisdom, foolishly lets the subordinate work out his own experience, instead of giving him the benefit of his own long experience, and thereby lightening his own burdens. The men must therefore take the initiative, and promotion by seniority will be suggested, as it will be difficult, under such circumstances, to pick out the best man. It will result in the survival of the fittest.

Wherever a man is found as being the first on the job, intelligent, interested, loyal and energetic in the pursuit of his duties, the last to leave his post, and then leaving only when all is done that can absolutely be done, that man, regardless of organizations, unions, or other affiliations, is bound to be finally recognized. Patience, however, is a virtue which not many of us possess, but which possessing pays well in the long run; also "The Lord helps them that help themselves" is a saying which, while much disparaged, contains a great truth. "A Clerk's Plea" exposes the individual, personal weaknesses of humanity generally, which each individual must overcome himself in order to succeed; no one is forced to learn; we are all free agents, having man's estate. If we do not exercise our given talents, we must accept the consequences.

The man who interests himself in his work and tries to learn more than he is paid to learn or do, soon commands attention from his superior, and it is so easy to do this, that the wonder is so few try to do it, if for nothing else than to be happy. The man who wants to learn and get along will always find a way to learn, and will be made to go along, because there are so few.

The world does not owe us a living, as so many think. We owe it to ourselves to work in the world, by the sweat of our brows, and the reward of our labors will be satisfaction, contentment, and joy in well doing. The great majority, however, do not sweat much. The hard-working, conscientious man, who has the interests of his company at heart, is, as M. S. says,

scarce, and such a man, if not recognized, will soon seek new fields for his ability; no such man ever stays long in the company of "duffers"; and again the clerk, with heart and soul, who enters railroad service because of the recognition which this great industry offers, is bound to succeed, because such clerks are few.

In taking up railroad work to make it one's profession, one does not and cannot stick in an office. To succeed finally as a professional railroad man, one must get an insight into the practical workings of the various departments—braking, conducting, operating yards, despatching, surveying, engineering—or at least of some of them; there is no such "profession" as clerking, any more than there is as "grocerying." There are clerks and clerks. Anyone who can wield a pencil or pen must, of necessity, call himself a "clerk" if he be so employed; one great trouble with clerks is that there are so many of them, and being also a field in which women enter more readily than any other "man field," wages are probably lower, except in executive positions. Then again, to crowd this field still more, the average young fellow, when he leaves school, wants to get into an office, because he can be dressed up. He does not like to come or go from home in overalls, or a working shirt, while learning a trade which would in all probability carry him around the world without a dollar in his pocket. He prefers to accept the office job, and only realizes when it is too late that he has idled his time away, reading the "sporting edition," playing billiards, and loafing around street corners, instead of cultivating some useful study, which could affect or have some relation to his daily work.

Mr. Basford in his article in the issue of July 23 said: "Many of the best high officials have been clerks; they did not rise because they were clerks, but in spite of that fact." That is the keynote to every condition in life; to succeed in spite of circumstances. If a man be a clerk he can make himself a very excellent clerk, if he so wills, but the great majority do not so will, and waken up too late to the fact that opportunity has knocked and passed on.

A man in any line may be a steady, plodding kind of a fellow, following the beaten track, with no initiative at all, satisfied with his bread and butter, and contented with this condition; but this man is bound to be passed by the man with red blood in his veins, ambitious, who exercises his brain and promotes energy all round by his activity, mentally and physically, in the office, field, or factory, and who knows all the time that he will succeed.

"A Clerk's Plea," after reading it carefully, seems to me to be a misnomer; it should have been termed "A Clerk's Whine."

M. S. says: "We may be honest and earnest in our efforts, but the lack of specific knowledge, etc., etc.," and then he asks, "Is it our fault? If it is, our failure to do the right thing has not been pointed out to us"; why are there no schools for us, and why don't competent men write books for us, and why this and why that? Is it our fault? Of course, it is your fault; you can take or lead a horse to the well, but you cannot make him drink; where there's a will there's a way; and if you don't at first succeed, try, try again.

Experience is, probably, after all, the best teacher for the everyday affairs of life, and if those of us who have learned our lesson in the school of experience would have a little patience and co-operate with the younger and ignorant element (who must display their ignorance, in order to profit from the experience of their elders, and that, too, in a much shorter time), it will do much to eliminate such complaints as those advanced by M. S.

I sympathize with all that M. S. says, but a "man's a man for a' that," must be proved by the man.

K. LEAN.

ENGLISH RAILWAY STATIONS CLOSED.—The North-Eastern Railway recently decided that, owing to the enlistment of railwaymen and the consequent shortage of staff, a number of its stations would be temporarily closed, effective Monday, September 20.

Electrification of 440.5 Miles of the St. Paul

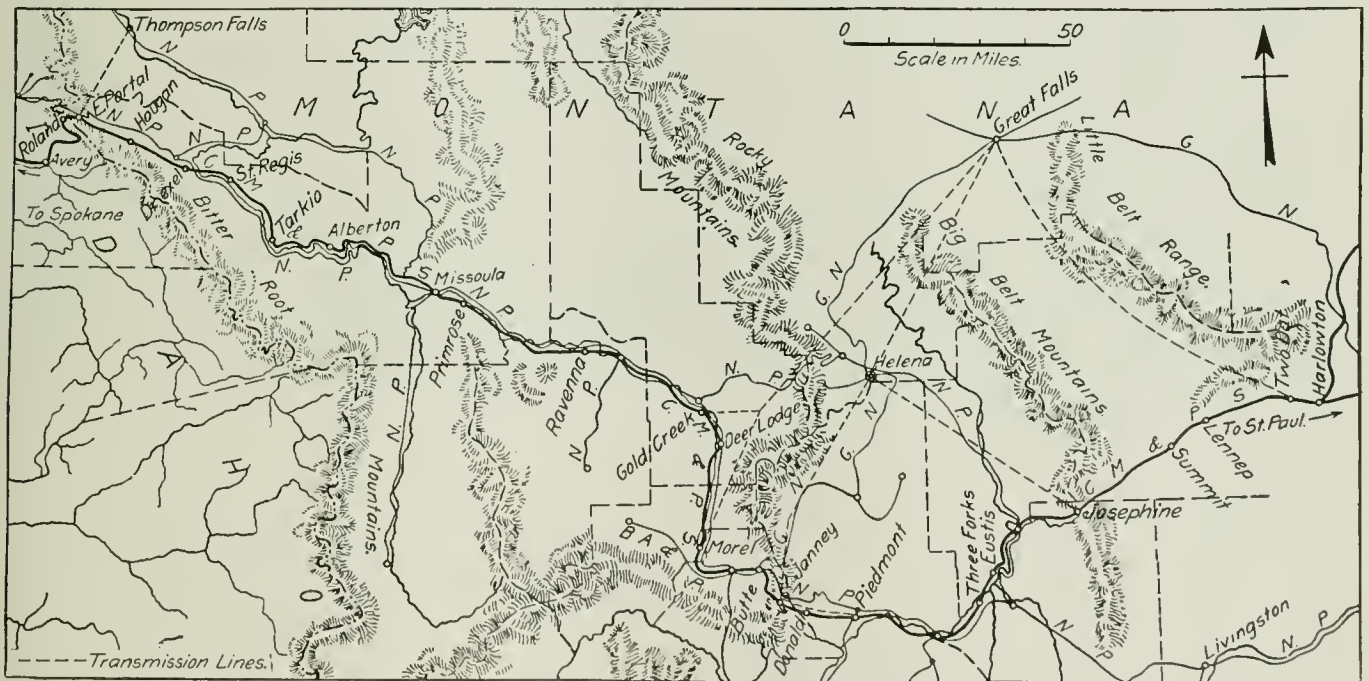
A Description of the New Construction Work on Four Entire Engine Districts with Heavy Mountain Grade

The Chicago, Milwaukee & St. Paul is now actively engaged in the electrification of 440.5 miles of main line and 141 miles of side and yard tracks on its Puget Sound extension between Harlowton, Mont., and Avery, Idaho. This includes the Rocky Mountain and Missoula divisions with four engine districts and intermediate terminals at Three Forks, Deer Lodge and Alberton, Mont. Work on the district between Three Forks and Deer Lodge, including 113 miles of line and 168 miles of all tracks, is now practically completed and it is expected that this section will be ready for electric operation shortly after November 1. The electrification of the eastern district between Three Forks and Harlowton is also nearing completion and it will be placed in service soon after January 1, 1916. Work is also under way on the two western districts comprising the Missoula division and it is expected that this division will be operated electrically by January 1, 1917. This entire project involves an expenditure estimated at \$15,000,000.

This project is of special interest to railway men for a number of reasons. With only one or two exceptions, all previous

Summit, 45 miles west of Harlowton, at an elevation of 5,795 ft., with a one per cent grade 14 miles long on the east slope and a one per cent grade 44 miles long on the west slope. The length of this latter grade presents one of the most serious problems encountered in this installation. The Rocky Mountains are crossed at Donald, 124 miles west of Summit and 18 miles east of Butte, at an elevation of 6,350 ft. The eastern slope includes 20.8 miles of two per cent grade and the western slope 10 miles of 1.66 per cent grade. The third district between Deer Lodge and Alberton descends continuously westward on a maximum grade of 0.4 per cent. The crossing of the Bitter Root mountains is made at Roland, Idaho, at an elevation of 4,200 ft. The summit is reached by 12 miles of 1.7 per cent grade on the east slope and 24 miles of 1.7 per cent grade on the west side. Over 6,250 ft. of rise and fall is overcome between Harlowton and Avery.

As would be expected in such mountainous country, the curvature is heavy, the maximum degree of curve being 10 deg. There are 36 tunnels between Harlowton and Avery, 16 of which



Map of the Electrified Line and Sources of Power Supply

electrification installations have been made to relieve local smoke conditions in cities or tunnels or to reduce congestion at certain specific points, and not primarily to effect economies of operation. This project of the St. Paul is being developed to reduce the cost of operation, the smoke problem being negligible, and there being no traffic congestion as this line is single track with only a moderate traffic. Also, while other installations have been of limited mileage and have only served to create constructive mileage for train crews in most cases, this supersedes steam operation on four entire engine districts, affording opportunity for the full development of economies in yard as well as line operation, and for the working out of methods for electrical operation on a much larger scale than heretofore possible.

PHYSICAL AND TRAFFIC CONDITIONS

Between Harlowton and Avery this line crosses the Belt, Rocky and Bitter Root mountains. The Belt mountains are crossed at

are on the western slope of the Bitter Root mountains. The longest is the St. Paul Pass tunnel at the summit of the Bitter Root mountains, 8,751 ft. in length.

The traffic consists of two heavy transcontinental passenger trains with a third local passenger train between Harlowton and Butte, and an average of four tonnage freight trains each way daily, with a local freight every second day. The freight traffic amounts to about 15,000 gross tonnage daily. Under ordinary conditions the prevailing tonnage is eastbound and consists largely of grain, lumber and other dead freight. Normally one-time freight is able to handle all eastbound expedite business. Westbound, nearly all the traffic consists of merchandise and other time freight.

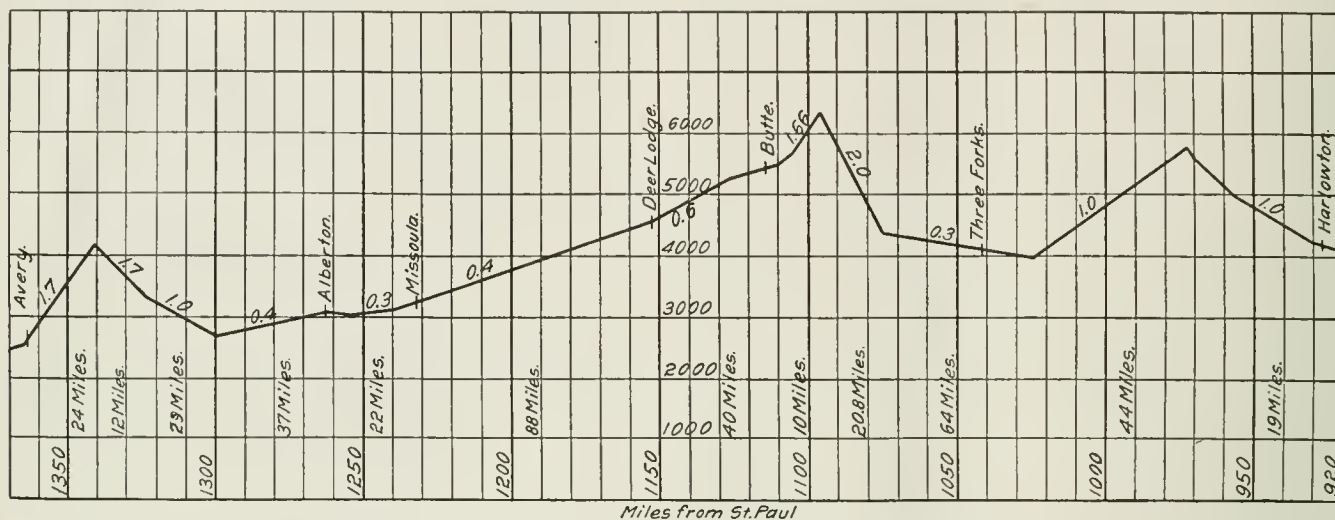
The local traffic originating within the limits of the electrified zone is relatively small, Butte and Missoula being the only cities of any importance. While the St. Paul brings considerable freight into Butte, it is the latest road into the city and reaches many industries only through connecting lines.

At the present time a 2,000-ton train is hauled up one per cent grade with one Mallet road engine. Helpers are added on the heavier grades, 7 engines being held in this service on the Rocky Mountain division, as compared with an average of 23 road engines.

Only three short branches connect with the main line between Harlowton and Avery and these will not be electrified at present. A considerable amount of business originates along the Great Falls line, which connects with the main line at Harlowton, but practically all this goes east. Almost all the traffic handled

tion of light tonnage. Power is secured by contract with the Montana Power Company at the unusually low price of 0.536 cents per kw. hour, based on a 60 per cent load factor.

Important operating economies are expected from this development, but because of the numerous new problems to be solved, many of the proposed methods of operation are only tentative and subject to wide variations as they are put in practice. One of the important innovations which will be introduced is that of running freight and passenger engines over two districts, changing crews at the intermediate terminals. While trains



Profile of the Electrified Portion of the Chicago, Milwaukee & St. Paul

therefore, comes from points west of Avery. This traffic is growing regularly and the electrical equipment now being installed is capable of handling a tonnage train in each direction every two hours, or nearly double the present business.

SPECIAL CONSIDERATIONS

One of the considerations leading to the decision to electrify this portion of the St. Paul was the favorable results secured from the electrification of the Butte, Anaconda & Pacific, which parallels the St. Paul west from Butte for a short distance. As described by J. B. Cox in the *Railway Age Gazette* of December 25, 1914, the first year's electric operation of this line showed an increase of 33 per cent in the average train load and a saving in operating expenses equal to 20 per cent return on the investment.

Such savings are brought about in large measure by the high cost of coal and the cheapness of electric power. The St. Paul secures the coal used in this district from company mines located

will be inspected at Three Forks and Albertain and bad-order cars set out, the delays at these points will be small compared with present methods of operation, while it will be necessary to maintain only a few men at these points. At Harlowton, Deer Lodge and Avery, the engines will be inspected, but they will be sent through the shop only after they have made about 2,000 miles.

Another feature of special interest is the regenerative system of operation of the electric locomotives by which the surplus energy not required to hold the trains on the descending grades will be returned to the line for further use. By this means not only will there be added safety on the heavy grades, as the regular air brake equipment will be held in reserve for emergency use, but the excessive wear on wheels and brake shoes will be eliminated. Of secondary importance is the returning of the surplus power to the line, affording a material saving in power consumption, the arrangement with the power company providing that the railroad is given credit for all energy returned.



The Piedmont Substation and Bungalows

on its line at Roundup, Mont., 70 miles east of Harlowton, giving an average haul over this zone of 300 miles. This coal costs an average of \$2.75 per ton at the point of use. It also provides about 1,000 tons of westbound traffic daily, although this is not as serious as might be supposed, as it is in the direc-

While the amount of power so returned can only be estimated within wide limits and will depend on the distribution of trains and other conditions, it has been estimated that 15 per cent to 18 per cent should be recovered in this way. The speeds of trains descending grades will not be fixed arbitrarily, but

will instead be left in the control of the engineer within broad limits.

Another original and interesting feature is the power limiting and indicating system which is being installed, by which the speeds of trains and the amount of power consumed will be fixed by the load despatcher. In this way, to avoid excessive peak loads, the despatcher can limit the amount of power taken by any train, assisting passenger and other preferred trains and holding back secondary trains. As far as practicable trains will also be so spaced that a descending train will be returning power to the line when others are ascending.

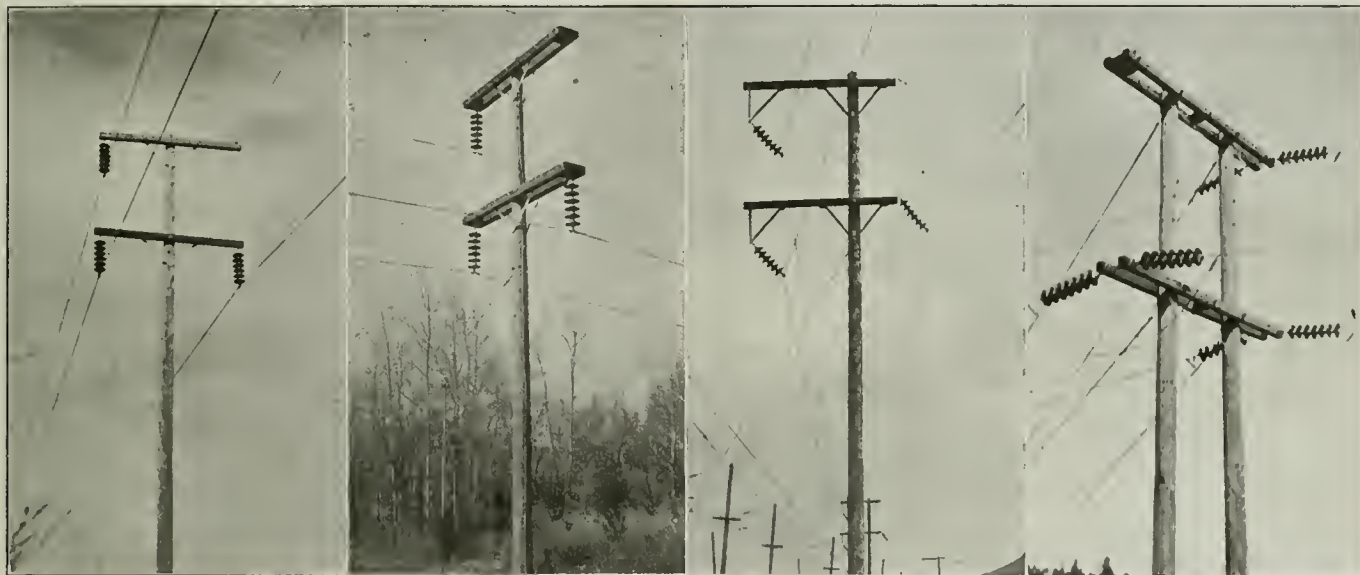
THE POWER SUPPLY

Power is secured from the Montana Power Company and is delivered by this company at the right of way at substations located at Two Dot, Josephine, Piedmont, Janney, Morel, Gold Creek and East Portal. With the exception of that delivered at East Portal, all power comes from the hydro-electric developments at Great Falls, the road lying roughly in the arc of a circle

sumption. They are located at Two Dot, Summit, Josephine, Eustis, Piedmont, Janney, Morel, Gold Creek, Ravenna, Primrose, Tarkio, Drexel, East Portal and Avery. In all cases the points of delivery of energy by the power company are at substations to permit one attendant to operate the switches on both lines.

The substation buildings are of permanent construction throughout, with concrete foundations, brick walls and concrete roofs carried on steel purlins and roof trusses. To provide proper ventilation for the motor generator sets, the foundations for this equipment are arched with a basement underneath and openings in the exterior walls for air inlets. The supply of air is controlled by steel sash operated as butterfly valves. All sash in the main buildings are also of steel and are controlled by chains or rods.

The floors are of concrete and contain conduits carrying power transmission lines to the various equipment units. The only conduits exposed to view are those for building lighting and those leading to the outside feeder system. A standard gage



Standard Transmission Line Construction (1) on Tangent with 300-ft. Spans. (2) On Tangent with Spans of 450 Feet. (3) On Curves up to 10 Degrees. (4) On Curves Between 10 Degrees and 30 Degrees

of a radius of about 100 miles, with Great Falls as the center. The power delivered at East Portal is generated at Thompson Falls, a relatively recent development. The power plants developed and proposed by this company have a total capacity of 244,000 hp., while large storage reservoirs are in service, insuring an ample continuous supply of power. By this arrangement, the railroad secures power without the necessity of making the large initial investment which would otherwise be required, while, by combining this with its large commercial load, the power company is able to sell the power cheaper than if it all went to the railroad.

This power is brought to the right of way as 100,000-volt, 3-phase, 60-cycle alternating current. To deliver it at the required places it was necessary to construct 100 miles of transmission line to reach Two Dot, 54 miles to reach Josephine, and 135 miles to reach Morel. In the vicinity of Butte, power was secured by tapping existing lines. These new lines consist of two 45-ft. wooden poles spaced 10 ft. 6 in. apart, and supporting a wooden cross arm 22 ft. long. Three transmission wires are supported from this cross arm by suspension insulators, one between the two poles and one near each end. Twelve of these supports were built per mile.

THE SUBSTATIONS

Fourteen substations are being built between Harlowton and Avery. They are spaced an average distance of 33 miles apart, the exact locations depending on the grades and the power con-

track is built in the floor on which will be operated a steel car or truck to transfer heavy equipment from one part of the building to another. A steel turntable is also being installed.

The roof consists of reinforced concrete slabs 3 in. thick supported on steel trusses and covered with a five-ply tar and gravel roof. All substations are built with flat roofs except those at Drexel, East Portal and Avery, which are provided with pitched roofs because of the very heavy snowfall in the Bitter Root mountains. Otherwise they are of the same construction as the other stations except that the horn gaps for the lightning arresters are placed indoors, increasing the size of the buildings somewhat.

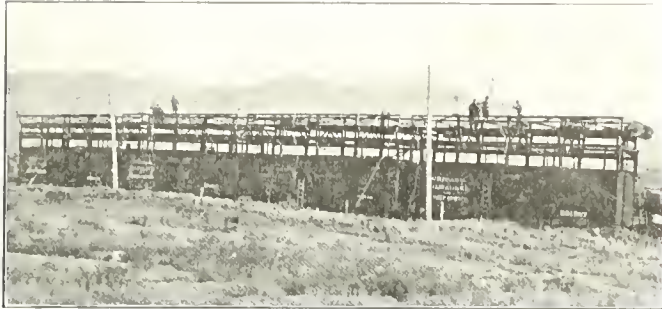
The substations are divided into two rooms, the motor generator or low tension room, and the transformer or high tension room. The partition is of brick, with two tin-clad doors for protection. One corner of the motor generator room is partitioned off and, with a bay built onto the building, forms the office. The interior walls are painted white above a green wainscot five feet high. All doors, sash and other exposed steel, conduits and substation equipment are painted black.

At the substations the 100,000-volt, 60-cycle, 3-phase alternating current is converted to 3,000-volt direct current. On delivery at the substations this 100,000 volt current passes through oil switches to the high tension bus, from which it is conducted through further oil switches to the transformers, emerging at 2,300 volts a.c. The current is then led through suitable

switches to the motor generator sets, leaving at 3,000 volts d.c., and passing through control switches on the switchboard to the feeder system at this potential.

The transformers are rated 1,900 and 2,500 k.v.a. and are provided with four 2½ per cent voltage taps and 50 per cent motor starting taps.

In the standard station the motor generator sets comprise a 60 cycle synchronous motor, driving two 1,500-volt d.c. generators connected permanently in series for 3,000 volts. The fields of both the synchronous motors and the direct current generators are separately excited by small generators direct connected to each end of the motor generator shaft. The direct current



Erecting the Overhead Work

generators are compound wound and will maintain constant potential up to 150 per cent overload with a capacity for momentary overloads up to three times their normal rating. To insure good commutation on these overloads, the generators are equipped with commutation poles and compensating pole face windings. The synchronous motors will also be used as synchronous condensers and it is expected that the transmission line voltage can be regulated in this way so as to eliminate any effect of the fluctuating load.

The transformers weigh 28 tons and the motor generator sets 66 tons. They are assembled in units of a maximum weight of 10 tons each to permit handling readily. A hand-operated traveling crane in the motor generator room and a triple chain block hoist in the transformer room, each with a capacity of 10 tons, are installed to handle the equipment.

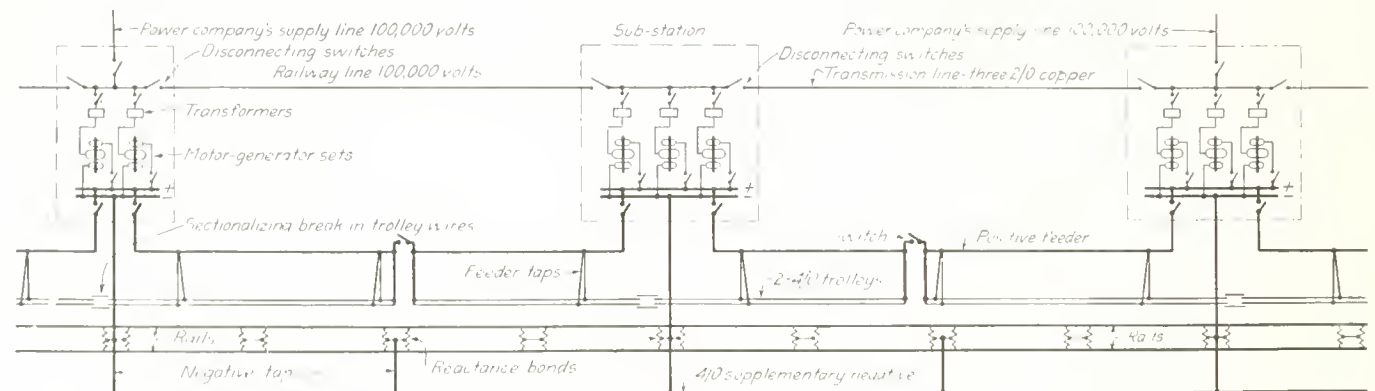


Diagram Showing the Transmission and Distribution System

Because of the difference in power demands, the generating equipment varies somewhat. At Piedmont and Janney three 1,500 kw. motor generator sets have been installed, while at all other stations between Harlowton and Deer Lodge two 2,000 kw. motor generator set are being installed. At East Portal, near the western end, the largest substation will be built, containing three 2,000 kw. motor generator sets. This station will also receive two taps from the power company's transmission line, while provision will be made for a future second transmission line belonging to the railway company westward as a precautionary measure, because of the heavy snowfall in this vicinity.

The substation at East Portal has a transformer room 30 ft. by 170 ft. and a motor generator room 40 ft. by 77 ft., with the ridge of roof 55 ft. above the ground. The two unit substations have transformer rooms 30 ft. by 87 ft., and motor generator rooms 40 ft. by 60 ft., while the three-unit substations have transformer rooms 30 ft. by 101 ft., and motor generator rooms 40 ft. by 77 ft. The height of roof of the flat top buildings is about 45 ft.

The source of water supply at the substations varies with the local conditions and includes deep wells, springs and streams. To insure adequate pressure, underground steel pneumatic tanks are installed, with electrically-driven pumps equipped with auxiliary air pumps. These pumps are automatic, starting and stopping at given pressures.

Special attention has been given to the provision of attractive bungalows and surroundings at the more or less isolated locations of the substations to make the living conditions of the operators as good as possible. To this end one four-room and one five-room bungalow of attractive design have been built at each substation as homes for the operators. These buildings are equipped with electric lights and running water. Each station layout is designed and painted differently to give it individuality.

THE TRANSMISSION LINE

The power distribution system includes the transmission line, the positive or outgoing feeder system, the overhead contact system and the negative or return system. A 100,000-volt transmission line, entirely independent of the power company's line, extends from Two Dot to Morel and from Gold Creek to Avery. In general, this line is located on the right of way, although it leaves it at numerous places where distance can be saved, and it passes over the summits of all tunnels. Disconnecting switches are placed in the line on each side of each substation, permitting power to be taken from either direction and providing relief from break-ins or trouble on any individual section of the line.

The construction of a 100,000-volt line along a right of way on which there are telegraph and telephone lines involves special problems in itself, the telephone being used for despatching purposes and the telegraph for commercial business. To reduce the interference as much as possible, the transmission line is

located on the side of the track opposite the other lines and near the right of way fence. At points where the telegraph lines formerly crossed over the track, they are placed underground to prevent physical contact with the transmission line under any conditions. Where the transmission line crosses the telegraph line, it is strengthened to give it a greater factor of safety.

The transmission line is built with Idaho cedar poles 45 ft. and 50 ft. long, with a minimum diameter at the top of 8 in. The cross-arms are of Washington fir and are 4¾ in. by 5¾ in. in cross section. For tangent work braces of ¼ in. by 2 in. galvanized steel are added. Three conductor wires are carried, each

consisting of six strands of copper with a hemp core. The copper is 0.15 in. in diameter and the completed conductor 0.45 in. The hemp core is saturated with a preservative compound, making it impervious to moisture, and is used to increase the size of the conductor. The standard distance between poles on tangents on level ground is 300 ft. Where the length of the individual wires supported by a pole is 450 ft. and over, double cross-arms are used as shown in one of the photographs. In marshy ground or where the poles are exposed to side wash, they are guyed and banked with rock.

For curve and angle work where the angle does not exceed 10 deg., the cross-arms are offset to provide the desired clearance between the wire and the pole and they are more heavily braced. For angles between 10 deg. and 30 deg. a two-pole structure heavily guyed and fitted with double arms and insulators is used, supporting the transmission wires at the level of the cross-arms.

The standard suspension insulator with six discs is employed, this type requiring 340,000 volts to arc over it when dry and 250,000 volts when wet. At anchorage and heavy strain points an insulator with seven additional discs is used for further protection.

In addition to the one conductor wire the upper cross-arm carries an uninsulated ground wire of $\frac{3}{8}$ -in. Siemens Martin steel strand, grounded at every pole with a wire of the same size. This is provided as additional protection from lightning, both for the line insulators and the substation equipment.

THE FEEDER AND TROLLEY CONSTRUCTION

The outgoing feeder system consists of one or two lines of standard bare copper cable of either 13/16 in. or 1 in. diameter. For the greater part of the distance a single line of the smaller cable is used, but on the heavier grades two feeders are required. The feeder is connected with the trolley wire at intervals of 1,000 ft. by bare 9/16 in. copper strand cable, as shown in one of the photographs.

Disconnecting switches are inserted in the feeder line on each side of each substation. Sectionalizing switches are also in-

tion complete instructions will be issued to all employees concerned, instructing them regarding the purpose and manner of using these switches.

The feeder system is carried on the common pole line with the trolley system. The poles are of Idaho cedar 40 ft. long and 8 in. minimum diameter at the top. They are spaced 150 ft. apart on tangents, the spacing decreasing in multiples of 15 ft. on curves to a minimum of 90 ft. They are set on an outward batter of $\frac{1}{2}$ in. to 1 ft. on tangents and slightly more on curves. Special forms of pole construction were adopted on the numerous bridges on this line as shown in the accompanying photographs. On through girder structures, the poles rest on



Standard Trolley Construction—Trolley Construction on Tangents with Feeder Tap (left); "Pull Overs" on a Heavy Curve (center); Steady Braces and Feeder Tap on Light Curve (right)

two angles placed back to back outside the girder. The base is held in place by a U-bolt passing around it and bolted to a short angle which is in turn riveted to the other angles. Another U-bolt near the top of the girder holds the pole in position. On deck girders the poles are supported by brackets framed of angle irons with U-bolt connections at the top and bottom. On pile trestles two 3-in. by 12-in. timbers are bolted



Overhead Construction for Two Tracks (left); Overhead Construction in Three Forks Yard (right)

stalled beyond the outlying switches at each yard and passing track, and at each end of all long tunnels, enabling any section of the line to be cut out at the time of a derailment, or for any other reason, without disturbing operation beyond the adjacent stations. Likewise, in case of an accident damaging both the track and trolley line, any section of the line can be "killed" and repair work conducted simultaneous with that on the track. These sectionalizing switches are mounted high on the trolley pole, removing all "live" parts from the operator, while the operating handle is placed about five feet above the ground and is locked with a switchlock, making it accessible to any properly authorized employee. Shortly before a district is placed in opera-

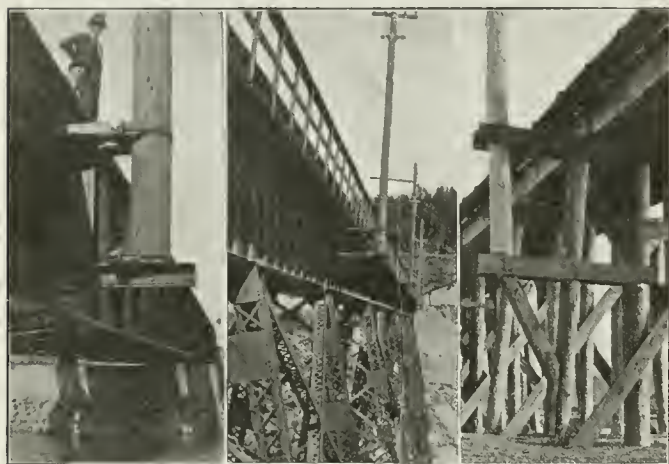
tion complete instructions will be issued to all employees concerned, instructing them regarding the purpose and manner of using these switches.

A cross-arm of Washington fir $3\frac{3}{4}$ in. by $4\frac{3}{4}$ in. in cross section carries the feeder wires. The messenger and trolley wires are supported by a bracket arm consisting of a $2\frac{1}{2}$ -in. by $2\frac{1}{2}$ -in. by $5/16$ -in. tee iron with a $5/8$ -in. truss rod extending from a connection near the outer end to the top of the pole.

The overhead contact system consists of the messenger and trolley wires, both of which are anchored at intervals of a

mile. The messenger wire is a seven-strand galvanized steel cable $\frac{1}{2}$ in. in diameter, supported directly from the bracket arms. The trolley system is unusual in that two 4/0 copper contact wires are provided, both of which are supported at intervals of 15 ft. from the messenger wire by hangers, spaced $7\frac{1}{2}$ ft. apart and supporting the two trolley wires alternately at an elevation of 24 ft. 2 in. above the top of rail. This form of construction with two wires, one of which is always flexible, permits the collection of heavy current with the current collector without sparking or excessive heating under the two extremes of heavy current consumption and high speed. Only one trolley wire is provided for yard and side tracks.

On curves up to six degrees and on curve easements steady braces are placed on each bracket arm to pull the trolley wires over, as shown in one of the photographs. On curves sharper than this a "backbone" consisting of a galvanized steel strand extends from pole to pole with "pull-offs" connecting with the messenger and trolley wires. The number of "pull-offs" depends on the degree of curve.



Special Construction on Through Girder Bridges (left); Steel Viaducts (center); Pile Trestles (right)

A special form of construction is provided in tunnels. Two suspension insulators attached to the roof of the tunnel 28 in. apart support a 3-in. 4-lb. inverted channel which carries the messenger wire and the two feeder wires spaced 6 in. at each side.

Where there is more than one track two-pole span construction is used. The maximum number of tracks spanned is nine in Deer Lodge yard. In yards the cross catenary span supports an intermediate or "steady" span which in turn supports the messenger wire. It is not designed to relieve the cross catenary of any load but is adopted simply to steady the messenger wire.

The negative or return system consists of the track rails and an auxiliary ground wire. The track rails are bonded with $\frac{5}{8}$ -in. copper bonds placed either under or outside the angle bars, depending on the type of joint in use. The return ground wire consists of a $\frac{1}{2}$ -in. copper cable carried on the top of the trolley poles without insulators. It is connected to the rails at every second signal station. In addition to providing protection for trackmen, this ground wire, located above the trolley, feeder and signal wires, affords effective protection from lightning for all these circuits and eliminates the necessity for lightning arresters for the first two. At tunnels the ground wire is hung from the side wall about six feet above the track.

THE LOCOMOTIVES

At the present time 43 locomotives have been ordered, the first of which are now being delivered. These locomotives are the first to be built for so high a potential as 3,000 volts d. c. The passenger and freight locomotives are similar in all respects

except that the former have a gear ratio permitting the hauling of a trailing load of 800 tons at 60 miles per hour. The passenger locomotives are also provided with oil-fired steam-heating outfits for the heating of the trains. The interchangeability of parts for these freight and passenger locomotives will be of material assistance in the maintenance of this equipment.

The cab consists of two sections each approximately 52 ft.



A Sectionalizing Switch Beyond the End of a Passing Track

long. The outer end of each section contains a compartment for the engineer and helper and the remainder is occupied by the equipment. The engineer's compartment is double lined, with hair felt insulation, while a 3,000-volt heater driven by a small motor removes the cold air from the floor. Each locomotive carries eight motors, each with a normal one-hour rating of 430 hp. and a continuous rating of 375 hp. or a total continuous rating of 3,000 hp. With a 30-per cent co-efficient of friction the tractive effort available for starting trains is approximately 135,600 lb. Each motor is twin-gearred to its driving axle, a pinion being mounted on each end of the armature shaft. The rim of the gear is mounted in such a way that its relation with the spider is fixed by springs, allowing flexibility between the two. The motor is of the commutating pole type with openings for forced ventilation provided by a motor-driven

blower in the cab. Each locomotive is equipped with a speed recorder and with flange oilers provided with an electric heater. The headlight is of the incandescant type with a 30-volt, 150-watt lamp. Each locomotive is also provided with a watt-hour meter showing the amount of power consumed at any time, which will be of value in figuring the cost of moving any particular train or class of traffic. Each half of the locomotive is equipped with an air compressor working against a pressure of 135 lb. in the main reservoir. Each compressor has a capacity sufficient to hold an ordinary train on these grades.

The passenger locomotives are designed to haul 800 tons on all grades up to two per cent and will maintain the present schedule with 650 tons. With trains heavier than this or on grades of two per cent, a second locomotive will be added. They are expected to handle such trains at a minimum speed of 30 miles an hour, while the maximum allowable speed is 60 miles per hour. The speed down the heavy grades is limited to 25 miles an hour by the operating rules of the road. Short local passenger trains will be operated by single units or half locomotives. In descending grades, the passenger locomotives are so arranged that one-half may be returning power to the line while the second unit will provide lights for the train or charge

Total length of locomotive.....	112 ft.
Rigid wheel base.....	10 ft. 6 in.
Voltage	3,000 d.c.
Voltage per motor.....	1,500 d.c.
Horsepower rating, one hour, each motor.....	430
Horsepower rating, continuous, each motor.....	375
Horsepower rating, one hour, complete locomotive.....	3,440
Horsepower rating, continuous, complete locomotive.....	3,000
Trailing load capacity, 2 per cent grade.....	1,250 tons
Trailing load capacity, 1 per cent grade.....	2,500 tons
Approximate speed at these loads and grades.....	16 m.p.h.

This electrification has necessitated the changing over of the present automatic signals to alternating current. These signals now extend from Three Forks to Lennep, 78 miles, from Piedmont to Butte, 37 miles, and from St. Regis to Hagan, 19 miles. Additional signals are now authorized between Butte and Finlen, 13 miles. These are being built not alone to eliminate electrical interference, but also to improve the view of the signals by placing them lower and in new locations.

This installation is being made under the direction of C. A. Goodnow, assistant to the president, and R. Beeuwkes, electrical engineer of the St. Paul. The General Electric Co., Schenectady, N. Y., is building all equipment. The Montana Power Company is the contractor for the construction of the transmission and trolley lines and for the installation of the substation equip-



One of the Electric Locomotives

the storage batteries. These functions are interchangeable and under the control of the engineer.

The freight locomotives are designed to haul 2,500 tons trailing on one per cent grades at a speed of 16.8 miles per hour. On all other grades in this line a second locomotive will enable trains of the same weight to be handled. The maximum speed of the freight locomotives is 30 miles per hour, while freight trains are limited to 15 miles per hour descending the heavy grades.

Six electric locomotives will be assigned to helper service on the Rocky Mountain division. With the original installation on this division, switching service will demand one electric locomotive each at Three Forks, Butte and Deer Lodge. With the completion of the work to Avery an additional switching locomotive will be required at Alberton. Special facilities will be provided at Deer Lodge for the maintenance of the electrical equipment.

The general characteristics of the locomotives are given below:

Total weight.....	284 tons
Weight on drivers.....	226 tons
Weight on each guiding truck.....	58 tons
Number of driving axles.....	8
Number of motors.....	8

ment. All building work is being done by company forces. The work on the first district was started in June, 1914, but was suspended nearly all summer by labor disturbances, so that it really began about a year ago.

THE ENGLISH RAILWAYMEN'S WAGES QUESTION.—The question of a proposed increase of wages in substitution for the war bonus granted to railwaymen in February last has been under discussion by the executive committee of the National Union of Railwaymen, which has forwarded a request to the railway companies to receive a deputation on the matter. The railway companies have now before them the men's request for an advance of wages and also for a joint conference on the question, but no definite arrangements in either respect have yet been concluded. Meanwhile, the executive committee of the National Union of Railwaymen have strongly deprecated any precipitate ill-advised or sectional strike in this hour of national crisis. A railway conciliation board meeting at Cardiff has satisfactorily settled the dispute of the Taff Vale engine drivers and firemen over reductions in grade and pay, which at one time threatened to give rise to considerable trouble. *Railway Gazette, London.*

ANNUAL REPORT OF THE RAILWAYS OF THE UNITED KINGDOM

The commercial department of the British Board of Trade has given out the following report of the railways of the United Kingdom, for the calendar year 1914, with comparative figures for the previous year. It is stated that on account of the war, no further statistics for the year will be published:

SUMMARY FOR THE YEAR 1914, WITH COMPARATIVE FIGURES FOR 1913.		
MILEAGE OF LINES OPEN FOR TRAFFIC.	1914.	1913.
Running lines:	Miles.	Miles.
First track	23,701	23,691
Second track	13,403	13,392
Third track	1,648	1,619
Fourth track	1,277	1,254
Over four tracks reduced to single track	706	700
Sidings reduced to single track	14,928	14,749
Total of single track, including sidings	55,663	55,405
AUTHORIZED CAPITAL.		
Shares and stock	\$5,046,016,500†	\$4,885,481,250
Loans and debenture stocks	1,989,110,520	1,979,521,740
Total	\$7,035,127,020†	\$6,865,002,720
PAID-UP CAPITAL. (The figures preceded by (*) show the nominal additions to capital included in the figures above.)		
Ordinary	\$2,399,824,260	\$2,396,291,040
Preferential	*453,520,620	*451,134,360
Guaranteed	173,990,430	1,724,308,560
Loans	*213,703,920	*213,752,520
Debenture stock	604,263,240	604,268,100
	*84,384,180	*84,384,180
	62,810,640	58,820,580
Total	\$1,711,536,480	\$1,699,605,180
	*216,517,860	*216,513,000
Total	\$6,518,338,920	\$6,483,293,460
	*968,026,580	*965,784,060
ENGINE MILEAGE.		
Train-miles, including empty trains run for traffic purposes on either the forward or the return journey:	Miles.	Miles.
Coaching (passenger)	273,659,000	273,495,000
Goods	156,007,000	161,684,000
Mixed	666,000	672,000
Total	430,332,000	435,851,000
Shunting miles:		
Coaching (passenger)	18,910,000	18,665,000
Goods	116,110,000	119,142,000
Mixed	59,000	58,000
Total	135,079,000	137,865,000
Other miles (assisting, light, &c.)	55,828,000	54,608,000
Total engine miles	621,239,000	628,324,000
REVENUE RECEIPTS AND EXPENDITURE.		
Total receipts (including miscellaneous net receipts)	\$676,016,280††	\$677,731,860
Expenditure	428,520,780	424,375,200
NET INCOME	\$247,495,500	\$253,356,660

†Including nominal additions to the amount of \$142,470,900 which were excluded from the total for 1913.

††Including the estimated amount receivable by the Companies, under agreement with the Government, in respect of the control of British railways during the period from August 5 to December 31.

RAILWAY CONSTRUCTION IN BRITISH SOUTH AFRICA.—The fact that a passenger may now enter a compartment at Johannesburg Station and alight at Walvis Bay without change is indicative of the transportation enterprise and expedition which have been taking place in the last few months on the southwest border of the Cape and in the territory lately held by the Germans. In the course of one of the numerous speeches which General Botha has been making recently, he stated that the total number of miles of railway construction since Union until the end of July, 1915, was 1,449, while another 950 miles would be ready at the end of this year.

ELECTRIFICATION IN SICILY.—A Milan syndicate has submitted to the Italian Government a scheme for the electrification of the light railways on the Island of Sicily, the total length of which is about 625 miles. According to the project, the necessary current would be taken from the generating station of the Societa Elettrica della Sicillie Orientale, and converted from three-phase to single-phase current at 50,000 volts at a large converting station to be established at Nicosia. Fourteen transformer and distributing stations would also be established along the railways, where the voltage would be transformed to a working pressure of 11,000 volts.

CHILLED IRON WHEELS

The Association of Manufacturers of Chilled Iron Wheels met in New York on October 12. In addressing the meeting George W. Lyndon said in part:

It is gratifying to know that the chilled iron wheel has not only been able to maintain itself as the wheel standard of the United States and Canada, but it is beginning to supplant the European standards, as evidenced by the fact that several manufacturers of this association are supplying chilled iron wheels in large quantities to the French and Russian governments.

That our flange recommendations are in the line of improvement is fully demonstrated by the fact that we have at the present time over one-half million wheels running that are finding their way through the present track construction without any complaints. The flange used on special wheels is 3/32 in. thicker than the M. C. B. flange and the flange as shown in our final argument is 3/16 in. thicker at the gaging point than the M. C. B. flange.

It is our purpose to have a sufficient amount of metal in reserve in order to enable us to design a chilled iron wheel of 950 lb., or heavier; in other words, we are building for the future. We do not want the limits of the possibilities of the chilled iron wheel confined by the limitations of flange design. We want no unreasonable restrictions in the use of the chilled iron wheel.

In March of this year we submitted to the chairman of the wheel committee of the M. C. B. Association a new set of standard specifications recommending the following:

650 lb. wheel—brake pressure	19,000 lb.
750 lb. wheel—brake pressure	32,200 lb.
850 lb. wheel—brake pressure	40,000 lb.

and detailed drawings of M. C. B. types of wheels and arch plate type of wheels.

There is absolutely no limit of weight in the case of steel wheels, but when it comes to a design of chilled iron wheels, all sorts of restrictions follow. We all know what an additional 25 lb. of iron will do to any of the standard M. C. B. wheels in the matter of drop and thermal test, and the proof of this is manifest in our 625 lb. M. C. B. pattern which we were enabled to re-design in the year of 1909 by the additional allowance of only 10 lb. of metal.

There are some tests which would establish the chilled iron wheel on a much firmer basis and I believe would be advantageous to all manufacturers. The tests that I refer to are comparative tests of the chilled iron wheel and the steel wheel.

1: Relative wearing values when rotating on a steel rail under various loads, the tread wear and flange wear to be observed separately.

2: Abrasion of rail under various conditions of loading.

3: Determination of the intensity of heating stresses in all parts of the chilled iron wheel, namely, single plate, intersection of plates, front plate, back plate, brackets, etc.

4: Analysis of the thermal test. Intensity of stresses in various parts of the wheel, and effect of thickening the thermal ring, increasing and decreasing the temperature of the iron, etc. The thermal test should be made an intelligent one instead of the present crude affair that is supposedly alike for all weights of wheels.

5: Determination of stresses in the hub and plates of the chilled iron wheel due to pressing on axles. Variation in stresses due to various classes of machining.

COAL AND IRON IN NEW SOUTH WALES.—The total quantity of coal raised in New South Wales to the end of 1914 is estimated at 202,400,767 tons, valued at \$380,000,000. The output for the year 1914 amounted to 10,390,622 tons, valued at \$18,500,000. The coal exported during the year amounted to 5,868,033 tons, valued at \$15,750,000. The quantity of pig-iron made in the State during 1914 from native ores was 75,150 tons, the value of which is estimated at \$1,250,000.

Annual Meeting of Railway Fire Protection Association

Abstracts of Papers and Committee Reports on Various Methods of Fire Prevention and Fire Protection

The second annual meeting of the Railway Fire Protection Association was held in the Hotel La Salle, Chicago, on October 5, 6 and 7, with 125 members and guests in attendance. President F. H. Elmore, superintendent of insurance of the Southern Railway, presided, and in his president's address spoke of the enlarging field of the association, and referred to the possibility of the establishment of uniform standards of railroad fire prevention with the association as the authority for the best ideas and methods.

ADDRESS BY T. C. POWELL

T. C. Powell, vice-president of the Queen & Crescent, delivered an address on the importance of fire prevention work, outlining the results of work of this kind on the Cincinnati, New Orleans & Texas Pacific. After the management had been confronted with the fact that the fire losses were increasing and the insurance premiums advancing, it concluded in 1908 a contract for periodical inspection of the entire property. The beneficial effects were shown by the fact that whereas for the three years preceding the contract, the average fire losses were over \$23,000 per annum, the average for the next two years was less than \$6,000. In the fiscal year 1913 the fire loss was less than \$3,000, the lowest for 16 years. Comparing the period during which the road did not have expert insurance inspection, but depended upon general instructions to guard against fire, with that during which it had the benefit of such inspection, Mr. Powell showed that from November, 1902, to June, 1908, \$111,495 was paid in premiums, and the insurance companies paid on account of fire losses, \$1,717,926, whereas during the period from June, 1908, to June, 1915, inclusive, the company paid in premiums \$89,639, while the insurance companies paid on account of fire losses, only \$44,750, and by reason of the close inspection the total premium for the year just concluded is less than 60 per cent of what it was 10 years ago, although the property value has increased more than 60 per cent.

The bridge and building department is required to submit to the insurance inspector plans for all buildings erected or additions to or changes in existing buildings, on the theory that if an ounce of prevention is worth a pound of cure, an ounce will go further and be more effective if applied at the beginning.

Abstracts of the committee reports are as follows:

RULES FOR PREVENTION OF FIRES AND PROTECTION OF PROPERTY

The committee on rules for prevention of fires and protection of property submitted a report of which the following is an abstract:

The committee deemed it advisable to make the rules of such a general character that they would apply to and be acceptable by all railroads and deal with hazards that are common to all.

It is believed that the all-important question relating to rules is their enforcement, and we believe this can best be accomplished by securing the fullest co-operation of all departments of the railroad service. Insurance department managers and their inspection forces should work closely with the operating heads in studying the economic side of the waste from fire, and this will most likely lead to a united effort to find the remedy and its application.

Especial heed has been paid to the suggestion of our executive committee, in giving consideration to the causes of fires, in the preparation of these rules. It is our conclusion that the chief causes are carelessness and ignorance, although it is also recognized that the transportation business is attended by hazards that are peculiar thereto. Therefore, these are the hazards that have received most careful consideration at the hands of this committee.

As to the form in which the rules are to be placed before those by whom they are to be observed, it has been found that the most common practice followed by railroads is to print them in bold type on heavy cardboard and post them conspicuously about the premises, and this practical method we recommend in order to best reach the masses of employees. It is also considered most advisable that the language be mandatory, rather than suggestive.

In the preparation of these rules, in view of the close relationship existing between the terms fire protection and fire prevention, it was not deemed advisable to make an attempt to divide them.

To our minds fire prevention deals mainly with arrangement and construction of buildings and the guarding of hazards. Good housekeeping methods should be so emphasized under authority as to enforce a strict compliance. It is the feeling of this committee that too much stress cannot be put upon the importance of looking out for those things that will prevent fires. It should be indelibly impressed upon the mind of every employee that it is his duty to conserve the property by elimination of the fire waste just as it is to prevent destruction by any other agency. It is urged that an active campaign be carried on at all times by the individual roads with a view of ever keeping this subject before the men employed in every branch of the service. This can probably best be done by the issuing of circulars or bulletins from time to time by executives, worded in such a manner as to forcibly call attention to these subjects.

The task of creating sentiment in favor of fire prevention is no small one, inasmuch as it calls for a breaking away from habits or practices that have grown to be a custom on account of their long standing. For instance, take that of smoking in and around stations by employees and patrons; these people, as a rule, have a feeling that the prohibition of this privilege is a serious interference with their personal liberty, and that such a rule should not be inflicted upon them. Nevertheless, it is true that many fires have their origin from this very source.

Like the movement for "safety first," it must be shown that those who are called upon to take these precautions are to become beneficiaries in part, at least. It should be clearly pointed out that conservation of property and preservation of life are the things we are striving after. A good point, and one that often carries the argument home to most men in the rank and file is, that lack of employment and consequent financial loss to them invariably follows in case of destruction of facilities.

In this connection we commend to the most careful consideration of members of this association the various bulletins issued last year by the Committee on Hazards—particularly Bulletin No. 1, dealing with care of the property.

In its broadest sense fire protection has a threefold significance and embraces: (1) The means of safeguarding or abolishing causes which originate fires; (2) the provision of means which may confine fire to the space in which it originates, and (3) the adequate means of fire extinguishment.

If it were safe to foster the doctrine that fire protection only has to do with the putting out of fire, it would be a comparatively simple matter to formulate rules under this head. It is considered advisable, however, that the word "protection" be accepted and dealt with in the broadest sense. The necessary means of fire extinguishment, always in readiness for effective service, is the final reserve relied upon when oversight or opportunity to prevent the hazard from starting fire has failed.

In every branch of endeavor, changes are continually taking

place which call for the most careful and thorough study on the part of fire protection engineers in taking care of increased, or entirely new, hazards that continually present themselves. The thought which should be ever present with those in charge of terminals and shop property is that the fire protection must keep pace with the growth and importance of the properties. It too often happens that terminals, shop and other properties are extended and enlarged without a corresponding increase in the fire-fighting facilities. The result is inevitable, for when the conflagration comes, it is soon found that the small quantity of hose, the limited number of hydrants and lack of water spell not only "oversight," but "disaster" as well.

For consideration at the next annual meeting, the committee submitted a draft of 24 rules, which are to be considered as a working basis only and which are to be amplified to meet local conditions by the individual members:

The report is signed by Robert Scott (A. C. L.), chairman; G. L. Ball (A. T. & S. F.); J. S. Rockwell (B. R. & P.); C. N. Rambo (N. & W.); W. T. Witter (So.).

COALING STATIONS

The Committee on Fire Prevention and Protection at Coaling Stations, A. D. Brooks, Illinois Central, chairman, submitted a report classifying coaling stations, describing the construction of the principal types in use, with methods of operation and their hazards, showing how to protect them, how to prevent fires in them, and comparing the life and cost of concrete, metal and wooden stations.

GRAIN ELEVATORS

The Committee on Fire Prevention and Protection in Grain Elevators submitted specifications for the construction of various classes of elevators and their apparatus with a view to eliminating fire hazards, followed by a general discussion of methods of prevention and protection.

COTTON HAZARDS

The Committee on Cotton Hazards, E. B. Berry, Southern, chairman, submitted a report outlining the conditions pertaining to the handling and transportation of cotton and the liability of the railroad for damage to cotton while in its possession. The report also discussed the various classes of hazards for the different kinds of cotton and submitted for the consideration of the association a series of recommended rules for fire prevention in the transportation of cotton. The committee also described some tests of a method of fireproofing cotton bales conducted by the Cotton Protective Company in April, under the supervision of the Oklahoma Fire Prevention Bureau. This consists of dipping the cotton bales in a chemical solution and is intended not only to fireproof the cotton, but to protect it against other kinds of damage. A bale of cotton which had been so treated was brought into the room and lighted matches, cigarettes and cigars were placed on the exposed surface of the cotton with no effect except a slight singeing or charring of the surface. It was stated that under this method of treatment cotton can be dipped and loaded for shipment within an hour, and it is claimed that it can be moved on flat cars as safely as in box cars. The Southeastern Underwriters' Association has offered a reduction in the insurance rates on treated cotton. The committee expressed the opinion that all cotton-carrying lines should co-operate and lend their support to this new treatment, not only for the purpose of reducing fire waste, but the prevention of country damage and dry rot.

OIL BURNING APPLIANCES

The Committee on Oil Burning Appliances, J. S. Richards, Sunset Central Lines, chairman, submitted a set of rules and requirements for the storage and use of fuel oil and for the construction and installation of oil burning equipment, accompanied by a series of plates showing how a safe fuel oil installation can be made. The committee reported that it had been in correspondence with the various railroads with a view to finding

just what practices were in effect, and what appliances were being used by the different roads. Particular attention was paid to the manner of installation of the various devices, as well as to the methods adopted in operation relative to the increased fire hazard due to the presence of oil burning appliances in and around various shops. The general rule, particularly in the installation of the oil burning devices, seems to be from the standpoint of economy rather than to minimize the extra hazards created through the use of oil as a fuel, as nearly all of the devices examined were home-made and constructed along the ground lines of those found on the market. There seems to be no set rule in effect governing the size or capacity of the regulating valve, which constitutes a source of increasing fire hazards in that the oil control in some instances is rather crude, relying on the flames to consume the vapor as it becomes atomized, regardless of the fact that the flow of oil and supply could be materially reduced in many cases, and thus effect a saving as well as reduce the fire hazard. The large increase in the consumption of fuel oil by the railroads is due in a great measure to the increase in steel rolling equipment, largely increasing the fire hazard, and it seems important that there should be some set rule governing the installation and use of oil burning devices. The committee recommended the adoption of the rules of the National Board of Fire Underwriters as a standard in the installation of oil burning devices, with one exception regarding its specifications as to automatic stop and drain valve installations.

HAND FIRE EXTINGUISHING APPARATUS

The Committee on Hand Fire Extinguishing Apparatus, N. Searls, Southern Pacific, chairman, submitted a report of its investigation of hand fire extinguishing apparatus, including chemical extinguishers, water barrels and buckets, dry sand and the various forms of hand grenades and dry powder extinguishers. The committee said that only in the most general way could recommendations for any standard be formulated that would satisfactorily meet the various conditions imposed on the railroads of this country. From data secured in reply to questions sent out it was found that all roads agree on the value of the chemical extinguisher and barrels and buckets, 55 per cent of those reporting stating that they do not use this form of apparatus and 50 per cent of those who do use them state that they are not recommended. The bulk of the report consisted of a discussion of the various types of apparatus with recommendations as to the best methods of adapting these forms of apparatus to the various conditions.

TERMINAL CLASSIFICATION AND STORAGE YARDS

The Committee on Fire Prevention and Protection in Terminal Classification and Storage Yards, Gilbert C. Hays, United States Steel Corporation, chairman, submitted a report classifying the hazards as follows:

Common Hazards—Sparks from locomotives; adjacent property; tramps and trespassers; burning rubbish; dry grass and weeds; spontaneous combustion.

Risks—Doors of wooden cars left open; hay; rubbish; straw and paper, etc., left in cars, grass and weeds growing along storage tracks, tramps building fires on floors of wooden cars, smoking, etc., trespassers and small boys playing in and around same; fires from exposing property and storage of cars on dead tracks.

Prevention.—Sparks from locomotives cause many fires in storage, terminal and classification yards, and the following suggestions and rules; which are in effect on the Baltimore & Ohio System, have a tendency to keep down the losses from these causes. Someone is held responsible to see before cars are stored in yards, etc., that all hay, straw and other rubbish has been removed from all wooden cars, and that all doors are closed securely as well as the traps to ice boxes and refrigerators. Rubbish should not be allowed to accumulate about cars stored, and all grass, weeds and small growth should be cleaned out. Cars should not be stored near hazardous risks or where

they would be exposed from the burning of adjacent property.

Where there is a large number of wooden cars subject to a conflagration, they should be set, whenever practicable, so they will be accessible in case of fire for the purpose of either extinguishing the fire or moving the cars out of danger. Ample facilities should be arranged for prompt removal in case of fire.

Cars should never be stored on stub or dead end tracks, they should be uncoupled at least every ten cars and a space of not less than 20 ft. between each cut; also when practicable a row of steel cars should be set between the lines of wooden cars.

The question of providing efficient watchman service should be considered, the watchman should be instructed just what to do in case of fire, the proper persons to notify to procure assistance of locomotives for removing cars should a fire occur. The service of a watchman is possibly most needed during the winter season when tramps are liable to build fires on the floors of stored cars; there is also the opportunity for sparks from locomotives setting fires at all seasons; also the risk from trespassers on the property and small boys playing in and around same. Watchmen should be familiar as to obtaining assistance from city fire department or local brigades if they are available for service.

Protection.—Standard 2-way fire hydrants, 300 ft. apart, on 6 in. mains, with standard hose houses and 300 ft. of approved hose in each house, with nozzles, wrenches, bars, axes, lanterns, etc. (100 ft. of hose to be attached to hydrants at all times and the rest to be laid on shelves), should be installed throughout the yards where possible. A gate valve to be placed with one outlet so that additional hose connection can be made without

A more elaborate method of protection is the installation of monitor nozzles on stand-pipes located throughout the yard or terminal on proper size mains, the nozzles so arranged as to be operated by one person or can be left alone. This makes a very efficient protection as it does away with the carrying and handling of hose, etc.

Where this more elaborate protection is not possible, water barrels with two pails to each should be installed 100 feet apart throughout the entire yard, and we especially recommend the installation of the fire pump on shifting engines as being one of the most effective devices.

Summary.—The protection of storage yards is one of the weakest features in connection with railway fire protection, for while a large number of railroads spend thousands of dollars to protect their shop and warehouse properties, little or no provision is made for the protection of car storage yards. In these days of retrenchment it is difficult to obtain authority for spending any considerable amount of money for fire protection purposes, and it is equally difficult to get the operating officers to appreciate how necessary it is to adequately protect a storage yard.

STATISTICS AND FORMS

The Committee on Statistics and Forms, F. R. Austin, Chicago & Eastern Illinois, chairman; submitted statistics based on reports from 41 roads, representing approximately 100,000 miles of line, giving a classification of fire losses, including both railroad property and lading, for the two calendar years, 1913 and 1914. The classification of fire losses by causes is shown in the following table:

CAUSES OF FIRES AND FIRE LOSSES									
Causes.	No.	1914		1913		Total 2 years		Per Cent.	
		No.	Loss	No.	Loss	No.	Loss		
Adjacent property	314		\$191,316.00	291	\$131,061.15	605	\$322,377.15	5.3	
Asbes and hot cinders	122		25,117.79	179	26,095.78	301	51,213.57	2.7	
Coal from engine fire boxes	257		93,166.88	236	24,707.95	493	117,874.83	4.4	
Electric wires	74		106,722.32	58	87,453.74	132	194,176.06	1.2	
Explosions	30		46,503.64	49	26,866.34	79	73,369.98	.7	
Forest fires	16		7,251.92	24	31,280.34	40	38,532.26	.3	
Fuses	2		52.91	6	2,377.74	8	2,430.65	.1	
Friction hot boxes, etc.	61		66,103.72	55	23,938.96	116	90,042.68	1.2	
Gasoline, oils, etc.	41		36,445.54	38	18,532.00	79	54,977.54	.7	
Heating appliances and flues	523		328,140.78	439	133,320.83	962	561,461.61	8.5	
Incendiary	175		150,318.88	174	167,320.83	349	317,798.51	3.1	
Lighting appliances	94		350,721.97	113	15,937.14	207	366,659.11	1.8	
Lightning	39		16,223.53	44	8,068.21	83	24,291.74	.7	
Matches	64		21,543.45	104	27,599.49	168	49,142.94	1.5	
Rubbish, burning	67		16,638.97	83	21,410.54	150	38,049.51	1.3	
Smoking	108		71,887.65	48	26,924.72	156	98,812.37	1.4	
Spark from locomotive	1,529		486,964.95	1,479	412,212.95	3,008	899,177.90	26.7	
Spontaneous combustion	213		107,775.13	180	151,077.20	393	258,852.33	3.5	
Torches	65		28,158.02	77	20,268.90	142	57,426.92	1.3	
Tramps and trespassers	344		153,547.02	180	214,036.93	524	367,583.95	4.7	
Unknown	1,180		637,116.93	1,442	867,369.79	2,622	1,504,486.72	23.3	
Waste and wooden lockers	12		1,321.25	19	12,614.84	31	13,936.09	.3	
Wrecks	61		93,143.29	80	124,271.76	141	217,415.05	1.3	
Miscellaneous	246		84,164.70	206	49,409.73	452	133,574.43	4.0	
TOTAL	5,637		\$3,120,347.24	5,604	\$2,633,316.66	11,241	\$5,753,663.90	100.0	
Average loss per fire			\$553.55		\$469.90		\$511.85		

shutting off the water. All hose connections and couplings should conform with the standard of the city or town in which the plant is located.

Strings of cars should be cut every 10 car lengths entirely across the yards, with an open space of 20 ft. maintained at all times. Cars lacking draw bars and couplings should be chained together to permit the pulling of an entire string in case of fire without breaks.

Switching engines should be equipped with steam fire extinguishing device, such as the Nathan or other devices used by the Rock Island and several other roads.

Water mains should be of the proper size to supply all fire hydrants and laid where practicable in a loop system, eliminating all dead ends. Water should be supplied through fire pumps of sufficient capacity to supply sufficient number of hose streams to compete with large fires. Supply to fire pump should be from two different sources when available. Drilled fire brigades should be organized so as to be familiar with the method of fighting fires.

A second table gave a classification of fire losses by location. Out of a total fire loss of \$5,658,232 in two years, \$1,639,300 was attributed to rolling equipment. The next largest sources of loss outside of miscellaneous were merchandise in transit, \$527,287; shops, buildings and contents, \$389,648; elevators, \$345,634; and passenger and combination stations and contents.

The committee reported that the gathering and compiling of statistics of this kind by a committee has worked out unsatisfactorily, and recommended that the committee be discontinued and that one person be appointed as a statistician to gather such data as the association requires, and that he be paid for his services.

ELECTRICAL HAZARDS

The Committee on Electrical Hazards submitted a report on the hazards to electric lighting installations, based on the rules and regulations of the National Electric code, which is the accepted standard for electric wiring and apparatus. The bulk of the report was devoted to a discussion of various causes of

hazards and to various types of electrical appliances, giving in parallel columns, the cause of the hazard, the probable effect, and references to the code for methods of remedying the trouble or correcting the defects. The one great cause for electrical fire hazards, the committee found, is poor insulation. The committee recommended that all electrical work be required to be installed strictly according to the rules and requirements of the National Electric code.

The Committee on Locomotive Sparks and Ash Pans Hazards, H. W. Colson, Atlanta, Birmingham & Atlantic, chairman, presented a progress report.

The Committee on Stations, Freight Depots and Warehouses, W. S. Maryon, Southern, chairman, submitted a report, showing that the percentage of loss in this class of property is high, and the destruction entails a loss above the actual value of the property in crippling operation, and resultant loss of revenue. Reports of the committee on statistics and forms read before the meeting, last year, showed a loss for the five-year-period from 1909 to 1913 of approximately \$731,000, on stations and warehouses, out of a total of \$6,158,000. To these figures should be added a percentage of loss on merchandise in transit destroyed in buildings, bringing the loss on this class of property to about one-sixth of the total. The need of reduction of the loss is obvious.

At the morning session on October 7, the meeting was addressed by F. A. Silcox, district forester of the United States Forest Service at Missoula, Mont., on the subject, "The Railroads and Forest Fires."

Following the session on Wednesday morning the association held an informal luncheon at the Hotel LaSalle, and following the afternoon session the members paid a visit to the Illinois Central shops at Burnside. At the Thursday session a series of motion pictures were shown, illustrating a trip through the Underwriters' Laboratories in Chicago.

The officers of the association were all re-elected: President, F. H. Elmore, superintendent of insurance, Southern Railway, Washington, D. C.; vice-president, Paul Hevener, superintendent of insurance department, Rock Island Lines, Chicago, Ill.; secretary-treasurer, C. B. Edwards, fire insurance agent, Mobile & Ohio, Mobile, Ala. C. S. Sherwin was elected in place of W. L. Lawrence, of the Delaware & Hudson, on the executive committee.

WHAT THE COMMERCIAL AGENT CAN DO FOR THE SHIPPER*

BY CARL K. LANDES

General Agent, Freight Department, Minneapolis, St. Paul & Sault Ste. Marie, Cincinnati, Ohio

For the purpose of this discussion the designation commercial freight agent must necessarily embrace every one engaged in the solicitation of freight. The contracting agent, the traveling freight agent, the commercial agent and the general agent are all working in similar ways to secure freight for the railroads.

To the question, "What can a commercial freight agent do for a shipper?" the answer is, "Manifest always a beneficent interest in the shipper's welfare, and try to be of helpful, practical service:

"By tracing shipments when requested to do so and giving replies promptly enough to make them of real value.

"By working for the quick settlement of all just claims that are brought to his attention.

"By endeavoring to interest the railroad purchasing agent in a manufacturer's product, to the mutual advantage of the shipper and the railroad when both believe in reciprocity.

"By furnishing, when possible, advance information regarding contemplated changes in rates and rules.

"By co-operating toward the adjustment of unfair rate conditions.

"By suggesting names of possible users of the product of a factory.

"By helping the shipper to secure equipment without unnecessary delay, and as business continues to improve the value of this service will increase in proportion.

"By supplying information regarding export tariff, customs duties and regulations governing shipments to foreign countries.

"By furnishing shippers with estimates of prospective business conditions throughout the territory traversed by his road."

This might be an opportune time to say that those who are interested in the Northwest should prepare to take advantage of the improved business conditions which soon will prevail in that section. The grain crops in the northwestern states of Minnesota, North and South Dakota and Montana are enormous, and the Soo Line alone is making preparations to handle 75,000 carloads of grain. At prevailing prices such a crop ought to distribute about \$70,000,000 among farmers located along our line. This money possibly may be spent by the farmers principally for automobiles, but other commodities also will be in great demand, and the thing to do is to be prepared to supply the demand.

Shippers, I think, generally understand that a commercial freight agent's office is equipped to furnish information and supply service along the lines mentioned, and that the commercial freight agent is earnestly desirous that shippers avail themselves as often as possible of the facilities of his office.

The visitor to Havana is struck by the frequency with which he encounters the mysterious sign reading simply—"Ask Mr. Foster!" but the mystery clears somewhat when he learns that "Mr. Foster" has his agents posted at different public places throughout the city, and that those agents are specially equipped to give the uncertain tourist definite information regarding all rates, routes, departures and arrivals about which the tourist may inquire. These agents also carry a full line of tickets to the good theaters or, for that matter, to European and Asiatic ports of call, and are instructed to endeavor to sell each tourist at least one of these tickets before allowing him to leave.

Now, I should like to have pasted upon the wall of every shipper's office a sign reading, "Ask the commercial freight agent," just to remind shippers to avail themselves of our facilities to furnish information and, incidentally, afford us an opportunity to ask for the privilege of demonstrating our ability to handle carloads and less than carloads with promptness and despatch.

Commercial freight agents of all other lines feel the same. All are anxious to be of service, realizing that to secure and hold business they must be courteous, considerate and willing to co-operate with the shipper in any just and laudable enterprise.

This attitude of the commercial freight agent is simply a reflection of the attitude of the present-day progressive executives of our most efficient railroads, and is in direct contrast to the old "Public be damned" policy that may have prevailed during earlier days, but fortunately exists now only in history.

The efforts that are now being made by many railroad executives to impress patrons with their sincere desire for harmonious relations are pronounced, practical and costly. Sir Thomas Shaughnessy, president of the Canadian Pacific, in a recent address to employees, impressed upon them that while they should continue to labor devotedly and loyally for the intelligent advancement of the company's affairs, they should never forget their duties to the public and should be unfailing in courtesy.

The slogan of the Soo Line is—"Safety and Courtesy Always!"

The Santa Fe recently has inaugurated what is called the "Harmony Special." One week in every month some of the officers, including the president, vice-presidents, general manager, freight, passenger and publicity agents, are drafted for a trip over a division of the road. The train stops at each station long enough to permit the officials aboard to talk with the patrons of the railroad. E. P. Ripley, president of the Santa Fe, recently stated that the "campaign was a success from the start and that now it is part of every official's duty to perform a harmony stunt when occasion demands."

So you see the officials of the railroads, from the highest to the lowest, want to be the friends of their patrons and they want their patrons to reciprocate their friendship.

* An address before the Traffic Branch of the Cincinnati Chamber of Commerce, on September 13, 1915.

Once upon a time there was a man who started out to make friends among his fellow men by resolving that for three months he would say something good about anyone whose name happened to be mentioned in his presence. He kept his resolution and he made hosts of friends. Therefore, I am going to ask you to resolve for the next 90 days to say something good about every railroad that is mentioned in your presence.

I. C. C. ACCIDENT REPORTS

The statistical office of the Interstate Commerce Commission may be supposed now to be wrestling with the mass of facts which, under the revised regulations, have been reported to it concerning accidents on railways during the month of July, 1915, the first month in which the new rules were in effect; and the results when summarized will show some figures which will tax the capacity of the statistician's adding machine; figures showing the number of hours that employees of the railways have worked during the month. This requirement of a statement of "man-hours" and of train and locomotive mileage is responsible for the most noticeable addition to the list of facts called for

L, M, S, meaning respectively collisions, derailments, boiler accidents, other locomotive accidents (not involving collisions or derailments), miscellaneous train accidents and train service accidents. "S a" would indicate an accident to a man engaged in uncoupling air and steam hose or safety chains; "S b" an accident while coupling or uncoupling cars; "S t" insufficient clearances; "S d" getting on or off cars, etc.; "S e" falling from cars, etc.; "S f" miscellaneous accidents to employees on duty on or about a train in connection with its operation; "S g" miscellaneous accidents, on or around trains, to persons other than employees.

The statement of the cause, question 16, is to be taken as a catch line, the full statement being entered under question 51; but in this case question 51 is left blank, the person making out the report having concluded, apparently, that the accident was not of sufficient importance to call for further detail. The legal department of a railroad, which always must gather all possible facts which may be needed in case the victim of an accident should sue for damages, would, of course, require, in a report like this, a considerable list of answers throwing light on the circumstances attending the accident; but these would

MONTHLY REPORT OF RAILWAY ACCIDENTS.										T
Name of reporting carrier (1) { Oakland & Eastport R.R.			Report to the Interstate Commerce Commission for the month of { July , 191 5							
Carrier's division (2) { Eastern	Carrier's number (3) { 401	Date of accident (4) { 23	Time of day (5) { 11 am	I. C. C. class (6) { S 1	I. C. C. No. (7) { 31					
Place of accident: State (8) { N. Y.	Nearst station (9) { Smithville	Nearst milepost (10) { ---	Estimated distance and direction from milepost named (11) { ---							
Kind of accident (12) { Crossing	Clear, cloudy, or foggy? (13) { Clear	Raining or snowing? (14) { ---	Daylight or dark? (15) { Day							
Cause (briefly) (16) { Struck at Peters' Crossing while driving automobile across										
Kind of train involved (17) { Milk	Train No. { 850	Engine Nos. (18) { 451	Direction (19) { W	Speed (20) { 30	m. p. h.					
(21) DETAILS OF CASUALTIES TO PERSONS.										
Name and address of person. (a)		Class of person. (b)	Nature and extent of injuries. (c)	Days disability. (if killed, so state.)						
				Actual. (d)	Probable. (e)					
21.										
22. A. Robinson		K	Contusion of hip		20					
23.										
24.										
50. COST: (a) Equipment, \$..... (b) Track, \$..... (c) Clearing wreck, \$..... (d) Total, \$.....										
51. Detail of cause, and nature of accident; circumstances, estimate, and description of damage to property; responsibility and experience of employees responsible. When not manifestly immaterial, give number of cars in train (loaded, empty), percentage of air brakes operating, and gross weight in tons. If space below is insufficient, use the reverse of this sheet.										

Form T, Government Accident Reports; Size of the Whole Blank, Eight and One-Half by Eleven Inches

Here reduced one-eighth in width, and space for answer to question 51 cut off.

by the new rules. Regardless, however, of the substance of the reports, the changes in form have imposed an immense amount of work on the railroad clerks who make them out.

The style of the principal blank, form T, is shown in a facsimile printed herewith, filled out with a statement, slightly disguised, of an accident that occurred in New York State in July. An examination of this form will give an idea of the character of the present requirements.

In the answer to the sixth question, the letter S indicates that this is a train service accident, and i indicates that the victim was struck by a locomotive or car at a highway grade crossing. The capital letters used in this place on the blank are C, D, B,

have no particular value for the Interstate Commerce Commission.

In column b, under question 21, the letter K means that the person injured in this accident is to be classed among "Other non-trespassers not on trains." The letter A in this column would indicate employees on duty; B employees not on duty; C passengers on passenger trains; D passengers on other trains; E passengers not on trains, and so on. Class A, employees on duty, is divided into 68 sub-classes. For example: (1) general officers \$3,000 per annum and upward; (2) general officers below \$3,000 per annum; (6) clerks, below \$900 per annum, except sub-class 37, telegrapher-clerks; (20) electricians; (31) em-

employees in outside agencies, except numbers 5, 6, 7 and 30. Sub-class 7 includes messengers and attendants, and sub-class 30 traveling agents and solicitors.

Question 51 calls for substantially the same information that has been required by the old forms, the chief difference being that heretofore the superintendent responsible for the report had considerable freedom to use his own judgment as to the extent to which he would explain the details, except in the more serious accidents; whereas, according to the regulations as now formulated, much detail is required in the case of every accident reported, no matter how relatively unimportant it may be.

Besides form T there are three others, F, R and V. Form F is a monthly statement of fatalities developed from previously reported injuries. Form R is a supplementary report to accompany form T, in the case of an accident due to a broken rail, calling for all available facts, under 39 heads, which may serve to explain the cause of the breakage of the rail.

Form V ("verification"), one to be sent in for each month, contains the oath of the officer sending the report, and a comparative statement showing the total number of non-train accidents happening during the month and the number of casualties resulting therefrom. For these accidents no form T report is required. Form V divides persons into six classes, namely, shopmen, stationmen, trackmen, bridge and building men, other employees, all other persons, and 11 classes of accidents (or causes), as follows: 71, working machinery, engines, motors, etc.; 72, transmission apparatus, belts, gears, shafting, ropes, etc.; 73, use of hand tools, apparatus, etc.; 74, flying particles; 75, explosives, inflammable, hot or corrosive substances; 76, electric currents; 77, collapse, fall, etc., of objects; 78 falls of person; 79, handling rails, ties, bridge timbers, etc.; 80, handling freight or supplies; 81, miscellaneous industrial causes.

At the bottom of each column, following the total number of killed or injured in that column, there is a space for the total number of "man-hours," that is to say, the aggregate number of hours worked during the month by all employees subject to industrial casualties in the classes named; and following this a statement of the average number of casualties per million man-hours.

Judging by the figures compiled by one New York railroad it may be estimated that the total number of "man-hours" reported by the railroads of the whole country for the month of July will aggregate about 393,359,950. Apparently the number of hours worked by these men on the railroads of America in a year will, therefore, aggregate between four and five billions; or, in a period of more active business, perhaps more than the larger number mentioned. These figures represent, it is to be remembered, only those employees who are subject to the classes of casualties named in the 11 items quoted above. As item 78, "falls of persons," covers a class of accidents to which almost everybody is liable, it would seem that these figures ought to include employees in every department. On the road above referred to 31 per cent of the hours reported were those worked by shopmen; 5 per cent by stationmen; 34 per cent by trackmen; 9 per cent by bridge and building men and 21 per cent by other employees.

From the standpoint of the railroad (as well as in the interest of all students of the records) uniformity, as between the federal and state regulations, is an important desideratum in the compilation of these reports; and this fact seems to be receiving increased appreciation. By inquiry of the different commissions we find that eight states—Colorado, Maryland, Montana, New York, North Dakota, Pennsylvania, West Virginia and Wisconsin—have taken or intend soon to take action to make their requirements in regard to railroad accidents correspond to those of the federal government. The rules of the Interstate Commerce Commission now call for such full, complete and detailed statements of every accident which is of public interest in connection with the question of the safety of railroad travel and operation that, without doubt, every state can get all the information reasonably needed for the state records by asking

for carbon copies of the reports sent to Washington. An order providing for the acceptance of these carbons would, therefore, seem to be reasonable in any state; but, as we see, only eight states have explicitly declared themselves on this point up to the present time. In a number of other states the requirement of the regulations is (in less detail) for about the same facts as are called for by the Interstate Commerce Commission's rules, but on blanks in which the details are differently arranged. This difference adds to the railroads' clerical work, while affording very little advantage; none at all so far as the outside observer can see. The officers of these states, however, in most cases, seem very scrupulous in their determination to suffer no derogation of the dignity and independence of their respective states. Quite likely, however, there will be other states which will fall into line with the eight above named. In Arizona it is understood that the Commission intends to accept reports made according to the I. C. C. formula. From a number of states no answer has been received to the inquiry which we sent. In Oregon all statistics of accidents now go to the Industrial Accident Commission.

This article has to do with the forms of reports. As to the substance of the information that belongs in a report of this kind—what amount and what kind of information is worth giving—there are numerous unsettled questions. The question as to how the different states will settle these details—or whether they will be left unsettled, as has been the situation in a number of states in the past—is an interesting one. Possibly the results of the operation of the Interstate Commerce Commission's plans may, in the next few months, throw some light on it.

REPRESSING TRESPASSERS ON THE NEW HAVEN

The New York, New Haven & Hartford is keeping up a vigorous campaign for the discouragement and prevention of trespassing on the tracks of the company. Signs to the num-

Saving Time or Saving Life?

Saving time sometimes means losing life.

A few minutes saved by walking on or crossing railroad tracks may mean your permanent disablement or death.

Five thousand, four hundred and seventy-one persons who trespassed on railroad property in the United States in 1914 were killed.

Every life so lost is an economic loss to the community.

Trespassing on railroad property is forbidden because of the danger it means to **YOU**.

You can reduce this annual waste of human life by not trespassing on the railroad tracks and right of way and by urging others not to do so.

THE NEW YORK, NEW HAVEN AND
HARTFORD RAILROAD CO.

DANGER OF Trespassing on the Railroad

TRESPASSING on railroad property costs almost as many lives in a year in this country as does the dreadful disease of SCARLET FEVER. The estimated number of deaths from SCARLET FEVER in the United States in the year 1912 was 6731.

The number of persons killed while trespassing on the railroad in the year 1914 was 5471.

Most of those who fell victims to this dreadful disease were unaware of the danger they were in and thus could not avoid it.

Those who were killed while trespassing on the railroads could have avoided the danger they were in, but failed to do so.

Every time you TRESPASS on the railroad you are putting your life knowingly and needlessly in danger.

AVOID DANGER WHEN YOU KNOW IT IS AROUND

THE NEW YORK, NEW HAVEN AND
HARTFORD RAILROAD CO.

Typical Bulletins Used in the New Haven Campaign to Discourage Trespassing

ber of 10,000 have been posted along the company's lines, warning all persons not having business on the premises to keep off. Renewed efforts have been made to obtain the active cooperation of magistrates, prosecuting officers and other local authorities. School superintendents and proprietors of factories have been called upon to render active assistance wherever possible.

With a view to agitating the subject from every possible angle a half-dozen different bulletins have been prepared setting forth the dangers of trespassing in such a way that he who runs may read. About 180,000 of these placards are to be posted. Facsimiles of two of them are shown herewith

Railroad Locomotive Repair Shop Organization

Efficiency and Output Can Be Considerably Increased
By Giving More Critical Attention to This Feature

By HENRY GARDNER

The old-fashioned railroad shop organization is well known; it consisted of a shop superintendent, or master mechanic, followed in line by an assistant superintendent and general foreman and a number of shop foremen, one for each department. In a shop of this kind the superintendent, assistant superintendent and general foreman have to bear all the burdens of administration and supervision; frequently there is no assistant superintendent in the organization, the whole load being carried by the superintendent and general foreman. Under this type of strictly line organization there are great possibilities for a glaring waste of time and effort by the supervisory force. These overloaded officers, continually goaded for output, must at the same time hold discipline meetings every day and must pass on all applicants for employment; they must be familiar with all piecework schedules and continually add new prices; they must see that all belts, motors, machines and cranes are kept in repair and must handle the apprentices, constantly instructing and moving and encouraging them.

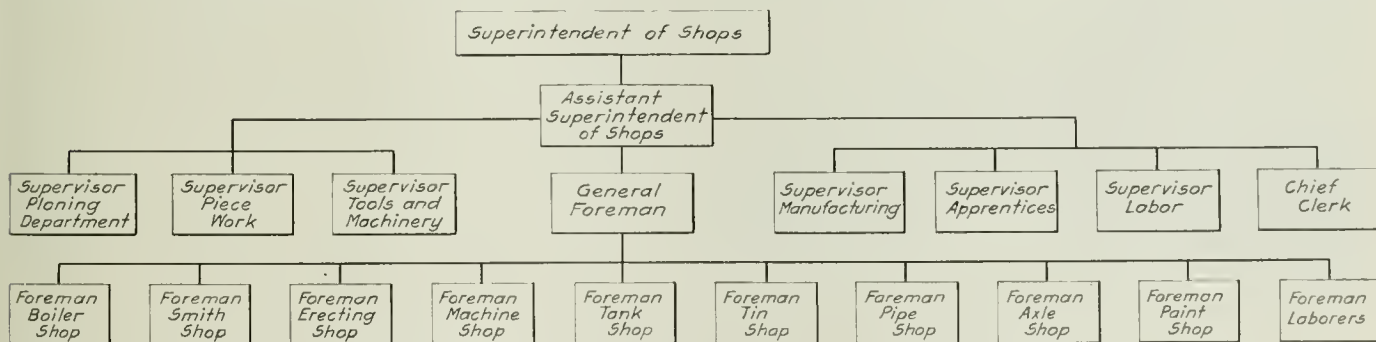
It is safe to say that no one man, or three men, can do justice to all of these duties in a shop of any appreciable size, and it is a foregone conclusion that they will frequently overlap one another in the performance of their work. An instance is recalled where three men in an old-fashioned line organization shop went over the same ground daily, one after the other, and often it was found that a sub-foreman had been told to do the same thing by each one of these three men in succession.

In the majority of railroad shops to-day the strictly line organi-

the composite line and staff organization if the maximum quantity and quality of output, at a minimum cost, are to be obtained.

A proper organization for a large railroad locomotive repair shop is shown by the accompanying chart. Here is a combination line and staff organization. The superintendent of shops has an assistant who has a general foreman next in line in charge of all departments, as is customary. But the staff is the vital part of the whole organization, and is directly responsible for the economic and effective management of the entire plant; the line, below the superintendence, is wholly in charge of output.

On the staff are six supervisors and a chief clerk as follows: A supervisor of piecework, or other wage payment system; a supervisor of routing, scheduling and despatching in all departments; a supervisor of apprentices whose important duties are well known; a supervisor of tools and machinery in charge of the repair and purchase and installation of all new machine and hand tools, cranes, etc., about the plant; a supervisor of manufacturing who is in direct charge of all shop orders and manufactured material either for outside shops and enginehouses or for local consumption and stock, and finally a supervisor of labor, whose office may be called the employment department; this man employs and discharges all men and administers discipline for all employees in and about the plant. The duties of the chief clerk are well known and established. The form of organization shown by the chart is distinctively up-to-date and is representative of tried and successful types. With this arrange-



An Ideal Form of Organization for a Large Locomotive Repair Shop

zation is in effect; there is no attempt made to plan, schedule or despatch the work in the various departments and almost any foreman can hire or discharge men, with or without just cause. The result of this state of affairs is as might be expected—low output, great waste of labor and material, with a high cost of repairs, and a general lack of system and order. The machine equipment is neglected or repaired in a makeshift manner and the money wasted in misuse and abuse of belting alone would pay for many new machines in a year. Cutting tools are dressed and hardened by guess, by the eye; no such thing as an electric furnace or a pyrometer is known.

In this same hypothetical but very typical shop, apprentices, if hired at all, are exploited by being kept on one machine for a year or more, and no serious attempt is made by any one to properly instruct them. If the shop is run on a day work basis the supervising officers must be constantly on the move to maintain the output; if the shop uses piecework to any extent an eternal personal vigilance must be exerted to keep up the quality as well as the quantity of output. These old-fashioned practices are now conceded to be wholly inadequate, especially for the larger shops, and the strictly line organization must give way to

ment the several and specific duties of each staff man are carefully defined and all overlapping and doubling of work by the supervising force is eliminated.

The first duty of the superintendent of a locomotive repair shop is to study quantity and quality of output. He should spend at least three-fourths of his time on this work, if he is to actually earn his salary. All clerical work, letter writing, etc., performed by a shop superintendent is a dead loss to the railroad and nine-tenths of this work should be turned over to his assistant and his chief clerk. A railroad shop superintendent has been known to spend an entire day with hammer and chisel and file surrounded by a loyal and admiring group made up of the assistant superintendent, the general foreman, the erecting shop foreman, the machine shop foreman and two skilled mechanics. But what became of the shop and the departments controlled by these men during that day? Obviously the loss to the company measured in dollars would be considerable.

The modern railroad shop superintendent must be more than a practical man and a good handler of men; he must be a superintendent in the same sense of the word as applied to similar positions in the strictly manufacturing shops. What else is a railroad

shop but a manufacturing plant, and how is it in any way different in so far as opportunities for saving and economy are presented? The shop superintendent should spend a part of his time planning and developing original and improvement work and he should have available up-to-date records of the output in all departments and should keep close watch over the cost of repairs. In connection with these duties the following records are suggested for the superintendent's office; these may be expanded or modified to suit local requirements, and they are better made in chart form, as a graphic diagram gives accurately an exact picture of conditions which cannot be so impressively presented in any other manner.

For a nine-hour day these formulae should be worked out each month and platted in diagram form:

- (1) $\frac{\text{Total engines out per month} \times 9}{\text{Total man-hours per month.}} = \text{Engines out, per man, per day.}$
- (2) $\frac{\text{Labor cost (payroll) per mo.} \times 9}{\text{Total man-hours per month.}} = \text{Labor cost of output per man per day.}$
- (3) $\frac{\text{Material cost per month} \times 9}{\text{Total man-hours per month.}} = \text{Material cost of output per man per day.}$
- (4) $\frac{\text{Labor cost per month}}{\text{Engines desp. per mo.}} = \text{Labor cost per engine despatched.}$
- (5) $\frac{\text{Material cost per month}}{\text{Engines desp. per mo.}} = \text{Material cost per engine despatched.}$
- (6) $\frac{\text{Man-hours per month.}}{\text{Engines desp. per mo.}} = \left\{ \begin{array}{l} \text{Number of hours it takes one man to turn} \\ \text{out one locomotive.} \end{array} \right.$

The above six formulae may be further subdivided to include each separate shop or department as the need for such data arises, or if a special study of some one department appears to be demanded by lowered output or faulty conditions. The percentage of material and labor costs should also be carefully watched and a chart may be made to show this each month. For example, the total material cost for all repairs for one month may be \$30,000, and the corresponding labor cost \$50,000. From this it is evident that material costs are running 37½ per cent. of total and labor costs 62½ per cent., which may be considered a fairly good condition for the average shop to-day.

As indicated by the organization chart the responsibilities of the assistant shop superintendent are the same as the superintendent, since in the event of the superintendent leaving suddenly or gaining a promotion the assistant superintendent should immediately fill his superior's position without appreciably disturbing the organization or the quantity and quality of the output. The duties of the assistant superintendent should be primarily to run the shop and get the required output. He should study and arrange for the charts and data required by the superintendent and should aim in every way to run the entire plant as if his superior were not there to supervise him. A great deal of time is wasted by shop superintendents and their assistants in habitually walking about the plant visiting every department superficially each day. The gain to the shop as a whole by this procedure is practically nothing. Many a railroad shop superintendent and his assistant walk miles, day after day, conscientiously going over the same old beaten path at about the same hour at least twice each day; the foremen and workmen anticipate the visits and, of course, are all on their best behavior.

The most important duty of an assistant superintendent in any organization should be to make an exhaustive study of each department of the shop; say the boiler shop, to start with. He should turn over all other routine duties to the chief clerk and staff men and general foreman and live for a month in this department, working with the foreman as his assistant, in a sense, for the entire day, if it be from 7 a. m. to 6 p. m. In this way an exact knowledge of details may be obtained and faults corrected or eliminated which otherwise would never have been even seen. A close, individual, departmental study of this kind has never failed to result in a great reduction in manufacturing costs as well as an increase in general effectiveness and frequently a decrease in payroll as a by-product. If a month cannot be spared, two weeks, or even one week, spent by the assistant superintendent in each and every department of the plant each year will work wonders. Finally, an up-to-date shop superintendent, as

well as his assistant, should visit other shops frequently and keep constantly posted as to the best methods and practices; they should also read the technical papers carefully, always watchful for labor saving devices and methods for cutting costs and eliminating wastes.

Next in line to the assistant superintendent is the general foreman. He is one of the most important men in the organization, and his duties have wholly to do with the prime object of running the shop, viz., to deliver repaired locomotives. He must be of an extremely active or motive type and must have exceptional ability for instructing and handling men and increasing production. The general foreman works with the seven staff men as occasion arises, in an advisory capacity, but he does not report to any of them or direct them. The general foreman runs the shop with a line and staff organization, exactly as in the old-time line organization, with the exception that a multitude of duties are removed from him so that he becomes virtually an output specialist.

The general foreman and the supervisor of the planning department should be closely allied and preferably their offices should open together so that the daily delay reports may be taken up at once by the general foreman and the causes traced and rectified. It is good practice for the supervisor of the planning department to give the general foreman a slip each morning stating the number and class of repairs of engines that are to be brought in, and it is the duty of this office to see that the departments are at all times equalized. The duties of the staff men are indicated by their titles; the scope of this article will not admit of further details.

The form of force organization required below the general foreman is so varied and depends so much upon local conditions that it must be sufficient to give simply a few general suggestions. The writer has made more than fifty individual charts for a single plant, illustrating departmental apportionment of skilled mechanics, shop hands, or handy men, and laborers; each shop must work these details out for itself—no hard and fast rules can be laid down. Great care should be taken to organize the working gangs with the proper proportion of skilled and unskilled men. Do not have sub-foremen, if needed at all, with no men reporting solely and directly to them; a sub-foreman, or assistant foreman, should always have full authority to direct the men under his charge. Workmen should not be required to report to or receive orders from more than one man, if friction is to be wholly eliminated. The working forces should be divided into small gangs under working leaders, which is better than dividing the whole responsibility between two or three leading foremen; this arrangement will cut down the cost of supervision and place the responsibility and supervision more nearly where the work is actually performed. Specialization is undoubtedly correct for the railroad shop and it must be developed to the fullest extent in every department. Making one man responsible for one class of work not only increases his earnings and his interest in his work, but it enables him to do the best work in a manner satisfactory both to himself and to the railroad. Over specialization is preferable to under specialization.

There is always some discussion as to the relative merits or demerits of two well-known forms of erecting shop organization. The first aims to have the pits divided into blocks of six or eight pits and places one foreman in charge of each block. The other method considers the whole erecting shop as a unit, and has the foremen in charge of gangs, which do special lines of work, and travel up and down over the entire shop, visiting every pit in the order that the work is required. In a shop using a scheduling and despatching system, the former organization is preferable, since accurate comparisons of output for each foreman may be obtained and platted from month to month and a close supervision of his record is very stimulating; moreover, a friendly and healthy rivalry is maintained, thereby keeping up that all-important enthusiasm and "esprit de corps" which, after all, is the great fundamental cause for human excellence. Engines coming into the shop should be divided equally between the foremen as far as possible, so that no one man will obtain unfair advantage

due to the improper selection and distribution of the repairs.

More important even than the distribution of the force organization of a railroad shop is the planning and despatching department in charge of one of the staff supervisors, reporting to the assistant shop superintendent. The work of planning for the admission of engines to the shop naturally assumes more importance than the correct placing of forces, since it is easily possible to bring in too many engines requiring one kind of repairs and thereby disarrange and disorganize the most carefully planned and effective grouping of forces which may have been established to meet certain fixed conditions. The balance of a shop plays a most important part in its successful and economical administration and this is where the supervisor in charge of scheduling and despatching comes in; he must, as far as possible, keep the ratio of classified repairs constant and change that ratio only as may be necessary to prevent overloading some department which may have unexpectedly fallen behind.

For example, let us assume that a shop has been very carefully organized, a man clipped off here or added there until the entire plant is working at maximum efficiency. Then let us assume that 45 per cent of all engines turned out are to have new fireboxes, that 15 per cent are to have new cylinders, that 10 per cent are to have one or more new fireboxes or flue sheets, and that 30 per cent are to receive simply general repairs to machinery with flues removed and safe-ended and with tires turned. Now let us suppose that the exigencies of the service make it impossible to obtain for this shop more than 20 per cent of engines needing general repairs and that 55 per cent of all engines arriving need new fireboxes, and that 25 per cent need new cylinders; what, then, for the time being, has become of our carefully planned organization both as to men and machines? The intelligent selection of engines has a very noticeable effect on the cost of repairs as well as on the mean output; this is much more apparent in large shops where the organization is less flexible and usually highly specialized.

A locomotive repair shop is primarily a plant for manufacturing and maintaining power units needed for marketing the commodity, transportation, which the railroad company sells to the public, and in order to enable the company to sell its product to the best advantage the shop must at all times be ready to supply the operating department with the locomotives needed. This demand for power varies appreciably with the seasons and other causes, national and international, so that it is not always possible to keep a fixed percentage of engines of certain classes available for shopping, which have also made their required mileage in service. The division superintendent and the superintendent of motive power should, however, co-operate closely with the local shop management, as no shop can deliver a constant maximum output from month to month which will satisfy the operating officials if it is not properly supplied with the kinds of repairs for which it has been organized. The ideal state of affairs exists when engines come in for repairs in a constant flow from month to month, and there is in normal times for every railroad a nearly constant direct ratio between the number of locomotives in service and the number requiring repairs; so far as conditions will allow, this ratio should be maintained.

Planning, scheduling and routing and despatching may be depended on to suggest and create the force organization needed. To a degree the organization will automatically adjust itself to the many variable working conditions so plainly brought to light by the accurate records resulting from the systematic scheduling and routing and despatching of all operations and material through all departments of the shop. With one well-known form of modern routing system the use of the despatch board tells at once which department is late or ahead and, provided the shop is using the normal repair ratios, suggests the changes in organization or equipment necessary to build up a department and consequently equalize the shops. The best shop organization can make but an outward show of efficiency without a planning department as outlined. To the casual observer the shop may be speeded up to its maximum intensity, but a careful analysis of

conditions will soon expose many weaknesses and wastes of labor and material.

Modern combination staff and line organizations must be more generally employed if our railroad shops are to keep pace with the increasing demands made by the management for reductions in maintenance costs needed to offset government regulation of freight rates and the ever-increasing demands of organized labor. Finally, the statement may now be made authoritatively that increases of output up to 25 per cent have been recorded in several large railroad shops using in greater part the modern organization described in this article, and it is conclusively beyond argument that similar or greater increases in output, with consistent decreases in labor and material costs, may be assured to any large railroad shop whose officers and their superiors have the foresight and courage to adopt these correct principles.

CLOCK-WORK TIME-LOCK FOR ELECTRIC INTERLOCKING MACHINE

On the "Model 2" unit-lever interlocking machines used at the Grand Central Terminal, New York City, there are now in use a number of clock-work time-releases or time-locks, made by the General Railway Signal Company, which are so simple and compact that all of the machinery for a release is enclosed within a box fixed on the top of the lever which it is to govern, the whole being no wider than the body of the "lever"; and the operation of the releases during a period of 12 months has been so satisfactory that all other devices for this purpose heretofore used at this interlocking are declared to be inferior.

The time release performs the function of a detector bar or

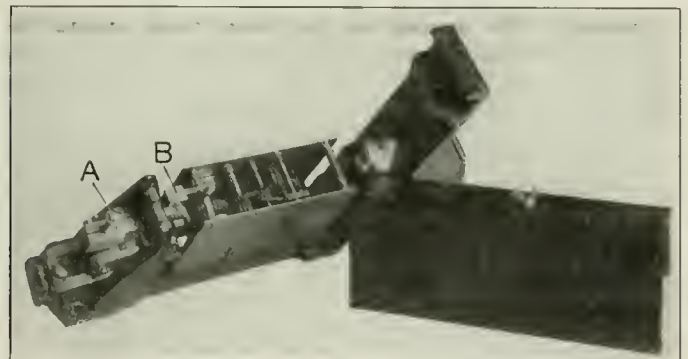


Fig. 1—Clock-Work Time-Lock for "Model 2" Unit Lever Interlocking Machine

detector track circuit; or, rather, it lengthens the time limit which ought to be imposed by a given detector circuit. For example, at D V interlocking, Spuyten Duyvil, 10 miles out from the terminus (see diagram), there is a release on the lever for signal 73, which signal, when cleared, gives a route from A, Track 6, through switches 81, 83, 85, 87 to B, Track 4. When a train makes this movement the arm of signal 73 can go back to the normal or stop position as soon as the engine passes it; and, without the restraint imposed by the time release mechanism, the lever also could be put back to normal. But the distance from switch 81 to switch 87 is so great that, before a slow train could reach, say, switch 85, an absent-minded signalman, having put lever 73 normal and having thereby released the mechanical interlocking, could move switch 85 in front of the train and thus turn it on to Track 2, which might be a dangerous movement. The time release therefore by deferring the restoration of lever 73, for, say, 35 seconds, serves for that length of time the same purpose as a detector bar extending from signal 73 to Track 4.

The clock-work apparatus is adjustable, so that any desired interval of time may be interposed, after the signal arm has been restored to the normal position, before the lever can be restored fully to the normal position.

The apparatus is fixed on the upper part of the signal lever

in the machine. A cam surface engages with a plunger and, through the medium of a rocker arm, forces the locking member to the locked position. Arranged in suitable relation to the rocker arm is another arm which drives the timing mechanism. In this arm is an adjustment screw *A*, Fig. 1, which determines the distance that the timing mechanism can be moved. Provision is made for adjusting the time from five seconds to two

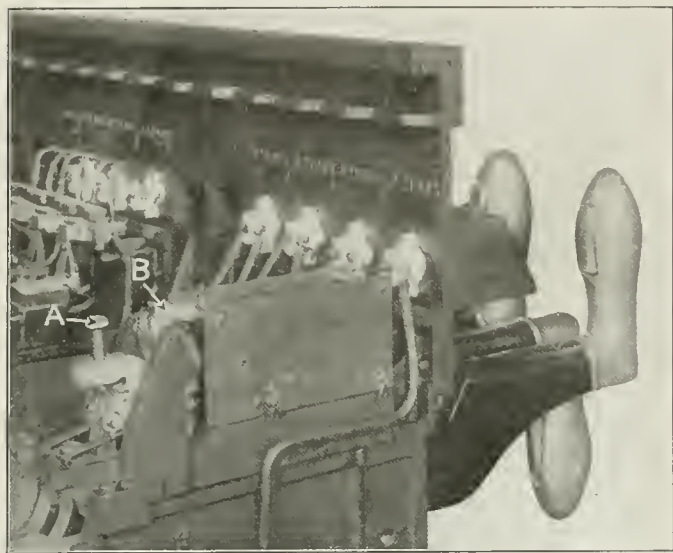


Fig. 2—Clock-Work Time-Lock

minutes. The moving of the lever from normal to reverse causes the lock plunger to move to the locked position, and it is latched there; and at the same time the lever winds up the spring in the timing mechanism, setting it forward the amount determined as proper for that particular application, this being in all cases fixed as may be determined locally in each case.

The mechanism remains in this position during the time the lever is reversed. When the lever is moved to the normal indication position the plunger on the rocker arm is free to drop into the depressed portion of the cam, on the lever; and the mechanism is left free to be driven backward by the action of

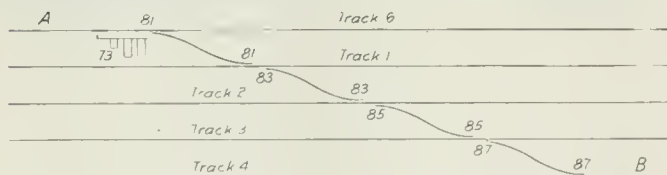


Fig. 3—Crossovers at Spuyten Duyvil

the spring, which was wound up at the time the lever was moved to the reversed position.

At the expiration of the time limit, the clockwork mechanism has moved to a point where it releases the latch (*B*, Fig. 2) which has been holding the lock plunger in engagement with the lever. The plunger is then snapped out by the action of the spring.

It will be noted that the locking plunger is not only forced into the locking position, but that the plunger remains in the full locked position until the end of the time interval. There is thus complete uniformity in action and no tendency to round the corners of the plunger or of the locking notch in the lever.

This device is so designed that it is mounted on the top of the lever guide in the same manner as the electric lever locks, without any change in adjacent parts. In this particular installation the device is used solely as a mechanical time lock; but it can with slight changes be made to close or to open electric circuits in conjunction with switch locking.

A cover is provided for the protection of the parts. It is shown (off) in Fig. 1. It can be sealed so that the adjustment

cannot be altered by unauthorized persons. The device is operated independently of the indication mechanism and, therefore, the indication system may be either battery or dynamic.

For the foregoing information and illustrations we are indebted to H. S. Balliet, signal engineer of the electric division of the New York Central.

PROPER MANAGEMENT OF FREIGHT-CAR SERVICE*

By J. R. CAVANAGH

Superintendent of Car Service Cleveland, Cincinnati, Chicago & St. Louis

I still believe that a general car pool, under the joint jurisdiction and supervision of the American Railway Association, the Master Car Builders' Association and the general traffic associations, would produce excellent results; especially if a scheme could be worked out for making all car repair shops "pool" shops so that when cars come into the "pool" shops they will be brought up to a certain unit of standardization. It should be arranged that none of the lines, parties to the pool, shall individually add any cars to its equipment except through the pool organization, and ownership should be based on a percentage (interest in the pool) basis, or as may be agreed upon.

For illustration: If the Kansas City Southern owns 11 per cent of the box car equipment and desires to increase its allotment to 15 per cent, and it could be shown that this was necessary or reasonable, the board of directors would so approve, and the Kansas City Southern could then add such additional box cars to its allotment as would increase its percentage to 15. If, however, it could be shown, by the board of directors, that such increase on the part of the Kansas City Southern was not necessary, or would be met by a general increase in the equipment of the pool, the Kansas City Southern would be charged with an additional 2½ per cent as against the 4 per cent which it desired to add, on the theory that it would get the benefit of the increased percentage of the other members of the pool in the use of their cars during the greater portion of the period when the other members do not need the cars.

My idea would be for all of the freight cars to be put into the pool. In order to obviate the various methods of classification of cars and the necessity for an equipment guide to determine what the car is, the cars should be marked with a specific pool mark.

For illustration: The first initial would indicate the classification such as:

- A—automobile or furniture cars;
- B—box cars;
- C—coke cars;
- D—dump cars;
- F—flat cars;
- G—gondola cars;
- H—hopper bottom cars.

The second letter to indicate the length, such as:

- A—60 feet long and under;
- B—55 feet long and under;
- C—50 feet long and under;
- D—45 feet long and under;
- E—40 feet long and under;
- G—36 feet long and under.

The third letter to indicate the capacity, such as:

- A—250,000 lb. and under;
- B—225,000 lb. and under;
- C—200,000 lb. and under;
- D—175,000 lb. and under;
- E—150,000 lb. and under;
- G—125,000 lb. and under;
- H—110,000 lb. and under;
- J—100,000 lb. and under;
- K—80,000 lb. and under.

Therefore, if a box car is 36 feet long and of 80,000 lb. capacity, the first initial or marking on the car would be "B" for box car, the second initial would be "G" for 36 feet long, and the third letter would be "K" for 80,000 lb. capacity. Thus, all pool cars of this class would be marked "B-G-K" and allotted their series according to the number of cars owned in such pool.

For illustration: A road having 14,000 cars would be given

* Abstract of written discussion of E. E. Betts' paper presented at the September meeting of the Western Railway Club, as noted in the *Railway Age Gazette* of September 24, page 578.

numbers from 1 to 14,000; a road having 9,000 cars would be given numbers 14,001 to 22,999, etc. Each car should bear ownership plates and, if necessary, to preserve identity, a stencil on the ends of the car, above the ownership plates, showing the original initials and car number. This will simplify reporting of cars, as the moment anybody, whether railroad man, shipper or consignee (after the scheme becomes known) on seeing "B-G-K" would know it was a box car, 36 feet long inside and 80,000 lb. capacity.

All roads should report to the pool the per diem on these cars at the current per diem rate, provided we remain under the present per diem arrangement. However, my idea contemplates an exchange settlement plan, as outlined in my various papers on the subject for the last 25 years. For illustration: On December 31, 1915, road "A" has 26,250 box cars; they are put into the pool. On that date an inventory develops that road "A," including its own cars, has 19,750 cars on its rails belonging to members of the pool; the difference between what it has on its own rails and what it has contributed to the pool represents its debit or credit balance each day, and the debits must agree with the credits.

The scheme also admits of subsequent readjustments of the per diem rate or exchange balance rate on the various classes of cars. Thus: It may be shown that for all "B-G-K" cars the per diem rate or settlement will be 40 cents, or one cent per ton capacity. All cars of 100,000 lb. capacity would be put in under 50 cents per car per day; this being more equitable than the present flat rate of 45 cents per car for a little dinky flat car as against the same rate for a great big 60-ton capacity steel self-clearing coal car, or a nice large 40-ton modern refrigerator car.

VALUATION METHODS ON THE BIG FOUR

The parties of the Interstate Commerce Commission, Division of Valuation, have been at work on the Cleveland, Cincinnati, Chicago & St. Louis since September, 1914, necessitating the organization by the railroad of a considerable force to carry on the work required of the railroad in conjunction with the government inventory.

Four government roadway parties have covered over 1,100 miles of line to date. A government terminal party is at work at Indianapolis, and there are two other terminal parties maintained jointly by the government and the railway. Four government parties are also making an inventory of the Western Union lines, while the railroad has a party on its own telegraph and telephone lines. A bridge party, a signal party and a building party, each consisting of two railroad men and one government man, commenced work in June and are following the roadway parties.

The roadway parties are taking only the field notes, which they send direct to the office of the Southern district of the Division of Valuation, at Chattanooga, which is handling all work on the Big Four, including the lines in Illinois which fall outside the boundaries of the Southern district. The terminal parties are making complete summaries of materials and assembly sheets. They also gather enough data to complete the terminal maps. Field work on all lines west of Indianapolis was completed about August 1.

The railroad is represented on each roadway party by a pilot selected from the staff of the engineering department, giving preference to a man who is well acquainted with the lines to be inventoried. The pilots are assigned to a given district sufficiently in advance of the government schedule to enable them to become thoroughly familiar with the property. The same end is accomplished on the joint bridge and building parties by assigning, in turn, old members of the division bridge and building forces who have had long experience with the bridges and buildings in the particular district to be covered.

The pilots walk over the district in advance of the field parties, taking with them all old maps of the line available. With this

information as a guide, sufficient notes are taken to enable the drawing room to make complete new maps. This includes complete data on all physical features, right of way, etc. The right page of the notebook is used for the plotted notes, the left page being used to indicate clearing ballast, shoulder widening, rail, sewers, pipe lines, etc. An effort is made also to interview all persons who can possibly give any information concerning hidden quantities.

The roadway parties are supplied with preliminary prints of the prescribed right of way, track and station maps, profiles and quantities on recent construction, all standard track plans, plans of bridges 12 ft. or less in length, lists of leases and abstracts of contracts concerning industrial tracks not owned entirely by the railroad. The bridge party is supplied with plans of all bridges over 12 ft. long, coaling stations, turntables, scales, water station tubs and supports and pipe lines. The building party is furnished all available plans of the buildings in the district.

Owing to the fact that the maps in the company's possession would not fulfill the specifications for maps and profiles as prescribed by the Interstate Commerce Commission, it has been necessary to make entirely new maps, a task requiring the organization of a considerable drafting force. As a result of the special efforts to push the drafting work, rapid progress has

Status of Maps and Profiles-Valuation.													
Week ending... 7/10/15.....													
Division.	Valuation Section	Length Miles	Right of Way & Track Maps						Profiles				
			Total miles	Plotted during week	Traced during week	Total miles	Plotted during week	Traced during week	Total miles	Plotted during week	Traced during week	Total miles	Plotted during week
Indpls Term.	1	180	180	0	180	0	180	0					
Indpls C.&E.	2	85	85	0	85	0	85	0					
White Water	25	630	170	75	0	0	0	0					
Cleveland	35	108	630	40	220	40							
Indpls-Ohio	41	1175	1030	230	660	200	220	220					
Sandusky	42	1288	995	160	995	160	995	160					
Michigan	46	1685	1495	100	1375	195	860	400					
Calico-South	9	1304	200	0	200	0			76	0	48	0	
Grand Total		2275	10568	655	13898	615	10320	780	2716	0	2528	0	21028
Total plotted-not inventoried by Government-Maps 1420.8 mi. Profiles 243.8 mi.													
Total traced " " " " -Maps 1285.8 mi. Profiles 204.8 mi.													
-21 Men on maps. 0 Men on Profiles. 3 Men on finishing.													
-2 Men on special work													

Table Used to Keep a Check on the Drafting Progress

been made, amounting to an output of from 60 to 80 miles of completed maps per week. In the month of June, 280 miles of maps were plotted, 288 miles were traced and 276 miles were checked. An accompanying table shows the means by which the progress on the maps is checked from week to week. On all lines save one the maps were made from old maps on hand, supplemented by information collected by the pilots. In the case of the White Water division, 70 miles long, no map was in existence and a complete resurvey was required.

An important feature of the organization is the separation of the work of the draftsmen or plotters from that of the tracers. Wherever practicable one plotter is assigned to a given valuation section which he carries through to completion, and each plotter is expected to make his own search for the necessary data. This arrangement prevents considerable duplication in searching the records, and enables each plotter to become thoroughly familiar with the particular records with which he is concerned.

In accordance with this arrangement the first work to be done by the plotters is to gather and record the information necessary for the prescribed schedule of right of way and also for the list of industrial tracks on which the company's rights are restricted, as provided in Interstate Commerce Commission order No. 12, dated January 21, 1915. To this end mimeograph blanks are provided on which the information can be recorded conveniently. A form headed "Report on Cost and Value of Right of Way and Real Estate" contains blanks not only for

the items required for the schedule to be put on the map, but is designed also for use in compiling the information required on DV. Forms Nos. 107 and 108 for the schedule of land to be filed with the Interstate Commerce Commission, as required in order No. 7, dated November 21, 1914.

The men obtain the information for right of way from the files of the office of the real estate agent. As they are assigned an entire section, the records are gone through by counties, the data being abstracted as found. In consequence, no special search of the records for a particular parcel of land is required unless it is missing when the complete file has been covered. Data as to sidetrack contracts are taken from the files of the engineering department, and recorded on the blanks provided, from which they are eventually copied on DV. Form 135.

When all the right of way sheets of a given district are finished they are given to a typist, who prepares the schedule summary in the form and order required for the map. This shows the parcel number, grantor, grantee, instrument, date, record index and custodian's number. A heading at the top of the sheet gives the date, sheet number, division and valuation section. Two carbon copies are made, one of which is a backed tissue carbon to permit blue printing the schedule on the working print of the map furnished to the field forces. The identification heading at the top of the schedule appears on those working blue prints but will, of course, be omitted when the schedule is placed on the finished maps.

In plotting, the draftsmen work on as long a roll of the detail paper as the alinement will permit. The conventional sheets are indicated roughly. The tracers make sheets of the standard 54-in. length. A material saving in time was obtained by the use of rubber stamps. Each tracer is given a sheet of detail paper upon which have been stamped to correct scale and proportions all conventional signs, names of counties, township numbers, figures from 0 to 9 for the various sizes of numerals used, the abbreviation N.V.¼, etc. By sliding this sheet under the tracing cloth to the proper position the various figures can be traced accurately and quickly. Recently greater efficiency has been obtained by the use of Ockerson printing devices for the same purpose, by means of which the various items are printed directly on the tracing cloth. A printing press has also been installed for printing the titles. To save time in setting them up, cuts have been purchased, giving the combinations of letters and words most frequently used. Another time-saving device is a power eraser made by attaching flexible dental shafting to the shaft of a very small electric motor operated from the lighting circuit. A common red pencil eraser cut roughly to the shape of a disc serves as the rubber.

The draftsmen are under the immediate direction of two squad foremen who assist the plotters in looking for information, investigate disputed points and check the drawings. They also follow up any searches for missing data which have been referred to the real estate department. The drawings are checked by these men principally for specification requirements, hidden quantities, right of way, etc. The complete check is obtained by the use of the working blue prints by the field forces and by furnishing the real estate department with prints to check for right of way. An independent squad of draftsmen corrects the tracings for errors discovered by the field forces and by the real estate department.

The organization under the direction of the real estate agent is at work preparing the schedule of land according to D. V. Forms 107 and 108. For this purpose they use the "Reports of Costs and Value of Right of Way and Real Estate" prepared by the plotters in the valuation office, checking the information which the plotters have entered and supplying the remaining data. This requires a search of all the records of the railroad. All new real estate records are kept and indexed in the office of the real estate agent, but old records are in the files of the auditor, except such as are filed in the construction correspondence in the chief engineer's office. The work is further complicated by the fact that the Big Four, like most other roads,

has absorbed a great many small corporations, each with independent records. In spite of these obstacles, about 500 miles of line had been scheduled by the first of August, all records being carefully indexed as the work was carried along in order that easy reference may be had to the original records.

AN INDEX-RECORD OF STATION AGENTS

R. L. White, superintendent's office, Southern Railway, Memphis, Tenn., sends us the following description of a chronological record and an index of the forces at the stations on his division, which he has found useful in an office where there are a number of clerks who have occasion frequently to correspond with stations or to refer to station business. This record was devised as a remedy for the constant inconvenience felt before anything of the kind was in use. The need of such an aid as this would be felt, of course, not only in a superintendent's office, but in the other departments which have to deal with stations—those of the general passenger agent, the general freight agent, the claim agent, etc.

The scheme requires two books (or two halves of a single book)—one, Book A, in which the names of the persons (employed in the classes to be dealt with) for the whole division are arranged alphabetically, a page for each letter; and the other, B, in which there is a page for each station, with numbered lines, constituting a chronological record for that station.

Take for example the case of a new man employed on the division (A. A. Adams). He is assigned to service at Montague station, which, we will say, is a new station. He is first entered on the Montague page of Book B, which gives the necessary information for Book A (see below). He is then recorded in Book A (the A page), which is an index to Book B. Here the entry is page 1, line 1.

Later on Adams goes to another station, Nomad, and his record at Montague is closed. He then appears on page 2, which is the station agency record for Nomad. After being so entered on Book B, his record on Book A has added to it another item—namely, page 2, line 1.

This same method is followed out in recording the service of Cashier B. B. Bond, first at Montague and then at Nomad; proper record being entered on both agency sheets, and then on page B, of the alphabetical record, which shows service at two different places.

When information is desired as to who is agent or cashier at Montague, it is only necessary to turn to the Montague station page of Book B; when information is desired as to any person, search is made on the page of Book A headed with the initial of his surname.

When the page covering the Montague agency is filled out it can still be known as page 1, the next page being made 1-A.

Sample Pages

X. & Y. R. R.—DIVISION A, BOOK B, PAGE 1

Record of Agency Forces
Montague

From Line	Date	Time	To Date	Time	Capacity	Name
1	1-1-14	7:00 a. m.	1-1-15	7:00 a. m.	Agent	A. A. Adams
2	1-1-14	7:00 a. m.	1-1-15	7:00 a. m.	Cashier	B. B. Bond
3	1-1-15	7:00 a. m.	*		Agent	C. C. Cox
4	1-1-15	7:00 a. m.	*		Cashier	D. D. Doc

X. & Y. R. R.—DIVISION A, BOOK B, PAGE 2

Record of Agency Forces
Nomad

From Line	Date	Time	To Date	Time	Capacity	Name
1	1-2-15	7:00 a. m.	7-1-15	7:00 a. m.	Agent	A. A. Adams
2	1-2-15	7:00 a. m.	7-1-15	7:00 a. m.	Cashier	B. B. Bond

X. & Y. R. R.—DIVISION A, BOOK A, PAGE A

Record of Agents and Their Forces

Name	A Page and Line
Adams.....A. A.	1 1 2 1 1

X. & Y. R. R.—DIVISION A, BOOK A, PAGE D

Record of Agents and Their Forces

Name	D Page and Line
Doe.....D. D.	1 4

* This space when left blank, indicates that the person is still in service at that station in the capacity shown.

General News Department

The Interior Department at Washington reports the completion of a section of the new Government railroad in Alaska, 20 miles long. It is said that this line begins at Anchorage, at the mouth of Ship creek (which flows into Knik Arm) and runs in a northerly direction toward the Matanuska coal field. This would seem to indicate that the branch to this coal field is to be the first section of the road to be finished.

The "post office" or mail room in the general office building of the Baltimore & Ohio at Baltimore is now equipped with lock boxes, in the same style as a government post office; and each office in the building, having a key to the box assigned to it in the mail room, sends for its letters at any time of the day or night, as may be desired. This mail room at Baltimore handles about 35,000 pieces of mail every 24 hours, most of these being, of course, railroad service letters.

R. P. Kyle, safety supervisor of the El Paso & Southwestern, in his second annual report, shows a marked diminution in the number of casualties to employees. Taking the years 1913, 1914 and 1915 in order, the records of employees killed have shown 12, 7, 2; and of injured 493, 455, 406. Only two passengers were injured during the past year and none killed; but in the column headed "trespassers and others" the casualties for the three years named, 1913, 1914, 1915, are killed, 9, 10, 12; injured, 22, 32, 45.

The Wisconsin conservation commission has received from the Chicago, Milwaukee & St. Paul an appeal for protection from the colony of beaver which have taken it upon themselves to construct a number of dams along Bear creek in Oneida county, causing the water to back up and flood the railroad company's right of way in the vicinity of Merrill and Goodnow. As beaver is protected by law, the railroad could not kill or trap the animals, even though their dams are causing wash-outs.

A westbound express train of the Baltimore & Ohio was stopped by robbers near Central station, W. Va., on the morning of October 8, about 2 o'clock, and a large quantity of registered mail was carried off. Included in the loot were 90 packages of unsigned bank notes, in transit from Washington to banks in western states. The robbers moved the engine and mail car three miles forward from the place where the train was stopped, and there they were taken into an automobile which was waiting in charge of an accomplice.

President Ripley, of the Atchison, Topeka & Santa Fe, on September 5 addressed a telegram to the Mayor of Ardmore, Okla., offering to settle all claims for personal injury and property losses resulting from the explosion of a tank car of gasoline on the company's tracks at Ardmore on September 22. Mr. Ripley made it plain that the railroad was not assuming liability for the accident. The verdict of the coroner's jury was that the accident was caused "through negligence of the Santa Fe Railroad Company and its employees, but said negligence was not felonious."

The Gulf Hurricane

The damage done by the storm of September 29 to the tracks of the Louisville & Nashville proved so serious that both freight and passenger trains are still being detoured by way of the Gulf & Ship Island and the New Orleans & North Eastern, by way of Hattiesburg. The distance from Gulfport to New Orleans by this route is 180 miles, as compared with 67 miles by the L. & N. Two complete passenger trains are run each way daily, and from four to six freight trains. On October 5 the line had been made passable from Mobile as far west as Bay St. Louis.

The damage to the track of the New Orleans & North Eastern was not very extensive, but traffic was suspended from Wednesday, September 29, until Sunday, October 3, mainly because of the loss of telegraph, telephone and block signal wires which

hampered the roadway department in assembling men and material for repair work. The water in Lake Pontchartrain did not subside until Friday evening. On the trestle of this road across the lake, six miles long, it was necessary to drive only 17 new piles. It was necessary to use single track between South Point and Citrus, 10 miles, until October 8.

Service over the Illinois Central's main line to New Orleans, on which 18 miles of double-track was washed out between New Orleans and Hammond, was resumed on October 8, when a new single track over this line was completed. While the main line was cut, service was maintained by detouring via the Yazoo & Mississippi Valley from New Orleans to Baton Rouge, and thence to Hammond via the Illinois Central.

Dinner to President Ripley

The officers and directors of the Atchison, Topeka & Santa Fe will give a dinner to President E. P. Ripley at the Blackstone hotel, Chicago, on Saturday evening, October 30, on the occasion of Mr. Ripley's seventieth birthday. The guests will number about 300, and will include intimate friends of Mr. Ripley, men with whom he has been closely associated in business, and the chairmen and presidents of the leading railways of the country.

Decisions of Accounting Officers

The Association of Railway Accounting Officers has in preparation a book containing a synopsis of all decisions and recommendations of the association relating to passenger accounts up to April, 1915. The book will contain the association's standard passenger forms and will be bound in cloth. Each member will receive a copy of the book free.

Extra copies, or copies for non-members, will be furnished at 75 cents each. The secretary of the association is E. R. Woodson, Woodward building, Washington, D. C.

Signalmen Imprisoned

Signalman Tinsley, chiefly responsible for the disastrous collision at Quintinshill (Gretna), Scotland, May 22 last, was tried for manslaughter in court at Edinburgh, September 15, and was sentenced to three years' penal servitude. The night signalman, Mechan, who was just going off duty at the time the error occurred, was sentenced to imprisonment for 18 months. Fireman Hutchinson, who was in the cabin at the time, was tried for manslaughter, but acquitted. The fireman had gone into the cabin in accordance with the rule to see that the signalman made no mistake which should endanger his train, standing near by; and he neglected to correct the signalman's error in not putting a collar on the signal lever as a precaution against improper movement of that lever. This collision was reported in the *Railway Age Gazette* of June 11, and October 8.

Reorganization of Association of Western Railways

A change has been made in the organization of the Association of Western Railways. Heretofore the chairman of the General Managers' Association of Chicago has been also chairman of the Association of Western Railways and chairman of its executive committee. Under the new plan the executive committee of the association will elect at its first meeting of each year a chairman of the committee, who shall also be ex-officio chairman of an advisory committee, appointed by the executive committee and consisting of eight of its members. W. G. Biedt, president of the Chicago & Alton, has been elected chairman of the executive committee and of the advisory committee. The executive committee will select an executive secretary, who may also be chairman of the General Managers' Association of Chicago. As noted elsewhere, J. W. Higgins, general manager of the Missouri Pacific, has been appointed chairman of the General Man-

agers' Association of Chicago and also executive secretary of the Association of Western Railways. Regular meetings of the advisory committee are to be held every two months on fixed dates at Chicago, and special meetings may be called at other times. The executive committee will obtain labor statistics from the different railroads, in addition to making investigations of other matters of interest to the railroads, reporting to the advisory committee, and will maintain a bureau of statistics for the compilation of such statistical and other historical matter as may from time to time be required by the advisory committee.

The New England Railroad Club

At the regular monthly meeting of the New England Railroad Club, to be held at the New American House, Boston, Mass., on Tuesday evening, October 19, an illustrated paper will be presented by F. M. Davison, of the Boston & Albany, entitled "Architecture in Railroad Work."

New York Railroad Club

At the regular monthly meeting of the New York Railroad Club to be held in the Engineering Societies' Building, 29 West 39th street, New York, on Friday evening, October 15, a paper will be presented by W. R. McKeen, consulting engineer, motor cars, of the Union Pacific, on the "Value of Motor Cars to Railroad Systems."

Railroad Men's Improvement Society

At the first meeting for the season the Railroad Men's Improvement Society held at the Meridian Club, 90 West street, New York, on October 7, a paper was presented by George P. Barker, president of the Efficiency Club of New York, entitled "Increasing Efficiency in Business." The paper dealt entirely with human efficiency and aimed to show how a man should try to bring out the elements of success existing in him.

National Safety Council

The Fourth Annual Safety Congress of the National Safety Council is to be held at the Bellevue-Stratford Hotel, Philadelphia, October 19, 20 and 21. This organization, composed of large industrial concerns in all parts of the United States, has now become an important body, its convention last year at Chicago having brought together about 1,500 delegates. It is expected that the meeting this year will draw a still larger number. All branches of industrial and civic life are represented in the different sections. At the general session on Tuesday, the 19th, W. C. Wilson, claims attorney of the Delaware, Lackawanna & Western, will deliver an address on Public Safety and the Railroads.

The meetings of the railroad section are to be held on Wednesday, October 20, from 9 a. m. to 5 p. m., and on Thursday, the 21st, from 9:30 a. m. until noon. The chairman of this section is Marcus A. Dow, general safety agent of the New York Central Lines, New York City. After the opening address by the chairman there will be a discussion of Mr. Wilson's paper (delivered the day before). R. C. Richards, Chicago & North Western, will speak on the value of the National Safety Council to railroads. Other subjects and speakers are as follows: Automobile Accidents, J. C. Rose, chief claim agent, Pennsylvania Railroad; Prizes to Committeemen, by W. C. Wilson, D. L. & W.; How to Maintain Interest in Safety Work, by W. B. Spaulding, claims attorney, St. Louis & San Francisco; How to Reach Non-English Speaking Employees, by Isaiah Hale, Atchison, Topeka & Santa Fe; Moving Pictures and How to Get Good Films, by C. H. Blakemore, Norfolk & Western. C. T. Banks, safety supervisor of the Erie, will also speak.

The papers which are named on the program are not expected to take up the whole of the time, and opportunity will be allowed for full and free discussions. Railroad officers interested in safety work may introduce any relevant topic. All railroads are invited to be represented, without regard to whether they are or are not members of the National Safety Council.

The president of the National Safety Council is R. W. Campbell, of the Illinois Steel Company, and one of the vice-presidents is R. C. Richards, of the Chicago & North Western. The secretary is W. H. Cameron, Chicago.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.
- AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, October 26-27, 1915, French Lick Springs Hotel, French Lick Springs, Ind.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, Chicago.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 19-21, 1915, Detroit, Mich.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.
- ASSOCIATION OF RAILWAY ELECTRIC ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual meeting, October 18-24, 1915, Chicago.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915. Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, October 19-21, Colorado Springs, Colo.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

Name of road.	Average mileage operated during period.	MONTH OF JULY, 1915					MONTH OF AUGUST, 1915.					Operating expenses					Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.
		Operating revenues					Maintenance of					Trans- portation.								
		Freight.	Passenger.	Total inc. mis.	Way and structures.	Equipment.	Traffic.	Miscellaneous.	General.	Total.	General.	Total.	General.	Total.						
Chicago, Indianapolis & Louisville.....	622	\$365,451	\$156,140	\$568,140	\$60,746	\$105,032	\$19,612	\$193,805	\$178	\$18,803	\$398,301	\$169,839	\$27,040	\$142,739	\$3,000	\$169,839	\$27,040	\$142,739	\$3,000	
Kansas City, Mexico & Orient.....	737	160,129	32,479	202,931	55,918	44,465	8,714	91,071	.....	8,948	208,116	161,886	10,000	161,886	.....	161,886	10,000	161,886	.....
Northwestern Pacific.....	507	145,858	27,480	462,502	59,507	46,632	6,352	120,796	.....	7,695	234,767	207,735	17,045	207,735	.....	207,735	17,045	207,735	.....
Oahu Ry. & Land Co.....	114	124,252	21,445	155,518	10,152	9,564	682	26,169	.....	3,585	50,152	105,366	7,250	98,116	.....	105,366	7,250	98,116	.....
Uster & Delaware.....	129	46,964	68,877	133,848	14,935	13,008	2,654	46,909	.....	2,700	80,259	53,589	3,500	50,089	.....	53,589	3,500	50,089	.....
Alabama & Vicksburg.....	143	\$76,464	\$36,688	\$125,171	\$17,916	\$25,725	\$3,642	\$43,675	\$2,246	\$5,260	\$98,464	\$26,706	\$7,936	\$18,770	\$5,839	\$26,706	\$7,936	\$18,770	\$5,839	
Alabama Great Southern.....	309	222,749	101,111	373,796	34,103	30,984	13,894	72,600	3,182	7,538	269,800	127,906	15,152	112,754	16,210	127,906	15,152	112,754	16,210	
Ann Arbor.....	294	124,832	62,282	201,601	25,793	30,383	5,240	72,753	670	79,933	242,781	58,920	12,800	47,123	21,215	58,920	12,800	47,123	21,215	
Arizona Eastern.....	378	195,877	35,095	244,820	34,093	24,820	2,118	50,192	1,016	10,048	122,101	122,629	14,220	108,409	54,477	122,629	14,220	108,409	54,477	
Atchafalaya, Topeka & Santa Fe.....	8,620	5,643,909	2,953,853	9,382,839	1,284,789	1,498,300	207,116	2,421,026	.....	166,593	5,460,646	3,922,193	412,063	3,506,962	669,032	3,922,193	412,063	3,506,962	669,032
Atlanta & West Point.....	93	46,563	40,042	101,268	13,041	20,939	5,383	31,523	3,021	4,558	78,465	22,804	5,525	16,777	7,783	22,804	5,525	16,777	7,783	
Atlanta, Birmingham & Atlantic.....	638	151,300	49,625	219,229	39,888	40,244	12,048	90,332	26	8,912	192,050	27,177	13,100	14,077	-9,411	27,177	13,100	14,077	-9,411	
Atlantic & St. Lawrence.....	167	66,524	20,421	109,481	25,728	23,460	3,570	50,331	.....	3,238	106,328	31,553	11,505	-8,352	-36,993	31,553	11,505	-8,352	-36,993
Atlantic Coast Line.....	4,699	1,294,492	563,206	2,017,173	360,209	484,076	55,261	817,252	6,351	66,182	1,988,184	228,989	140,000	88,931	15,209	228,989	140,000	88,931	15,209	
Baltimore & Ohio.....	4,535	7,165,763	1,494,837	9,348,857	1,047,673	1,768,378	163,216	2,748,041	.....	180,716	5,954,349	3,394,508	276,429	3,118,079	607,434	3,394,508	276,429	3,118,079	607,434
Baltimore & Ohio Chicago Terminal.....	79	.....	1,118	134,559	20,250	12,311	976	55,575	2,302	5,003	94,664	39,895	17,654	20,888	-104	39,895	17,654	20,888	-104
Baltimore, Chesapeake & Atlantic.....	88	79,447	68,492	153,448	13,551	30,557	2,043	42,609	.....	2,632	110,879	40,319	2,249	40,319	-9,242	40,319	2,249	40,319	-9,242
Bangor & Aroostook.....	631	163,290	60,650	241,342	47,380	51,177	2,693	70,127	3,319	11,699	285,072	56,270	12,675	43,595	11,887	56,270	12,675	43,595	11,887	
Bessemer & Lake Erie.....	205	1,204,697	49,682	1,281,925	81,877	156,984	7,990	241,469	.....	31,693	489,592	779,333	16,794	762,538	76,931	779,333	16,794	762,538	76,931
Bingham & Garfield.....	27	170,925	2,994	173,919	16,371	14,835	1,040	21,826	.....	1,848	56,113	118,482	4,014	114,467	51,976	118,482	4,014	114,467	51,976
Boston & Maine.....	2,302	2,340,000	1,603,261	4,305,024	518,075	334,980	32,571	1,663,909	17,984	10,279	2,869,897	1,435,127	164,197	1,270,930	349,322	1,435,127	164,197	1,270,930	349,322	
Buffalo & Susquehanna R. R. Corporation	253	112,159	7,813	121,584	23,525	32,003	1,094	31,087	.....	5,437	93,076	28,473	2,600	25,873	-4,052	28,473	2,600	25,873	-4,052
Buffalo & Susquehanna Railway.....	91	16,357	7,195	25,998	3,935	5,560	444	24,053	22	2,335	1,638	1,638	1,600	48	6,384	1,638	1,600	48	6,384	
Buffalo, Rochester & Pittsburgh.....	586	792,034	115,818	946,542	170,362	199,652	12,334	281,019	1,069	22,433	686,870	259,672	20,000	239,672	-44,248	259,672	20,000	239,672	-44,248	
Canadian Pacific Lines in Maine.....	233	39,241	19,115	64,467	20,346	13,683	5,006	27,103	.....	3,530	69,869	-17,401	12,000	8,967	8,967	69,869	-17,401	12,000	8,967
Carolina, Clinchfield & Ohio.....	283	201,726	20,787	227,677	22,211	27,805	7,353	38,678	.....	8,689	103,537	124,140	14,250	109,834	30,749	103,537	14,250	109,834	30,749
Central of New Jersey.....	18	9,821	1,492	11,313	999	70	1,699	2,559	.....	624	5,641	5,990	750	791	-9,242	5,990	750	791	-9,242
Central New England.....	304	302,234	42,334	358,211	56,195	53,995	1,324	88,733	.....	5,163	185,294	172,917	12,800	160,116	84,645	172,917	12,800	160,116	84,645
Central Vermont.....	411	211,375	104,449	315,824	54,697	53,953	10,574	136,340	1,075	6,437	263,076	78,134	15,590	63,543	9,683	78,134	15,590	63,543	9,683	
Chesapeake & Ohio Lines.....	341	84,018	29,687	113,705	26,169	18,099	3,155	45,721	.....	4,420	97,555	22,614	5,000	17,614	3,887	22,614	5,000	17,614	3,887
Chesapeake & Ohio Western Carolina.....	2,374	3,152,618	593,514	3,746,132	446,129	815,950	52,394	1,093,345	19,746	71,373	2,497,887	1,475,712	113,120	1,360,592	314,014	1,475,712	113,120	1,360,592	314,014	
Chicago & Alton.....	1,282	947,924	273,920	1,331,844	233,377	332,940	20,825	449,955	7,606	36,781	1,078,978	235,151	53,600	201,551	-159,765	235,151	53,600	201,551	-159,765	
Chicago & Eastern Illinois.....	622	409,490	173,148	582,638	65,263	100,560	10,917	196,912	.....	16,666	406,998	224,047	26,815	197,217	32,484	224,047	26,815	197,217	32,484
Chicago & Great Western.....	1,052	889,235	382,456	1,371,691	161,738	298,091	33,344	420,108	9,587	30,804	1,754,983	422,075	43,121	378,926	-46,157	422,075	43,121	378,926	-46,157	
Chicago & Erie.....	270	480,423	59,539	539,962	64,966	60,183	17,784	121,281	2,023	12,659	376,074	209,657	20,500	189,157	151,865	209,657	20,500	189,157	151,865	
Chicago & Northwestern.....	8,108	4,456,880	2,093,723	6,550,603	1,179,319	1,238,484	113,886	2,418,303	55,408	150,143	5,611,172	2,167,499	385,000	1,779,479	-267,707	2,167,499	385,000	1,779,479	-267,707	
Chicago, Burlington & Quincy.....	9,366	5,210,839	2,160,318	7,371,157	1,240,254	1,195,941	147,354	2,402,413	18,821	158,601	5,118,386	3,029,139	353,399	2,675,741	-506,227	3,029,139	353,399	2,675,741	-506,227	
Chicago, Burlington & Quincy.....	1,427	806,340	309,327	1,215,667	187,594	215,089	44,159	400,413	8,761	32,557	889,790	331,307	46,150	284,511	-88,566	331,307	46,150	284,511	-88,566	
Chicago, Rock Island & Pacific.....	13	.....	.....	.....	22,701	15,788	986	38,486	.....	4,863	132,744	44,958	2,519	42,439	9,999	44,958	2,519	42,439	9,999
Chicago, Rock Island & Pacific.....	1,753	850,219	491,757	1,341,976	271,089	200,129	30,841	493,785	15,058	139,295	4,643,952	1,493,191	272,186	1,220,902	-334,712	1,493,191	272,186	1,220,902	-334,712	
Chicago, St. Paul, Minn. & Omaha.....	1,753	850,219	491,757	1,341,976	271,089	200,129	30,841	493,785	15,058	36,527	1,045,578	420,522	82,277	337,351	-169,815	420,522	82,277	337,351	-169,815	
Chicago, Terre Haute & St. E.....	374	154,970	17,608	172,578	29,381	33,029	3,710	49,749	668	7,753	125,191	52,663	10,417	42,247	-9,785	52,663	10,417	42,247	-9,785	
Cincinnati, Hamilton & Dayton.....	1,003	731,428	153,563	884,991	146,575	153,113	19,111	357,161	3,818	22,688	580,390	291,970	34,581	257,098	54,791	291,970	34,581	257,098	54,791	
Cincinnati, New Orleans & Texas Pacific.....	337	581,451	146,220	727,671	87,380	201,616	24,188	337,445	5,815	1,585										

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF AUGUST, 1915. — (Continued)

Name of road.	Average mileage operated during period.	Operating revenues			Way and structures.		Equipment.		Operating expenses					Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total inc. misc.	Operating revenues	Traffic.	Trans- portation.	Miscel- lanous.	General.	Total.							
Galveston, Harrisburgh & San Antonio.....	1,351	\$648,402	\$236,738	\$924,395	\$126,107	\$126,107	\$25,254	\$330,067	\$10,049	\$32,228	\$651,298	\$23,097	\$46,269	\$226,475	\$39,922	\$1,847	
Galveston, Wharf	13																
Georgia	307	133,812	69,806	219,188	22,737	40,337	13,205	98,355	95	7,131	181,860	37,328	3,225	34,103	12,144	9,289	
Georgia, Southern & Florida.....	395	92,734	51,928	164,950	21,137	30,964	6,466	68,629	503,769	11,130	179,793	4,060	14,109	18,677	9,289	9,289	
Grand Rapids & Indiana.....	575	249,417	207,264	503,769	58,035	68,130	11,130	64,666	68,629	14,109	179,793	4,060	14,109	18,677	9,289	9,289	
Grand Trunk Western.....	347	500,000	672,289	1,172,289	53,189	107,764	18,862	223,834	6,289	11,866	419,804	252,485	32,970	146,865	40,902	70,547	
Great Northern	8,103	4,176,879	1,319,033	6,126,727	705,095	629,700	98,153	1,541,268	76,159	120,367	3,154,688	3,007,939	384,775	2,623,028	-599,973	70,547	
Gulf, Colorado & Santa Fe.....	1,938	736,439	285,272	1,091,195	339,627	197,744	30,773	427,795	.....	35,878	1,028,779	62,416	58,203	4,054	-157,754	70,547
Gulf & Ship Island	308	108,227	29,395	145,841	12,410	24,674	3,040	34,506	224	6,192	81,047	64,794	7,740	56,972	7,740	7,740	
Hocking Valley	351	506,980	81,833	650,074	60,520	88,127	8,470	165,767	.....	14,076	336,960	313,114	37,400	275,714	27,105	70,547
Houston, East & West, Texas.....	191	62,040	29,113	98,152	24,514	19,068	1,894	34,748	696	2,960	83,821	14,331	5,779	8,500	-20,646	70,547	
Houston & Texas Central.....	895	317,409	136,676	494,797	72,816	84,294	15,050	180,591	6,055	18,803	377,040	117,757	29,883	87,572	-26,409	70,547	
Illinois Central	4,767	3,842,224	1,208,655	5,529,843	875,132	1,286,369	96,236	1,723,226	29,714	138,674	4,355,598	1,394,246	269,700	1,123,560	-136,704	70,547	
Indiana Harbor Belt.....	110	.....	270,085	270,085	35,410	29,590	2,510	95,480	.....	7,808	170,798	99,287	7,502	91,769	6,120	70,547
International & Great Northern.....	1,160	401,310	145,330	598,049	109,262	147,434	21,121	286,346	2,351	29,078	592,678	5,371	28,795	-23,492	-80,044	70,547	
Kanawha & Michigan.....	177	251,221	33,242	320,791	39,057	60,308	3,165	72,673	19	7,145	182,367	108,393	12,300	96,093	11,668	70,547	
Kansas City Southern.....	837	593,607	134,561	807,401	82,505	81,369	26,837	262,720	.....	34,418	475,403	332,004	43,764	287,743	19,037	70,547
Lake Erie & Western.....	900	467,952	82,134	575,173	68,760	115,609	12,879	196,902	.....	12,063	406,213	168,960	24,000	144,955	-30,631	70,547
Lake Erie & Hudson River.....	97	143,040	11,510	161,397	20,922	22,797	1,788	50,546	.....	3,484	99,507	61,890	4,200	57,690	5,471	70,547
Leligh & New England.....	296	252,650	1,813	270,009	39,498	31,574	1,647	62,842	.....	5,211	140,773	129,237	6,200	123,037	25,937	70,547
Leligh Valley	1,442	3,093,546	462,366	3,779,598	435,198	717,388	89,053	1,227,940	13,687	684,449	2,549,941	1,229,657	139,000	1,090,477	-52,436	70,547	
Long Island	398	298,134	995,875	1,472,453	118,508	130,676	13,252	481,661	6,141	24,750	774,988	697,465	77,645	618,164	19,332	70,547	
Louisiana Western	208	100,814	56,043	169,932	33,342	36,431	6,232	51,681	2,017	6,232	135,923	34,009	9,975	23,986	-19,845	70,547	
Louisiana & Arkansas.....	279	108,780	15,176	127,908	26,577	24,212	3,017	33,436	.....	3,995	97,236	36,672	7,500	29,172	-37,624	70,547
Louisiana Ry. & Navigation Co.....	351	143,451	29,984	182,751	29,267	28,010	6,418	60,772	.....	4,992	129,459	53,292	9,498	43,790	2,220	70,547
Louisville & Nashville.....	5,037	3,302,107	1,015,006	4,628,371	713,601	827,933	103,938	1,341,488	26,174	97,171	3,106,433	1,521,938	189,522	1,321,329	330,614	70,547	
Louisville, Henderson & St. Louis.....	200	74,862	45,042	126,720	37,734	16,095	5,574	35,645	.....	2,876	97,924	28,796	3,800	24,959	-12,621	70,547
Maine Central	1,220	553,163	405,135	1,050,517	142,104	125,411	12,123	347,615	7,761	26,297	661,054	389,463	53,084	336,379	23,501	70,547	
Michigan Central	1,785	1,919,013	974,841	3,243,727	419,831	461,011	58,349	1,056,937	49,889	57,611	2,103,326	1,140,401	121,000	1,019,278	134,874	70,547	
Midland Valley	380	105,249	33,089	145,706	23,326	16,895	2,303	41,849	.....	5,525	91,898	53,808	5,359	48,434	34,170	70,547
Minneapolis & St. Louis.....	1,646	592,043	180,974	822,665	114,079	122,369	16,727	298,923	119	21,580	573,797	248,868	31,243	217,279	-60,244	70,547	
Minn., St. Paul & Sault Ste. Marie.....	4,190	1,664,156	838,649	2,539,032	314,170	343,069	48,230	753,235	20,497	57,189	1,534,393	1,004,639	117,729	886,910	193,798	70,547	
Missouri, Oklahoma & Gulf Ry. Co. of Texas.....	19	7,777	401	8,281	1,171	1,404	845	4,346	.....	422	8,188	93	140	-46	-3,722	70,547
Missouri & North Arkansas.....	365	66,236	32,672	105,590	27,937	21,274	2,306	34,446	.....	6,675	91,638	13,952	5,800	8,081	16,916	70,547
Missouri, Kansas & Texas System.....	3,865	1,724,315	745,709	2,653,342	414,493	394,177	53,655	884,654	17,658	81,065	1,835,346	817,995	140,567	676,630	15,119	70,547	
Missouri, Oklahoma & Gulf.....	334	70,702	19,945	95,146	29,364	18,043	4,436	43,893	71	7,243	103,050	-7,902	5,131	-13,054	-37,019	70,547	
Mobile & Ohio.....	1,122	737,502	109,487	897,078	103,759	209,751	32,737	332,310	2,404	28,526	712,327	184,751	32,636	152,029	31,971	70,547	
Monongahela	75	126,632	2,282	131,022	16,029	15,188	1,216	26,016	.....	3,191	61,728	69,294	2,500	66,794	.....	70,547
Morgan's La. & Texas R. R. & S. Co.....	405	195,050	84,031	304,144	56,784	62,287	10,442	127,068	2,520	11,914	270,715	33,429	20,881	12,420	-57,020	70,547	
Nashville, Chattanooga & St. Louis.....	1,231	628,154	242,731	945,760	101,922	180,836	46,157	342,984	9,410	31,664	712,858	232,901	26,000	206,619	74,461	70,547	
Nevada Northern	165	129,976	11,201	145,509	20,501	11,749	789	27,038	64	3,989	64,129	81,379	8,631	72,749	39,458	70,547	
New Orleans & North Eastern.....	196	212,872	47,986	287,017	32,942	59,439	10,092	88,088	5,585	11,514	207,660	79,357	15,201	64,156	13,416	70,547	
New Orleans, Mobile & Chicago.....	403	112,490	24,043	143,208	29,942	23,849	4,414	47,133	19	6,680	102,999	40,209	6,883	33,124	-7,284	70,547	
New Orleans Great Northern.....	283	108,587	27,075	148,720	17,064	23,221	2,677	41,176	178	6,185	90,501	58,219	3,922	54,292	7,309	70,547	
New Orleans, Texas & Mexico.....	286	84,709	20,822	114,670	16,852	21,843	3,728	36,963	.....	8,321	87,707	26,963	1,502	25,409	-5,885	70,547
New York Central Railroad.....	5,979	9,134,055	4,609,059	15,983,789	1,834,575	2,700,240	260,364	4,600,986	238,372	334,826	9,969,363	6,014,425	774,989	5,236,446	61,770	70,547	
New York, Chicago & St. Louis.....	569	862,917	149,367	1,053,086	111,639	143,030	51,624	407,807	5,423	22,022	741,545	311,541	42,000	269,431	.....	70,547
New York, New Haven & Hartford.....	2,005	3,005,710	2,649,889	6,264,053	645,716	1,058,224	39,385	1,992,101	53,284	129,232	3,914,469	2,349,584	254,500	2,095,040	462,800	70,547	
New York, Ontario & Western.....	568	440,402	336,373	912,033	128,824	113,595	81,550	276,997	.....	16,082	543,652	368,378	20,983	347,379	14,277	70,547
New York, Philadelphia & Norfolk.....	112	305,407	46,728	381,230	38,599	80,676	5,465	137,709	3,731	11,092	277,272	103,959	9,500	94,415	18,447	70,547	
New York, Susquehanna & Western.....	140	177,677	50,409	252,392	23,146	29,940	2,001	107,123	.....	5,379	167,397	84,996	13,208	71,774	5,134	70,547
Norfolk & Western.....	2,042	4,071,610	513,742	4,729,492	664,215	822,787	53,523	1,151,360	8,654	68,323	2,747						

REVENUES AND EXPENSES OF RAILWAYS

TWO MONTHS OF FISCAL YEAR ENDING JUNE 30, 1916 - (Continued)

Name of road.	Average mileage operated during period.	Operating revenues			Maintenance of way and structures.			Operating expenses			Net railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.	
		Freight.	Passenger.	Total inc. misc.	Way and structures.	Equipment.	Traffic.	Transportation.	Miscellaneous.	General.					Total.
Alabama & Vicksburg.	143	\$52,463	\$71,448	\$246,824	\$35,274	\$56,540	\$7,328	\$97,214	\$4,314	\$10,677	\$201,346	\$15,686	\$29,791	\$8,870	
Alabama Great Southern.	309	\$47,934	201,360	799,943	70,746	178,574	26,828	250,842	6,614	15,937	548,216	251,727	241,408	39,594	
Ann Arbor.	294	2,811,531	117,125	3,931,758	47,080	61,653	9,645	145,834	1,215	16,245	281,673	112,085	86,356	28,220	
Arizona Eastern.	378	399,928	71,982	499,410	66,097	49,838	4,619	101,520	1,936	21,582	245,374	254,037	225,584	76,413	
Atchison, Topeka & Santa Fe.	8,620	10,701,296	5,915,658	18,179,204	2,535,181	2,794,638	406,816	4,815,121	.....	332,281	10,844,810	7,334,395	6,504,081	1,268,284
Atlanta & West Point.	93	91,039	79,053	198,053	26,844	43,640	11,112	61,853	5,571	9,003	138,024	11,050	28,431	9,620	
Atlanta, Birmingham & Atlantic.	638	317,923	94,642	450,081	75,562	80,244	25,171	186,774	.....	18,373	386,174	63,907	37,703	22,414
Atlantic & St. Lawrence.	167	134,675	63,800	217,740	47,280	39,397	7,569	102,601	.....	6,890	203,017	23,010	9,007	37,901
Atlantic Coast Line.	4,699	2,736,179	1,125,363	4,194,560	740,643	926,098	107,007	1,664,205	12,738	139,192	3,588,018	606,542	322,831	94,541	
Baltimore & Ohio.	4,335	13,890,323	2,801,833	18,019,610	1,884,224	3,419,214	327,974	5,438,361	89,736	388,957	11,548,190	6,471,420	5,902,247	1,392,222	
Baltimore & Ohio Chicago Terminal.	79	.....	1,752	262,765	39,043	31,656	1,881	107,815	4,544	10,699	189,217	73,548	36,874	5,136
Baltimore, Chesapeake & Atlantic.	88	169,461	126,396	307,208	24,821	59,387	4,246	134,594	.....	5,548	228,597	78,611	74,113	16,773
Bangor & Aroostook.	631	318,807	113,049	467,637	95,538	99,755	5,474	142,491	6,568	21,197	370,976	96,661	71,311	721	
Bessemer & Lake Erie.	205	2,419,408	86,513	2,534,732	154,253	322,652	17,296	475,301	.....	24,222	975,245	1,559,488	1,525,900	259,766
Bingham & Gardiner.	27	341,106	5,971	348,138	35,894	35,412	2,017	43,421	.....	3,637	120,781	7,916	221,441	67,031
Boston & Maine.	2,302	4,609,368	3,064,678	8,404,260	1,033,719	1,051,325	82,880	3,327,643	36,072	194,275	5,725,914	2,678,346	2,351,363	758,680	
Buffalo & Susquehanna R. R. Corporation	253	218,643	15,002	237,615	45,588	65,104	2,141	63,721	.....	11,222	187,775	49,840	44,640	7,637
Buffalo & Susquehanna Railway.	91	133,291	13,935	150,297	7,827	10,566	903	23,325	.....	4,719	47,405	4,892	1,692	14,804
Buffalo, Rochester & Pittsburgh.	586	1,612,000	220,858	1,907,939	354,629	398,224	23,593	548,913	2,132	43,715	1,371,207	536,732	496,731	16,663	
Canadian Pacific Lines in Maine.	233	78,642	33,539	126,733	38,955	27,475	10,593	54,394	.....	6,754	138,172	24,000	35,438	15,502
Carolina, Clinchfield & Ohio.	283	368,207	41,510	419,031	41,460	52,435	15,830	71,065	.....	17,043	195,763	223,269	194,712	30,277
Carolina, Clinchfield & Ohio of S. C.	18	17,317	2,629	20,564	2,614	159	3,332	4,385	.....	1,034	11,512	9,051	7,551	1,961
Central of New Jersey.	381	3,671,529	1,413,559	5,393,128	481,017	1,002,895	69,915	1,819,349	29,608	114,797	3,517,578	234,079	1,641,471	91,547	
Central New England.	304	608,738	85,764	722,352	108,876	61,792	2,377	186,561	.....	9,397	368,837	25,600	327,913	205,067
Central Vermont.	411	167,437	193,305	329,312	99,295	106,335	18,847	270,029	2,141	13,479	501,127	151,685	120,504	20,534	
Charleston & Western Carolina.	341	166,737	57,103	236,762	53,856	39,813	6,909	90,245	.....	9,301	200,124	36,637	26,637	1,303
Chesapeake & Ohio Lines.	2,374	6,021,571	1,139,695	7,616,175	861,987	1,886,221	104,438	2,482,249	38,619	145,993	4,882,861	2,733,315	2,502,696	631,021	
Chicago & Alton.	1,052	1,619,960	740,257	2,563,416	327,422	583,494	67,346	835,393	18,885	60,987	1,891,857	671,560	584,991	134,812	
Chicago & Eastern Illinois.	1,282	1,783,382	332,526	2,525,724	462,070	624,150	43,083	870,084	14,865	78,541	2,088,082	437,642	107,200	330,015	
Chicago, Indianapolis & Louisville.	622	774,949	329,310	1,199,185	126,008	214,593	38,629	390,717	2,344	33,469	808,299	33,886	339,956	35,574	
Chicago & Erie.	270	915,476	115,412	1,124,389	146,040	108,365	34,021	435,212	4,152	27,307	751,269	373,120	332,120	351,805	
Chicago & Northwestern.	8,108	8,696,840	4,116,500	14,381,827	2,438,868	2,451,023	232,988	4,385,352	13,965	303,576	10,371,877	4,040,640	3,266,301	643,674	
Chicago, Burlington & Quincy.	9,366	9,767,873	4,205,934	15,521,649	2,607,600	2,857,447	289,713	4,564,068	152,244	327,731	10,178,823	5,542,826	4,636,011	965,140	
Chicago Great Western.	1,427	1,532,834	605,397	2,349,895	379,560	429,350	91,515	795,698	17,274	67,479	1,776,841	573,054	478,625	58,229	
Chicago Junction.	13	.....	346,201	346,201	46,533	33,237	2,017	174,595	.....	12,259	269,039	77,162	72,940	12,514
Chicago, Milwaukee & St. Paul.	10,076	11,076,417	3,651,173	16,504,458	1,882,653	2,472,147	319,847	5,639,025	138,890	321,890	10,280,870	6,223,588	902,156	5,318,939	787,848
Chicago, Peoria & St. Louis.	255	197,905	56,604	271,224	54,988	56,494	11,225	106,814	.....	10,970	240,491	30,733	21,835	29,981
Chicago, Rock Island & Gulf.	477	323,800	113,389	477,280	91,465	181,807	18,494	381,807	4,324	15,225	383,577	93,704	72,305	20,347	
Chicago, Rock Island & Pacific.	7,657	7,133,049	3,548,739	11,575,068	1,964,415	2,201,142	299,453	4,314,588	117,713	283,016	11,718,822	2,396,246	540,463	1,855,070	670,935
Chicago, St. Paul, Minn. & Omaha.	1,753	1,628,906	978,718	2,856,634	508,190	382,018	60,478	980,738	33,548	74,269	2,426,025	821,609	160,232	274,029	31,358
Chicago, Terre Haute & S. E.	374	298,596	32,794	341,124	62,781	74,440	7,179	98,267	1,402	16,097	252,756	88,369	20,833	31,358	31,358
Cincinnati, Hamilton & Dayton.	1,003	1,409,434	200,364	1,914,837	281,724	292,963	38,625	708,083	6,869	42,422	1,369,576	545,262	67,731	476,695	86,159
Cincinnati, New Orleans & Texas Pacific.	337	1,666,711	282,075	1,546,632	174,191	359,183	46,564	473,299	10,371	36,564	1,300,083	446,549	384,523	16,862	16,862
Cincinnati Northern.	246	230,446	46,693	288,910	63,583	47,194	5,226	88,527	8,262	212,792	76,118	65,087	14,765	14,765
Cincinnati, Ohio & Cleveland.	2,381	4,489,721	1,670,834	6,727,048	851,053	1,251,352	145,207	2,206,687	51,659	140,434	4,624,973	2,102,075	1,845,471	298,892	298,892
Cleveland, Cincinnati, Chic. & St. Louis.	2,381	4,489,721	1,670,834	6,727,048	851,053	1,251,352	145,207	2,206,687	51,659	140,434	4,624,973	2,102,075	1,845,471	298,892	298,892
Colorado Midland.	338	179,992	58,282	259,098	58,793	63,810	16,169	109,365	4,161	10,610	262,908	20,000	23,809	22,726	22,726
Colorado Southern.	1,089	903,717	310,277	1,302,673	215,853	299,014	20,787	372,517	10,401	17,239	969,593	333,080	263,016	64,509	64,509
Cripple Creek & Colorado Springs.	87	186,439	87,313	277,905	41,569	29,241	11,247	64,711	7,440	153,667	124,238	112,010	12,007	12,007
Cumberland Valley.	164	378,581	115,861	521,351	64,789	60,885	8,362	137,264	1,555	15,205	308,260	713,091	11,589	201,502	50,246
Delaware, Lackawanna & Western.	959	4,751,584	1,632,560	7,145,834	978,845	1,111,166	146,490	2,211,092	65,720	156,048	4,654,617	2,491,216	2,117,726	124,689	124,689
Denver & Rio Grande.	2,577	2,684,863	1,176,094	4,245,611	746,440	645,831	76,656	1,089,580	135,009	98,588	2,792,086	1,453,525	180,000	1,273,449	336,076
Denver & Salt Lake.	255	229,930	100,269	348,010	42,102	50,377	5,589	100,600	11,374	209,931	138,088	16,041	122,046	11,405
Detroit & Marquette.	393	107,226	60,500	181,779	21,054	33,281	4,277	65,288	7,335	5,148	129,783	57,396	15,043	42,353	7,651
Detroit, Grand Haven & Milwaukee.	191	348,000	105,500	516,740	37,280	58,142	11,609	208,248	1,637	8,516	325,432	191,3			

REVENUES AND EXPENSES OF RAILWAYS

TWO MONTHS OF FISCAL YEAR ENDING JUNE 30, 1916—Continued

Name of Road	Average mileage operated during period.	Operating revenues			Maintenance of			Operating expenses				Net from railway operation.	Railway tax accruals	Operating income (or loss).	Increase (or decrease) last year.
		Freight.	Passenger, inc. mis.	Total.	Way and Structures.	Equipment	Traffic.	Trans- portation.	Miscellaneous.	General.	Total.				
Grand Trunk Western.....	347	\$952,000	\$272,000	\$1,224,000	\$118,010	\$218,558	\$35,414	\$445,358	\$12,316	\$25,462	\$855,117	\$453,123	\$65,940	\$387,180	\$184,710
Great Northern.....	8,102	8,043,196	2,646,929	12,020,751	1,406,604	1,202,136	205,714	3,050,479	1,607,782	23,659	6,277,457	5,743,294	753,535	4,989,141	1,129,888
Gulf, Colorado & Santa Fe.....	1,938	1,620,448	580,603	2,342,719	568,521	394,125	58,279	865,645	.....	68,400	1,949,766	302,953	116,400	1,774,300	588,659
Gulf & Ship Island.....	308	207,206	60,769	281,863	28,183	51,110	5,662	72,316	.....	12,656	170,429	115,435	15,336	99,966	8,410
Hocking Valley.....	351	928,279	156,408	1,084,687	193,210	110,561	16,776	325,845	.....	30,885	655,031	538,179	74,800	463,379	145,084
Houston, East & West Texas.....	191	141,180	58,306	199,486	213,574	52,893	39,789	70,033	1,317	6,197	174,116	39,458	11,615	27,872	35,077
Houston & Texas Central.....	895	693,803	273,738	967,541	10,538,664	156,478	182,237	369,097	11,463	39,085	789,121	264,542	58,894	205,185	21,025
Illinois Central.....	4,767	7,188,999	2,353,016	9,542,015	1,058,004	1,759,804	202,050	3,382,330	59,303	28,647	8,212,483	2,161,186	539,400	1,654,857	311,748
Indiana Harbor Belt.....	110	859,268	292,240	1,151,508	1,257,748	224,316	52,572	193,608	.....	15,391	304,568	181,048	15,049	165,915	18,190
International & Great Northern.....	1,160	859,268	292,240	1,151,508	1,257,748	224,316	52,572	193,608	.....	15,391	304,568	181,048	15,049	165,915	18,190
Kanawha & Michigan.....	177	491,104	64,037	555,141	568,306	76,698	115,233	143,811	19	14,981	357,374	210,932	24,050	186,882	10,289
Kansas City Southern.....	837	1,220,187	262,068	1,482,255	1,638,753	163,926	156,874	530,211	.....	24,572	781,415	697,348	88,345	608,321	8,887
Lake Erie & Western.....	907	861,084	151,935	1,013,019	1,064,552	137,577	226,416	367,420	.....	24,572	781,415	697,348	88,345	608,321	8,887
Lehigh & Hudson River.....	97	280,233	21,835	302,068	315,402	45,226	3,507	100,293	.....	7,708	196,274	116,218	8,400	107,818	16,956
Lehigh & New England.....	296	537,344	2,999	540,343	590,011	117,732	65,282	126,406	.....	10,008	286,886	303,125	12,400	290,725	9,072
Lehigh Valley.....	1,442	6,137,366	904,754	7,042,120	751,336	846,859	173,680	2,425,802	25,980	143,055	5,116,360	2,396,999	277,000	2,119,021	58,020
Long Island.....	398	593,270	2,059,984	2,653,254	3,023,794	263,555	31,056	964,110	12,653	59,707	1,583,555	1,443,150	155,290	1,283,570	23,575
Louisiana & Arkansas.....	279	223,272	29,719	252,991	260,926	53,662	48,511	66,668	.....	8,206	183,595	77,531	15,000	62,524	49,116
Louisiana Ry. & Navigation Co.....	351	273,512	59,176	332,688	351,900	59,882	12,444	116,197	.....	9,928	253,497	98,493	19,000	79,488	1,014
Louisiana Western.....	208	205,587	109,914	315,501	341,497	69,683	13,267	99,377	4,116	12,518	253,461	88,036	20,000	67,920	10,466
Louisville & Nashville.....	5,037	6,504,960	1,979,519	8,484,479	9,114,214	1,418,435	216,004	2,683,978	\$56,124	162,055	3,747,932	1,422,615	273,018	1,148,112	173,283
Louisville, Henderson & St. Louis.....	200	1,145,589	77,759	1,223,348	1,237,748	76,973	10,691	72,754	17,786	55,432	1,350,114	688,367	106,181	582,185	25,853
Maine Central.....	1,220	1,103,202	772,550	1,875,752	2,047,481	297,727	29,770	707,609	94,452	11,425	4,143,838	2,147,431	242,000	1,905,431	349,321
Michigan Central.....	1,785	3,624,332	1,965,402	5,589,734	6,293,270	802,362	925,080	1,171,118	18,473	11,418	182,017	88,957	10,718	78,010	57,185
Midland Valley.....	380	191,830	64,911	256,741	270,973	33,812	4,373	81,010	.....	162,055	3,747,932	1,422,615	273,018	1,148,112	173,283
Minn., St. Paul & Sault Ste. Marie.....	4,190	3,212,689	1,252,853	4,465,542	4,927,221	632,017	100,998	1,466,926	42,629	122,388	3,011,432	1,915,789	223,725	1,692,063	217,373
Minneapolis & St. Louis.....	1,646	1,155,198	356,065	1,511,263	1,615,339	252,486	35,301	578,896	209	42,110	1,109,343	505,996	62,433	443,207	34,852
Missouri & North Arkansas.....	365	1,224,457	62,554	1,287,011	1,981,776	32,382	41,321	67,393	.....	10,602	176,000	22,177	11,600	10,504	10,700
Missouri, Oklahoma & Gulf Ry. of Texas.....	10	1,911,119	1,178,587	3,089,706	3,307,186	2,882	1,480	8,827	34,046	1,062	1,757	571	1,280	581	4,535
Missouri, Kansas & Texas System.....	3,865	3,372,168	1,438,571	4,810,739	5,170,345	844,401	111,981	1,815,663	18,473	162,055	3,747,932	1,422,615	273,018	1,148,112	173,283
Missouri, Oklahoma & Gulf.....	334	135,994	38,626	174,620	181,913	63,311	8,611	84,781	181	14,475	297,936	26,023	10,359	16,674	6,465
Mobile & Ohio.....	1,122	1,479,741	213,821	1,693,562	1,793,433	202,041	70,207	667,446	4,469	59,365	1,403,428	390,005	65,272	324,450	87,042
Monongahela.....	75	247,096	4,588	251,684	255,832	4,703	1,734	40,224	.....	6,214	110,425	145,407	5,000	140,407	8,000
Morgan's La. & Texas R. & S. Co.....	405	390,247	154,208	544,455	610,583	108,312	22,166	231,019	5,113	23,842	525,159	85,424	41,761	43,346	74,637
Nashville, Chattanooga & St. Louis.....	1,231	1,251,983	479,019	1,731,002	1,888,063	214,783	91,882	680,782	18,473	64,477	1,429,689	458,375	52,000	405,984	66,853
Nevada Northern.....	165	263,891	221,015	484,906	294,256	39,562	1,416	53,711	129	8,153	126,217	168,040	17,536	150,503	59,511
New Orleans & North Eastern.....	196	4,125,045	95,769	4,220,814	573,352	58,967	114,661	177,903	11,204	23,280	406,541	166,811	30,051	136,760	11,007
New Orleans, Mobile & Chicago.....	204	220,398	48,235	268,633	282,805	45,306	8,626	94,079	—19	14,189	207,171	75,634	13,282	62,105	26,403
New Orleans, Texas & Mexico.....	286	188,965	50,001	238,966	255,707	41,565	8,017	81,544	.....	18,798	193,650	62,057	3,003	59,001	3,252
New Orleans Great Northern.....	277	209,633	54,867	264,500	289,690	46,436	5,523	82,300	341	12,131	180,883	108,806	7,814	100,961	5,633
New York, Chicago & St. Louis.....	569	1,636,526	300,823	1,937,349	2,017,875	221,319	101,229	803,634	11,250	42,907	1,469,868	548,007	84,000	463,881	57,755
New York Central Railroad.....	5,979	17,848,484	9,049,646	26,898,130	3,381,558	5,227,859	503,178	9,207,801	456,476	720,978	19,732,374	11,649,184	1,548,600	10,095,962	1,075,535
New York, New Haven & Hartford.....	2,005	5,973,655	2,596,314	8,569,969	12,511,713	1,499,168	76,381	4,033,190	101,167	260,229	7,733,802	4,778,911	509,000	4,269,800	1,075,535
New York, Ontario & Western.....	568	943,735	659,092	1,602,827	1,873,602	247,185	16,157	568,854	.....	31,375	1,101,974	721,628	41,967	729,634	6,118
New York, Philadelphia & Norfolk.....	112	712,057	91,155	803,212	862,694	80,600	10,698	300,806	8,223	22,001	585,588	277,106	19,000	258,063	28,871
New York, Susquehanna & Western.....	140	355,424	102,002	457,426	514,267	39,725	3,692	209,306	.....	11,859	321,296	192,971	26,417	166,541	49,425
Norfolk & Western.....	2,042	7,910,283	1,004,272	8,914,555	1,284,004	1,603,032	103,705	2,240,412	16,812	136,527	5,359,540	3,837,796	336,000	3,500,000	1,099,203
Norfolk Southern.....	908	412,362	211,964	624,326	677,910	90,413	15,873	238,298	129	33,359	473,978	203,932	24,602	179,330	40,606
Northern Pacific.....	6,471	7,386,558	2,872,768	10,259,326	11,426,113	1,876,520	220,226	3,152,340	207,494	176,397	6,860,599	4,565,514	739,918	3,825,149	407,640
Northwestern Pacific.....	507	317,502	515,675	833,177	910,333	122,071	12,908	246,224	.....	14,606	477,267	212,066	34,900	177,166	73,076
Oahu Railway & Land Co.....	114	281,607	42,616	324,223	341,706	20,163	1,377	55,995	.....	7,153	105,020	236,686	14,500	222,186	7,720
Oregon Short Line.....	2,255	2,491,295	1,093,319	3,584,614	3,913,641	550,085	437,850	862,982	73,721	104,933	2,102,024				

Traffic News

W. L. Taylor, attorney for the Chicago, Indianapolis & Louisville, will address the Transportation Club of Indianapolis at its monthly dinner on October 18, on the subject of "The Panama Canal; Its Effect on the World's Transportation."

The New York, New Haven & Hartford announces that on its "Merchants' Limited" express train, leaving New York for Boston and Boston for New York at 5 p. m., two dining cars are now run. On one of them a regular dinner will be served, at \$1.25, while on the other food may be ordered by the card.

The New York Central announces that the Twentieth Century Limited during the six months ended with August 31, arrived in New York on time 177 times, was 5 minutes late once, and was over 5 minutes late only 6 times. It also arrived in Chicago 177 times on time and was over 5 minutes late 7 times.

The United States Department of Agriculture announces that all federal restrictions on the movement of livestock because of foot-and-mouth disease have been removed in the states of Indiana, Michigan and Virginia. The whole country, with the exception of northern Illinois, is now practically free. The Union Stock Yards in Chicago are classed as a restricted area, in which livestock may be moved for immediate slaughter only.

The transcontinental railways have filed an application with the Interstate Commerce Commission for a fourth section order allowing them to extend to Pittsburgh territory the 55-cent rate on iron and steel articles, which now applies from Chicago and Mississippi river crossings to the Pacific coast. The steamship lines operating through the Panama Canal have announced their intention of opposing the rate by asking for a suspension of the tariffs.

It is now expected that the Panama canal may be blocked by the landslide two or three months, and the officers in charge will set no date when traffic can be resumed. It is estimated that ten million cubic yards of earth may be in motion. Of the ships detained on the Atlantic and the Pacific sides, aggregating more than 100, a considerable number have already been sent around Cape Horn. It is expected that ship owners desiring to transfer cargoes across the Isthmus by railroad will be allowed to do so at a rate of three dollars a ton.

Canadian Northern Excursion to the Coast

The first passenger train to run through from Montreal and Toronto to the Pacific coast terminus of the Canadian Northern left Toronto and Montreal on the evening of October 12. It carried officers of the road, members of the Canadian Parliament, newspaper men and a large number of other invited guests.

Car Surpluses and Shortages

The American Railway Association's committee on relations between railroads, Arthur Hale, chairman, has issued statistical statement No. 9, giving a summary of freight car surpluses and shortages for October 1, 1915, with comparisons.

The total surplus on October 1, 1915, was 88,061; on September 1, 1915, 191,309, and on October 1, 1914, 133,382.

The surplus for September 1, 1915, shown above includes figures reported since the issue of statistical statement No. 8.

There is a general decrease in surplus under September 1, 1915, chiefly in groups 2 and 4 (East), group 5 (Southeast), group 6 (Central North), group 8 (Central), group 10 (West) and group 11 (Canada), in box cars; there being a considerable decrease in groups 6 and 11. There is also a decrease in the surplus of coal cars, chiefly in groups 2 (East) and 3 (Central North).

The total shortage on October 1, 1915, was 9,762; on September 1, 1915, 6,300, and on October 1, 1914, 2,355.

The shortage for September 1, 1915, shown above includes figures reported since the issue of statistical statement No. 8.

There is a general increase in shortage over September 1, 1915,

excepting in group 2 (East) and group 3 (Central North), where there are slight decreases in the shortage of box cars; and in group 4 (East) where there is a decrease in the shortage of coal cars.

The figures by classes of cars follow:

Classes	Surplus	Shortage
Box	41,622	5,368
Flat	6,993	325
Coal and Gondola.....	16,563	3,251
Other	22,883	818
	88,061	9,762

Chicago Board of Trade Wants Railway Lake Service Continued

The Chicago Board of Trade has filed a petition with the Interstate Commerce Commission asking for permission to intervene in the case of the Lehigh Valley for a rehearing on its application to continue the operation of its lake lines. The board of trade also asks that the commission's order, effective on December 15, requiring the railroads to dispose of their lake lines, be postponed until the commission has heard further evidence on behalf of shippers interested in water transportation over the Great Lakes. The board of trade has also sent communications to other commercial organizations, suggesting a conference to be held with the purpose of sending a representative committee to Washington, asking for a postponement of the order and for a further hearing.

The board says in its petition to the commission, that for many years there has been "for the most part adequate facilities" in the way of boats on the Great Lakes, and that the "rates have been regulated largely by supply and demand," but that since several of the railroads have disposed of their interests in boat lines, the effect has been "to decrease the supply of boats and enormously advance the charges for transportation of grain" via water to eastern ports from Chicago; that these conditions "threaten to disrupt the means of transportation on which many members of your petitioner have long been depending for the marketing of their commodities, and which the geographical location of the city of Chicago entitles said members to rely upon, and that the disruption of, and curtailment of said means of water transportation will be destructive of the business of, and highly injurious to your petitioner, various members in the city of Chicago and many cities and towns located in the interior of the United States, which have been for many years past accustomed to ship the products of the farm through the port of Chicago."

In its letter to other organizations the board says that as a result of the commission's order, the port of Chicago and other Lake Michigan and Lake Superior points will be without regular boat line service to and from the east for the transportation of package freight, and in addition thereto the shippers of bulk grain will be deprived of the use of the so-called package boat lines for carrying bulk grain to Buffalo. Already, it says, some of the boats have been withdrawn from service, and the rates have been increased, and there is not sufficient boat space for the accommodation of package freight.

THE LONDON & SOUTH-WESTERN ELECTRIFICATION.—The London & South-Western has recently inaugurated electric traction on its London suburban lines and the new electric trains will soon be running between Waterloo and Wimbledon. Their use will be extended later. The trains used consist of three cars—a motor car at each end with a trailer between. There are two motors of 275 h.p. each per motor car, so that the total rating per train is 1,100 h.p. This is a much higher allowance than on the Metropolitan District, which gives 500 h.p. for two cars (motor car and trailer), or on the London tube railways, which have 500 h.p. for three cars (motor car and two trailers). The London & South-Western electric rolling stock is, however, much larger and heavier than that of the other lines mentioned. The carriages are standard British railway bogie coaches, and this, taken with the weight of the electric equipment on two cars out of every three, produces a heavy train in proportion to the number of cars composing it. It is evident that on the South-Western lines it is intended to develop high speed between the stations and to have a high rate of acceleration after each stop. There ought to be a great improvement in schedule speed as compared with the leisurely jog-trot of the existing suburban steam trains, and in fact, the South-Western's suburban traffic should be revolutionized. *Railway Gazette, London.*

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has suspended from November 1 to February 29 tariffs of seven New England roads proposing increased rates on milk and cream to Boston and other points.

Oral arguments on the application of the western railroads for advances in interstate passenger fares were presented before the Interstate Commerce Commission at Washington last week, by attorneys for the western railroads and by the representatives of the protesting state railway commissions.

The American Livestock Association, the National Wool Growers' Association, the Cattle Raisers' Association of Texas and the Corn Belt Meat Producers' Association have entered a protest with the Interstate Commerce Commission against granting a rehearing of the western rate advance case.

The Interstate Commerce Commission has extended from December 1 to December 15 the time within which railroads operating boat lines on the Great Lakes are required to dispose of their interests in the boats, in accordance with the commission's order of May 7, under the Panama Canal Act. The change was made to permit the companies to finish the navigation season.

Rates to La Crosse, Wis.

In re rates on agricultural implements and other commodities between La Crosse, Wis., and other points and St. Paul, Minn., and other points. Opinion by Commissioner Clements:

The commission finds that the carriers have not justified increased rates on agricultural implements, wagons, beer, conductor pipe, iron roofing, building and roofing paper, structural iron, linseed oil, etc., between La Crosse and other Wisconsin points taking the same rates and Minneapolis, St. Paul, Minnesota Transfer and Duluth, Minn., and other points.

The carriers contended that the existing rates were too low, and that the rates in this general section had recently been disturbed by the establishment in Minnesota of rates based upon mileage, and that this necessitated a readjustment in certain interstate rates, the proposed rates to and from La Crosse generally being the same as those established for the intrastate haul between Winona and the Minnesota points of origin or destination involved.

The commission believes, however, that there may be justification on a more adequate record for changes in the present adjustment of the rates involved in the present case. (36 I. C., 151.)

STATE COMMISSIONS

The Public Service Commission of New Hampshire has directed the railroads of the state to submit for approval regulations for providing stakes and wire for shipments of lumber on open cars. This order is in accordance with a law passed by the last legislature, designed to prohibit carriers from requiring shippers to bear the expense of stakes and wires. The idea of enforcing this rule as regards interstate shipments appears to have been given up.

COURT NEWS

Right to Build Across Highways

The Louisiana Supreme Court holds that a railroad company has an implied right to build across a highway, since otherwise the right granted by article 271 of the constitution "to construct and operate a railroad between any points within this state" would have to be abandoned. In exercising the right to cross, a railroad may obstruct the highway and the public be temporarily or perhaps permanently, compelled to find their own way around the obstruction; but such obstruction would not constitute an altering or changing, within the meaning of the statute.—*Police Jury v. Tremont & G. Ry. Co. (La.)*, 67 So. 829.

"Passenger Train" May Consist Mainly of Freight Cars

In a suit upon a contract under which a subscriber agreed to pay \$50 provided the railroad ran a regular passenger train along a specified route within two years, the Georgia Court of Appeals holds that a train operated on a fixed schedule is a "passenger train" within the meaning of the contract, if the train includes one or more cars for the accommodation and carriage of passengers under the regulations imposed by law for the transportation of passengers, notwithstanding it may include cars used exclusively for the transportation of freight.—*Power v. Gainesville & Northwestern (Ga.)*, 86 S. E. 61.

Income Tax—Lessee's Agreement to Pay

A railroad company leased its property to another company by a lease which provided that the lessee should "pay all taxes and assessments . . . upon the yearly payments herein agreed to be made by the party of the second part to the party of the first part for the payment or collection of which . . . the said party of the first part would otherwise be liable," and that the lessee should "pay all taxes . . . which, during the continuance of the term hereby demised, shall . . . be . . . imposed on the demised premises; . . . all payments required to be made by the party of the first part during the term of this indenture . . . shall be assumed and discharged by the party of the second part as if the party of the second part were primarily liable for the same." The Pennsylvania Supreme Court held that the lessor, having paid a tax under the federal income tax act on the income received under the lease, was entitled to recover it from the successor of the lessee.—*North Pennsylvania v. Reading (Pa.)*, 95 Atl. 100.

Passengers on Freight Trains—Degree of Care Required

In an action for personal injury due to a violent jolt while riding in a caboose, the Circuit Court of Appeals for the Eighth circuit holds that an instruction to the jury that under the laws of Arkansas the defendant was required to carry passengers for hire upon its local freight trains, but not required to equip its cabooses like passenger cars, that one traveling in the caboose of a local freight train is bound to know that it is subject to more violent jerks in stopping and starting than passenger trains, and that the plaintiff assumed the risk of injury from any usual or ordinary jerk, stated the law correctly.—*Kansas City Southern v. Clinton, C. C. A.*, 224 Fed. 896.

Independent Negligent Act of Employee

A railroad employee working at a coal chute coaling engines engaged in interstate commerce was injured while lifting the wheel of a coal buggy out of the hole it had broken in the rotten floor over which he was wheeling coal to the tipples. In an action against the railroad for his injuries the Alabama Supreme Court held that his act in lifting the buggy after it had fallen was an independent act and the proximate cause of the injury; and hence the negligence of the railroad company in failing to maintain a proper floor was not the continuous sequence proximately causing the injury, and it was not liable.—*Southern v. Peters, Ala.*, 69 So. 611.

Expert Evidence as to Type of Derail Required

A locomotive engineer was killed by derailment at a derailling switch where a side track nine miles long ran into the main track. In a suit for damages the fact was cited that some derailling switches are very short, these usually being used in yards, while others are from 50 ft. to 250 ft. long, being in the nature of diverging tracks and being used generally where main tracks come together; and it was claimed that this siding 9 miles long was of the nature of a main track. The court found, however, that the class to which a track should be assigned depended on the use made of it, rather than its length; and also found that the derail with the long diverging track was customarily used where trains might be expected to run at high speed. The United States Circuit Court of Appeals, second circuit, holds that the question of which type should have been used at this particular place was an engineering problem, which should not have been left to the jury's decision.—(*New York Central v. Banker, C. C. A.*, 224 Fed., 351).

Railway Officers

Executive, Financial, Legal and Accounting

E. R. Cassidy has been appointed claim agent of the New Orleans Great Northern, with office at Bogalusa, La., vice F. D. Blue, resigned.

Oliver G. Browne has been appointed assistant chief claim agent of the New York Central with headquarters at New York, vice Willis H. Failing, resigned, to accept service with another company.

Operating

John Wilfred Higgins, who has been appointed chairman of the General Managers' Association of Chicago and executive secretary of the Association of Western Railways, was born on



J. W. Higgins

October 12, 1864, at Newport, R. I. He entered railway service in October, 1879, as a messenger boy on the Illinois Central, and has since then held the following positions in railway service: June, 1881, to November, 1881, track laborer on the Illinois Central and the Toledo, Peoria & Western; December, 1881, to June, 1883, switchman on the Illinois Central; June, 1883, to August, 1883, telegraph operator; August, 1883, to October, 1884, freight and passenger brakeman and baggageman; October, 1884, to October, 1889, freight conductor; October, 1889, to April,

1890, chief clerk to the superintendent of the Chicago division; April, 1890, to December, 1891, trainmaster on the Centralia district of the Chicago division; December, 1891, to February, 1892, chief clerk to the general superintendent. From February to June, 1892, he was assistant superintendent of the Louisiana division, and from June, 1892, to January, 1893, superintendent of the same division. From January to April, 1893, he was superintendent of terminals of the Illinois Central and Yazoo & Mississippi Valley at New Orleans, La.; April, 1893, to April, 1896, superintendent of terminals at Chicago, Ill.; April, 1896, to April, 1899, superintendent of the Amboy division; May 1, 1899, to January 1, 1901, superintendent of transportation; January 1, 1901, to July, 1903, general superintendent of transportation of Illinois Central system. From September, 1903, to February, 1904, he was assistant superintendent of the Eastern division of the Grand Trunk; from February, 1904, to December, 1904, assistant superintendent of the Middle division of the same road; December, 1904, to March, 1905, inspector of transportation of the Missouri Pacific system; March 1, 1905, to January 1, 1912, assistant general manager, and from January 1, 1912, to November 1, 1915, general manager of the same system. His new appointment takes effect on November 1.

A. W. McClelland has been appointed chief despatcher of the Northern Pacific with headquarters at Staples, Minn., vice A. M. Deverell, resigned. Effective October 1.

H. W. Gillette, assistant chief despatcher of the Northern Pacific, has been promoted to chief despatcher with headquarters at Jamestown, N. D., vice J. J. Mulroy, promoted. Effective October 1.

W. A. Kingsland, auditor of the Quebec lines of the Canadian Northern at Quebec, Que., has been appointed general superintendent of the Quebec lines with headquarters at Montreal, succeeding F. M. Spaidal, deceased.

Samuel Nicholson, trainmaster of the Norfolk & Western at Crewe, Pa., has been appointed assistant superintendent of the Norfolk division, with office at Petersburg, Va., and J. T. Ellett has been appointed trainmaster of the Norfolk division, with office at Crewe, vice Mr. Nicholson.

L. U. Morris, whose appointment as general superintendent of the El Paso & Southwestern has been announced, was born on November 7, 1873, at Winfield, Kan. He entered railway service on March 7, 1888, as office boy in the superintendent's office of the Atchison, Topeka & Santa Fe, at San Marcial, N. M. He remained with this road until September 18, 1905. During that time he successively held the following positions: telegraph operator, station agent, brakeman, conductor, trainmaster and division superintendent at Wellington, Kan. From September 18, 1905, until September, 1915, he was superintendent of the Eastern division of the El Paso & Southwestern, with headquarters at Tucumcari, N. M.

John J. Pelley, whose appointment as superintendent of the Yazoo & Mississippi Valley has been announced, entered the service of the Illinois Central as track apprentice on August 29, 1900. On August 1, 1904, he was appointed supervisor on the Indiana division, and on November 1, 1905, was transferred to the Memphis division of the Yazoo & Mississippi Valley. On January 15, 1908, he was appointed roadmaster on the Louisiana division of the Illinois Central, with headquarters at New Orleans, La. On June 6, 1911, he was transferred to the Tennessee division, and on May 10, 1912, was appointed superintendent of that division, with headquarters at Fulton, Ky. He remained there until September 15, 1915, when he was appointed to his present position.

P. J. Flynn, whose appointment as superintendent, districts 2 and 3, Central division, Canadian Northern, has been announced in these columns, was born at Fishers, N. Y., on November 22, 1872. He entered railway service on April 1, 1888, and since that time has held the following positions: until August 1, 1891, yard clerk of the Lehigh Valley, at Buffalo, N. Y.; from August 1, 1891, to April 1, 1892, night yardmaster same road, at Buffalo, N. Y.; from April 1, 1892, to January 24, 1894, yardmaster at the Tift Farm yards of the same road, at Buffalo, N. Y.; from January 24, 1894, to November 1, 1898, general yardmaster of the same road, at Manchester, N. Y. On November 1, 1898, he was appointed assistant trainmaster of the Pennsylvania division of the same road, and on April 1, 1901, was appointed general yardmaster, at Sayre, Pa.; from February 1 to August 1, 1905, he was general yardmaster for the New York, New Haven & Hartford, at Worcester, Mass.; from August 1, 1905, to February 1, 1907, he was general yardmaster in charge of terminals for the same road, at Providence, R. I.; from February 1, 1907, to October 1, 1908, general yardmaster in charge of terminals for the Lehigh Valley, at Buffalo, N. Y.; from October 1, 1908, to January 1, 1913, trainmaster of the same road, at Buffalo, N. Y. From January 1, 1913, to August, 1915, he was terminals manager, Winnipeg joint terminals, of the Canadian Northern, the Grand Trunk and the National Transcontinental, at Winnipeg, Man.

Traffic

F. P. Kinney has been appointed assistant general freight agent of the New York, New Haven & Hartford Railroad and the Central New England, with headquarters at New Haven, Conn.

W. T. Bennett has been appointed agriculturist of the Central of Georgia with office at Savannah, Ga., succeeding T. G. Chastain, and W. C. Shannon has been appointed commercial agent with headquarters at Philadelphia, Pa., vice F. A. MacBride.

Edward Eden, district freight agent of the Canadian Pacific, at Omaha, Neb., has been promoted to assistant export freight agent, with headquarters at Chicago, Ill. C. E. Decker has been appointed to the position left vacant by Mr. Eden. G. C. Cochran has been appointed district freight agent, with headquarters at Detroit, Mich., vice E. Olson, resigned.

Charles S. Lee, passenger traffic manager of the Lehigh Valley at New York, will retire from active service on October 31. Mr. Lee has been in continuous charge of the passenger traffic of this company for 22 years, and with the retirement of Mr. Lee the position of passenger traffic manager will be abolished.

ished. A portrait of Mr. Lee and a sketch of his railway career were published in the *Railway Age Gazette* of December 4, 1914, page 1065.

C. H. Mitchell, general agent of the Chicago, Milwaukee & St. Paul at Duluth, Minn., has been appointed division freight and passenger agent at Great Falls, Mont., vice P. H. Scanlon, who has been appointed commercial agent at Helena, Mont. G. M. Bowman, commercial agent at Cincinnati, Ohio, succeeds C. H. Mitchell as general agent at Duluth, Minn. T. P. Casey, Canadian freight and passenger agent, with headquarters at Toronto, Ont., has been appointed commercial agent at Cincinnati, vice G. M. Bowman.

Richard Benjamin Miller, whose resignation as traffic manager of the Oregon-Washington Railroad & Navigation Company has been announced, was born at Silver City, Idaho, on April 8, 1870. He entered railway service in 1886 as office boy in the employ of the Oregon Railway & Navigation Company. From October 1, 1897, to September 1, 1901, he was assistant freight agent of the same company; from September 1, 1901, to May 15, he was general freight and passenger agent of the Southern Pacific lines in Oregon; from May 15, 1902, to January 1, 1910, general freight agent of the Oregon Railroad & Navigation Company; from September 15, 1905, to November 1, 1911, he was also general freight agent of the Southern Pacific lines in Oregon; from January 1, to December 23, 1910, also traffic manager of the Oregon Railroad & Navigation Company and the Oregon-Washington Railroad; from December 23, 1910, to November 1, 1911, traffic manager of the Oregon-Washington Railroad & Navigation Company, a merger of the Oregon Railroad & Navigation Company and the Oregon-Washington Railroad; from November 1, 1911, when the O. W. R. & N. Company and the Southern Pacific were segregated, until November 1, 1915, traffic manager of the former road.



R. B. Miller

Engineering and Rolling Stock

L. E. Faulkner, division engineer of the Mississippi Central at Hattiesburg, Miss., has been appointed chief engineer with office at Hattiesburg.

J. E. Gould has been appointed master mechanic of the Charlotte Harbor & Northern with office at Arcadia, Fla., vice W. H. McAmis, resigned to accept service elsewhere.

A. L. Graburn, mechanical engineer of the Canadian Northern at Toronto, Ont., has been appointed assistant superintendent of rolling stock of the Eastern lines, with office at Toronto, Ont.

V. R. Walling, first assistant engineer of the Chicago & Western Indiana, has been appointed principal assistant engineer, in charge of construction and maintenance, with office at Chicago.

August Fredericks has been appointed roadmaster of the Chicago, Milwaukee & St. Paul at Elgin, Ill., to succeed W. H. Kofmehl, resigned to join the sales force of the Chicago Malleable Castings Company.

W. W. Greenland, assistant engineer of the Wabash at Moberly, Mo., has been appointed engineer maintenance of way of the Western division, with headquarters at Moberly. E. Shelah, formerly engineer maintenance of way of the Decatur division, has been appointed engineer maintenance of way of the Springfield division, with headquarters at Springfield, Ill.

A. E. Eager, superintendent of shops of the Canadian Northern, at Winnipeg, Man., has been appointed assistant superin-

tendent of rolling stock, with headquarters at the same city. A. McCowan, general car foreman, has been appointed supervisor of car work, at Winnipeg. H. W. Andrew, coach yard foreman at Winnipeg, has been appointed general car foreman, with headquarters at the same place, vice A. McCowan, promoted.

J. L. Hodgson, master car builder of the Grand Trunk, has been appointed general car foreman of the National Transcontinental, in charge of the car department at Transcona, Man., and of the car department at divisional points, Transcona to Ft. William inclusive, with office at Transcona. J. A. Mitchell has been appointed general foreman in charge of motive power, at Transcona.

C. E. Brooks, acting superintendent of motive power of the Grand Trunk Pacific, has been appointed superintendent of motive power, with office at Transcona, Man. He will also assume the duties of master car builder, J. L. Hodgson having resigned to enter the service of the National Transcontinental. E. Hackling, car foreman, at Prince George, B. C., has been appointed general car foreman, with headquarters at Transcona, Man. R. P. Graves, resident engineer, at Ft. William, Ont., has been transferred west of Winnipeg, Man.

Purchasing

C. E. Lepard, heretofore employed in the office of the locomotive foreman of the Canadian Northern at Regina, Sask., has been appointed division storekeeper, at that city, vice J. Butterfield, enlisted for active service.

OBITUARY

Thomas Powell Fowler, formerly from January, 1886, to September, 1912, president of the New York, Ontario & Western, died on October 12, at his summer home at Warwick, N. Y. Mr. Fowler was born on October 26, 1851, at Newburgh, N. Y., and graduated from Columbia Law School. In 1879 he became a director of the Shenango & Allegheny, now a part of the Bessemer & Lake Erie. Two years later he was elected a director of the Lehigh & Hudson River and in 1883 became a director of the West Pennsylvania & Shenango Connecting. In March, 1884, he was appointed receiver of the Shenango & Allegheny, and later in the same month was elected president of that road, and in July of that year became a director of the New York, Ontario & Western. In 1886 he became a director also of the Carthage & Adirondack. Mr. Fowler was elected president of the New York, Ontario & Western in January, 1886, resigning from that position, also as director of the same road, on September 25, 1912. A sketch of Mr. Fowler and of his work on the New York, Ontario & Western was published in the *Railway Age Gazette* of September 27, 1912, p. 582.

O. F. Cole, chief engineer of the Arkansas, Louisiana & Gulf, died at Crossell, Ark., on September 27.

Benjamin S. Cable, formerly general attorney of the Chicago, Rock Island & Pacific, was killed in an automobile accident at Ipswich, Mass., on September 27. A graduate of Yale and the Columbia Law School, he entered the practice of law in Chicago, and for a number of years, up to 1909, served the Rock Island lines as local attorney, assistant general attorney and general attorney. During the Taft administration he was assistant secretary of commerce and labor.



T. P. Fowler

Equipment and Supplies

LOCOMOTIVE BUILDING

THE ATCHISON, TOPEKA & SANTA FE is reported as contemplating the purchase of 30 Mikado type locomotives.

THE WABASH will install superheaters on 45 Mikado type locomotives at its Decatur, Ill., shops. It is now completing the installation of superheaters on 18 engines, thus making 63 altogether.

CAR BUILDING

THE ANACONDA COPPER MINING COMPANY is inquiring for 14 dump cars.

THE CINCINNATI, HAMILTON & DAYTON is inquiring for 500 underframes.

THE ATCHISON, TOPEKA & SANTA FE is inquiring for prices on 400 steel tie cars.

THE MISSOURI, KANSAS & TEXAS has been authorized by the court to purchase 200 ballast cars.

THE NEW YORK CENTRAL, reported in last week's issue of the *Railway Age Gazette* as having ordered 500 freight cars for the Michigan Central from the Haskell & Barker Car Company, ordered 500 automobile cars from this company.

THE CINCINNATI, INDIANAPOLIS & WESTERN, B. A. Worthington, general manager, Indianapolis, Ind., has issued tentative inquiries for 15 steel coaches, 3 steel postal cars, 9 steel baggage cars and 1 steel dining car. It is also formally inquiring for 20 eight-wheel caboose, 350 box, 80 flat, 50 hopper, 100 to 150 general service, 100 to 150 gondola, 50 stock and 100 automobile cars.

IRON AND STEEL

THE PITTSBURGH & LAKE ERIE has ordered 5,000 tons of rails from the Carnegie Steel Company.

THE NEW YORK, CHICAGO & ST. LOUIS has ordered 2,500 tons of rails from the Carnegie Steel Company.

THE JAMESTOWN RAILWAY has ordered 550 tons of structural steel from the Empire Structural Steel Company.

THE PHILADELPHIA & READING has ordered 3,000 tons of steel from the Pennsylvania Steel Company for a bridge at Sunbury, Pa.

THE ILLINOIS CENTRAL has ordered 1,000 tons of steel from the American Bridge Company for a car repair shop at Nonconah, Tenn.

THE NORTHERN PACIFIC has ordered 813 tons of steel from the American Bridge Company for grade separation bridges at Spokane, Wash.

THE CHICAGO & MILWAUKEE ELECTRIC has ordered 225 tons of steel from the Wisconsin Bridge & Iron Company for a bridge near Milwaukee, Wis.

THE BALTIMORE & OHIO has divided an order for 62,500 tons of rails among the Maryland Steel Company, the Cambria Steel Company, the Carnegie Steel Company and the Illinois Steel Company.

BRITISH LOCOMOTIVE EXPORTS.—There was some improvement in August in the exports of locomotives from the United Kingdom, the increase occurring especially in shipments to British India. The value of the exports to the Argentine Republic rallied in August to \$220,000, as compared with \$45,000 in August, 1914, and \$450,000 in August, 1913. The aggregate value of the shipments in all directions in August was \$1,400,000, as compared with \$1,050,000 and \$1,500,000.

Supply Trade News

W. M. White has resigned as sales manager of The Esterline Company, of Indianapolis, Ind., manufacturers of "Golden Glow" headlights.

The Bucyrus Company, South Milwaukee, Wis., has opened an office at 900 Hibernian Building, Los Angeles, Cal., in charge of G. H. Hutchinson.

Fairbanks, Morse & Co. have been awarded a contract by the Detroit Terminal Railroad for a conveyor type coaling station of large capacity to be erected at North Detroit, Mich.

Ambrose N. Diehl has been appointed assistant superintendent of the Duquesne steel works of the Carnegie Steel Company, succeeding Edward J. Hamilton, recently made general superintendent.

Robert E. Belknap, whose appointment as district sales manager of the Pennsylvania Steel Company and the Maryland Steel Company at New York City was announced in this column



R. E. Belknap

last week, graduated from Johns Hopkins University in 1897, and in the following year aided in the construction of the Eighth avenue and Sixth avenue underground trolley conduits for the Metropolitan Street Railway of New York city, as assistant to the engineer of the National Contracting Company. In 1901 he entered the employ of the Pennsylvania Steel Company and Maryland Steel Company. After a thorough training in the rail, frog and switch departments, billet mill, steel foundry and bridge shop, and the forging, machine and marine departments, he was at-

tached to the general sales office at Steelton, Pa. In July, 1902, he came to the then new Chicago sales office as assistant sales agent and western representative, and in 1906 was made district sales manager. Mr. Belknap was president of the National Railway Appliances Association for the year 1911-12.

The Fargo Manufacturing Company, Inc., Poughkeepsie, N. Y., manufacturers of electrical connectors and cable grips, has opened a New York City office in the Vanderbilt Concourse building, 52 Vanderbilt avenue.

Early in the year Joseph T. Ryerson & Son announced a contest for a trade name for its line of tool steel. A \$100 prize was offered for the best name, and over 10,000 names were entered in the contest. The judges have decided on the word "Ryolite" as the winning name.

The Roberts & Schaefer Company, Chicago, has recently received a contract from the Nashville, Chattanooga & St. Louis for the construction of a modern fireproof reinforced concrete coaling plant at Cowan, Tenn. The plant will be designed to coal locomotives on four tracks and equipped with automatic electric elevating facilities supplying coal to a 250-ton storage pocket. The contract price is about \$17,500.

H. A. Varney, general sales manager of the National Boiler Washing Company, Chicago, has resigned to become manager of the railroad department of the Smith-Totman Company with offices in the People's Gas Building, Chicago. Mr. Varney was born at Spencer, Iowa, on September 9, 1877, and was educated at the public schools of his native city and at the Iowa Agricultural College. He came into the railway supply field in

1906 as a member of the construction force of the W. L. Miller Heating Company. He joined the sales force of the National Boiler Washington Company in 1909, and was later promoted to the position with that company which he now resigns.

The Union Switch & Signal Company announces the appointment of George A. Blackmore as general sales manager in charge of the activities of the New York, Montreal and Atlanta offices, with headquarters at New York. Resident managers A. Dean and T. H. Patenall, of New York and Montreal, respectively, and sales engineer Brastow, of Atlanta, will report to him. He will eventually be located at Swissvale in charge of sales, construction and commercial engineering. A sketch and photograph of Mr. Blackmore appeared in the *Railway Age Gazette* of September 4, 1914, at the time he went to the Bryant Zinc Company, New York, as its vice-president.

TRADE PUBLICATIONS

FACTORY AND OFFICE EQUIPMENT.—The Manufacturing Equipment & Engineering Company, Boston, Mass., has recently issued three books relating respectively to the company's sanitary bubbling fountains, its line of sanitary washbowls and its metal lockers for factory, office and other use.

METHODS OF CONSTRUCTING LARGE CAPACITY DEEP WELLS.—The American Well Works has issued a bulletin explaining the advantages of drilled wells having a diameter as large as 30 in. The methods used in drilling these large diameter wells and the special equipment necessary are described in detail.

STEAM SHOVELS.—The American Steel Dredge Company, Fort Wayne, Ind., has issued Bulletin No. 10, describing the company's "single-line" revolving steam shovels. The booklet is well illustrated with both photographs and diagrams, and claims increased efficiency for the excavator through reduced friction and a wider digging angle.

KEROSENE TORCHES.—The Hauck Manufacturing Company, Brooklyn, N. Y., has recently issued bulletin No. 60, entitled, *Saving Ways in Busy Shops*, dealing with the company's burners and furnaces for kerosene and other oil fuel. The booklet contains a number of illustrations of the various burners and others showing the work which may be done by them.

SAVING SET-UPS IN RAILROAD SHOPS.—This is the title of a booklet which has recently been issued by the Lucas Machine Tool Company, Cleveland, Ohio. The booklet relates particularly to the Lucas "Precision" boring, drilling and milling machine and aims to show wherein that machine is productive of efficiency in the railroad shop. The catalog is well illustrated and attractively gotten up.

MINWAX PRODUCTS.—The Minwax Company, New York City, has issued Bulletin No. 1 of a proposed series, which gives briefly a description of its system of waterproofing, with the specifications; and photographs of the use of this material on numerous structures, including the Martin's Creek viaduct of the Lackawanna, this product being used on this structure as well as on the Tunkhannock viaduct.

FLUE TOOLS.—Gustav Wiedeke & Co., Dayton, Ohio, have recently issued a 96-page catalog descriptive of the Ideal flue tools manufactured by the company. The booklet describes and illustrates the line of Wiedeke Ideal tube expanders, cutters and accessories. Each tool mentioned is described and in connection with the description there are given specifications, price lists, and detailed views of the tool and its parts.

FIREPROOF FLOORS AND BEARING PARTITIONS OF PRESSED STEEL CONSTRUCTION.—This pamphlet issued by the Trussed Concrete Steel Company, Youngstown, Ohio, illustrates the use of a form of fire-resisting construction involving the use of Kahn pressed steel I-beams and H-studs. Fifteen standard sections are provided, of depths varying from 3 to 12 in. and having an appearance somewhat similar to the standard rolled I-beam. They are made of two pressed steel troughs riveted together back to back, the edges of the bases being turned in to a depth of $\frac{1}{2}$ in. The pamphlet illustrates the wide flexibility with which this form of structural material may be applied. In general, it is intended to cover the studs and beams on each side with a metal lath or mesh such as Hy-Rib, to facilitate the application of concrete surfaces.

Railway Construction

ATCHISON, TOPEKA & SANTA FE.—The report of this company for the year ended June 30, 1915, shows that the Minkler Southern, from Minkler, Cal., to Exeter, aggregating with two short branches, 43.71 miles, was completed and opened for traffic in October, 1914, and an extension from Exeter to Lindsay, 6.95 miles, has since been built, and placed in operation. The Oil Fields & Santa Fe was formed to buy certain lines extending from Cushing, Okla., to Pemeta, and from Jennings to Oilton, reaching the Cushing oil field. A line from Pemeta to Oilton, connecting these railroads and an extension from Pemeta to Drumright are now under construction, a total of about 27 miles, including the lines that have been bought and those now under construction. On the Northwestern Pacific, which is owned jointly by the Santa Fe and the Southern Pacific, track laying has been finished on the gap between Willets, Cal., and Shively, which are 105.64 miles apart, and the line was placed in operation in July, 1915.

ATHABASCA & FORT VERMILLION.—The preliminary survey being made for the line projected from Athabasca, Alta., northwesterly to Trout Lake and to Fort Vermillion, about 300 miles, has been made to Wabiscaw, it is said, and two possible points located for building a bridge over the Athabasca river. A. C. Galbraith, chief engineer. (June 25, p. 1497.)

DALLAS & SOUTHWESTERN TRACTION.—This company, which was organized to build an electric line from Dallas, Tex., south, has surveyors now in the field, it is said, locating the line from Dallas southwest via Cleburne, and Glen Rose to Stephenville, about 100 miles. It is said that financial arrangements have been made and construction work will be started as soon as survey now in progress between Stephenville and Glen Rose is finished. E. P. Turner, president, Dallas. (Aug. 13, p. 301.)

DENVER & RIO GRANDE.—This road is making a preliminary survey for a line from Alamosa, Colo., to Durango.

EDMONTON, DUNVEGAN & BRITISH COLUMBIA.—Track laying on the extension of this road is reported finished on a temporary bridge over the Big Smoky river at mileage 290 from Edmonton, Alta., and track laying is under way to the Spirit river, on 67 miles additional. A permanent bridge is being built over the Big Smoky river. The line is now in operation from Edmonton, Alta., to McLennan, 261.7 miles. Grading work on an additional line through the Grande Prairie district is under way on about 60 miles, and the company expects to have the track laying completed on this section during 1915. (July 30, p. 619.)

LULA-HOMER RAILROAD.—An officer writes that the plans call for building from Belton, Ga., southeast to Homer, thence east via Cinesville to Hartwell and then northeast to Anderson, S. C., 82 miles. Grading work has been finished on 73 per cent of the section from Lula to Homer. The contract for all the grading, erection of buildings and track laying, also for equipping the line, has been let to W. J. Redmond, Atlanta, Ga., and construction work will be started on October 15. Arrangements have been made to dispose of a bond issue of \$165,000 6 per cent 40-year gold bonds. C. J. Hood, president of the Northeastern Banking Association, is president of the railroad, Commerce, Ga. D. G. Ziegler, chief engineer, Lula, Ga. (March 26, p. 720.)

MINKLER SOUTHERN.—See Atchison, Topeka & Santa Fe.

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has approved the plans and form of contract for the reconstruction of the Brighton Beach elevated line in the borough of Brooklyn. This involves the reconstruction of the line from Church avenue north to Malbone street and the widening of this section from two to four tracks, also the reconstruction of three stations, at a cost of from \$750,000 to \$1,000,000. From Sheepshead Bay south the line is to be elevated into Coney Island and four-tracked. The line is also to be connected by a new two-track subway branch through Flatbush avenue at Malbone street with the Fourth avenue subway near the Long Island terminal at Atlantic and Flatbush avenues.

The commission has approved the contract and plans for the construction of foundations and structure of Section No. 2 of the Jamaica elevated extension. This comprises 2.2 miles of two-track elevated railroad from Walnut street along Jamaica avenue to Cliffside avenue. The commission has also approved the form of contract for the erection of steel for additional tracks on the Myrtle avenue line from Willoughby avenue to Palmetto street, and for certain additional work on the Lutheran Cemetery line.

NORTHWESTERN PACIFIC.—See Atchison, Topeka & Santa Fe.

OIL FIELDS & SANTA FE.—See Atchison, Topeka & Santa Fe.

SALT LAKE & OGDEN (ELECTRIC).—This road is laying a second track between Orchard station, Utah, and Clinton station, a distance of about three miles. Grading has been completed and rails will be laid upon receipt of ties. A combined roadway and aqueduct overhead crossing will be built to eliminate a grade crossing. The viaduct will be 40 ft. long and will be built by company forces. Bids for steel opened on October 5.

SOUTH CAROLINA ROADS (ELECTRIC).—Surveys have been made for a line to be built from Sumter, S. C., east via Goodwill, in Shiloh township, to Turbeville, thence northeast to Olanta, 32 miles. The line may eventually be extended from Olanta southeast to Lake City, in all about 47 miles. Rights of way have been secured on about 75 per cent of the section between Olanta and Sumter, and free station sites and terminal sites will be guaranteed on this section. The Chamber of Commerce of Sumter has paid for the necessary surveys and owns the title to three-fourths of the right of way, and is looking for capital to build and operate the line. The promoters expect that the line will develop a traffic in timber, cotton, corn, tobacco, livestock and general farm products. Residents of Sardinia, in Clarendon county, about four miles from Turbeville, want a branch built north to Turbeville. E. I. Reardon is managing secretary of the Chamber of Commerce at Sumter. (Oct. 8, p. 670.)

SOUTH DAKOTA & WESTERN.—This company has filed articles of incorporation in South Dakota with a capital of \$1,000,000 and headquarters at Yankton. The plans call for building from Mitchell, in Davison county, S. D., southwesterly through Davison, Aurora, Douglas and Charles Mix counties to Platte in that county, thence northwest to a point in Brule county near Chamberlain, about 80 miles. The incorporators included W. L. Bruce, W. E. Heaton, A. A. Loft, E. A. Bruce and J. J. Orr, all of Yankton, S. D.

ST. JOHN & QUEBEC.—The Provincial government of New Brunswick has taken over the charter of this company and after an adjustment and settlement of outstanding claims arising out of the construction of the 120 miles between Gagetown, N. B., and Centreville have been arranged, will complete the construction of the line. The company was organized to build from Grand Falls, N. B., southeast following the St. John river to St. John, about 210 miles. The sections yet to be built are from Centreville north to Grand Falls and from Gagetown south to St. John. The section from Fredericton to Centreville, 88 miles, is now being operated by the Canadian Government Railways. (June 4, p. 1182.)

RAILWAY STRUCTURES

BEAUMONT, TEX.—This city is asking for bids on the construction of a proposed municipal freight terminal. Bids will be received on November 2, and specifications provide that the terminal must be completed by February 15, 1916.

KANSAS CITY, MO.—James Stewart & Co. of New York have been awarded a contract for the superstructure of a new addition to the Chicago, Milwaukee & St. Paul elevator. The improvement involves reinforced concrete construction and will cost in the neighborhood of \$65,000.

MARSHALL, TEX.—The Texas & Pacific is preparing plans for new shops to replace those destroyed recently by fire.

NASHOTAH, WIS.—The Chicago, Milwaukee & St. Paul has awarded a contract for a new station to Gunder Anderson of Oconomowoc, Wis. It will be a tile and concrete structure and will cost about \$10,000.

Railway Financial News

CAROLINA, ATLANTIC & WESTERN.—See Seaboard Air Line.

HOCKING VALLEY.—Kuhn, Loeb & Co. and the National City Bank, both of New York, bought from the Hocking Valley and sold to the public \$4,000,000 two-year 5 per cent notes. The proceeds will be used to pay off a like amount of one-year 6 per cent notes which mature November 1.

LEXINGTON & EASTERN.—See Louisville & Nashville.

LOUISVILLE & NASHVILLE.—The Lexington & Eastern, which runs from a point on the Louisville & Nashville to a point in the eastern Kentucky coal fields, about 100 miles, has been taken over by the Louisville & Nashville.

George C. Jenkins, of Baltimore, has been elected a director of the Louisville & Nashville, succeeding Michael Jenkins.

MISSOURI PACIFIC.—The Union Trust Company of New York, as trustee of the first and refunding mortgage of the St. Louis, Iron Mountain & Southern, has begun suit in the federal district court at St. Louis to foreclose this mortgage.

SEABOARD AIR LINE.—Directors approved the consolidation of the Seaboard Air Line with the Carolina, Atlantic & Western. Common stock of the new company to the amount of \$40,041,000 is to be issued in equal exchange for the old Seaboard stock, of which there is \$37,516,000, and for the Carolina, Atlantic and Western stock, of which there is \$2,525,000. Of the \$27,280,000 new preferred stock \$2,280,000 is to be exchanged for an equal amount of the 5 per cent refunding bonds of the Carolina, Atlantic & Western. This stock is to bear 6 per cent non-cumulative dividends. The balance is to be exchanged for an equal amount of old Seaboard preferred. The dividend rate on this class of new preferred will be the same as at present, 4 per cent regular, with an additional 2 per cent after 4 per cent is paid on the common.

WABASH.—The Wall Street Journal comments on the Wabash reorganization as follows:

A total of \$39,498,928 first refunding and extension 4 per cent bonds out of a total issue of \$40,600,000 were deposited with the reorganization committee under an agreement to underwrite the cash assessment not subscribed for by the stockholders. After it was determined how many stockholders had paid their assessments it was announced that the proportion of the total assessment required from the refunding 4 per cent bondholders would be \$654.82 per \$1,000 bond, indicating that only about 4 per cent of the stockholders paid their assessment and that the bondholders were therefore obligated for the payment of the balance of the \$27,720,000 cash to be raised by assessment or for a total of \$26,583,480.

Out of the \$39,498,928 deposited bonds which agreed to underwrite the cash assessment, 98.5 per cent have either paid in the initial instalment of 10 per cent or have paid their obligation in full. The 1.5 per cent which have not paid so far, probably represents deferred payments which will be received in the course of a few days, inasmuch as the final day for receiving payment was only last Saturday. It is expected that eventually all the deposited bonds will make payment, inasmuch as no protest of any kind has been received from any bondholders concerning the plan of reorganization or the amount of the payment which fell upon them. The very small amount of undeposited bonds is said to represent foreign and isolated holdings that cannot be reached.

FREIGHT TRAFFIC RECEIPTS OF GERMAN STATE RAILWAYS.—It is reported from Berlin that the freight traffic of the German State railways to the end of the first year of war has almost reached the normal amount of the previous year. In August, 1914, they amounted to 41.6 per cent of the previous year; in January, 1915, 90.1 per cent; June, 1915, 96.1 per cent, and in July, 1915, 97.6 per cent of the previous year. If the frontier region traffic, which, owing to the state of war, has specially suffered, say about 2 per cent be deducted, then the figure for the previous year is almost exactly the same.

[ADVERTISEMENT]

ANNUAL REPORT

ATCHISON, TOPEKA & SANTA FE RAILWAY COMPANY—TWENTIETH ANNUAL REPORT

OFFICE OF
THE ATCHISON, TOPEKA & SANTA FE RAILWAY SYSTEM
No. 5 Nassau Street, New York City

SEPTEMBER 14, 1915.

To the Stockholders:

Your Directors submit the following report for the fiscal year July 1, 1914, to June 30, 1915, inclusive:

The Lines comprising the Atchison System, the operations of which are embraced in the following statements, are as follows:

	June 30, 1915	June 30, 1914
Atchison, Topeka & Santa Fe Railway.....	8,513.48 miles	8,339.72 miles
Rio Grande, El Paso & Santa Fe Railroad...	20.22 "	20.22 "
Gulf, Colorado & Santa Fe Railway.....	1,937.71 "	1,595.89 "
Pecos & Northern Texas Railway.....	"	569.79 "
Panhandle & Santa Fe Railway.....	665.02 "	179.16 "
Texas & Gulf Railway	"	125.49 "
Gulf & Interstate Railway of Texas.....	"	71.33 "
Concho, San Saba & Llano Valley Railroad..	"	59.63 "
	<u>11,136.43 "</u>	<u>10,961.23 "</u>

Increase during the year 175.20 miles.

The average mileage operated during the fiscal year ending June 30, 1915, was 11,114.52 miles, being an increase of 206.00 miles as compared with the average mileage operated during the preceding fiscal year.

Under leases effective July 1, 1914, the lines of the Pecos & Northern Texas Railway north of Sweetwater, Texas, were operated by the Panhandle & Santa Fe Railway, and the lines of the Texas & Gulf Railway, Gulf & Interstate Railway of Texas, Concho, San Saba & Llano Valley Railroad and Pecos & Northern Texas Railway south of Sweetwater by the Gulf, Colorado & Santa Fe Railway.

In addition to lines covered by this report there were completed on June 30, 1915, 25.70 miles of additional line, all of which will be ready for operation in the near future.

The Company also controls, through ownership of stocks and bonds, other lines aggregating 228.92 miles, and is interested jointly with other companies in 606.08 miles.

For detailed statement of present mileage and of changes in mileage since last Annual Report, see pages 43 to 47.

INCOME STATEMENT

The following is a summary of the transactions of the System for the years ending June 30, 1914, and 1915:

	1914	1915
Operating Revenues	\$111,109,769.86	\$117,665,587.46
Operating Expenses	73,469,333.68	76,091,553.69
Net Operating Revenue	\$37,640,436.18	\$41,574,033.77
Taxes	5,525,585.30	5,497,316.77
Uncollectible Railway Revenues.....	"	25,316.43
Operating Income	\$32,114,850.88	\$36,051,400.57
Other Income	2,174,353.12	2,997,150.47
Gross Corporate Income	\$34,289,204.00	\$39,048,551.04
Rentals and Other Charges (see note)....	1,218,827.08	2,131,942.03
	<u>\$33,070,376.92</u>	<u>\$36,916,609.01</u>
Interest on Bonds, including accrued interest on Adjustment Bonds	12,886,412.23	12,785,747.10

Net Corporate Income (representing amount available for dividends and surplus and for necessary but unproductive or only partially productive expenditures)

From the net corporate income for the year the following sums have been deducted:

DIVIDENDS ON PREFERRED STOCK—	
No. 33 (2½%) paid Feb. 1, 1915	\$2,854,343.25
No. 34 (2½%) paid Aug. 2, 1915	2,854,343.25
	<u>\$5,708,686.50</u>
DIVIDENDS ON COMMON STOCK—	
No. 37 (1½%) paid Sept. 1, 1914	\$2,942,407.50
No. 38 (1½%) paid Dec. 1, 1914	2,942,632.50
No. 39, (1½%) paid Mar. 1, 1915	2,959,147.50
No. 40 (1½%) paid June 1, 1915	2,997,142.50
	<u>11,841,330.00</u>
Appropriation for Fuel Reserve Fund	54,502.78
California-Arizona Lines Bonds Sinking Fund	12,945.67
Appropriated for Additions and Betterments	6,513,396.96
	<u>\$24,130,861.91</u>
Surplus to credit of Profit and Loss June 30, 1914.....	\$20,569,800.81
Additions to Profit and Loss Account (Sundry Adjustments)	11,421.10
Surplus to credit of Profit and Loss June 30, 1915.....	<u>\$20,581,221.91</u>

NOTE. The increase of \$913,114.95 in "Rentals and Other Charges" occurs chiefly in the item "Hire of Equipment," due mainly to the large grain crop and the necessity for using "foreign" cars to a greater extent than usual in handling it.

Income from sources other than earnings from operation consisted of interest on cash in banks and sums collected as interest and dividends upon bonds and stocks of companies, the operations of which are not included in the System accounts.

CAPITAL EXPENDITURES AND REDUCTION OF BOOK VALUES

The total charges to Capital Account, as shown by the General Balance Sheet, page 26, at June 30, 1915, aggregated \$683,855,314.09 as compared

with \$671,814,299.94 at June 30, 1914, an increase during the year of \$12,041,014.15, which analyzes as follows:

Construction and acquisition of new mileage, including the acquisition of bonds and stocks of other railway and terminal companies:

Dodge City & Cimarron Valley Ry.....	\$11,430.34
Eastern Ry. of New Mexico	5,243.10
Grand Canyon Ry.....	18,405.75
Minkler Southern Ry.....	370,888.27
Oil Fields & Santa Fe Ry.....	370,072.20
Northwestern Pacific R. Ry.....	155,800.00
Rocky Mountain & Santa Fe Ry.....	3,000,000.00
Union Passenger Depot Co. of Galveston...	292,565.87
Verde Valley Ry.....	24,000.00
	<u>\$4,248,405.53</u>

Additions and Betterments—System Lines:

Fixed Property	\$5,115,796.42
Additional Equipment	2,464,431.34
Betterments to Equipment	21,121.05
	<u>7,601,348.81</u>

Fuel Lands and Other Properties:

Real Estate held for future use.....	\$154,038.72
Tie and Timber Lands	23,700.91
Miscellaneous Items	112,757.67
	<u>290,497.30</u>

Other Investments

	<u>219,689.34</u>
Total Charges	<u>\$12,359,940.98</u>

Reduction of Book Values:

California, Arizona & Santa Fe Ry.....	\$4,299.11
San Francisco Terminal Property.....	6,000.00
Western Oklahoma Ry.....	44,645.10
Ice Plant, Belen	12,000.00
Ice Plant, San Bernardino.....	59,792.89
Santa Barbara Tie & Pole Co.....	7,189.73
Fuel Lands	185,000.00
	<u>318,926.83</u>

Net Increase in Capital Account during the year.....\$12,041,014.15

The item of \$2,464,431.34 for "Additional Equipment" analyzes as follows:

727 Freight-Train Cars	\$907,775.40
142 Passenger-Train Cars	2,455,292.99
1,927 Miscellaneous Work Cars	250,114.36
5 Miscellaneous Equipment	2,793.97
	<u>\$3,615,976.72</u>

Less—Value of Equipment retired during the year as follows:

47 Locomotives	\$198,078.47
2,789 Freight-Train Cars	881,085.34
10 Passenger-Train Cars	30,259.48
107 Miscellaneous Work Cars	37,381.97
Adjustment of charges for locomotives received in prior year....	4,740.12
	<u>\$1,151,545.38</u>
	<u>\$2,464,431.34</u>

The 1,927 miscellaneous work cars included in equipment added and the 2,789 freight-train cars reported as retired include 1,925 cars, which, being permanently assigned to work service, were relettered in work service equipment series during the year and transferred from freight equipment to work service equipment at their depreciated value at time of relettering.

In addition to the equipment reported retired as above, 33 freight-train cars leased from the Oklahoma Central Railroad Co. were also retired during the year and liability therefor included in Other Unadjusted Credits in the General Balance Sheet.

MAINTENANCE OF EQUIPMENT

The following statement shows the sums charged to Operating Expenses for Maintenance of Equipment during each year since July 1, 1896:

Year ending June 30	Average Operated Mileage	Total Expenditure	Expenditure per Mile
1897	6,443.81	\$3,443,884.82	\$534.45
1898	6,936.02	4,659,277.99	671.75
1899	7,032.62	4,810,795.64	684.07
1900	7,341.34	5,267,832.40	717.56
1901	7,807.31	6,257,456.57	801.49
1902	7,855.38	7,864,951.25	1,001.22
1903	7,965.13	8,510,543.09	1,068.48
1904	8,179.59	10,006,135.41	1,223.31
1905	8,305.40	10,914,864.47	1,314.19
1906	8,433.99	10,720,040.43	1,271.05
1907	9,273.15	11,779,846.64	1,270.32
1908	9,415.01	14,246,621.44	1,513.18
1909	9,794.86	13,903,897.37	1,419.51
1910	9,916.33	15,560,047.44	1,569.13
1911	10,350.13	16,686,145.45	1,612.17
1912	10,627.92	16,521,231.41	1,554.51
1913	10,750.31	19,415,224.63	1,806.02
1914	10,908.52	19,100,724.51	1,750.99
1915	11,114.52	19,764,535.40	1,778.26

For the year ending June 30, 1915, maintenance charges, including renewals and depreciation, averaged as follows:

Per locomotive	\$4,600.26
Per locomotive mile .....	.1674
Per freight car	128.99
Per freight car mile .....	.0119
Per passenger car, including mail and express.....	1,203.56
Per passenger car mile .....	.0139

The foregoing average maintenance charges include a proportion of unlocated expenditures for Maintenance of Equipment charged to Superintendence, Shop Machinery, Injuries to Persons, Insurance, Stationery and Printing, Other Expenses, and Maintaining Joint Equipment at Terminals. Refrigerator cars are not taken into consideration in arriving at freight car averages, such cars being operated by The Santa Fe Refrigerator Despatch Company, which bears the expense of their maintenance.

MAINTENANCE OF WAY AND STRUCTURES

The following statement shows the sums charged to Operating Expenses for Maintenance of Way and Structures during each year since July 1, 1896:

Year ending June 30.	Average Operated Mileage.	Total Expenditure.	Expenditure per Mile.
1897	6,443.81	\$6,282,923.15	\$975.03
1898	6,936.02	8,281,397.88	1,193.97
1899	7,032.62	7,672,107.62	1,090.93
1900	7,341.34	6,354,372.10	865.56
1901	7,807.31	6,433,840.36	824.08
1902	7,855.38	6,141,466.39	781.82
1903	7,965.13	9,304,892.04	1,168.20
1904	8,179.59	9,170,234.07	1,121.11
1905	8,305.40	11,385,418.33	1,370.85
1906	8,433.99	12,475,407.97	1,479.18
1907	9,273.15	15,286,062.66	1,648.42
1908	9,415.01	14,120,828.02	1,499.82
1909	9,794.86	12,884,406.81	1,315.43
1910	9,916.33	17,807,136.20	1,795.74
1911	10,350.13	16,059,786.90	1,551.65
1912	10,627.92	16,076,833.75	1,512.70
1913	10,750.31	18,054,413.03	1,679.43
1914	10,908.52	15,308,780.25	1,403.38
1915	11,114.52	16,514,467.89	1,485.85

COMPARISON OF OPERATING RESULTS

The following is a statement of revenues and expenses of the System for the fiscal year ending June 30, 1915, in comparison with the previous year:

	Year Ending June 30, 1915.	Year Ending June 30, 1914.	Increase.	Decrease.
OPERATING REVENUES:				
Freight	\$80,504,393.33	\$73,638,388.01	\$6,866,005.32	
Passenger	27,823,063.87	28,497,232.68		\$674,168.81
Mail, Express and Miscel.	9,338,130.26	8,974,149.17	363,981.09	
Total Operating Revenues	\$117,665,587.46	\$111,109,769.86	\$6,555,817.60	
OPERATING EXPENSES:				
Maintenance of Way & Structures	\$16,514,467.89	\$15,425,729.81	\$1,088,738.08	
Maintenance of Equipment	19,764,535.40	19,213,342.69	551,192.71	
Traffic	2,649,174.86	2,521,773.79	127,401.07	
Transportation—				
Rail Line	34,827,705.34	33,899,108.43	928,596.91	
General	2,476,595.20	2,409,378.96	67,216.24	
Transportation for Invest.—Cr.	140,925.00			\$140,925.00
Total Operating Expenses	\$76,091,553.69	\$73,469,333.68	\$2,622,220.01	
Net Operating Revenue	\$41,574,033.77	\$37,640,436.18	\$3,933,597.59	
Ratio of Operating Expenses to Operating Revenues.	64.67	66.12		1.45

Credits in italics.

NOTE.—The Operating Expenses by general accounts used for comparative purposes are not the same as shown in the last annual report, but are revised in accordance with Classification of Operating Expenses as prescribed by the Interstate Commerce Commission, effective July 1, 1914.

The average tons of freight (revenue and company) per loaded car mile increased from 18.75 to 19.71, or 5.12 per cent.

The average tons of freight (revenue and company) carried per freight-train mile (freight and mixed) increased from 420.45 to 442.04, or 5.13 per cent.

The average freight revenue per freight-train mile increased from \$3.47 to \$3.55, or 2.31 per cent.

The average passenger revenue per passenger-train mile decreased from \$1.17 to \$1.09, or 6.84 per cent.

The average passenger train revenue per passenger-train mile decreased from \$1.45 to \$1.37, or 5.52 per cent.

The tons of freight carried one mile (revenue and company) increased 1,099,152,546, or 12.33 per cent., while miles run by freight cars (loaded and empty) in freight and mixed trains increased 66,620,201, or 9.82 per cent., and the mileage of such trains increased 1,450,897, or 6.84 per cent.

The number of passengers carried one mile increased 31,618,391, or 2.41 per cent., while miles run by passenger cars in passenger and mixed trains increased 10,362,341, or 7.41 per cent., and the mileage of such trains increased 1,213,955, or 4.98 per cent.

While freight operating revenues increased 9.32 per cent., the freight service rendered, as measured by tons transported one mile, increased 12.33 per cent.; and while earnings from passengers carried decreased 2.37 per cent., the passenger service rendered, as measured by passengers carried one mile, increased 2.41 per cent.

The following is a consolidated statement of the business of the System for each fiscal year during the period since January 1, 1896:

Fiscal Year Ending June 30.	Average Miles Operated.	Gross Revenues, Including Income from Other Sources.	Expenses, Including Taxes, Rentals and Other Charges.	Interest on Bonds.	Net Corporate Income.
1897 (18 mos.)	6,443.81	\$44,532,628.99	\$36,038,455.30	\$8,440,387.91	\$5,785.78
1898	6,936.02	39,396,126.41	30,513,553.17	7,045,988.30	1,836,584.94
1899	7,032.62	40,762,933.47	29,332,964.11	7,241,972.00	4,187,997.36
1900	7,341.34	46,498,899.04	29,414,427.56	7,345,166.50	9,739,304.98
1901	7,807.31	54,807,379.78	34,502,039.87	7,830,810.83	12,474,529.08
1902	7,855.38	60,275,944.33	36,272,432.45	8,438,985.00	15,564,526.88
1903	7,965.13	63,668,390.99	40,635,576.48	9,134,485.24	13,898,329.27
1904	8,179.59	69,419,975.41	44,641,434.10	9,418,770.00	15,359,771.31
1905	8,305.40	69,189,739.65	47,835,883.50	9,611,510.09	11,742,346.06
1906	8,433.99	79,390,749.05	51,035,355.71	10,622,181.22	17,733,209.12
1907	9,273.15	94,436,574.08	61,779,916.16	11,487,934.70	21,168,723.82
1908	9,415.01	91,289,770.61	65,031,582.67	12,579,301.77	13,678,886.17
1909	9,794.86	95,424,091.89	61,458,019.13	13,548,081.93	20,417,990.83
1910	9,916.33	107,543,250.16	75,133,314.54	11,984,151.36	20,425,784.26

Fiscal Year Ending June 30.	Average Miles Operated.	Gross Revenues, Including Income from Other Sources.	Expenses, Including Taxes, Rentals and Other Charges.	Interest on Bonds.	Net Corporate Income.
1911	10,350.13	109,772,481.69	75,689,094.83	12,712,319.31	21,371,067.55
1912	10,627.92	110,322,328.13	77,001,227.38	13,660,859.50	19,660,241.25
1913	10,750.31	119,411,875.94	83,432,816.21	13,825,325.50	22,153,734.33
1914	10,908.52	113,284,122.98	80,213,746.06	12,886,412.23	20,183,964.69
1915	11,114.52	120,662,737.93	83,746,128.92	12,785,747.10	24,130,861.91

The following statement shows the gross operating revenues of the System (exclusive of income from other sources) per mile of road operated for each fiscal year since July 1, 1896:

Year Ending June 30.	Gross Operating Revenues.	Average per Mile of Road.
1897	\$30,621,230.10	\$4,752.04
1898	39,214,099.24	5,653.69
1899	40,513,498.63	5,760.80
1900	46,232,078.23	6,297.49
1901	54,474,822.61	6,977.41
1902	59,135,085.53	7,527.97
1903	62,350,397.28	7,827.92
1904	68,171,200.18	8,334.31
1905	68,375,837.25	8,232.70
1906	78,044,347.25	9,253.55
1907	93,683,406.91	10,102.65
1908	90,617,796.38	9,624.82
1909	94,265,716.87	9,624.00
1910	104,993,194.67	10,587.91
1911	107,565,115.62	10,392.63
1912	107,752,359.91	10,138.61
1913	116,896,251.98	10,873.75
1914	111,109,769.86	10,185.60
1915	117,665,587.46	10,586.65

The following statement shows the development of the freight and passenger revenues of the System since July 1, 1896:

Year Ending June 30.	Freight Revenue.	Passenger Revenue.
1897	\$22,067,686.77	\$5,574,288.31
1898	28,588,716.76	7,347,361.59
1899	29,492,586.65	8,126,141.85
1900	33,729,332.83	9,334,661.57
1901	39,052,557.43	11,678,017.25
1902	41,815,607.05	13,439,384.57
1903	44,622,438.71	13,469,985.78
1904	47,762,653.23	15,433,773.63
1905	47,408,982.36	16,045,380.27
1906	54,598,902.82	18,013,988.56
1907	65,500,309.42	21,171,629.08
1908	61,848,638.51	21,643,427.49
1909	64,212,638.10	22,734,505.32
1910	71,194,055.59	25,437,181.98
1911	71,787,200.89	27,204,867.66
1912	71,529,574.67	27,453,525.41
1913	78,190,923.18	29,425,922.44
1914	73,638,388.01	28,497,232.68
1915	80,504,393.33	27,823,063.87

PROPERTY INVESTMENT AND RATE OF RETURN.

The development of the Company's business and of its efficiency have been due principally to the very large expenditures (over \$308,000,000) which have been made in the extension and improvement of the property since January 1, 1896. In order to make such expenditures, your Company has raised since 1896 over \$218,000,000 of "new money" by the sale of bonds which are now outstanding or which (in the case of many of the Convertible Bonds sold) are represented by Common Stock now outstanding.

The following statement shows, for each year, the amount of investment, the amount of net income applicable to bond interest, dividends, improvement of property and strengthening of credit, and the rate of return which such net income represents on the amount of the investment.

Year Ending June 30.	Property Investment.*	Income Applicable to Bond Interest, Dividends, Improvement of Property and Strengthening of Credit.†	Per Cent. of Property Investment.
1896 (6 months)	\$372,104,262.77	\$2,432,870.06	.65
1897	387,957,477.68	6,070,364.45	1.57
1898	392,169,842.02	8,871,947.26	2.26
1899	399,527,444.30	11,409,315.36	2.86
1900	407,187,811.22	17,064,850.91	4.19
1901	419,541,440.17	21,196,714.38	5.05
1902	439,911,035.33	23,921,018.14	5.44
1903	454,290,057.89	23,032,814.51	5.07
1904	466,273,139.34	24,778,541.31	5.31
1905	473,020,998.79	21,353,856.15	4.51
1906	496,782,342.35	28,355,393.34	5.71
1907	519,004,129.48	32,724,274.07	6.31
1908	541,727,328.96	25,633,510.34	4.73
1909	548,251,270.97	33,523,437.28	6.11
1910	585,948,031.56	32,387,712.39	5.53
1911	620,833,307.37	34,102,511.86	5.49
1912	635,182,282.35	33,321,100.75	5.25
1913	657,128,078.35	36,078,744.55	5.49
1914	671,814,299.94	33,070,376.92	4.92
1915	683,855,314.09	36,928,030.11	5.40
Annual Average	\$508,625,494.75	\$24,436,276.11	4.90

* The amounts above shown as "Property Investment" do not include anything for necessary working capital such as materials and supplies and cash. Ordinarily such necessary working capital considerably exceeds \$5,000,000.

In the years 1901 to 1908 the "Property Investment" was reduced by "writing off" sums aggregating \$21,066,685.78, which sums are excluded from the "Property Investment" as above stated.

The figures for the years 1910 to 1914, inclusive, are not the same as shown in the corresponding table of annual report for the previous year, but are revised to conform to the Interstate Commerce Commission's classification of "General Balance Sheet Accounts," effective July 1, 1914.

† The "Income" shown above is determined after allowing for adjustments made through profit and loss.

The striking fact emphasized by the foregoing statement is that the earnings on the entire investment are now not much more than five per cent.

per annum, and it must be borne in mind that of these earnings it is necessary to appropriate a considerable amount each year for additions and betterments to preserve the Company's credit.

The ability of your Company, under the conditions which this statement exhibits, to pay six per cent. on the common stock, is due to the fact that it pays an average of only slightly more than four per cent. on its bonded debt, much of the bonded debt having been created when money could be obtained at or near four per cent.

CAPITAL STOCK AND FUNDED DEBT.

The outstanding Capital Stock (deducting stock in treasury) on June 30, 1914, consisted of:

Common	\$195,811,500.00	
Preferred	114,173,730.00	
		\$309,985,230.00

Issued during the year:

Common Stock issued in exchange for Convertible Bonds retired		4,678,000.00
Capital Stock outstanding June 30, 1915:		
Common	\$200,489,500.00	
Preferred	114,173,730.00	
		\$314,663,230.00

The outstanding Funded Debt of the System (deducting bonds in the treasury) amounted on June 30, 1914, to..... \$313,193,648.50

The following changes in the Funded Debt occurred during the year:

Obligations Issued:		
Convertible 4% Bonds.....	\$ 977,000.00	
Rocky Mountain Division 4% Bonds.....	3,000,000.00	
California-Arizona Lines First and Refunding Mortgage 4½% Bonds.....	10,866.90	
		3,987,866.90
Obligations Purchased or Retired:		
Serial Debenture 4% Bonds.....	\$5,000.00	
Convertible 4% Bonds.....	4,678,000.00	
California-Arizona Lines First and Refunding Mortgage 4½% Bonds.....	9,733.00	
Chicago & St. Louis Ry. Co. First Mortgage 6% Bonds	1,498,000.00	
Funded Debt Matured Unpaid included in General Balance Sheet under "Current Liabilities"	15,500.00	
		6,206,233.00

Decrease of Funded Debt..... \$ 2,218,366.10

Total System Funded Debt outstanding June 30, 1915..... \$310,975,282.40

Interest charges for year ending June 30, 1916, will be approximately \$12,678,840, or an average monthly charge of about \$1,056,570. In making this approximation, exchanges of Convertible Bonds for Common Stock made since June 30, 1915, aggregating \$2,007,000, are considered.

TREASURY.

Neither this Company nor any of its auxiliaries has any notes or bills outstanding.

The Company held in its treasury on June 30, 1915, \$21,186,791.95 cash, and had available \$5,278,000 General Mortgage Bonds, including bonds not yet certified by the Trustee. The Company also has in the treasury unpledged a large amount of stocks and bonds of other companies, of which part are carried in the balance sheet as Investments and part are included under Railroads, Franchises and Other Property.

During the year \$977,000 of Convertible Four Per Cent. Bonds, which formed part of the Company's treasury assets, were sold for cash, realizing \$997,702.50.

FUEL RESERVE FUND.

The fund has been increased during the year by appropriations of income, as follows:

Amount of credit of Fund June 30, 1914.....	\$1,778,332.02
Added during the year.....	54,502.78

In Fund June 30, 1915..... \$1,832,834.80

MINKLER SOUTHERN RAILWAY.

This line, from Minkler to Exeter, California, aggregating, with two short branches, 43.71 miles, was completed and opened for traffic on October 1, 1914. An extension, from Exeter to Lindsay, a distance of 6.95 miles, has since been constructed and will be placed in operation October 1, 1915.

OKLAHOMA CENTRAL RAILROAD.

This line, extending from Chickasha, Oklahoma, to Lehigh, Oklahoma, a distance of 133 miles, crossing your main line at Purcell and Byars, was leased by your Company effective August 1, 1914, for a term of five years, and has since that date been operated as a part of its System. The line serves a fairly good agricultural country, but the main purpose in leasing it was to secure coal from the Lehigh fields for use on the System and to permit of supplying the demand for coal at points in northern Texas.

OIL FIELDS & SANTA FE RAILWAY.

This company was formed to acquire certain lines extending from Cushing to Pemeta, Oklahoma, and from Jennings to Oilton, Oklahoma, tapping the so-called Cushing Oil Field, which is an important source of supply for fuel oil. A line from Pemeta to Oilton, connecting the railroads purchased, and an extension from Pemeta to Drumwright are now under construction. The lines acquired, together with those now being built, will aggregate about 27 miles of railway, which, upon the completion of construction, will be operated, under lease, by your Company as a part of its system, and will, it is believed, make a valuable feeder to your main line, with which it connects at Cushing.

OAKLAND WHARF PROPERTY.

The facilities on your Company's water frontage at Oakland, California, referred to under the above caption in the last annual report, were placed in operation July 1, 1915, though not fully completed.

ROCKY MOUNTAIN & SANTA FE RAILWAY.

Reference was made in the last annual report to an agreement with the St. Louis, Rocky Mountain & Pacific Company, under which your Company took possession of this line (then known as the St. Louis, Rocky Mountain & Pacific Railway) on August 1, 1913, under a certain contract of purchase. The conditions of the purchase contract have been met and \$3,000,000 of Four Per Cent. Rocky Mountain Division Bonds have been issued in acquisition of the stock and indebtedness of the Rocky Mountain & Santa Fe Railway Company, which owns this line; and the line has been leased to your Company.

NORTHWESTERN PACIFIC RAILROAD COMPANY.

Track laying on the line of this Company (whose capital stock is owned one-half by your Company and one-half by the Southern Pacific Company) from Willets to Shively, a distance of 105.64 miles, has been completed, and the line was placed in operation on July 1, 1915. This construction closes the gap in the mileage and has made possible the establishment of through train service between Eureka on the north and San Francisco Bay on the south.

UNION PASSENGER STATION, KANSAS CITY.

The new facilities constitute one of the largest and most complete passenger terminals in the country and represent a very large investment. The heavy fixed charge which this investment entails and the maintenance and operation of these extensive facilities place a large expense upon the Kansas City railroads, all of whom are using the new station; however, the new facilities are a great accommodation to the public and, of course, materially improve operating conditions at Kansas City.

TAXES.

Instead of showing the customary large increase, the fiscal year just closed shows a decrease in taxes of \$28,268.53. The tax accruals for the fiscal year ending June 30, 1914, were \$5,525,585.30, while the accruals for the fiscal year ending June 30, 1915, were but \$5,497,316.77. However, information so far received pertaining to assessments and rates for the present fiscal year indicates the decrease was temporary only and that we will this year show another substantial increase.

In the report of last year your attention was called to the alarming growth of public expenditures, and the fear was expressed that expenditures for good roads were likely to assume large proportions. States are vying with states, and counties with counties, and the worst fears of a year ago are being realized. Road improvement and construction projects are approved and bond issues voted with but little regard to the ability of the taxpayers to bear the burden and with even less consideration of the utility and permanency of the roads. Yuma County, Arizona, well illustrates the recklessness with which people are now spending money. This county with a population of but 7,730 and but little wealth other than railroad property and having a bonded indebtedness of \$138,791 has just approved a bond issue of \$500,000 for the improvement of its highways.

Your officials are doing everything in their power to check the unwise and improper expenditure of public funds by arousing the taxpayers and by encouraging associations of taxpayers to fight for efficiency and economy. Their efforts have generally borne good fruit and encourage them to carry on the struggle.

REVISED ACCOUNTING RULES OF THE INTERSTATE COMMERCE COMMISSION.

The Interstate Commerce Commission issued, effective July 1, 1907, its first classifications, pursuant to the Act to Regulate Commerce, as amended, with the purpose of establishing a uniform system of accounts for steam roads. These classifications related to operating revenues and expenses, expenditures for land and equipment, and locomotive, car, and train miles; later these were followed by instructions pertaining to income, profit and loss, and balance sheet accounts. These classifications, which had been under review for a considerable period, were revised and reissued effective July 1, 1914. Certain expenditures which formerly at the option of the carriers were chargeable to Operating Expenses, are under the revised classifications, obligatory charges to Capital Account. As a result of these changes the operating expenses of your Company for the year covered by this report were relieved of charges aggregating upwards of \$600,000, with corresponding increase in the charges to Additions and Betterments, as compared with what they would otherwise have been. The greater part of this amount represents transportation charges on men employed and material used in improvement work, increased weight of second-hand rail, and necessary fastenings and appurtenances applied during the year in track renewals. The revised classifications also account for the change in the form of the general balance sheet as shown on pages 26 and 27 of this report.

GENERAL.

The year has been the largest as to earnings, both gross and net, in the history of the Company. Two reasons contributed mainly to this result, viz.: the unprecedented wheat crop of Kansas and the largely increased yield of agricultural products of all kinds in the so-called "Plains Country" in Western Texas and Western Oklahoma. These two items were more than sufficient to overcome a falling off of \$1,304,472.05 in net revenue of the lines west of Albuquerque.

The wheat of Kansas and Oklahoma was largely exported via Galveston, thus giving your properties the longest possible haul and the largest possible earnings, and this has created so marked an improvement in business of your Texas lines as to make their net earnings much more than ever before.

The Panama-Pacific Exposition at San Francisco and the Panama-California Exposition at San Diego have created some passenger business, but at such low rates as to afford little if any profit.

Relations with the general public, especially that portion residing along the line, are quite satisfactory, but contest is being made as to rates in various states before both commissions and courts. There is little demur to the proposition that the railroads need more money, but each class of shippers is firm in the view that the increase should not come from it.

The general merchandise rates all over the country (now lower than anywhere else in the world) could be doubled and the ordinary living expense of each family would be so little increased that the head of the family would not know of this advance unless somebody told him. A large part of the trouble about rates comes from certain classes of middle men who contribute little to the prosperity of the country, but who are well organized and consequently influential.

It is too early to measure accurately the effect of the Panama Canal. But it is evident that the loss of revenue on that account is very substantial and already it probably is considerably in excess of \$1,000,000 per year.

Governor John G. McCullough, a director of this Company, passed away on May 29, 1915. His sound judgment and wide experience in railroad work, as well as his activities in public life, enabled him to render most valuable service to the Company and his associates on the Board. His familiarity with the affairs of the Company and conditions in its territory gained from frequent trips over the property testified to the responsibility he felt was attached to his directorship. It is proper, therefore, that there should be given place in this report for this expression of sorrow for the great loss the Company has sustained by his death.

Your Directors are pleased to record their appreciation of loyal and efficient service by officers and employees.

EDWARD P. RIPLEY,
President.

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*Illustrated.

A letter to the editor, by Robert W. Hunt, on another page, reviews the development of rail straightening and calls attention

The Cold Straightening of Rails

to the constant danger of serious injury to the rail as a result of the rough treatment which it now receives while undergoing this process. The elimination of occasion for concern from this cause by a departure from the present practice in the straightening of rails will not solve the rail problem, but it does seem to offer an opportunity for improvement and merits consideration. The letter confirms the findings of Dr. P. H. Dudley, as reported by him in the discussion of the report of the Rail Committee of the American Railway Engineering Association last March, although the solution of the problem offered differs somewhat in detail from that suggested by Dr. Dudley. Captain Hunt's plan will meet with approbation from some sources and also with no less emphatic objection. Bowed rails will not pile and load into cars as conveniently as straight ones, and it is to be expected that the laying of such rail on tangent track will be a source of some inconvenience and result in increased labor cost. These and other objections must be answered. We hope that Captain Hunt's letter will call forth discussion of this question raised from all points of view.

The Panama Canal in the fiscal year ending June 30, 1915, cost the taxpayers of the United States about \$10,000,000. This sum

Financial Results of the Panama Canal

represents the interest at 3 per cent on the cost of the canal, less the amount by which the tolls earned during the year exceeded the expenses of canal operation and maintenance. Some of the taxpayers, including the owners of steamship lines and shippers of freight to and from the Atlantic and Pacific seaboard territory, have profited greatly by the canal and doubtless are satisfied to pay a share of the expense. Others, including the shippers of the Middle West and the railroads, have been injured in their business, but they pay their share of the taxes just the same. The tolls earned by the canal during the year amounted to \$4,343,383, and the expenses of operation and maintenance to \$4,066,727. This makes the excess of tolls earned over expenses amount to \$276,656, and, according to the Canal Record, the official publication of the Panama Canal, which publishes the figures, this "represents a profit of 6.7 per cent on the expenditure for operation and maintenance alone, not counting anything for interest on the money invested or for depreciation of plant." If the railroads of the United States could keep their accounts in this way there would not now be nearly 42,000 miles of road in the hands of receivers. If the railroads could calculate their profits as a percentage of their expenses they would present a striking appearance of prosperity, since a road with an operating ratio of 70 would show a "profit" of approximately 42 per cent. This is not, however, the most important difference between the methods of accounting of the canal authorities and the railways. The immediate cause for the receivership of a railroad is usually its inability to pay the interest on its bonds. Government enterprises encounter no such difficulty, because their accounts usually include only receipts and expenditures, and the little matter of interest on bonds is taken care of elsewhere. This enables the Canal Record to use the word "profit," whereas the *Railway Age Gazette* in a review of the year's operations of a railroad that had earned less than one-fortieth of the interest on its investment would be obliged to employ some expression signifying "deficit." The Canal Record does not attempt to conceal the facts. In the last paragraph of its review it says: "If, however, consideration be given to the interest on the money invested, which is a regular consideration from a commercial point of view, the profit vanishes. The money invested by the United States in the enterprise is approximately \$360,000,000. The interest on this at 3 per cent

(which is the rate of interest on the last bonds issued for the canal work) amounts to \$10,800,000." In the discussion of a railroad's annual report this rather troublesome detail usually demands a degree of attention somewhat earlier in the story. The revenues of the Panama Railroad and its steamship line were \$2,787,056 and \$2,642,457, respectively, while the expenses were \$2,607,479 and \$2,142,603, giving a net revenue from rail and steamship operations of \$679,430. The net cost of other business operations in connection with the canal during the year was \$2,469,642, and the canal zone government cost \$288,887. With a profit of \$71,234 from commissary operations, deficits from the operation of the Hotel Washington and of plantations, and a revenue from land rentals, the total revenues of the combined canal, railroad and steamship enterprise were \$19,236,818, and the total expenses were \$18,283,315, leaving an excess of revenues over expenses of \$953,502, which would not go very far toward paying interest on the investment.

RAILROAD BANKRUPTCY

IN last week's issue of the *Railway Age Gazette* there was a table showing the mileage and outstanding securities of each one of the roads now in the hands of receivers. It may be recalled that this mileage amounted to one-sixth of the total mileage of railroads in the United States. The total par value of securities issued against this approximately 42,000 miles of road in the hands of receivers is \$2,264,000,000, or about \$54,000 per mile. Of the total 41,988 miles in receivers' hands, 34,902 miles are Class 1 roads reporting monthly earnings to the Interstate Commerce Commission, and the revenues, expenses and net operating income for these roads were published in the *Railway Age Gazette* of September 24. Net operating income is the total amount which the company has left after paying its operating expenses and taxes. From this it must pay the interest on its bonds, its rentals and its dividends to its stockholders.

If the railroad business were in a prosperous condition, and bankers and investors had confidence in the stability of railroad earnings, a company which was earning 7 per cent on the total cost of its property, if one-third of its capital was raised through the sale of bonds and two-thirds through the sale of stock, would have stock selling at approximately par and bonds on a 5 per cent basis, and assuming that the company had sold its bonds at about a 5 per cent basis, the company could, with a fair degree of safety, pay 6 per cent dividends. In other words, net income equal to 7 per cent on total capitalization would provide for 5 per cent on borrowed money, 6 per cent on stock, and a fair margin of safety in the form of surplus.

The Pennsylvania is a 6 per cent stock and is now selling at about 114 per cent of par; the Southern Pacific is paying 6 per cent and is selling at about 96 per cent of par; the Atchison, Topeka & Santa Fe is paying 6 per cent, and its stock is selling at about 106 per cent of par. Some of the bonds of these roads are selling on a lower yield basis than 5 per cent, but new bonds certainly could not be sold at anything less than 5 per cent. Investors are assuming that there will be the necessary fair margin of safety over the 6 per cent on the stock—that is, that these companies are likely to earn about 7 per cent on their total capitalization. Taking 7 per cent, therefore, as a fair minimum which net operating income ought to average on total capitalization, it is interesting to see what capitalization per mile of line each one of the roads in the hands of receivers could be given on the basis of its 1915 net operating income. The following table shows these figures:

	Mileage	Net Operating Income	(a)	(b)
Atlanta, Birmingham & Atlantic...	642	\$133,807	\$1,911,529	\$2,964
Chicago & Eastern Illinois.....	1,282	1,967,224	28,103,200	21,921
Chicago, Peoria & St. Louis.....	255	119,732	28,103,200	21,921
Cincinnati, Hamilton & Dayton...	1,011	721,710	10,310,142	10,198
Colorado Midland	338	47,895	684,214	2,024
International & Great Northern...	1,160	806,500	11,521,429	9,932

Missouri & North Arkansas.....	365	*221,619	.....	.....
Missouri, Oklahoma & Gulf.....	334	*177,113	.....	.....
New Orleans, Mobile & Chicago..	403	374,129	5,344,700	13,262
New Orleans, Texas & Mexico...	286	110,051	1,572,157	5,497
Pere Marquette.....	2,314	4,069,504	58,135,771	25,123
Pittsburgh, Shawmut & Northern.	294	365,371	5,219,586	17,754
St. Louis & San Francisco.....	4,747	11,755,204	167,931,486	35,376
St. Louis, Brownsville & Mexico..	548	525,267	7,503,814	13,693
St. Louis, San Francisco & Texas.	235	1,278	18,257	77
Tennessee Central.....	294	165,270	2,361,000	8,031
Toledo, St. Louis & Western.....	451	888,922	1,269,889	2,816
Trinity & Brazos Valley.....	328	*62,134	.....	.....
Wahash	2,519	4,931,005	70,442,929	27,965
Wheeling & Lake Erie.....	512	1,002,407	14,320,100	27,969
Chicago, Rock Island & Pacific...	7,855	13,415,308	191,647,257	24,398
Missouri, Kansas & Texas.....	3,865	8,584,604	122,637,200	31,730
Missouri Pacific.....	3,921	5,390,773	77,011,043	19,462
Western Pacific.....	943	931,305	13,304,357	14,109

* Deficit.

(a) Capitalization on which net operating income would yield 7 per cent.
(b) Capitalization per mile on which net operating income would yield 7 per cent.

The average capitalization per mile on which all the 34,902 miles of road reporting monthly earnings to the Interstate Commerce Commission could earn 7 per cent is \$22,858. This on its face is utterly inadequate. Of the roads in the hands of receivers only two are earning a net operating income which would be 7 per cent on anything that might conceivably be their actual cost per mile. These are the St. Louis & San Francisco, earning 7 per cent on \$35,376 per mile, and the Missouri, Kansas & Texas, earning 7 per cent on \$31,730 per mile.

At the recent hearing on valuation it was pointed out that the best method of arriving at estimates of the present cost of reproduction of the railroads in the United States would be to base the estimates on the actual experience of companies which have built new mileage recently. The Pacific coast extension of the Chicago, Milwaukee & St. Paul cost at the very least an average of from sixty to seventy thousand dollars per mile. This may be somewhat higher than would be the cost of building the entire St. Louis & San Francisco, but probably not a great deal higher, when we taken into consideration stations, yards, shops, right of way and equipment; but the St. Louis & San Francisco and the Missouri, Kansas & Texas are in a class by themselves among the roads in the hands of receivers. The International & Great Northern is earning 7 per cent on less than \$10,000 per mile; the Chicago & Eastern Illinois, a far more expensive road to build per mile than the average of the St. Louis & San Francisco, is earning 7 per cent on only \$21,921 per mile; the Missouri Pacific, running through a territory where the right of way alone, including the terminals, would amount to more than six thousand dollars a mile, is earning 7 per cent on \$19,462 per mile.

There are only three possible assumptions: Either that these roads are not needed by the country which they serve and that the loss which investors have sustained and which they face is due to the business mistake of building them, and that therefore a scaling down of securities to represent the earning power of the roads could not be considered confiscation; or that these roads are being operated so poorly that the wastes, if eliminated, would make up the difference between 7 per cent on the amount shown per mile in our table and 7 per cent on what the roads would actually cost to build; or, lastly, that rates fixed by state commissions and the Interstate Commerce Commission are low to the point which is plainly confiscatory as affecting these roads. Since most of the business is competitive, if these roads are to have higher rates their competitors also must be given higher rates. Whether or not there would be any way of compelling commissions to do this through the courts is questionable, but this is a larger question than simply a legal one. The commissions and public opinion must in the end be guided by economic principles, from which there is no escape.

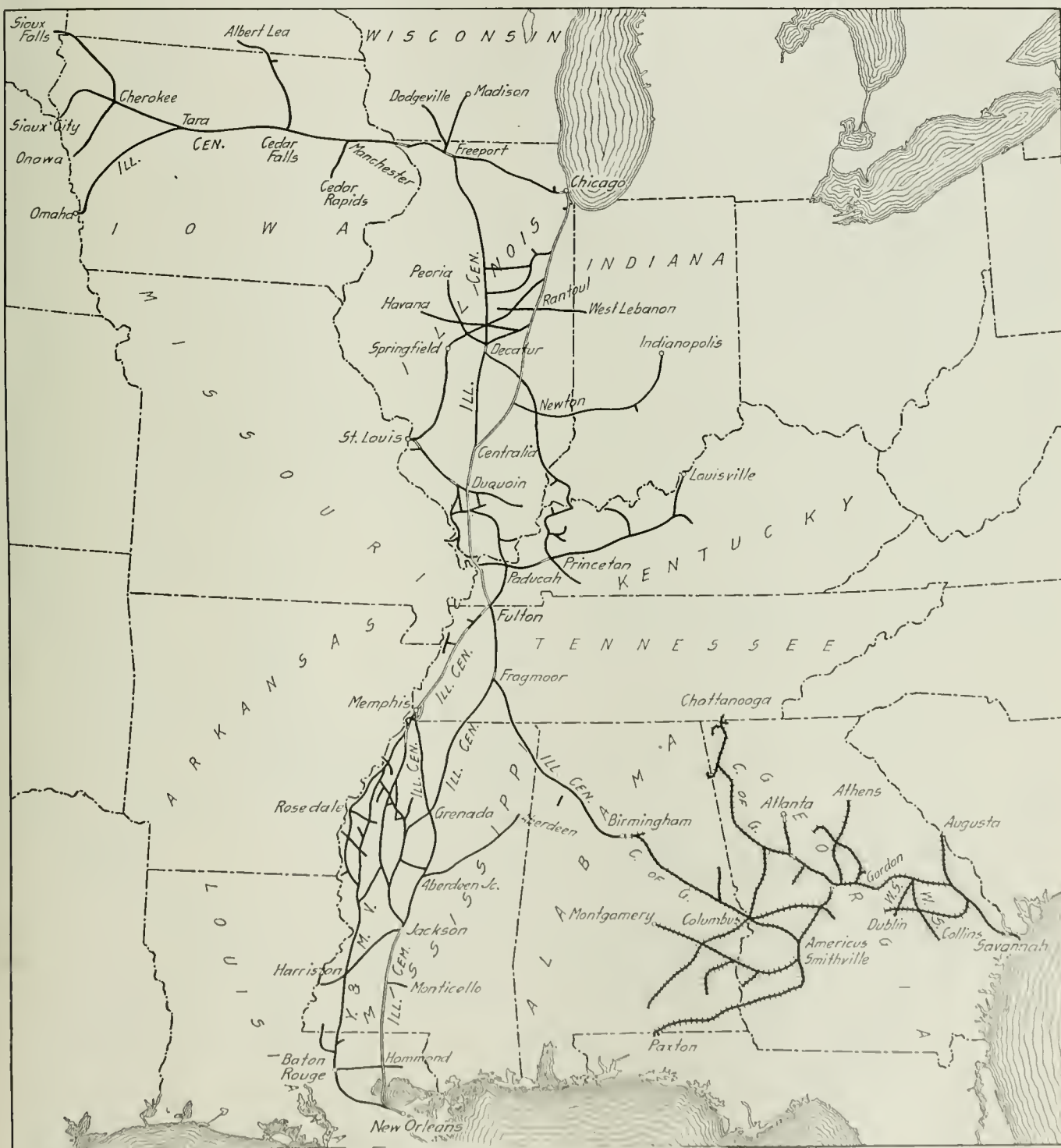
As to whether or not the roads should have been built and are needed to serve the territory which they now serve, it would be interesting to stop their operation for just one day and then receive the opinion of the people living in the territory served.

ILLINOIS CENTRAL

THE Illinois Central made a saving in transportation expenses in the fiscal year ended June 30, 1915, enough to offset almost half of the loss in operating revenue due to business depression and especially to the depression in the lumber business and in the South. In 1915 total operating revenues amounted to \$61,700,000, a decrease as compared with the previous year of \$4,173,000, or 6.34 per cent. Transportation expenses amounted to \$22,300,000, a decrease as compared with the previous year of \$1,850,000, or 7.66 per cent. The reduction in transportation

locomotives, and a reduction in payments for loss and damage to freight of 27.48 per cent. The trainload of revenue and company freight in 1915 was 523 tons as against 488 tons the year before, and the showing per locomotive mile was even better, the average tons of freight per revenue service locomotive mile being 509 in 1915 as against 471 in 1914.

In addition to the reduction in transportation expenses there was a reduction in both maintenance of way and maintenance of equipment, total operating expenses amounting to \$47,570,000, a decrease as compared with the previous year of \$3,205,000.



The Illinois Central and the Central of Georgia

expenses in greater proportion than the reduction in business is credited to the substitution of superheater locomotives on main line for saturated steam locomotives; a successful fuel economy campaign, which was probably also helped by the superheater

Interest charges were less, but rentals of other roads considerably more, so that the net income, after the payment of fixed charges and rentals, was \$6,859,000 in 1915 as against \$8,139,000 in 1914. The 5 per cent dividends called for \$5,465,000, so that

in the fiscal year 1915 the company had a surplus of \$1,240,000.

The expense for maintenance of way and structures was \$8,839,000 in 1915, a reduction of 3.98 per cent, most of which reduction was the result of \$217,000 less spent for rails and \$206,000 less for general repairs of roadway and track, the latter item being affected by the fact that the 1914 expenses on this account were abnormally large because of the charges to maintenance incidental to betterment work and new construction work at Memphis. In 1915 a liberal policy as to tie renewals was pursued, the tie renewals being equal to 673 miles of track, or nearly 9 per cent of all ties in track, including sidings.

Maintenance of equipment cost \$13,892,000, or 4.26 per cent less than in the preceding year, and the reduction was the result of repairs to fewer freight-train cars due, at least in part, to a reduction in freight car mileage. The company spent \$2,351,000 for additions and betterments to its own line, but of this, \$624,000 was transferred to "miscellaneous physical property." In addition there was \$6,094,000 advanced to subsidiary companies. The Illinois Central also spent \$2,503,000 for new equipment, against which there was issued \$1,980,000 equipment trust certificates, series C. On July 1, \$10,780,000 4½ per cent notes matured and were paid, the company having had on hand June 30, 1914, \$10,859,000 cash. At the end of the year the company had \$2,586,000 cash and during the year had borrowed \$1,000,000. Total current liabilities, including this \$1,000,000 loans and bills payable, amounted at the end of the year to \$15,304,000 and current assets, including the cash mentioned previously, to \$20,415,000.

The total tonnage of freight carried on the Illinois Central in 1915 was 31,309,000, comparing with 32,343,000 carried the year before. Of the total carried in 1915, 45.15 per cent was products of mines, 19.00 per cent products of agriculture, 12.48 per cent lumber and 8.28 per cent manufactures. The tonnage

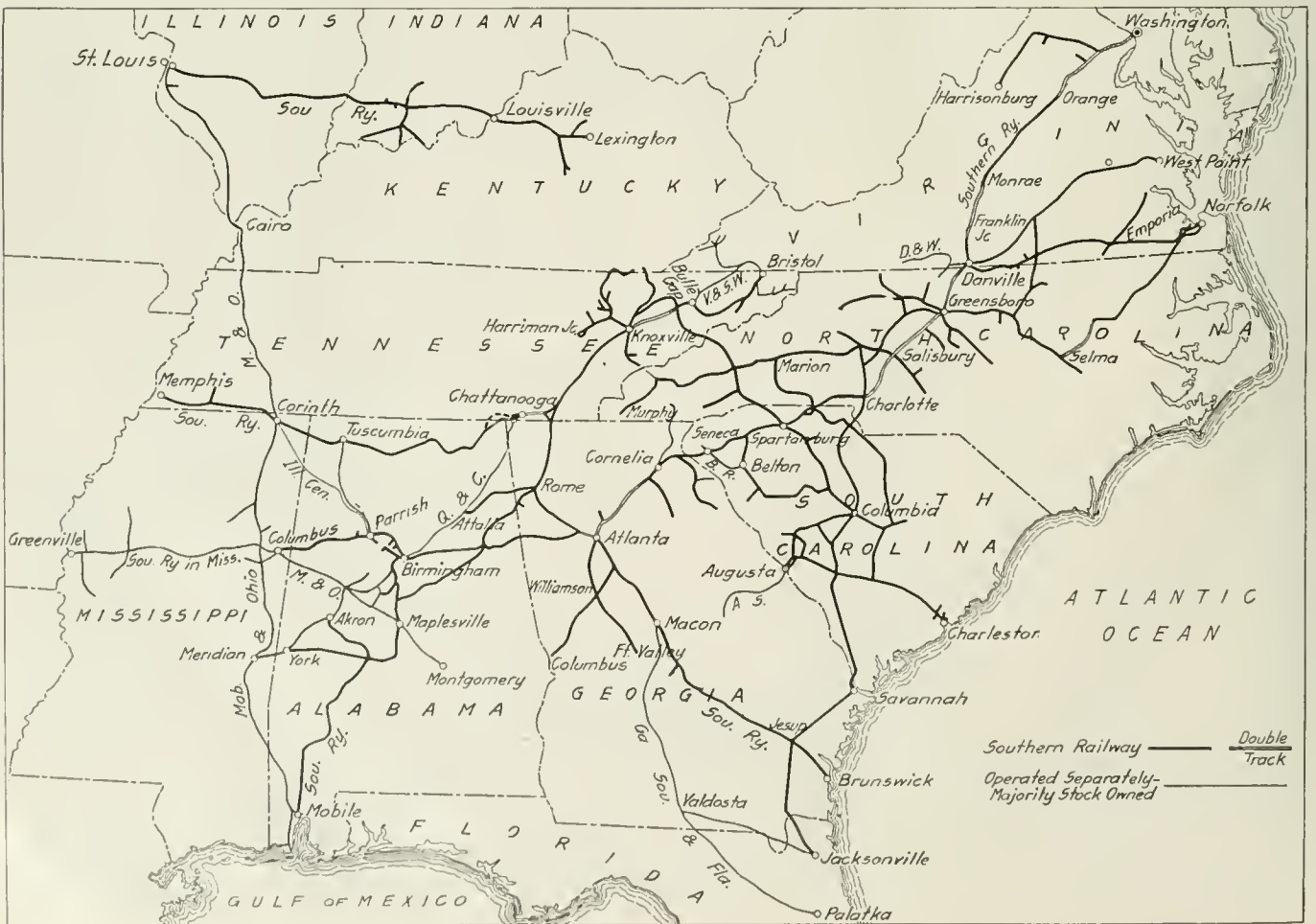
of products of mines was 14,136,000, as compared with 13,843,000 in 1914. On the other hand, the tonnage of lumber was 3,906,000 in 1915 as against 4,804,000 in 1914.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915.	1914.
Average mileage operated.....	4,770	4,769
Freight revenue.....	\$41,212,271	\$43,871,272
Passenger revenue.....	12,640,597	13,715,979
Total operating revenues.....	61,700,372	65,873,700
Maint. of way and structures.....	8,839,472	9,205,946
Maintenance of equipment.....	13,892,444	14,510,079
Traffic expenses.....	1,238,440	1,290,778
Transportation expenses.....	22,299,815	24,150,040
General expenses.....	1,603,256	1,618,484
Transportation for investment—Cr.....	303,279	
Total operating expenses.....	47,570,148	50,775,327
Taxes.....	3,233,838	3,341,247
Operating income.....	10,878,473	11,739,475
Gross income.....	18,537,901	19,060,075
Net income.....	6,859,162	8,138,824
Sinking fund and other appropriations.....	153,903	41,643
Dividends.....	5,464,800	5,464,800
Surplus.....	1,240,460	2,632,381

SOUTHERN RAILWAY

IN 1908 a sudden loss of \$3,716,000 in total operating revenues of the Southern Railway, representing a decrease, as compared with the previous year, of 6.56 per cent., caused the almost entire suspension of capital expenditures and, taken in connection with the after-panic conditions of that year, threatened the company with receivership. In the fiscal year ended June 30, 1915, there was a loss of \$8,551,000 in operating revenues, representing a decrease of 12.09 per cent., as compared with the previous year, and the company was able, by the suspension of dividends on its preferred stock and economies in operation, to get through the year with a surplus of \$1,523,000, or only half a million dollars less than the previous year. Additions and betterment work, for which money had been raised in 1914, was continued, according to the original program, with the result that new money was spent in the South at the very time when



The Southern Railway

the states in that part of the country were most in need of it.

A suggestion of how this result was accomplished is contained in the statement that the increase in ton miles of revenue freight carried per mile of road in 1915 was 28.35 per cent. greater than in 1908, while the freight-train mileage in 1915 was 18.98 less than in 1908.

The loss in revenue in 1915 was sudden, almost beyond comprehension. In August there was a decrease in revenue, as compared with the same month of the year before, of 1.20 per cent.; in September, 8.33 per cent.; in October, 18.47; in November, 20.06; in December, 19.97, and in January, 18.93. As President Harrison says, "the South practically suspended for a time its industrial activities."

As briefly stated as possible, the general methods by which the management met this crisis were, a frank statement of its problems to the people of the South, with an explanation of the necessity for reducing passenger service so as to, in some measure, offset decrease in business; an appeal to the loyalty of its employees for redoubled efforts toward economy and efficiency; a generous sacrifice on the part of the officers in accepting a reduction in salaries, and a new effort on the part of the management to effect economies through better and more constant supervision; the application of the most scientific methods of operation, and ingenuity in devising means of handling business more economically.

State commissions and the most intelligent public opinion of the South gave their hearty co-operation in an attempt to reduce passenger service, and with a reduction of 14.57 per cent. in passengers carried one mile, there was a reduction of 8.29 per cent. in passenger-train mileage, and there was furthermore a reduction of 5.33 per cent. in transportation costs per passenger-train mile for enginemen, trainmen and fuel.

In describing the response of the officers and employees to the needs of the company, President Harrison says: "There has never been a year of the company's history in which the stockholders have had as much reason for pride in and appreciation of the officers and employees, their work, their spirit, their loyal self-sacrifice. The manner in which a grave emergency was met and dealt with illustrates at its best that discipline which distinguishes a true organization for a mere co-operative society. Our organization, which has in recent years been built and cemented by a strict adherence to the principle of promotion for merit and reliance upon men made on the road, who have faithfully stood by during all our vicissitudes, has proven in this year of need the greatest of the company's assets, for it has fought a losing fight and won."

The remarkable results obtained by supervision and more scientific railroading deserve far more space than can possibly be given to them in this review of the company's 1915 fiscal year. The Southern Railway operates 7,022 miles of line. There are seven main lines and a great net work of branch lines.

These main lines run from Potomac Yard (just outside of Washington, D. C.) to Atlanta, Ga., 644 miles; from Atlanta to Birmingham, Ala., 167 miles; from Salisbury, N. C., to Morristown, Tenn., 228 miles; from Bristol, Tenn., to Chattanooga, Tenn., 242 miles; from Greensboro, N. C., to Pinners Point, Va. (opposite Norfolk), 267 miles; from Ashville, N. C., to Columbia, S. C., 163 miles, and from Chattanooga, Tenn., to Brunswick, Ga., 428 miles, a total of 2,139 miles.

The program of physical betterment of the property which was begun in 1907 and was interrupted in 1908, and work on which has been carried on ever since, provides for grade reduction and double tracking of the main lines with the heaviest density, the principal main lines being that from Washington to Atlanta, with the introduction of automatic block signals, the elimination of grade crossings, the improvement of yard facilities and the reconstruction of a large number of passenger stations. All of these expenditures, except the last, contribute more or less directly to more economical operation. The branch lines even yet are more than adequate for the greatest traffic which they have ever had to handle or will have to handle in the near future.

Freight to or from points on branch lines is handled in local trains.

Not only have ratings been established for through freight trains, but astonishing results have been obtained by increasing the loading of local trains. The rating and heavier loading of locomotives in local train service began in March, 1914. In that month the average trainload for local trains was 192 tons. In June, 1915, the average trainload was 362 tons, or an increase of 88.50 per cent. The average trainload for the entire system was 382 tons in 1915 as against 339 tons in 1914, an increase of 12.71 per cent. In 1915, on 14 heavy traffic divisions in the direction of heavy traffic, 94.90 per cent. of available locomotive power was utilized, as against 87.40 per cent. in 1914, and in the direction of light traffic, 77.80 per cent., as against 71.50 per cent. Some idea of how these results were obtained may be gained from the fact that in 1914 through freights on one division handled 14,157,000 gross ton miles, with 9,405 engine miles, and local freights handled 2,826,000 gross ton miles, with 4,780 engine miles. In 1915 through freights handled 3,743,000 gross ton miles, with 1,732 engine miles, and local freights, 7,704,000 gross ton miles, with 3,975 engine miles. Thus by better loading the tons per engine mile in through freight service was increased by 43.60 per cent., and by a shifting of freight into local service and better loading the tons per engine mile in local freights increased by 228 per cent. On all 14 of the heavy traffic divisions the average increase in net tons per engine mile for through freights in June, 1915, as compared with June, 1914, was 13.70 per cent., and for local freights, 62.30 per cent. The results of this kind of supervision and resulting improvement in operating methods are reflected in transportation expenses, which amounted in 1915 to \$22,758,000, or \$2,956,000 (11.50 per cent) less than in 1914.

Maintenance expenses were cut to meet the reduction in business; but President Harrison says that owing to the "splendid responses to the emergency by officers and men charged with maintenance," the physical condition of the roadway and structures is better than it has ever been. Maintenance of way cost \$8,452,000 in 1915, a decrease as compared with the previous year of \$831,000, or 8.95 per cent.

Maintenance of equipment in 1915 cost \$10,691,000, a decrease as compared with the previous year of \$1,443,000, or 11.89 per cent. The only deferred maintenance, President Harrison says, is in repairs to freight cars.

The fact that only one passenger was killed in a train accident, and he was standing on the platform of a car is good evidence of the physical condition of the property.

As previously mentioned, \$11,022,000 was spent for additions and betterments, of which \$9,005,000 was for roadway and structures, and \$2,017,000 for equipment. The largest items of expenditure for additions and betterments were for second track and line revision on the Danville division, \$2,060,000, and on the Washington division, \$1,676,000, and for new and enlarged yards, \$1,890,000.

At the end of the year the company had \$3,075,000 cash, \$2,127,000 time deposits and \$2,932,000 special deposits, comparing with \$2,955,000 cash, \$9,649,000 time deposits and \$7,583,000 special deposits at the beginning of the year. Loans and bills payable remained unchanged, at \$455,000.

The South has made remarkable progress both in agriculture and in manufacture in the last ten years and the sudden closing of the cotton markets of Europe to its principal cash product stopped this progress only temporarily. On the other hand, the low cotton prices of 1914 greatly stimulated a development which had been going on for some years looking toward more diversified agriculture in the South. The South may be expected in the future to provide the bulk of its own food supplies, with some surplus for sale. This will rob the possibility of a year of very low cotton prices of its worst terrors. As a matter of fact, agricultural conditions in the South this fall are extraordinarily good. The cotton crop is small, but prices are much higher than any one would have predicted six months ago and the left-over supply of last year's crop and this year's crop will apparently

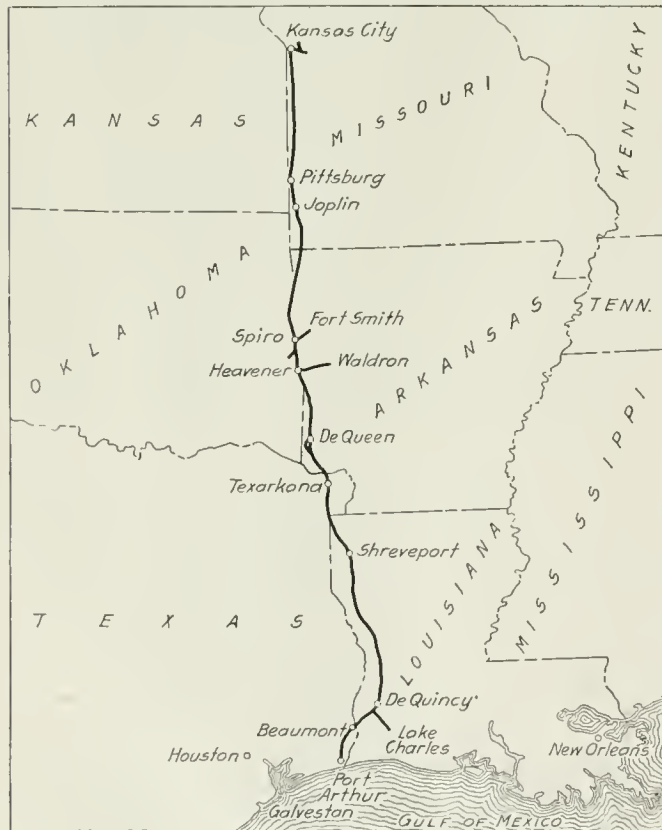
both be fairly well consumed, giving the planters a chance to start with a clean slate next year.

The following table shows the principal figures for operation in 1915, as compared with 1914:

	1915.	1914.
Average mileage operated.....	7,031	7,033
Freight revenue.....	\$40,458,858	\$45,632,207
Passenger revenue.....	16,175,674	19,016,099
Total operating revenues.....	62,199,510	70,750,997
Maint. of way and structures.....	8,452,119	9,283,239
Maintenance of equipment.....	10,691,267	12,133,829
Traffic expenses.....	2,110,467	2,244,351
Transportation expenses.....	22,757,597	25,713,747
Miscellaneous expenses.....	388,229	463,598
General expenses.....	2,019,621	1,987,879
Transp. for investment—Ca.....	244,590	65,993
Total operating expenses.....	46,174,711	51,760,649
Taxes.....	2,595,828	2,679,390
Operating income.....	13,400,055	16,310,958
Gross income.....	16,638,972	19,578,364
Net income.....	1,656,682	4,839,706
Dividends.....		2,700,000
Surplus.....	1,656,682	2,139,706

KANSAS CITY SOUTHERN

THE field forces of the Interstate Commerce Commission completed their surveys and inventories of the Kansas City Southern in April, 1915. The results of the valuation of the property have not been made public, but it is interesting to note that the total cost of federal valuation to date to the company has been \$112,796. The present market price of the total outstanding securities would put a valuation of more than \$71,000 per mile on the Kansas City Southern. The total par value of all



The Kansas City Southern

the securities outstanding would put a value of about \$118,000 per mile on the property. The net operating income of the company in the fiscal year ended June 30, 1915, was \$2,983,000. This would be 7 per cent on about \$53,000 per mile.

Total operating revenues in 1915 amounted to \$10,036,000, a decrease as compared with the previous year of \$935,000. Total operating expenses amounted to \$6,479,000, a decrease as compared with the previous year of \$431,000. The Kansas City Southern is all main line and all single track, except for 18 miles of double track. The freight density (ton miles per mile of road) in 1915 was 1,451,000 tons, comparing with 1,377,000 tons in the previous year. Passenger density was 77,161 in 1915 and

88,684 in the previous year. The average ton mile rate in 1915 was 6.85 mills, and in 1914, 7.77 mills; the receipts per passenger per mile were 2.212 cents in 1915 and 2.311 cents in 1914. The total trainload of freight, including company freight, was 582 tons in 1915 and 545 tons in 1914. The falling off in revenue is ascribed by the management to a loss of \$1,376,000 because of general business depression and disturbed conditions in the South resulting from the European war, and of \$72,000 in express revenue caused principally by the extension of the parcels post. This was partially offset by an increase of \$423,000 from abundant crops and conditions favoring export trade, \$81,000 due to larger movement of asphalt from southern refineries and of black strap molasses for use in the manufacture of mixed stock feed, and increased revenue from the mails following reweighing.

Maintenance of way and structures cost \$1,132,000, a decrease of about \$12,000 as compared with the year before; but the actual decrease in the amount spent in maintenance of the property was about \$61,000, the difference being caused by book-keeping charges in accordance with the Interstate Commerce Commission's rules for amortization of abandoned property.

Maintenance of equipment expenses amounted to \$1,185,000, a decrease of \$167,000 as compared with the year before. This decrease, the management thinks, is due to a saving made because of the improved condition of equipment.

Transportation expenses amounted to \$3,397,000, a saving as compared with the previous year of \$274,000. This is in part due to the larger average trainload of freight and in part to savings in yard service, station service and to a reduction of \$18,600 in payments for injuries to persons, etc.

Although freight revenue amounted to \$7,731,000 in 1915, a decrease of \$526,000, the total ton mileage of revenue freight was 1,129,000,000, an increase as compared with the previous year of 66,000,000 ton miles. The rate per ton mile of 6.85 mills in 1915, mentioned previously, compares with a rate per ton mile of 7.77 mills in 1914. The lower average rate is due to a smaller tonnage of high-class traffic and a large proportion of low class traffic. The saving in transportation expenses is especially noteworthy, because it was made despite the fact that the volume of freight business handled was greater in 1915 than in 1914.

The table shows the figures for operation in 1915 and 1914:

	1915	1914
Mileage operated.....	837	828
Freight revenue.....	\$7,731,118	\$8,257,449
Passenger revenue.....	1,410,618	1,675,168
Total operating revenues.....	10,035,896	10,970,403
Maintenance of way and structures.....	1,132,078	1,143,806
Maintenance of equipment.....	1,185,016	1,351,591
Traffic expenses.....	336,196	324,708
Transportation expenses.....	3,397,007	3,671,223
General expenses.....	489,009	418,992
Transportation for investment—Cr.....	60,484	—
Total operating expenses.....	6,478,821	6,910,321
Taxes.....	574,316	567,857
Operating income.....	2,982,759	3,492,225
Gross income.....	3,143,678	3,689,639
Net income.....	1,140,431	1,725,449
Dividends.....	840,000	840,000
Surplus.....	300,431	885,449

NEW BOOKS

North Pacific Ports. Second edition. Bound in cloth; 421 pages; size, 5 in. by 7 in. Compiled and published by the Terminal Publishing Company, Inc., 802 Pacific Building, Seattle, Wash.

This is properly termed the Pacific shipping year book. It is a compilation of useful marine, exporting and importing information for Alaska and the western coasts of the United States and Canada and contains much data relative to the essential features of each of the Pacific ports from Nome to San Diego. There are given, for example, the harbor regulations, the charges for wharfage, pilotage, storage and other services assessed against a ship or cargo, information concerning the steamship lines plying from each of the ports, lists of docks and piers, etc. While the book is intended primarily for the ship owner, exporter or importer, railroad men desiring to become conversant with Pacific coast conditions will find in it much of value. The 1915 edition contains nearly 100 pages more than the first edition and has been otherwise improved.

Letters to the Editor

THE ACHIEVEMENTS OF THE STATE RAILWAY LINES OF GERMANY

LONDON, Eng.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I read with not a little amusement in the *Railway Age Gazette* of September 3 Mr. Wile's story of "the amazing ability of the Kaiser's staff and field marshals to fling not only regiments, brigades and divisions, but entire army corps and even whole armies, from East to West, and back again from West to East, as emergency requires."

I am sure, as Mr. Wile says, that "many an American traffic manager," who knows what it is to move a mere 100,000 men without baggage to and from a baseball game, "will acknowledge that the job of switching a couple of million armed men, with full artillery equipment, back and forth incessantly, week in and week out through an area corresponding roughly to the states of Ohio, Michigan, Indiana, Iowa, Kentucky, Missouri, Wisconsin and Tennessee" will not only say that "represents as big a piece of 'railroading' as ever was tackled," but that it represents a piece of "railroading" that no man ever has tackled or will tackle!

Let us see what it would mean to do it. An army corps of 40,000 men with its complement of horses, guns, ammunition, baggage, ambulances, field kitchens, etc., requires, according to English reckoning, 160 trains. We are, of course, accustomed to short trains moved at high speed, and we give our men much more room than continental armies are allowed. As nearly as I can make out, the French railways, which have published very full statistics, have moved on the average more like 300 to 350 men in a train. Let us assume the maximum that the Germans could move to be 500; then an army corps would require 80 trains; a couple of million men—that is fifty army corps—would require 4,000 trains. Now what is the capacity of a railway? The French mobilization scheme on the main lines allowed for a train every 10 minutes for 66 hours out of 72. And I think no practical railway man would undertake more than this. This means a capacity of 200,000 men in three days. And to do this implied the command of at least four first-class stations, amply equipped with siding accommodation, loading appliances, coal supplies, etc., at the forwarding end, and similar accommodation at the receiving end. The French did it in their own country according to a prepared scheme. Can anybody imagine that the Germans could do as much on an improvised scheme, with the broken down railroads of Belgium at one end and the broken down and mainly single-track lines of Poland and Galicia at the other? How many distinct routes the Germans had available I cannot say. But it is clear that they would have needed at least 10 first-class double lines, cleared—not lines only, but stations as well—of all other traffic of any kind whatsoever. Where the Germans got the vehicles to hold a couple of million men or the engines to haul them, where they side-tracked them for the three days before the return journey began, I know not; and Mr. Wile does not tell us.

So much for possibilities; now for actualities. The French and Russian general staffs—whose business it is to know from prisoners' regimental badges and other information available what troops are in front of them—have never suggested that there have been any great movements of German troops from the one frontier to the other. I have inquired from the two men in this country probably most competent to answer what is their impression. The answers were private, so I am not at liberty to give my informants' names. The one writes: "Mr. Wile's statement is, of course, an absurd exaggeration. . . . When the necessity arose for strengthening the Germans in the

East, various army corps were from time to time moved east from the West, but the movement was never very large, and the greatest transfer appears to have taken place during the last three months, when about nine divisions (190,000 men) were transferred in this manner." My other correspondent writes: "The statement is quite ridiculous. The most that have ever been moved from West to East has been a corps at a time, if that, and it took anything from a week to 10 days."

I think when the history of the war comes to be written these two statements will be found somewhat nearer the truth than Mr. Wile's fantastic tale of "switching a couple of millions week in and week out" from one front to the other. It is worth noticing that the official statement of the German general staff, which Mr. Wile translates, deals entirely with generalities. It is not unusual for Germans to survey their work and to find it very good. But it would have been more interesting to outside observers, had they copied the example of the French, and given us precise figures of what they did actually accomplish.

One of my correspondents says: "The largest operation of the sort in the war so far was the transport of three whole army corps from the Aisne to Flanders"—not 800 to 1,000 miles, but, say, 150—"in one week by the French railways nearly a year ago."

W. M. ACWORTH.

FIGHTING SHY OF A HARD JOB

RICHMOND, Va.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

One hears much discussion among railway men as to whether the valuation of railways is to be based on "original cost to date," or on "cost of reproduction new," as if there were to be a choice between the two methods. I have noticed that railway men are almost a unit in favor of "reproduction new." This is where they are making a mistake. From the standpoint of the clerks, who are supposed to do this work, there is reason to fight "original cost," for it is a heartbreaking task to dig it out on account of the way most of the records have been kept. But from the standpoint of the owners, or stockholders, the roads should insist on original cost as a basis of valuation, instead of fighting it. Many of the railroads in this country can be reproduced new for 50 per cent of what they cost originally, and if the roads themselves do not dig up this original cost, who is going to do it? Who has any interest in doing it except the owners?

When Congress had the valuation bill before it, many reasons were given for its passage. Two of these were, as a basis for making rates and as a basis for government purchase. For both these purposes it seems to me self-evident that the owners of the property are vitally interested in having the first cost price considered in placing a legal value on their property, which will run from 20 per cent to 50 per cent higher than any cost that can be estimated for reproduction new. The fact is that the higher officers of the railways, as a rule, have not found time to give the matter their personal study. It has been observed that they all shy at it, and turn it over to subordinates. It sifts down to where the accounting officer details several clerks, whom he can most readily spare, to "work it up." Those clerks feel that they have a snap, and without much study of what they are to do and no particular interest fire away on some item, say buildings, to find the original cost. They immediately bump into a stone wall, or what feels like one. The records are not in shape to pick this up readily. It requires intelligent and patient effort and experience with building matters, so the clerks immediately raise a cry that it cannot be done, no records, etc. They tell the chief clerk it cannot be done; he tells his superior and so on, back to the commission, until the commission seems now inclined to believe that original cost to date must be abandoned to a large extent and estimated cost of reproduction depended upon.

The writer has assisted several roads in this work and has had long service in construction accounting, and is therefore

entitled to an opinion. I do not know of anyone who has looked up more of those things than I have, and I will say that I have never found anything yet that the cost could not be found in some way, if the records have not been destroyed, which is not the case in 99 per cent of the roads. The records are generally well preserved, but are crude and scattered, and it requires work to unravel them. Can the railways afford not to do it at any cost of labor? The cost of reproduction new must be estimated, of course. This is up to the commission, but the original cost is the job of the owners of the property. It is not a question of which method shall be used, as many seem to think; both methods must necessarily be used to arrive at a just valuation, which lies somewhere between the two. The only hope of the carriers to get the value they are entitled to is by presenting data showing their original cost to date.

A. P. T.

COLD STRAIGHTENING OF RAILS

CHICAGO

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The cold straightening of iron rails was originally accomplished by the use of a 40-lb. sledge wielded, as I remember it, by a stalwart Welshman, and the picture of his slinging the sledge, as well as that of his subsequent refreshment from bread and cheese and a jug of ale, is very clear in my memory. As the size of the rail sections and output of the mills were increased, mechanical means of straightening became necessary, and the rail-straightening press was invented. The first ones were of the crocodile type copied from the squeezers used to press the balls of puddled iron into blooms, later changed to a machine with a straight plunger driven eccentrically, and, except for increased weight and power, it is to-day about the same machine, continuing to transmit the force of its blows to the rail through a wedge-shaped gag.

The early hot-straightening was an operation involving heavy and hot labor; the camber or sweep being given to the rails by manually placing them head up on curved plates and hammering them into place with wooden mauls. This involved turning the curved rail over onto the hot bed, by seizing it at each end with tongs, and there was always the danger of putting a twist in it while so doing. The rails were pushed along the hot beds by hand power, and care was subsequently exercised by turning them at various stages of their cooling. This all required time and severe and exhausting labor. The situation brought the revolutionary invention of A. J. Gustin, embracing an automatic curving or cambering machine and mechanical means of sliding the rails along the hot beds. The Gustin device was improved upon and gradually superseded by the cambering machine designed by William Clark, and all later mills have been equipped on those lines.

The objections to gagging steel rails during the operation of cold straightening them have long been recognized, and generally appreciated by engineers familiar with the details of rail making; but, while a number of efforts have been made to perform cold straightening through some other means, the rail press and its brutal gagging still hold the field in all countries where steel rails are manufactured. To obtain the desired results, the rail has to receive blows which shall send the metal beyond its elastic limit, and as frequently a rail will receive a number of such blows, it is easy to understand the cause of many otherwise mysterious breakages of rails in service, and I am confident that most of the dreaded and somewhat mysterious transverse fissures had their origin during the cold straightening operation.

The writer, by written articles and earnest speech, has for years called attention to the dangers incident to the cold straightening of rails by gagging, and I early introduced into rail specifications demands for the reduction of gagging to a minimum through more careful treatment of the rails during the hot straightening process, and undoubtedly much good has been accomplished through such provisions. As the weight and speed

of rolling stock have increased, railway track construction and maintenance have progressed, and thus the requirements for straight line and surface of the rails have also grown, and unless this was met by more careful work on the hot beds, the cold gagging was certain to be more severe.

In the designing of practically all of the more recent rail sections it has been sought to have the metal so distributed that undue stresses shall not be developed during any part of their making, and much good has been accomplished. Just at present the question as to the practicability of increasing the standard length of rails beyond 33 ft. is being seriously considered by railway engineers, and many of them realize that such increase will add to the straightening troubles. If the length is materially increased, it will necessitate alterations in the hot bed equipment of most, if not all, of the rail mills, as well as some alterations in the locations of their cold straightening presses, drill presses, etc., and will be liable to augment the cold straightening troubles and, therefore, I think it would now be well to consider the desirability and practicability of adopting radically new straightening requirements. I feel confident that with careful and skilful manipulation of the rail cambering machines, and carefully constructed and ample and well protected hot beds, about all of the current sectioned rails can be so manipulated that they will require but little if any cold gagging. Indeed, I believe that in a short time the cold press could be almost if not entirely eliminated; but this would require a willingness on the part of the railway engineers to accept rails which would not be absolutely straight, so far as having sweeps in either their line or surface or both. Such sweeps need not be so great but that with present track laying methods the rails could be spiked straight when laid, and thus the danger of incipient or actual ruptures from cold gagging be eliminated. Of course, to begin with kinks would have to be gagged out, but I think that, as a principle, rails with kinks should be rejected, and, if so, that penalty would soon lead to their non-production. It would be a radical departure, and, in my judgment, should be introduced in a conservative manner, letting the progressive steps be taken as they become justified by experience, and I am confident that many if not all rail makers would welcome such an innovation—shall I say progress—and that in a short time we would be getting satisfactory results.

ROBERT W. HUNT.

WITH RAILROADS IT'S DIFFERENT

BY FRANCIS W. LANE

If in European travel you should meet death by a shell, or a German submarine blow up your boat, there is glory in the story which your friends will love to tell, and for you it doesn't matter; you're the goat. When a juggernaut automobile knocks you down upon the street—whether you or it's the one that didn't stop—on the whole, it is a trifle, even though the wreck's complete and your remnants are collected by a cop. But with railroads it is different. If, perchance, a flying train strews anatomy of yours along the track, there is only one thing certain, it will not occur again; but your ghost is almost sure to wander back. You stroll along the roadway and flip the moving car, and, to duck the con, you sit upon the step; you don't appear to figure you've no business where you are and, unless you're pinched for trespass, don't get hep. When you travel, merest trifles set aquiver every nerve; if you pinch your little finger in the door, or you lose your equilibrium in scooting round a curve, you will damn that measly road forevermore. You will charge the grossest crime, negligence in operation, even though you had no business to be there; curse the managing officials, fill the air with lamentation, and cavort around and rip and tear your hair. In Europe they are killing men by thousands every day; over here we drown a shipload at a dock; our juggernaut automobiles mostly kill what's in their way; but it takes a jolt by rail to give a shock!

Annual Meeting of Railway Real Estate Association

New Organization Holds Its First Convention at Chicago for Discussion of Land and Tax Matters

The first annual meeting of the Railway Real Estate Association, whose recent organization was reported in the *Railway Age Gazette* of June 11, page 1256, was held at the Hotel La Salle, Chicago, on October 13 and 14. The membership of the association is now 79, of which over half were in attendance at the first meeting. President F. P. Crandon, tax commissioner of the Chicago & North Western, presided, and after brief addresses by the officers and other preliminary business the program was devoted principally to the reading and discussion of papers.

W. W. Baldwin, vice-president of the Chicago, Burlington & Quincy, addressed the meeting on the subject of recently proposed changes in the tax laws of Illinois, and changes in the constitution of the state as applied to taxation, which he said would strike out every clause requiring uniformity as to methods of taxation based on a valuation of the property, in order to exempt certain classes of property from taxation and to place the entire burden on other classes. This, he said, would undoubtedly increase the taxes paid by large corporations, including the railroads, and the effect would be very apparent when the state enters upon a plan of heavy expenditures for road improvements.

VALUATION OF RAILWAY LAND

William A. Cokeley, right of way and claim agent of the New York, Westchester & Boston, read a paper on "Valuation of Railway Land," of which the following is an abstract:

In the examinations being made by the Interstate Commerce Commission, relative to the valuation of railroads, the land appraisers engaged in the work, having access to books, data, etc., both public and private, have brought to light many instances of land valuations of specific parcels, widely divergent in amounts. How this condition was brought about can only be conjectured, but it will prove mighty embarrassing, in the event of litigation, if the valuation of the property in question, as offered in evidence by the railroad, happens to differ materially in amount from that placed upon it by the land appraisers.

A likely explanation is that different valuations were made by employees. It is known that in many instances, attorneys have aided directors in making a good showing by appreciating land values, in order to justify the issuance and sale of bonds. Attempts also have been made, successfully at times, to beat tax valuations and assessments by similar tactics, and values have been enhanced or reduced as the exigency demanded.

Fortunately the day of the expert retained from time to time, in order to appreciate or depreciate the value of the land holdings of a railroad is over. The new order of affairs, relative to regulation of business corporations, has lessened the desire to adhere to such methods and they have been practically eliminated.

If we have not adjusted ourselves to this new order, how can we? By conducting the affairs of the real estate department as carefully, methodically and scientifically as the engineering department is conducted.

By this I do not mean that appraisals or values of land can be made by formula, but our methods must be just as illuminating as the computations of the engineers. How many of us can furnish a description showing the physical character of the parcels that go to make up the holdings of the property under our charge? How many can show, by any record at their command, just what prompted and justified them in valuing a piece of property at a greater amount than was paid for it? If our system is not elastic enough to permit us to establish and keep such a record, then we should immediately institute a reform and devise a form which will accomplish the desired

result. After a form has been devised an inspection of the physical character of the entire property, parcel by parcel, should be in order—a mental photograph formed and notes made. A reconnaissance of adjoining or adjacent property should also be made and notes taken in the same manner. Then we are equipped to accurately describe any parcel of land, giving its character, its influence on neighboring property and also indicating what influence neighboring property has on it. Such a description is absolutely essential where appreciation of value is shown over cost value.

It may be said that many roads have just such records. Fortunately are those that have anticipated this requisite. There is nothing that will convince the land appraisers of the merit of your valuations more quickly than preparedness by proper records.

There will be much litigation between the government and the railroads before it will be definitely settled just what land values will be allowed. It is because of possible litigation that I advise making up a complete history of each parcel, containing much that is not included in the form furnished by the commission.

It must be remembered that the land appraisers are human and subject to all the frailties of human kind. Some are competent and fair. Some are competent and biased. Some lack judgment and many lack perspicacity. It therefore behooves us to be in such a position, come as they may, as to establish our values beyond dispute. They must have more than a semblance of fairness. They must be backed by reasons that will justify our judgment and be convincing beyond cavil.

While the land appraisers may not have had the experience the right-of-way or railroad real estate agent may have had, it must not be forgotten that their appraisals will stand unless we can offset them in court. We must be prepared to furnish our attorneys with facts that will completely confute the contentions of their opponents and upset the appraisals made by the government. So be prepared.

The discussion on Mr. Cokeley's paper was opened by E. A. Whitman, valuation engineer, Minneapolis, St. Paul & Sault Ste. Marie.

COSTS OF REAL ESTATE

E. Holbrook, special engineer, Union Pacific and Southern Pacific systems, gave an informal address on "Compositions of Cost of Railway Estate," in which he urged the importance of making every effort to get at the composition of cost of right-of-way and terminal grounds on account of the necessity for proving these costs in connection with the valuation now being made by the Interstate Commerce Commission. In illustrating the importance of the subject he called attention to the fact that the railways in the United States own about \$5,000,000,000 worth of land, which is the largest item of property they have, constituting about one-third of the total. He discussed the relation of cost to values, and described the results of numerous investigations showing the large proportion of expense entering into the acquirement of railway land, in addition to the bare cost of the property, which can only be discovered in many cases by extensive research, while there are many such items of cost which cannot be traced now. Mr. Holbrook expressed the opinion that such obscure items will usually run from 10 to 15 per cent of the cost of land as shown by the vouchers.

He also outlined an interesting calculation he had made with reference to the unearned increment argument, to show the effect of railway location on the value of adjacent land. He had taken the assessed value of all property within 10 miles of a railroad for a distance of 40 miles, in a territory in which

there was no other road sufficiently near to influence the value of the land, and had computed the value of the entire property with relation to the value of the outside property. He found that in a total valuation of \$15,000,000 the excess value of the entire property as compared with the value of the property at the outside edges, was \$3,250,000, or more than what the entire railroad through the property cost. He also gave some interesting figures as to an investigation of the cost of property acquired by the railroads for the Kansas City terminal. His investigation had not been completed, but at the time of the investigation the railroads had spent \$10,500,000 for land, which represented 3.09 times its normal market value, and that other items which he had been able to locate, including a large amount of land donated to the city for a park, brought the total cost of land up to approximately \$14,000,000. The first land for the terminal was purchased in 1902, and the rest from 1906 on. He had figured the interest on each piece of land from the date of its purchase to November 1, 1914, when the terminal was opened, and it amounted to 31 per cent of the cost of the land, or about equal to its normal value. Eliminating the value of the land donated to the city the railroad received only about \$2,000,000 worth of property, figured at its normal market price.

Mr. Holbrook said that some railroads had ordered their land departments not to anticipate any expense on account of the valuation, and therefore that some of them had not done the work necessary to get their records in proper shape. He urged the members of the association to do everything in their power to induce their roads to begin the work of investigating the cost of their land, and to make every possible search for records of this kind, as it is work that requires a long time and can never be made complete. And in the future railroads should never buy a piece of land without making complete records of all items of cost connected with the purchase.

LEASING OF RAILWAY PROPERTY

Frank Taylor, right-of-way and lease agent of the Canadian Pacific, read a paper on "Leasing of Railway Property for Industrial Purposes," in which he said in part:

The promiscuous granting of sites on railway property at nominal rents, for shipping warehouses, etc., by local officers, a custom which prevailed pretty generally not many years ago, seems now, like many other old railway customs, to be yielding to the ever-widening demand for uniformity in practice, and for executive control by means of standard methods. While, however, some railways have a well-defined policy, and clearly-drawn instructions governing the handling of all such leases, on other railways we find either no general policy at all, or an indefinite one, subject to change to meet any and all conditions demanded by shippers who are looking for sites.

What we should first endeavor to accomplish is, the adoption of a schedule of rents bearing a fixed ratio to the value of property, and then undertake to adhere absolutely to such a schedule. Many railways have a schedule of rents and apply it in probably the majority of leases, but the exceptions are sometimes so numerous as to materially affect the revenue from this source, and to discourage effort to maintain the standard.

The principal obstacles to the rigid observance of a schedule are first, the precedent established years ago of granting leases at nominal rents, many of which leases are still in force, and second, the conditions arising at competitive points, due to lack of agreement between railways. With regard to old leases at nominal rents, the argument usually advanced when there is any talk of getting them up to schedule, is that lessees erected their warehouses under such leases, believing that the company did not seek revenue from this source, and that it now would be tantamount to a breach of good faith for them to charge a rent proportionate to the value of the site, and this is usually followed by a guarded intimation that a change in the rent would result in the removal of warehouse and loss of traffic to

the railway, and finally a "spiel" about what good friends they have been to the company all these years, and so on.

Then the freight traffic officer, for he usually gets into the deal about this stage, verifies the touching story of fidelity and affection, and between him and the operating department officials, the lease agent is finally routed with a mortifying conviction that he was caught in the act of stealing candy from a baby, and that he didn't even get away with the candy.

We are sometimes reminded that in our zeal for our special work, our horizon is too apt to become limited to the departmental scope, that the obtaining, handling and retaining of freight business is the major function of a railway company, and that where it is involved the question of rent for industrial sites must be relegated to its proper and insignificant niche.

This is a sort of a cold douche, but rather than get disgruntled about it, and seek solace in the reflection that a freight man would give away the whole road for a carload of competitive freight, it would be better to face the situation. The freight man is right about the relative importance of freight traffic, but it is just possible that he may have a departmental note in his own eye. The sources of revenue on the big transportation companies of our day are very varied, and not one of them in these days of competitive and legislative burdens can with prudence be ignored. If the industrial site is a handmaiden of the freight business, and can also be utilized as one of the sources of direct revenue without detriment to traffic returns, there can be no question regarding the wisdom of benefitting by it.

Until the old leases are brought up to the general schedule there will always be difficulty in getting new applicants to accept it, and this difficulty is greatly increased, when for traffic considerations exceptions to schedule rates in new leases are made in favor of certain shippers, or at competitive points. This latter condition can only be remedied by an agreement between railway companies.

Mr. Taylor then outlined the methods used by the Canadian Pacific. The paper was discussed by W. S. Bake, land and tax agent, Pere Marquette.

RAILWAY TAXATION

J. B. Jones, tax agent of the Louisville & Nashville, read a paper entitled, "Is Railway Taxation Approaching the Limit?" in which he outlined the methods of railway taxation in Alabama and Florida. He estimated that in Alabama the railroads pay, in state, county and municipal taxes and licenses, substantially more than one-sixth of their net operating revenues in the state; in other words, it takes over two months' earnings to pay the taxes, and that the assessed valuation of railroad property constitutes about 16 per cent of the aggregate assessed valuation of all property in the state. As to the rates of ad valorem taxation, he said, the constitutional limits of taxation have been generally reached, but the state apparently has not yet reached the limit of its power as to license taxes. In Florida the railroads pay about 15 per cent of the ad valorem state taxes, but probably a considerably larger proportion of local taxes. Discussing the general situation Mr. Jones showed that the taxes paid by the railroads of the United States per mile amounted in 1900 to \$255, in 1907 to \$367 and in 1915 to \$586, or about 16 per cent of the net operating revenues, but that there is an encouraging sign in the reduction from \$604 per mile in 1914.

OTHER PAPERS

Other papers were presented as follows:

"Subsidy Lands and Office Records," by B. A. McAllister, land commissioner, Southern Pacific. Discussion opened by John A. Dresser, until recently manager lands department, Algoma Central & Hudson Bay.

"Real Estate Features in Connection with Separation of Grade Crossings," by H. A. Howarth, real estate agent, Long Island Railroad. Discussion opened by E. E. Pettibone, real estate agent, New York Central Lines west of Buffalo.

"Uniform Contracts Covering the Occupation of Railway Lands," by H. H. Trabue, assistant chief engineer and assistant real estate agent, Nashville, Chattanooga & St. Louis. Discussion opened by C. H. Moran, assistant real estate agent, Baltimore & Ohio.

"Acquirement of Right-of-Way Land and the Preparation of Deeds Therefor," by Peter K. Soffel, real estate claim and tax agent, Wabash-Pittsburgh Terminal, and Wheeling & Lake Erie. Discussion opened by J. W. Marvin, right-of-way and tax agent, Duluth & Iron Range.

Pierce Butler, valuation counsel, Western Group Presidents' Conference Committee on Valuation, addressed the meeting on some features in connection with the valuation of railway land.

It was decided that the president should appoint committees for the ensuing year, as follows: A standing committee of five on standard forms for leases, a committee of five to investigate and report as information on methods of keeping office records and accounts, a committee of three to examine the constitution and by-laws with a view to their revision, and a membership council. It was also decided to extend an invitation to the Railway Tax Association to amalgamate with the Railway Real Estate Association. Officers for the ensuing year were elected as follows: President, B. A. McAllaster, land commissioner, Southern Pacific Company, San Francisco; first vice-president, James P. Nelson, valuation engineer, Chesapeake & Ohio, Richmond, Va.; second vice-president, Frank Taylor, right-of-way and lease agent, Canadian Pacific, Montreal, Que.; secretary, F. C. Irvine, special agent, Pennsylvania Lines, Pittsburgh, Pa.; treasurer, J. G. Armstrong, assistant real estate agent, Wabash-Pittsburgh Terminal and West Side Belt, Pittsburgh, Pa.; board of directors: F. A. Walter, general right-of-way and tax agent, San Pedro, Los Angeles & Salt Lake, Los Angeles, Cal.; H. D. Howe, general land and tax agent, New York Central Lines West, Chicago, Ill.

It was decided to hold the 1916 annual meeting in Chicago.

EFFECT OF RECENT FLOODS ON RAILWAYS

The public seldom realizes the extent to which the ordinary difficulties of railroad operation are frequently increased by extraordinary occurrences, such as floods and storms, nor the great pressure of emergency work suddenly thrust upon a railroad organization by the necessity of immediately repairing the damage thus caused in order to restore service as speedily as possible.

The great floods which put large sections of the railroads in Ohio, Indiana and Pennsylvania out of commission for considerable periods in the spring of 1913, causing damage which was estimated to have cost the railroads in Ohio alone approximately \$10,000,000, naturally attracted widespread attention, but the effects of more localized catastrophes, such as the floods at Galveston, Tex., and in the vicinity of St. Louis, Mo., which were described in the *Railway Age Gazette* of August 27, page 393, and the recent storm in the vicinity of New Orleans, La., are often scarcely appreciated outside of the territory involved.

One of the accompanying pages of illustrations showing some of the effects of the hurricane of August 16 on the property and equipment of the Sunset-Central Lines in the vicinity of Galveston, gives an idea of the unusual difficulties experienced by the railroads on such occasions. The losses of the Sunset-Central Lines on account of this storm were conservatively estimated at \$375,000.

Another page of illustrations presented herewith shows some of the effects on the railroads of the recent hurricane which passed over New Orleans and vicinity on September 29, causing the deaths of about 300 persons, and damage to property which has been roughly estimated at over \$1,000,000, a large proportion of which was railroad property.

A hurricane from the Gulf of Mexico struck New Orleans about 8:00 a. m., on the date mentioned, gaining in violence during the day until between 4:30 and 7:30 p. m., the wind

attained a velocity of from 80 to 120 miles an hour. The barometer fell to 28.11 in., said to be the lowest ever recorded in the United States. In addition to the damage to buildings in the city of New Orleans the country for many miles was devastated and railroads entering the city from every direction suffered damage as well as interruptions to their service.

The most serious consequences of the storm, as far as loss of both life and property is concerned, were the results of the flood. Besides bringing heavy rains the storm backed up the waters of Lake Pontchartrain, north of New Orleans and connecting with the Gulf of Mexico, forming a tidal wave nearly 12 ft. in height when it struck the western shore of the lake, and overflowing the low-lying surrounding country for miles. The line of the Louisville & Nashville, which crosses an arm of the gulf over a long bridge at Rigolets at the lower extremity of the lake was cut in two when several of the girder spans were washed away, in addition to damage done at many other places on the line between New Orleans and Ocean Springs, Miss.

The Illinois Central main line to New Orleans extends along the western shore of the lake for several miles, crossing a narrow channel between Lake Pontchartrain and Lake Maurepas, and between New Orleans and Hammond 18 miles of double track was washed from the embankment, most of it between Kenner and Ruddock. Although cutting the main line, the storm did not interfere with the Illinois Central's through service, because the line of its controlled road, the Yazoo & Mississippi Valley, entering New Orleans from the west from Baton Rouge, was not damaged and trains were detoured over this line, and from Baton Rouge to Hammond. A single track was restored through the flooded part of the main line on October 8.

The property loss of the Sunset-Central Lines is estimated at \$150,000, consisting principally of damages to shop buildings in Algiers, La., the sinking of several barges and car floats used in transferring freight between New Orleans and Algiers, roofs and walls of freight houses and warehouses damaged, and damages to ferry inclines on the New Orleans side of the Mississippi river. Aside from obstructions caused by fallen telegraph poles, signal posts and trees, the line into New Orleans was not interrupted and trains leaving there the day following the storm reached Houston, Tex., practically on time. None of the destruction was of such a nature as to interfere with the prompt handling of business and repairs were rapidly under way. The views reproduced herewith were taken on the Sunset-Central Lines and on the Illinois Central.

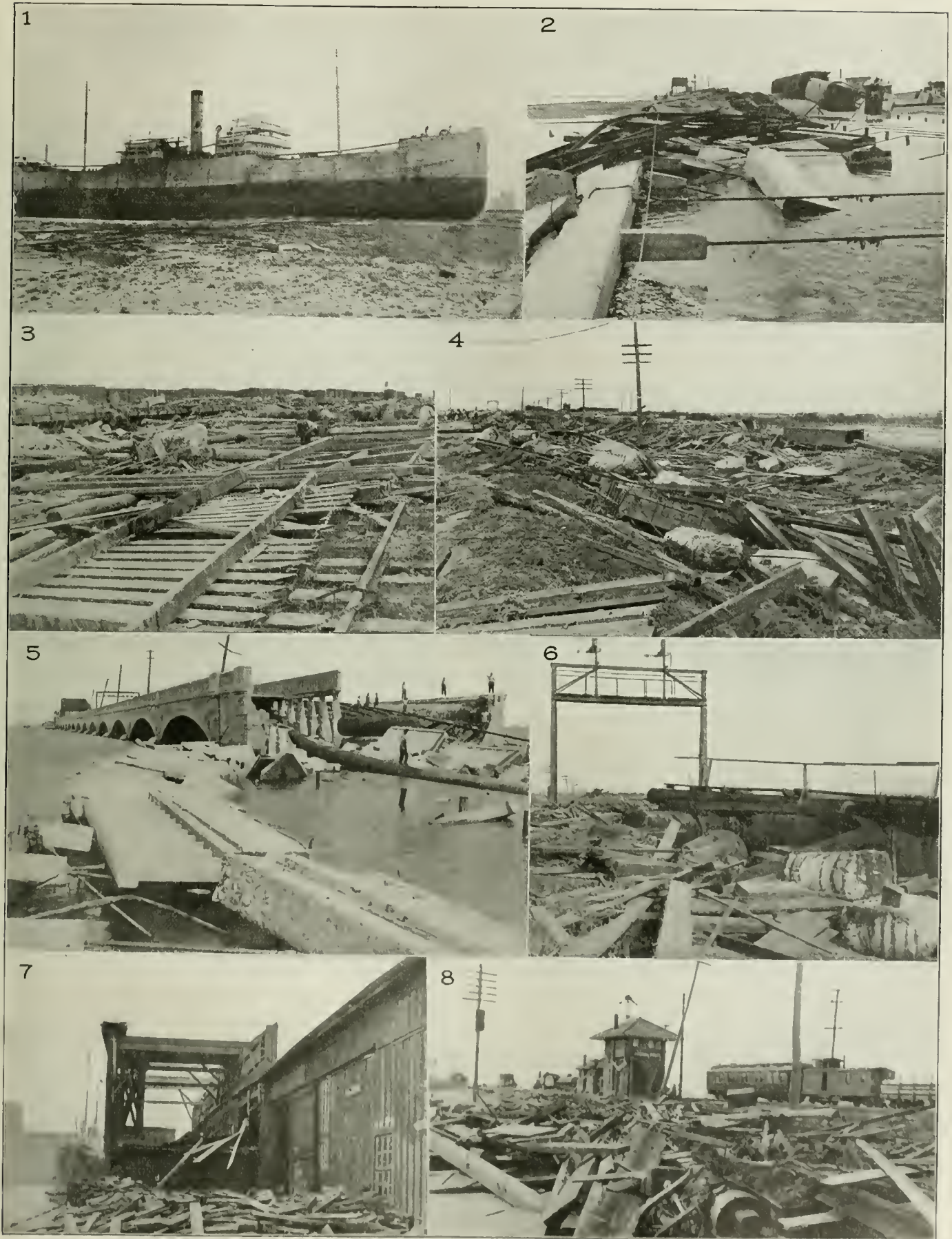
In the case of the latter road it will be noted that much of the track was washed to a considerable distance from the embankment. In other places one track was turned completely over onto the other track. Although most of the line is located at a considerable distance from the lake, the water in some places overflowed several miles of farm land to a depth of four to six feet on either side of the track, and the flood came so suddenly that at Frenier, La., 25 section men were drowned before they could escape. Roadmaster R. L. Hazlegrove and Peter Elardo, a section foreman, were drowned in the section house at Manchac.

Aside from the damage to the track the Illinois Central's property loss was estimated at \$30,000. This included the loss of the station at Manchac, damage to docks and several roofs, including that of the roadhouse at Harahan, La. There was comparatively little damage to the company's property in New Orleans. Over 14,000 lineal feet of bridge work in 67 double track bridges was damaged. About half of the decks were washed away, but most of the material was recoverable and the piling and caps were left intact. On the Yazoo & Mississippi Valley the only damage was to telegraph and signal wires and poles.

The storm subsided about 9 o'clock in the evening and much of the water flowed into the lake, making it possible to begin rebuilding operations at once on the following day. On the Illinois Central repair gangs were promptly organized and sent



1) and (2) Sunset-Central Lines Car Shop and Paint Shop at Algiers, La. (3) and (4) Illinois Central Main Line Between Manchac and Hammond After Repair Work was Begun. (5) Pump Station and Tank at La Branch, La., Where Several Houses were Washed Away. (6) Showing Track Washed off Trestle and Turned Upside Down. (7) Showing Cars Washed off Track. (8) Government Yard Roundhouse After the Flood



(1) British S. S. Ribston, 330 Feet Long, Aground on G. H. & S. A. Side Tracks. (2) Overturned Interurban Cars on Damaged Causeway, Looking Toward Galveston Island (3) Scene in G. H. & S. A. Yards, Galveston Island. (4) Debris on Island near Entrance to Causeway. (5) Arched Portion of Causeway, Looking Toward Mainland. (6) Signal Tower at Entrance to Causeway, Mainland. (7) Corner of Southern Pacific Wharf, Galveston Island. (8) Virginia Point on G. H. & S. A. Tracks

to the scene of the washouts in motor boats, working from both ends of the washed out portion of the track. About 1,000 men were employed on the work in the day time and 600 at night. Much of the track it was possible to pick up and relay on the embankment intact, and much of the timber was recovered. Derricks and new materials required were brought in as fast as a track could be laid, while to some places material was brought in by boats, which were also used by the supervising officers. The president, vice-president in charge of the operation, general manager, chief engineer and other officers were on the scene as early as possible.

The railroad forces also were able to do a great deal of relief work in rescuing people who had been obliged to take refuge in trees. The extent to which railroad service was interfered with is indicated by the experience of a man who to get from Gulfport, Miss., to New Orleans, a distance of about 60 miles, on the Sunday following the storm, found it necessary to travel 360 miles by way of Jackson, Miss., and Baton Rouge, La., to get to his destination.

TRAIN ACCIDENTS IN SEPTEMBER*

The following is a list of the most notable train accidents that occurred on railways of the United States in the month of September, 1915:

COLLISIONS

Date	Road	Place	Kind of Accident	Kind of Train	Killed	Injured
1	Chicago, M. & St. P.	Racine	bc	F. & F.	1	0
1	Missouri, K. & T.	Smithville	bc	F. & F.	2	1
8	Denver & R. G.	Tennessee Pass	bc	P. & F.	1	64
24	Missouri Pac.	La Platte	bc	P. & F.	3	4
25	Balt. & Ohio	Willow	rc	F. & F.	1	2

DERAILMENTS

Date	Road	Place	Cause of Derailment	Kind of Train	Killed	Injured
4	San Pedro, L. A.	Galt, Nev.	Washout	P	0	3
4	Norfolk & W.	Starkey	Slide	F	4	4
5	Balt. & Ohio	Confluence	D. truck	P	0	13
10	Chicago & A.	Elwood	Unx	P	0	7
14	Wrightsville & T.	Alcorns, Ga.	Cow	P	1	1
18	Balt. & Ohio	Ripley, W. Va.	See below	F	0	9
20	C. B. & Quincy	W. Springs, Ill.	D. truck	F	1	16
23	Penn.	Titusville	B. wheel	F	1	0
28	New York Central	Bryan, Ohio		F	1	1
30	Penn.	Lancaster	Unx	F	1	3

The trains in collision at Racine, Wis., on the first, were an eastbound and a westbound freight, both running at moderate speed. Two engines and one car were badly damaged. The engineman of the eastbound train was killed. The collision was due to disregard of a meeting order by the men in charge of the eastbound train. The engineman forgot the order and the conductor started from the appointed meeting place on the assumption that the westbound had arrived.

The butting collision near Smithville, Tex., on the first, was between two heavy freight trains, both running at good speed; and ten cars were wrecked. The engineman and fireman of the northbound train were killed and a brakeman was slightly injured. The collision was due to neglect of the men in charge of the northbound train, who overlooked a dispatcher's order.

The trains in collision near Tennessee Pass, Colo., on the eighth, were eastbound passenger No. 20 and a westbound extra train, consisting of a light engine. Both engines were damaged. One fireman was killed and 11 employees and 53 passengers were injured, most of the injuries being slight. The collision was due to the negligence of the men in charge of the light engine.

The trains in collision near La Platte, Neb., on the morning of the 24th, were southbound passenger No. 104 and northbound

freight No. 153, both running at good speed. Three trainmen were killed and four were injured. The passengers escaped with minor injuries. The collision was due to forgetfulness on the part of the men in charge of the passenger train, who overlooked a dispatcher's order and a caution card and ran past the appointed meeting place—a non-telegraph station.

The trains in collision near Willow, Ohio, on the 25th, were both work trains, one running into the rear of the other, because the leading train was not properly protected by flag. One employee was killed, and seven others were slightly injured.

The train derailed near Galt, Nev., on the fourth, was a westbound express. Three passengers were injured. The cause of the derailment was a washout, due to a cloudburst.

The train derailed near Starkey, Va., on the fourth, was a southbound freight and the engine and five cars were wrecked. Two trainmen and two trespassers were killed and four trespassers were injured. The derailment was due to a landslide which struck the engine, sidewise, at the moment it reached the point.

The train derailed near Confluence, Va., on the fifth, was an excursion passenger train and two employees and 11 passengers were injured. The cause of the derailment was a defective engine truck.

The train derailed near Ellwood, Ill., on the evening of the 10th, was southbound passenger No. 9, and one coach was partly overturned. Seven passengers were slightly injured. The tender was the first vehicle to leave the track; cause not discovered.

The train derailed at Alcorns, Ga., on the 14th, was a passenger train No. 2 and the engine was overturned. The engineman was killed and the fireman injured. The derailment was caused by a cow, which ran upon the track immediately ahead of the train while it was moving at low speed.

The train derailed near Ripley, W. Va., on the 18th, was a wrecking train consisting of an engine and four cars, and the cause of the trouble was a loose wrecking crane which swung crosswise of the track and knocked down one truss of a bridge. The engine passed over the bridge in safety, but the cars fell to the bed of the creek 50 ft. below the track. Nine employees were injured.

The train derailed at Western Springs on the 20th was an eastbound freight and a derailed car fell in front of westbound passenger No. 55, which was running about 40 miles an hour. It overturned the engine. Fourteen passengers and two trainmen were injured, one of the trainmen fatally. The cause of the derailment was a brakebeam which became loose and fell to the track.

The train derailed near Titusville, Pa., on the night of the 23rd, was a fast freight and 17 cars were wrecked. One brakeman was killed. The derailment was due to the breaking of a wheel.

The accident at Bryan, Ohio, on the 28th, was the derailment of a work train, the tender of the locomotive being the first vehicle to jump the track. The fireman was killed and the engineman injured.

The train derailed at Lancaster, Pa., on the 30th, was a local freight, and the cause of the derailment was an open switch. One car was knocked off a trestle in the yard, and one brakeman was killed. Three other trainmen were injured.

Electric Car Accidents.—Only three serious accidents are reported in the newspapers as having occurred on electric roads in the month of September, but all three are on what may be called high speed roads. None of the accidents was attended by fatal injuries. On the fifth, near Huron, Ohio, there was a butting collision between a "limited" train and a local, in which about 35 passengers were injured. Near Norfolk, Va., on the sixth, an express car collided with a work car, injuring the motorman and slightly injuring a number of passengers. At Woodside, Ill., on the 20th, an interurban train, in which was a sleeping car, was derailed and the sleeper rolled down a 15-ft. embankment. Twenty persons were injured.

*Abbreviations and marks used in Accident List:

rc, Rear collision—bc, Butting collision—xc, Other collisions—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, Unexplained—derail, Open derailing switch—ms, Misplaced switch—acc, obst., Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of locomotive on road—fire, Cars burned while running—P, or Pass., Passenger train—F, or Ft., Freight train (including empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

Passenger Train Cars for the Northern Pacific

All-Steel Equipment of Standard Construction for Service
Between St. Paul and Duluth and on the Pacific Coast

The Northern Pacific has recently received from the Pullman Company 47 coaches, 22 mail and express cars, 17 baggage cars and 6 dining cars of all-steel construction, 10 of the baggage cars and four of the mail and express cars being equipped with the head end generator sets of which two are of the axle machine train lighter type. The interesting feature of these cars is the marked similarity in their construction. The trucks are identical, the underframe practically so, and the framing only different in characteristic details, the coaches and diners

have a seating capacity of 84, and the diners 30. Vestibule ends are used on the coaches and diners, the side doors and steps being wider than usual. The other cars have stub ends.

The coaches have a natural Mexican mahogany finish from the window sills to the lower head lining and 7/16-in. fireproof Agasote below the windows to the baseboard. The ceiling is of the half empire style, with 3/16-in. fireproof Agasote head lining finished in pearl color with gold stripes. The diners are finished in Cuban mahogany with the exception of the kitchen, which is finished in plain oak. Agasote is used below the window sills and on the ceiling, which is of the full empire style. It is decorated in pearl color with gold stripes. Pressed prism plate glass embodying the Northern Pacific monad emblem



Interior of Northern Pacific Dining Cars

being designed to carry a live load of 20,000 lb. and 18,000 lb. respectively, and the other cars 50,000 lb. Many of the Northern Pacific standard parts were used and, where possible, steel castings were used in preference to forgings. The cars all have the same general dimensions, which are as follows:

Length over end sills (Dining Cars).....	72 ft. 10 in.
Length over end sills (Other Cars).....	70 ft. 10 in.
Width over side sills.....	10 ft. 1 3/4 in.
Rail to top of floor.....	4 ft. 5 3/4 in.
Truck wheels, number and diameter.....	6—36 in.
Journals	5 in. by 9 in.

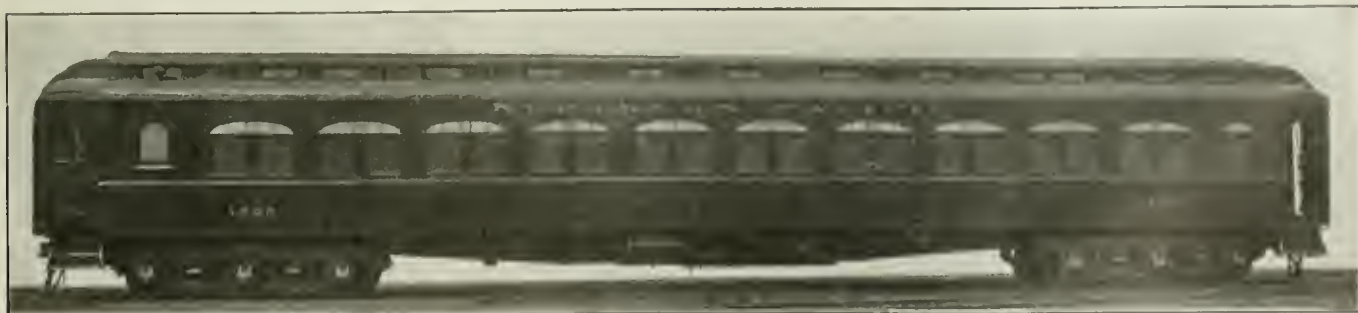
The weight of the coaches is 141,100 lb.; the mail and express



Interior of Coach Taken Under Its Own Illumination

design at the center is used for saloon, deck and gothic windows of the coaches and diners. On the coaches the prism glass was applied both inside and outside at the gothics, while in the dining-room of the diners the space usually taken up by the gothics was incorporated in the main window, making a clear glass 36 in. high by 47 in. wide. These large and extra high windows are particularly adapted to afford unobstructed views. The oval aspect of the windows, which is the Northern Pacific standard for wooden cars, has been maintained in these cars. The flooring in the coaches and the dining rooms of dining cars is of flexolith the color of which is natural gray in the dining cars and tinted red color in the coaches to harmonize with the inside finish.

The baggage and the mail and express cars have an inside



Northern Pacific All-Steel Passenger Coach

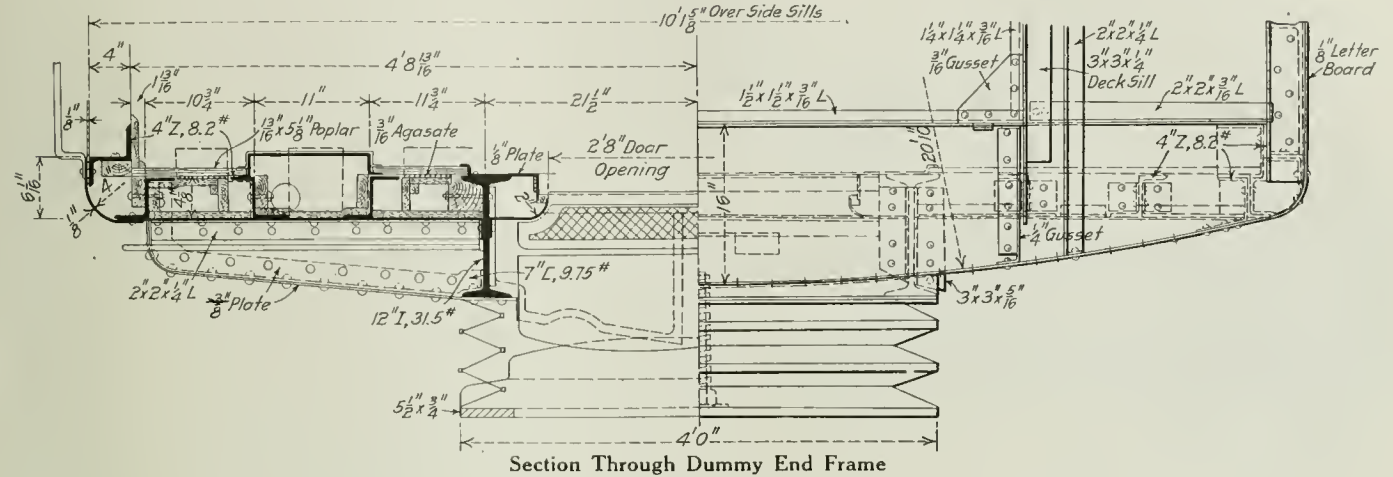
cars, 140,300 lb. without, and 146,200 lb. with, the lighting dynamo; the baggage cars, 127,800 lb., without the lighting dynamo, and 139,800 lb. with, and the dining cars, 160,100 lb. The coaches

sheating of 13/16-in. by 5 1/8-in. poplar, with a ceiling of 3/16-in. Agasote. A 1 1/8-in. poplar partition separates the dynamo compartment from the rest of the car. All of the baggage and the

all types of cars discussed in this article is similar, the clerestory type of construction being used. The side posts are $\frac{1}{8}$ -in. pressed steel channel sections 4 in. wide placed with the backs at right angles with the side of the car. The side plates are 4-in. 82-lb. Z-bars. The upper and lower deck carlines and the deck posts are made of one piece of $\frac{1}{8}$ -in. steel plate pressed in the form of a channel.

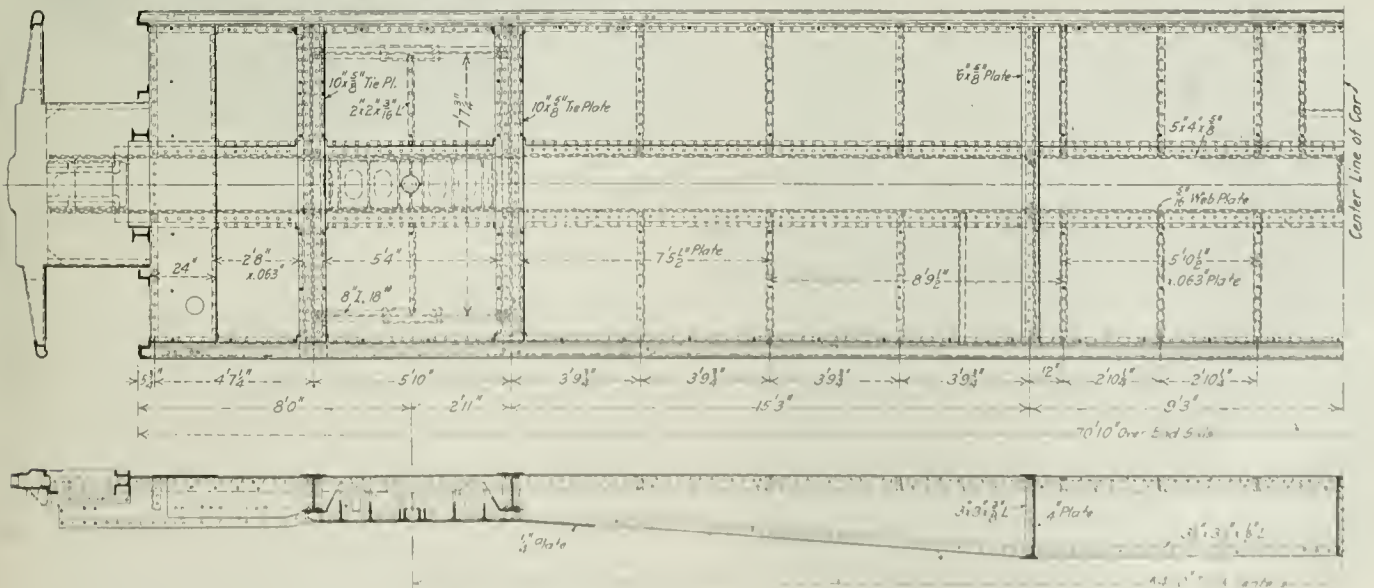
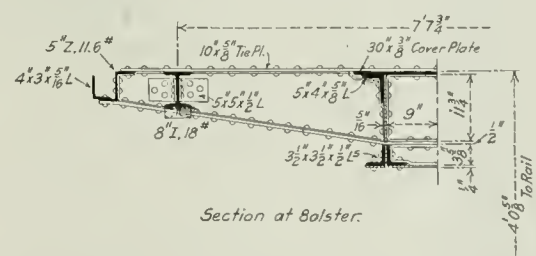
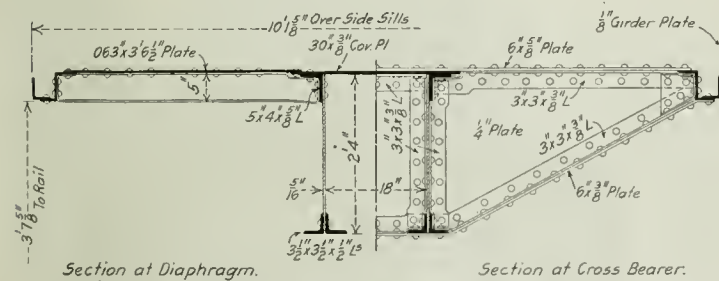
directly to the center sill. An anti-telescoping plate extends across all sills back of the end sill.

Insulation.—The insulation for the floors of the coaches and diners consists of a layer of $\frac{1}{8}$ -in. ceilinite cemented to the steel subfloor and passing under the six floor stringers, a layer of 3-ply salamander, an air space, a course of Neponset paper laid between the two courses of 13/16-in. fir flooring and a layer of



In the vestibule ends four 6-in., 23.9-lb. I-beams form the door and vestibule diaphragm posts and four 4-in., 82-lb. Z-bars the intermediate and corner posts. The cast-steel buffer is mounted directly on the center sill and is further reinforced by

$\frac{1}{2}$ -in. flexolith with wire netting laid on the top course of wooden flooring. The insulation for the side and end walls consists of a layer of 3-ply salamander cemented to the inside of the steel sheathing, an air space, a course of 2-ply salamander,



Underframe Construction of Northern Pacific Passenger Cars

a 7-in., 9.75-lb. channel 2 ft. 4 1/4 in. each side of the center line of the car. In the stub end cars 12-in., 31.5-lb. I-beams are used for the door posts, and eight 4-in., 82 lb. Z bars form the intermediate and corner posts, there being two corner posts at each corner. As in the vestibule end the buffer casting is attached

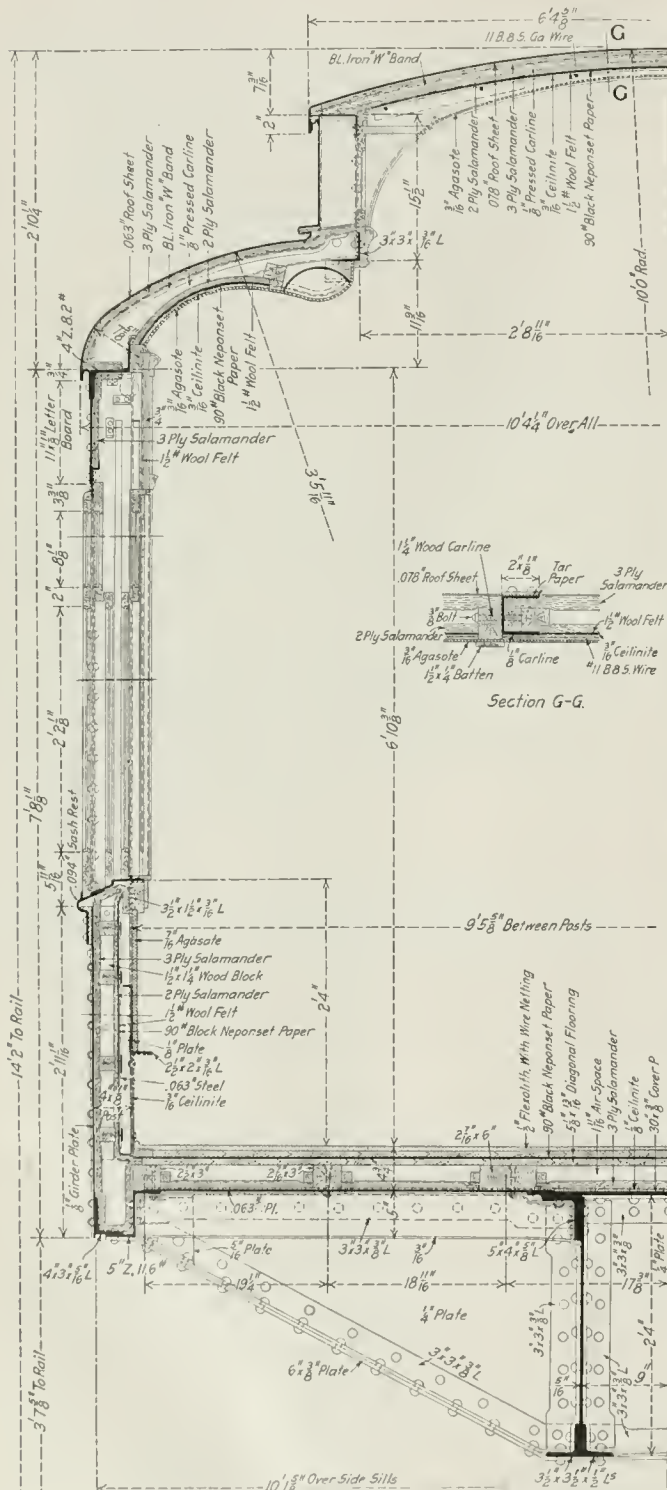
a layer of wool felt, a layer of Neponset paper, an air space and a layer of 3/16 in. ceilinite cemented to the inside lining. The insulation for the roof, including both the upper and lower decks, consists of a layer of 3-ply salamander cemented to the roof sheets, an air space, 2-ply salamander, Neponset paper, wool

telt and a layer of 3/16-in. ceillinite. These cars are equipped with Baker heaters and the Gold indirect steam-heating system with sufficient radiating surface to heat the cars to 70 deg., with an outside temperature of 50 deg. below zero.

The insulation for the floors of the baggage, and mail and express cars consists of a layer of 3-ply salamander cemented to the steel subfloor, an air space and a course of Neponset

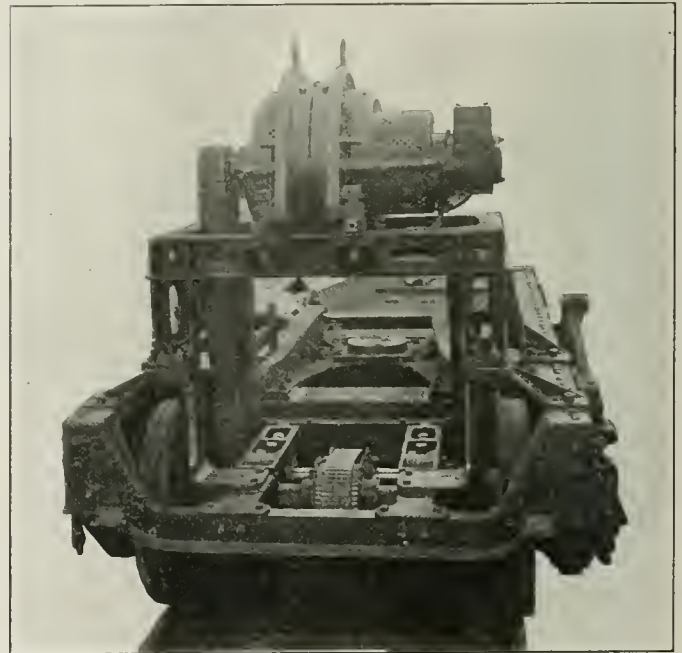
of 3-ply salamander cemented to the roof sheets. These cars are heated by the Gold direct steam-heating system with sufficient capacity to maintain a temperature of 70 deg. with an outside temperature of 38 deg. below zero.

Trucks.—Six-wheel trucks with structural steel frames are used under all the cars. They have a wheel base of 11 ft., open-hearth steel annealed axles with 5-in. by 9-in. journals, 36-in. solid steel wheels and a distance of 7 ft. 7 $\frac{3}{4}$ in. from center to center of the Stucki roller side bearings. Cast-steel parts are used instead of forgings where practicable. The truck bolster is cast steel. The center plates of the car body and the trucks are positively locked against any horizontal movement, and in addition the car body and truck are securely held together by the Coleman center plate locking device. The center plate faces provide 116 sq. in. actual or 101 sq. in. projected area of contact and were machined and ground together to a smooth working fit. The benefits of this, combined with the use of roller side bearings, are readily apparent. The braking of the truck is of special interest. One piece cast-steel brake hangers are used and they are longer than those ordinarily used on six-wheel trucks. Two brake beams are applied to the middle pair of wheels and one beam to the inside of



Cross Section of Coach at the Window

paper laid between the two courses of 13/16-in. flooring. The side and end walls are insulated with a layer of 3-ply salamander cemented to the outside sheathing, an air space, a layer of 2-ply salamander cemented to a layer of 3/16-in. ceillinite which in turn is cemented to the inside lining of 13/16-in. poplar. The upper and lower decks of the roof are insulated with a layer



Axle Train Lighter Mounted on Truck

each of the outside wheels. The design prevents the back surge of the truck when it comes to a stop, the brakes applying with a slightly preponderant downward force on the rear of the truck.

Lighting.—All cars are wired for the 64-volt, head-end electric lighting system, straight electric with candle-lamp auxiliary. The dining-cars, dynamo cars and combination mail and express cars are equipped with 200-ampere-hour storage batteries. The electric wiring in all cars was installed in conduit. The dining-cars and coaches are equipped with a new system of car lighting which eliminates the projection of fixtures into the body of the car. The new-style fixtures used were very carefully and accurately designed to give a large amount of light without glare. The illustration showing the interior of the coach was photographed at night with its own illumination.

Ten of the baggage cars and two of the mail and express cars are equipped with a 25-kw. steam turbine set with a switch-board designed to allow charging of the batteries during the lighting hours. Two of the mail and express cars are equipped with 17 1/2-kw. axle machine train lighters. These are mounted directly on the trucks and are driven through a jack shaft from the outside truck axle. The machine is driven by a Morse silent chain. One of the photographs shows the machine inside the

car. A heavy canvas webbing closes the opening in the car floor around the machine to keep the dust and cold air out. In service the machine and the opening in the floor are completely covered by a sheet iron casing.

An interesting feature in connection with the building of these cars is that the plans and specifications described the cars in such detail that the builders were able to place orders for material as soon as they received the contract (December 4, 1914) and where thereby enabled to turn out the first cars February 20, 1915. These cars have been made up into new steel trains running between St. Paul and Duluth, between Spokane and Seattle and between Seattle and Portland. In addition to these, the Pullman-Northern Pacific Association has supplied 21 new steel standard sleepers for use in these trains.

INDUSTRIAL TRUCKS ON THE PENNSYLVANIA*

By T. V. BUCKWALTER

The industrial electric motor truck as at present developed comprises baggage and mail trucks for use in passenger stations, warehouse trucks for freight stations and warehouses, shop trucks for railroad shops and general industrial purposes and electric tractors for propelling freight cars over street railway tracks.

There are no well-defined lines of demarcation between the first three classes. Baggage trucks are characterized by a height of about two-thirds the distance from the platform to the baggage-car floor, about 30 in. The length is controlled generally by existing elevator sizes and ranges from 9 to 12 ft. The width is generally 44 in. A modification of the baggage truck has a



Baggage Truck—Straight Frame Class

body only 9 in. high for use in depressed track stations where the car floor is but slightly higher than the station platform.

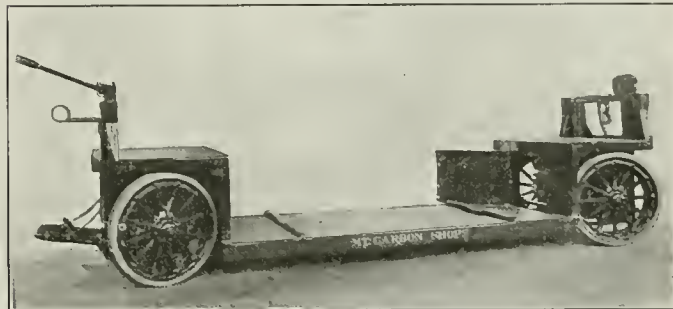
The electric warehouse trucks are characterized by a depressed portion at one end to facilitate loading, and delivery of the load into the end of a freight car. The restrictions limit the height to about 10 in., the width to about 40 in. and the over-all length to less than 9 ft. Shop trucks are subject to a variety of conditions as regards relative size and bulk of material handled. This has required a number of modifications in sizes. A distinct shop truck class has therefore not been developed but adaptation has been made of baggage and warehouse classes.

Railroad stations and shops are generally congested, and runways are narrow, therefore with the object of avoiding entirely the necessity of turning around, which would block other traffic, railroad industrial trucks have been constructed with double-end control. This feature permits of operation with equal facility in either direction, reducing congestion to a minimum. An

exception is the warehouse truck, which must have the low frame suitable to run into freight cars.

Space required to turn can be reduced still further by steering four wheels instead of two, and operation is made exactly identical in either direction. This eliminates the practice of running two-wheel steering trucks backward.

Sufficient traction for all ordinary work is available with two-wheel driving and therefore four-wheel driving complication is avoided. The voltage of industrial trucks has been selected after a careful study of the advantages of prevailing commercial truck standards and of much lower voltages, and was finally



Drop Frame Shop Truck with Transverse Rail for Carrying Mounted Wheels

adopted at 24 volts as the minimum at which efficient motors were obtainable, in consideration of the preponderant advantages of the low-voltage battery. The 24-volt battery has the minimum number of cells, and minimum number of connectors, and consequently the minimum possibility of jar and connector breakage, the minimum cost per unit of capacity and the minimum weight per unit of capacity.

The capacity of industrial trucks was worked out at 4,000 lb. as the maximum that could be handled within narrow and congested enclosures readily and safely, in consideration of the absolute necessity of quick stopping and positive and quick manipulation of control mechanism. Larger than 4,000-lb. trucks are too cumbersome, and smaller trucks will not carry enough to realize the full efficiency of the service. A 50-per cent overload factor has been found desirable, which makes a total weight as much as can be handled quickly.



Shop Truck—Warehouse Class

High-speed capacity has been found of little or no value, for the reason that the speed is limited by the amount of congestion of runways, and by the presence of other people who have other duties beside looking out for trucks. Therefore the

* Abstract of a paper read before the Electric Vehicle Association, at Cleveland, October 18.

speed has been reduced gradually as our experience has increased to the present standard of 6 to 7 miles an hour with the empty truck and 5 to 6 miles an hour loaded.

OPERATING RESULTS

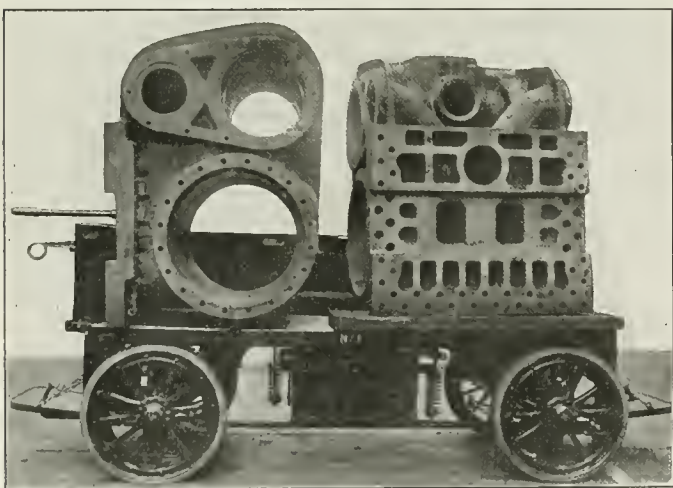
The records of operation for the year 1914, including all labor and operating charges for a total of 212 trucks, show:

ELECTRIC TRUCKS; SUMMARY OF DATA, 1914

Shop	Shop trucks Average monthly data all trucks			Averages per truck month		
	No. of trucks	K.W.H. current cost	Total cost	Total cost	Saving	Percent age
Harrisburg	1	209	\$5.43	\$70.00	\$70.00	100
Verona	1	587	8.81	82.00	82.00	99.8
Trenton	1	792	9.90	67.00	134.00	87
Juniata	2	1,426	11.14	131.00	65.00	109.00
Altoona Car	3	1,251	8.57	190.00	63.00	96.00
Renovo	2	1,168	18.05	136.00	68.00	93.00
Altoona Mach.	9	2,342	14.06	788.00	87.00	92.00
Pitcairn	4	789	4.05	312.00	67.00	89.00
Meadows Shop	1	734	29.40	34.00	34.00	21.00
Jersey City, Pier L.	3-5	1,340	45.77	173.00	51.90	.....

Station	Baggage trucks Average monthly data all trucks			Averages per truck month		
	No. of trucks	K.W.H. current cost	Total cost	Total cost	Saving	Percent age
Baltimore	2	953	\$11.50	\$27.00	\$13.00	100
Philadelphia	34-35	6,821	88.66	421.00	16.00	81.2
Pittsburgh	17-28	6,731	34.96	503.00	17.00	76.5
New York	64-66	5,016	66.63	1,184.00	18.00	76.1
North Philadelphia	4-10	1,534	43.56	154.00	24.00	55.3
Washington	18	11,810	85.88	455.00	25.00	54.4
Jersey City	3-5	956	19.12	115.00	29.00	46.5
Harrisburg	1	588	12.01	66.00	66.00	20.6

For the shop trucks the total cost includes the wages of the driver, which, under differing circumstances, varies from \$32 to \$60 a month; repairs of trucks, repairs and renewal of bat-



Shop Truck—Straight Frame Class

teries, and new material for trucks, batteries, and tires. Of the shop trucks that at Harrisburg made the best record and is entered as 100 per cent; the ratio of the others is calculated on the Harrisburg record as standard.

The wide variation in some of the charges is due to difference in current cost ranging from 0.5 cents to 10 cents per K. W. H. to the number of trucks in the installation, and to the character of the work.

The figures for the baggage trucks do not include charges for drivers for the reason that the trucks are driven by the baggage porters.

The installations are given an efficiency standing based on the saving on shop trucks and on the cost of operation on baggage trucks. In the shops these trucks handle work formerly done by manual labor and the saving is readily computed. However, the figures do not represent the total saving, as, for instance, the increased efficiency of the shop due to having material handled on a regular and prompt schedule does not admit of calculation. The old practice of helping out the labor gang with machinists is largely done away with.

The saving effected in baggage service is considerable but the figures are not sufficiently complete to be presented at this time. This saving is difficult of calculation. The character of the service has changed considerably since the introduction of electric trucks. The parcel post, formerly non-existent, is now a large and important part of the work. The labor force has not, generally speaking, been decreased, but, on the other hand, the business has increased. Rush periods can now be handled without borrowing untrained men from other departments, and a better class of men continue in service, as compared with the rapidly changing force in the old days. The operating officers consider that the most important advantage of electric baggage trucks is relief to terminal congestion and prompt despatch of trains resulting from avoidance of baggage detention. The saving effected is not stated on certain installations. This does not indicate an absence of a saving, but the failure of the operating people to ascertain the amount in time for this paper. The installations omitted would be near the top of the list. Under the heading "Number of Trucks" is indicated the number at the beginning and the end of the year, but the averages are based on actual truck months.

ELECTRIC TRACTOR

The electric tractor has now been in service 31 months and has proved entirely satisfactory. A description of this machine will be found in the *Railway Age Gazette*, January 9, 1914. It replaces horses for moving freight cars on tracks laid on paved streets. The tractor runs on the pavement like an automobile truck. Cars can be pulled or pushed by either end of the tractor. Steering, driving and braking is on four wheels. The size of tire is 60 in. by 6 in.; the weight 29,000 lb., and the drawbar capacity, 8,000 lb. at two miles an hour. The normal speed with one car on level tangent is six miles an hour. Brakes can be operated by hand or automatic air. Radial draft gear with standard couplers is provided at each end. Driving gears are 33 in. in diameter and 4 in. wide on each wheel.

During 1914 this tractor was in service an average of 7.6 hours a day, with 6.7 hours on a charge; an average discharge daily of 478 ampere hours, and an average of 11.5 miles daily. The average number of cars moved daily was 29.4 in addition to 20.5 "internal" movements. The total number of cars moved in the year was 8,562 in addition to 5,956 "internal" movements, and the total weight of these cars, in tons, was 219,382.

The record for the first seven months of 1915 shows the average hours in service daily to be 8.2; the average miles, 12.8, and the average number of cars moved 36.3, in addition to 25 internal movements.

"Internal movements" means cars moved from point to point within the track territory operated by the tractor. These movements are not included in total costs in service.

From the records of the 2½ years the following data may be derived:

Cost of tractor	\$13,400.00
Cost of maintenance and operation, 2½ years....	\$13,145.67
Interest at 6% on \$13,400, 2½ years.....	2,010.00
Depreciation, less tires and battery, \$13,400 — \$4,200	
= \$9,200 at 5 per cent, 2½ years.....	1,150.00
Depreciation battery \$3,200 at 25 per cent, 2½ years	2,000.00
	\$18,205.67
Total cost of service, 2½ years.....	\$18,205.67
Total number of cars (in and out) 2½ years	22,639
Total cost of service if horses had been used, 22,639×\$1.86..	\$42,108.54
Saving by electric tractor, 2½ years.....	23,902.87
Saving over investment, 2½ years	178.4%
Saving over investment, 1 year.....	71.4%
Total cost of service per car, 18,205.67 ÷ 22,639.....	\$0.805
Average weight per car.....	33,196 tons
Cost of service, per ton (in and out).....	0.0243
Total miles operated.....	8,804.3 miles
Total number cars handled in internal movements.....	15,202 cars
Grand total cars (in, out and internal).....	37,841
Cost of maintenance and operation per car (in, out and internal) 13,145.67 ÷ 37,841	0.347
Cost of maintenance and operation per ton (in, out and internal)	.0104
Cost of maintenance and operation per mile 13,145 ÷ 37,841....	1.49
Cost of service per working day by tractor.....	24.67
Cost of service per working day by teams.....	57.06
Saving per day	32.39

There has been a gradual growth of service in number of cars moved per month from 690 to 920 cars, during a period when railroad business has been stationary. At the same time

the cost per car has decreased from a maximum of 83 cents to 58 cents.

Mr. Buckwalter amplified the statement of cost with details by months, from which it appears that since September, 1914, the average expense per month for driver has been \$7,165, as compared with \$13,451 per month for the corresponding period prior to October, 1914, indicating that formerly a driver's mate was employed.

NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS

The annual meeting of the National Association of Railway Commissioners was held at San Francisco, Cal., on October 12, 13, 14 and 15. In his opening address as president of the association, Clifford Thorne, chairman of the Iowa Railroad Commission, vigorously defended state regulation as opposed to what he characterized as a tendency toward complete federal regulation. Mr. Thorne said in part:

"Too much 'nationalism' is just as wrong as too much 'states' rights. There is a happy medium. It is not this government as one nation, not the several states, but the combination in one federal plan that has rendered such a distinct contribution to the welfare of humanity. It is this federal plan that must be most jealously guarded. A tendency one way or the other, towards centralization or toward decentralization, is dangerous.

"For several years there has been gradually developing in this country a sentiment in favor of wiping out state lines. An agitation, partly spontaneous and partly inspired by interested persons, has been carried on to support a change in our judicial decisions relative to the powers of a state to regulate business. It is now vigorously claimed that the time has arrived for the practical abolition of all state regulation. Such a change in the American plan of government would be of stupendous importance. The issues of today concern vast property interests, and the future policies of state and nation on many grave questions of business are vitally concerned."

After reviewing the Minnesota rate case and the decision of the United States Supreme Court, Mr. Thorne said: "The court said that the question as to whether federal regulation of commerce shall supplant state regulation is not a question for the judiciary to determine; it is legislative and not judicial in character. It now becomes, not a question of precedent or of statute, but one of expediency, of wisdom.

"Within the next 25 years substantially all our commercial affairs will be carried on by companies doing both state and interstate business. What is good for railroads will be good for others. Shall we abandon our state governments, so far as the regulation of business is concerned? Here is an issue which strikes at fundamentals; which has to do with the method of government.

"In striving after the new, we frequently fail to realize the intrinsic value of the old. What is the fundamental characteristic of our government? It is the creation of a nation, large and strong enough to assert its independence among the world powers; at the same time combined with a form of government securing real tangible home rule to the various independent sovereignties making up that nation.

"If the national government is permitted to gradually absorb the functions formerly exercised by the states, it will only be a question of time until some great evil will demand some great remedy. Agitation will follow agitation. There will be no opportunity to try out the new proposal; the nation as a whole must adopt it or reject it. We believe the federal plan, as conceived by our fathers, is better than the new nationalism. We believe the states are a distinct factor in our scheme of government."

Judson C. Clements, of the Interstate Commerce Commission, addressed the meeting on the subject of federal regulation of railroad securities. Mr. Clements said that there must come a

time when some single tribunal will control this phase of railway operation. "It will be a long time," he said, "before effective legislation can be secured by the states, and public ownership should be resorted to only as the last resort." Mr. Clements said that politics would figure too largely in the management of government-owned roads.

It was decided to establish a bureau at Washington to represent the interests of the states and to assist the Interstate Commerce Commission in its work of making a valuation of railroad property, and the following committee was appointed to take charge of the new bureau: C. E. Elmquist of Minnesota, Clifford Thorne of Iowa, G. A. Henshaw of Oklahoma, Max Thelen of San Francisco, C. B. Aitchison of Oregon, J. L. Bristow of Kansas, and E. C. Niles of New Hampshire. A resolution was adopted advocating legislation to give railroad commissions power to eliminate grade crossings. The committee on railway service and accommodations submitted recommendations that every state be urged to enact laws against the use of liquor on trains. R. R. Prentiss of the Virginia commission was elected president of the association for the ensuing year.

ECONOMIC VALUE OF TERMINAL IMPROVEMENTS AT DETROIT

One of the important engineering works of the country completed within recent years is the double tube tunnel under the Detroit river, connecting the American and Canadian divisions of the Michigan Central.

Detailed descriptions of the work* and the numerous difficulties successfully overcome, from an engineering standpoint, were made public from time to time during construction. The tunnel was opened for traffic in 1910, and has entirely superseded the use of ferryboats for transferring Michigan Central freight and passenger traffic across the river. Sufficient time has now elapsed to fully test the estimates of the advocates of the plan as to the advantages it was believed would accrue from a materially reduced cost of handling traffic and time saved in transportation.

There are usually one or more points upon trunk lines with a fluctuating volume of traffic which tend to limit the amount of business that may be handled economically on the whole line. When the traffic load approaches the peak, congestion is found at these points, the whole line becomes affected and operating costs rise abnormally. Such a place was the Detroit river ferry over which all the through traffic of the Michigan Central had to pass, and as early as 1870 plans were made for relief from the limitations this method of transfer imposed. With the engineering facilities then available, a projected tunnel was found to be impracticable of construction because of the conditions which tests disclosed in the river bottom.

Various plans involving the erection of a bridge were discussed, but these were finally abandoned in 1904 for the reason that the clearances demanded for lake vessels would have required a structure of such height that it would have been necessary either to establish grades impossible of operation, or construct approaches of such great length that the cost would have been prohibitive.

The growing traffic and vexatious delays pressed for a solution of the problem, and in 1906, confronted with the necessity of making large additions to its ferry transfer equipment, the Michigan Central appointed a committee to study the situation. The committee reported that a tunnel could be built within reasonable limits of cost, and that in operation it would be economical enough to justify the investment. Plans were then adopted for the laying of twin tubes under the river, and, as a necessary adjunct thereto, provision was made for a new passenger

*For description of tunnel, see *Railway Age Gazette*, November 10, 1911, page 945; for description of tunnel yards, see August 18, 1911, page 334; for description of Detroit terminal passenger station, see January 9, 1914, page 73.

station in Detroit and for new yards and terminals required by the change in location.

In the construction of the tunnel, lying partly within the United States and partly within the Dominion of Canada, it was necessary to organize separate tunnel companies, one under the laws of Michigan and one under the laws of the Dominion of Canada. These companies were subsequently consolidated under the name of the Detroit River Tunnel Company, which was authorized to build and own the property, all of which has since been leased to the Michigan Central. Construction work was begun in 1906 and completed in 1910. The terminal building was opened for use in December, 1913, a short while before its completion, on account of the destruction by fire of the old station. The entire property—that is, the Detroit River Tunnel Company—was capitalized at \$21,000,000, of which \$3,000,000 was in capital stock, all owned by the Michigan Central, and \$18,000,000 in fifty-year first mortgage 4½ per cent bonds. The money was expended for the cost of building and equipping the tunnel, for rights-of-way, separation of grades at street crossings, and the construction of the new passenger station, yards and other terminal facilities.

Up to 1910, all Michigan Central trains were ferried across the Detroit river, requiring the breaking up of through trains and involving many switching movements and a delay of from three to eight hours per train in through freight service. On account of the swift current in the river, the frequent use of the channel by steamships, and the added difficulties of fogs in the summer and autumn, and ice in the winter, it was found impossible to maintain schedules or to regulate traffic in a satisfactory manner.

Since the opening of the tunnel for operation, the average time of passenger trains between Windsor and the new Detroit terminal, in either direction, is about nine minutes, or less time than it formerly required simply to place the trains on the transfer boats.

The average time required for moving a freight train through the tunnel is about twenty minutes, as compared with several hours required for breaking up, switching, reassembling and ferrying trains under the former method of operation, in addition to which they were frequently subject to more or less serious delays crossing the river because of weather conditions, ice, etc.

This saving of time has been particularly advantageous in the handling of traffic requiring expedited transit, such as perishable commodities. Thus, the railroad has been in a position to give better service because of the removal of the main cause of delay, but has been able to improve its operating efficiency on this division by greatly increasing the train loads since it has been possible to send solid trains through the tunnel.

The following statement indicates the growth in average monthly operating revenues which the Michigan Central has enjoyed since opening the tunnel:

Three-Year Monthly Averages—			
	1907-9	1912-14	Increase Per Cent
Monthly Passenger Earnings:			
Summer months	\$645,935	\$838,056	29.74
Winter months	470,209	634,164	34.87
Average throughout period....	\$558,072	\$736,111	31.90
Monthly Freight Earnings:			
Summer months	\$1,481,740	\$1,791,970	20.94
Winter months	1,494,737	1,830,530	22.47
Average throughout period...	\$1,488,238	\$1,811,250	21.70
Monthly Passenger and Freight:			
Summer months	\$2,127,675	\$2,630,028	23.61
Winter months	1,964,946	2,464,694	25.43
Average throughout period....	\$2,046,311	\$2,547,361	24.49

Just how much of the increased traffic represents a normal growth and how much comes from the better service which the road renders cannot be ascertained.

Important as are the benefits mentioned to the public and the railroad resulting from the construction of the tunnel, a feature

of equal importance, particularly from the railroad viewpoint, is the fact that the total cost of transfer is now considerably less per car than it was under the old method of ferrying across the river. Although the investment in the tunnel property and equipment is about eight times as large as that required for the transfer boats and slips, the cost of switching and operating the trains, and maintaining the property is so much lower that the higher interest charges and taxes are more than offset.

Statistics for the year 1914, as compared with the year 1908 when the transfer boats were in operation, show that there has been a large saving in the cost of switching service, although the number of cars transferred across the river in 1914 was greater than in 1908.

A material saving has also been obtained by the transferring to the new freight yards at Windsor, constructed for this purpose, of all the switching operations necessary on through freight trains, thus relieving the Detroit yards (which were rapidly becoming congested and overcrowded owing to the extraordinary industrial growth of Detroit) and increasing their capacity about 40 per cent. Another item, the exact amount of which cannot now be computed because of the loss of records by fire, is the saving in per diem charges on loaded and empty freight cars, particularly empty cars, many of which were formerly frequently held back on either side of the river as a matter of necessity in order that the forwarding of loaded cars might be expedited. Under present conditions, there being no congestion at this point, empties are forwarded without delay.

The traffic through the tunnel represents but a small percentage of its capacity. If it continues to increase in the next few years as it has in the past decade, the Michigan Central will find the tunnel to be an increasingly valuable asset, and one without which it would not be able to render the service that will be absolutely required of it if it is to maintain its standing as a trunk line.

It is not possible as yet to determine the decreased cost of handling passenger trains that will result from the use of the new station. A more convenient arrangement of the tracks has undoubtedly effected a reduction in cost. The better location of the station and the better service the tunnel affords have undoubtedly attracted to the line a larger number of passengers.

In planning the new station and terminal at Detroit, and following the scheme of development applied to the Grand Central Terminal in New York, the company has included its own offices in the building and has reserved for renting purposes certain parts of the property, the income from which, it is expected, will meet a large part of the interest charges on the terminal investment.

The improvements at Detroit afford an example of a relatively large investment concentrated at one point. Following the general policy of the New York Central Lines with regard to important changes, this improvement is not a temporary makeshift, but has been installed with liberal provision for present needs and ample capacity for growth in the future. In this case, the wisdom of the investment has already been demonstrated, not only from the standpoint of economy and consequent benefit to the owners of the property, but in greatly promoting the public service as well.

A BRITISH RAILWAY'S EQUIPMENT.—The North British Railway Company owns over 60,000 freight cars and the number awaiting repair is normally about 1,000. Owing to the various adverse conditions resulting from the war the number awaiting repair at the present time is about 5,000. Notwithstanding this the supply of cars to the ironmasters and coal mines was never so satisfactory to the trade as it is just now. This is due to the car supply on the North British being controlled from the train control office, which is at Portobello, a point not far from Edinburgh.

Maintenance of Way Section

The report on water tanks presented before the convention of the Bridge & Building Association this week, and abstracted on another page in this issue, calls to mind

Recent Developments of Water Tanks

the changes which have been made within the last few years in the manner of storing water for locomotive use at outlying points. It is only a few years since water was almost universally stored in wooden roadside tanks of 50,000 to 60,000 gal. capacity, located alongside the track and delivering directly to locomotives. Today the capacity has increased until the 100,000-gal. tank may be said to be standard; the steel tank has replaced the wooden tank on many roads, and frequently the tank is set back from the track and water is delivered to the locomotives through a standpipe. These and other developments make necessary the continued study of this problem by those having to do with water tank installations. It is especially important, in determining between wood and steel tanks, to study the relative merits of the two materials for use in particular locations, for the quality of both of these materials obtained has been changing rapidly. It is necessary to scrutinize carefully not only the materials entering into the tanks proper, but into their accessories as well, for a tank is serviceable only so long as all of its appliances are serviceable.

In 1897 the average freight traffic density of the railways of this country was approximately 482,396 ton-miles per mile of

The Development of Special Steels

main track and the average passenger traffic density 62,144 passenger-miles per mile of main track. In 1913 these figures had increased to 1,095,000 and 126,300, respectively. Thus, in 16 years the average amount of traffic passing over each mile of main track had doubled. These are necessarily average figures and do not indicate the amount of traffic passing over the points of greatest congestion. On portions of several roads the freight traffic movement alone over certain parts of the lines exceeds 20,000,000 ton-miles annually, and the movement over each track is proportionately large. Nevertheless, these figures denote in a general way the increased service required of the tracks all over the country. The unit of track construction most directly affected by the density of traffic is the rail; and especially is this true at the points subject to the most severe attacks, as in the case of the high rails on curves and special construction at frogs and crossings. With this large increase in the service demanded, it is not surprising that there have arisen many instances of rapid rail wear. This has led to efforts to secure some metal other than Bessemer or open-hearth steel which will give a greater life at these particular places, and has given rise to the experiments with special steels described by W. C. Cushing in another column. To be successful, any substitute metal must possess the valuable qualities of the present open-hearth steel, while at the same time affording a greater resistance to wear, and must yield itself to manufacture at a cost sufficiently low to enable it to be used with economy. These are rigid requirements and it is neither surprising nor discouraging to note that no entirely satisfactory substitute has yet been developed. Material progress is being made in the development of materials of the required physical characteristics and with increased use the cost of manufacture will decrease materially. It is important that these and other experiments be continued, even at heavy initial cost to the railroads as well as to the manufacturers, for it is certain that the traffic will continue to grow in the future as it has in the past, and that the demand for rail materials giving greater resistance

to wear will gather momentum from year to year. It is not beyond the range of possibility that the ultimate solution will be the development of several grades of rail material of varying resistances to wear and corresponding cost for use on lines of different traffic densities.

Competitive commercial enterprises are frequently hampered by the lack of proper standards for the control of quality,

Rating of Concrete Mixers

quantity, weight and sizes of the various products. A loose interpretation of inadequate standards or the entire absence of such standards always works to the disadvantage of the conscientious dealer in favor of his unscrupulous competitor. The purchaser also suffers. Fortunately these conditions no longer obtain in most well-established lines, because of the rules, specifications and standards adopted by the various manufacturers' associations. A recent example of this is the action taken by the National Association of Mixer Manufacturers for the standardization of the rating of batch concrete mixers. It is a well-known fact that the batch capacity of a mixer of unmixed sand, stone and cement is about 50 per cent greater than its capacity for mixed concrete, and up to the present some mixer manufacturers have been rating their machines by their capacity in mixed concrete, while others rate them by their capacity in loose, unmixed material. The action recently taken by the mixer manufacturers was in the form of a resolution which provided that the members of the association shall specify the capacity of their mixers as "size of wet mixed batch" in catalogues and circulars and not otherwise. It also provides that the dry, unmixed capacity of a mixer may be approximated as one and one-half times the wet mixed batch, on the basis of a stone concrete with 1½ in. crushed stone and 1¾ gal. of water per cubic foot of mixed concrete. The Association of Mixer Manufacturers is to be commended for this action.

THE DANGER POINT IN RETRENCHMENT

A GREAT deal of attention is being given to the "Safety First" agitation, and it is to the credit of the railways that they have led in this movement. Numerous more or less important measures have been adopted to increase the safety of travel, many of which have involved the expenditure of large sums of money. As an example, the extension of automatic block signals may be cited. In many cases such installations have been made for the economic purpose of increasing the capacity of the line, but in many other places, large expenditures have been authorized primarily for considerations of safety on lines where a congestion of traffic did not prevail.

The past few years have been years of declining railway revenues in the face of increasing expenses, a condition requiring strict retrenchment and the conservation of resources. In such times the problem is to distribute the limited funds available where they will go furthest toward accomplishing the desired result, there not being resources available sufficient to do all the work desired. Under these conditions, great care must be exercised to maintain all units of the property to the proper standards of safety.

In any period of retrenchment, the first and most drastic reductions in expenditures are ordinarily made in the maintenance of way department. During the year ending June 30, 1915, the average expenditure for maintenance of way and structures for the railways of the country decreased about \$210 per mile of

line, or 11 per cent. While the effects of restricted expenditures are not ordinarily reflected at once in the condition of the track and structures, this last reduction, coming after an extended period of retrenchment, has caused the condition of much track to deteriorate seriously and in many cases to the point of danger.

It is, of course, impossible for a railway to spend money which it does not earn or possess, and for the policy of slow starvation which is being carried out by the state and federal regulating authorities, they must accept their full measure of responsibility. But, regardless of the cause of present conditions railway officers must also accept responsibility for so distributing the funds at their disposal as to secure the greatest degree of safety for the traveling public. In this connection, those in charge of the maintenance of the track and structures should bring to the attention of those responsible for the distribution of funds the actual condition of the property, particularly at those points where travel is endangered. If the higher officer is then unwilling to make the proper expenditures, he must accept the responsibility.

In these days of labor agitation, great dependence is placed on the unorganized, poorly paid section foreman who is expected to maintain track safe for high speed trains 24 hours in the day, frequently with only two or three foreign speaking assistants, and with no 16-hour law to protect him in times of storm or wet weather. Furthermore, when retrenchment comes, the amount of ballast, rail and other materials furnished for maintenance purposes is reduced, and at the same time the foreman is given less labor, although his track requires more attention and the trains run at the same speeds. After all, the track is the first essential to safe railway operation and without good track the best equipment and the most elaborate signals are ineffective.

SELF-EDUCATION

It is a common complaint among all ranks of maintenance of way employees that few opportunities are presented for promotion to positions of more responsibility and correspondingly greater rewards. At the same time the executive officers of railways lament their inability to secure men properly prepared to fill vacancies in this department as they occur. If these two apparently contradictory conclusions are correct, and it must be admitted that there is merit in each, it is pertinent to inquire what measures are being taken to bring the men and the positions together.

All branches of maintenance of way work are changing rapidly and the standard methods and materials of only a few years ago are fast becoming obsolete. The introduction of special materials, such as heat treated bolts, and of devices such as rail anchors, the use of treated ties and the adoption of motor cars, illustrate recent developments in track work. The widespread use of concrete and measures for its proper preparation, the use of fuel oil engines in pumping stations and the construction of more scientifically designed track scales are of similar importance in other branches of this department. To serve his company best, as well as himself, a man must keep abreast of these developments and do his share in perfecting them. This requires that he must use all the available means for educating himself to greater efficiency.

A few years ago opportunities for education along the line of a man's work, but outside of his regular daily activities, were very limited. Fortunately this condition is rapidly disappearing and information is available today for men of all ranks. For the man who desires that his line of study be directed for him, courses of instruction have been prepared which will give him, step by step, a broad working knowledge of his duties. These courses are available for officers and employees in practically all ranks of the maintenance of way department. Realizing the merits of such courses, several railroads are now placing them

at the disposal of their men in the lower grades without expense to them.

For the man who prefers to select his own literature, the number of books on railway subjects is increasing constantly, while the railway journals present information concerning recent railway developments from week to week, and from month to month.

The universal demand for trained men and the means for self-education so generally accessible, should afford sufficient incentive for the wide-awake men to so prepare themselves. It is significant that some of the most prominent men in the railway field today are those who were denied the privileges of a college education and who have advanced to their present high positions by dint of hard study, and it is interesting to note that, having attained success, they retain their same studious habits. The same opportunities are presented, to a degree at least, in all ranks, even to the most humble. Within the past year one general manager went to the man in charge of educational work on his road for a list of track laborers whose educational work indicated they were fitted for foremen, and out of a list of 80 men so selected he secured practically his entire quota of section foremen for the year. There has never been a time in the history of our railways when trained men were in so much demand in all ranks as today. The man who properly equips himself for the work of the position he now holds and continually endeavors to fit himself for the position just above it will almost certainly secure recognition and advancement. What is true in this regard today will be true to an increasing extent from year to year.

THE RAPID DEVELOPMENT OF CONCRETE CONSTRUCTION METHODS

In a spirit of conjecture, perhaps not unalloyed with flippancy, the bridge engineer of a certain railroad recently suggested the following picture of the future of concrete construction on railroads: After the excavation has been completed, a gang of carpenters will build the forms complete to the last detail. When all is ready a "concrete train" will arrive on the ground and, in a manner comparing favorably with the operation of a modern fire department, a few active, skillful men will run out lines of hose or flexible pipe and proceed to "squirt" the forms full of concrete. It must be admitted that this sounds somewhat like the prophecy of a well-known American inventor which had to do with concrete houses built in a day in cast iron forms, with furniture and plumbing all in place, etc., but which unfortunately has not been fulfilled. On the other hand, the picture outlined above was a result of a close association with the concrete industry and was drawn in the light of the recent developments in the making and placing of concrete.

Reviewing the use of concrete during the last twenty years, the first ten were marked by the development and application of the theory of reinforced concrete design; the second ten by a wonderful advance in the making and placing of concrete. It is believed that this will account for a recently observed tendency toward a return to the use of mass concrete in place of reinforced concrete in certain classes of retaining walls where mass concrete can serve the same purpose. Where it can be handled in large quantities, concrete can now be made and placed so much more cheaply than formerly that the saving of concrete in the thin reinforced wall is largely neutralized by the greater cost of the reinforcement and form work.

Fifteen years ago a large portion of the concrete was hand-mixed, while now almost no job is too small to justify a mixer. Today we use the cement gun, the concrete atomizer and the pneumatic mixer and placer, collapsible steel forms and concrete mixer cars. Mechanical or gravity handling of mixed concrete is a firmly established practice, and manual labor is eliminated even for supplying the materials to the mixer. One of the lessons of the Panama Canal is taught by the illustration it afforded of the possibilities for plant development when large quantities of concrete are required.

A New Terminal for the Southern at Birmingham, Ala.

This Includes a Classification Yard and Engine Facilities with Provision for Future Enlargement

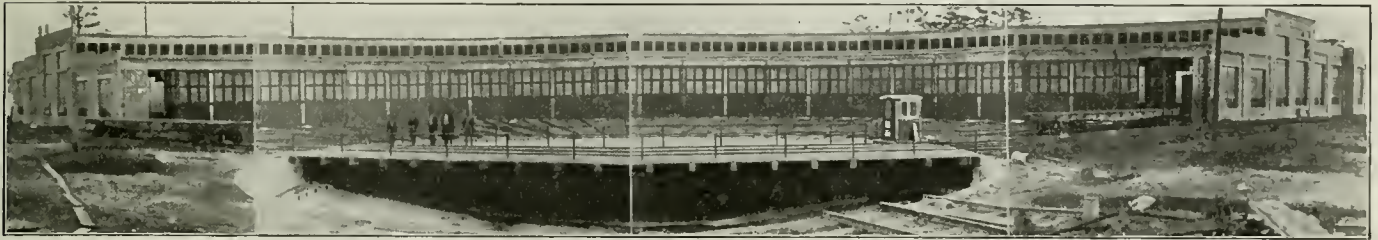
To keep abreast of the rapid growth of Birmingham, Ala., the railroads running through it have been obliged to increase their passenger and freight facilities. Among these, the Southern has recently built a freight yard and engine terminal representing an expenditure of \$661,000, which will be adequate to handle its business in the Birmingham district for some time to come.

The facilities of the Southern for handling freight, up to the

borrow, obtained from the location of the future extension of the yard. Drainage is taken care of by a system of catch basins, inlets and sewers of terra cotta, cast iron and reinforced concrete pipe, ranging from 12 in. to 48 in. in diameter.

YARD ARRANGEMENT

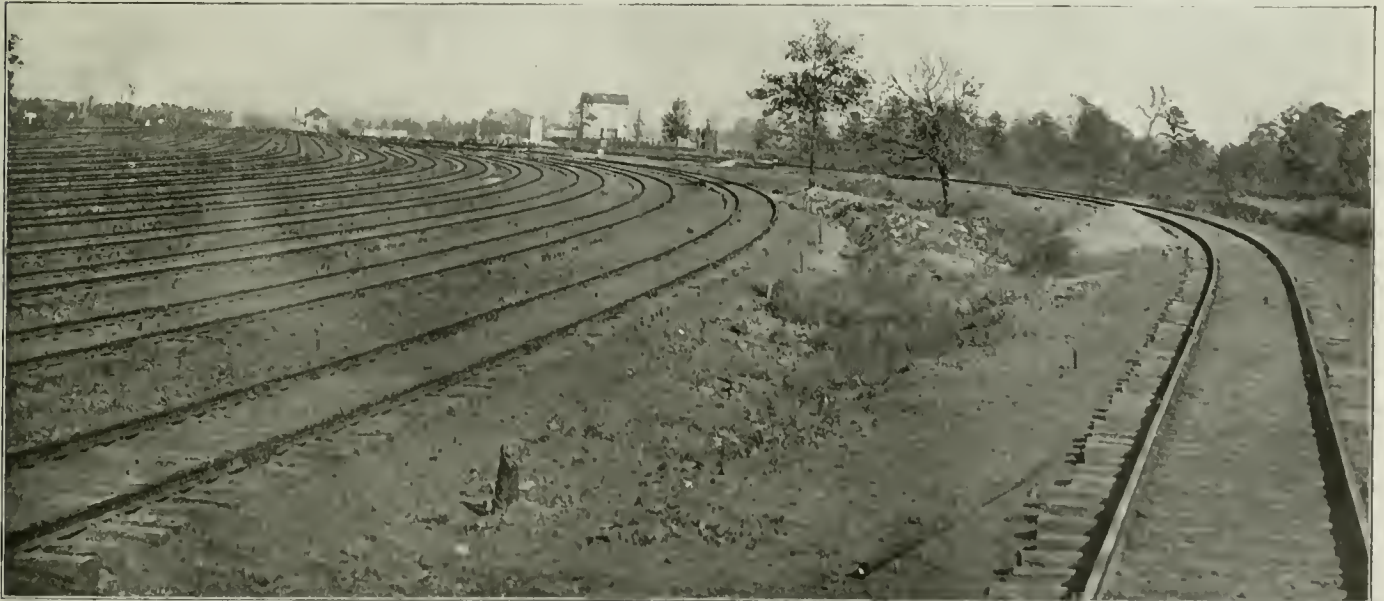
The receiving yard consists of 8 tracks, having a capacity of 45 cars each, and two running tracks; the yard tracks are



The Roundhouse and Turntable

time of this improvement, consisted of four yards scattered over a territory of approximately 10 miles, and such improvements as could have been made would have involved a large expenditure of money and would not have provided adequate facilities for any reasonable length of time. It was therefore decided to abandon all schemes for expansion of the old yards and to build a new yard on property owned by the railway at North

laid 12 ft. 6 in. and running tracks 15 ft. between centers. The grade of the receiving yard is level for about half its length, changing to a grade of 0.5 per cent ascending in the direction of the hump. The grades for the new hump as shown on the accompanying profile were adopted after careful observation of various humps in operation at other yards and actual tests during construction; that is, when the yard was practically com-



Looking East Over the Classification Yard

Birmingham, Ala., to be known as "Finley Yard," in honor of the late President Finley. Plans were accordingly developed for a yard layout, taking into consideration the probable needs for a period of 25 years, with the intention, however, of building only one unit of the yard at a time and adding to it as found necessary.

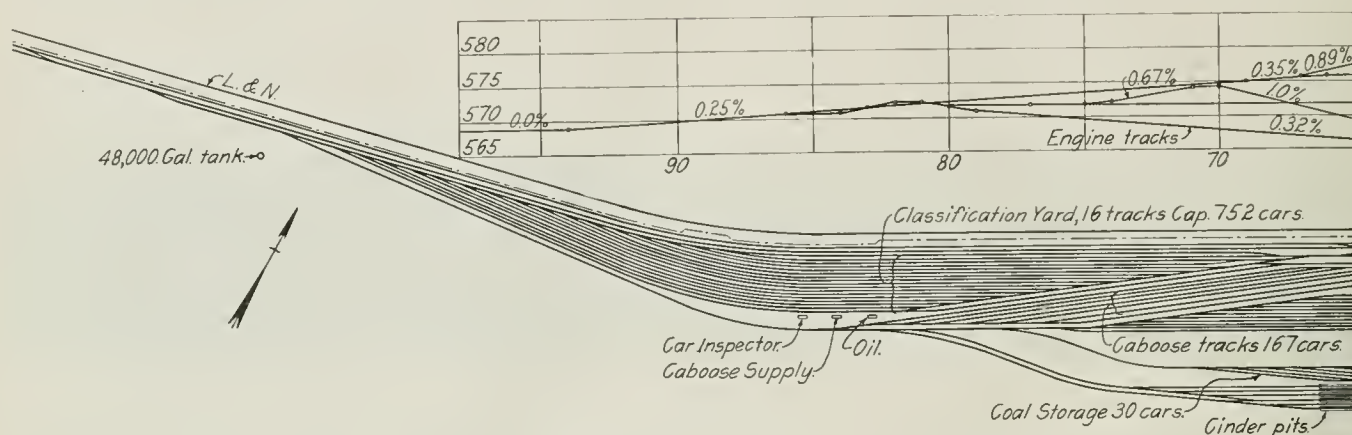
The first unit consists of a receiving yard, a gravity classification yard and a storage and repair yard, having a combined capacity of about 2,000 cars and a complete engine terminal.

The grading for the above consisted of about 105,000 cu. yd. of earth and 1,600 cu. yd. of solid rock excavation, the cuts and fills equalizing, with the exception of 20,000 cu. yd. of

pleted, and before it is put in operation, cars were run over the hump and the grades adjusted to meet local conditions. Commencing with the vertical curve at the apex the grade is 3.0 per cent, reducing to 0.6 per cent across the scales, a distance of 91 ft. The maximum beyond the scales is 3.8 per cent. Vertical curves were used at all grade intersections, their lengths ranging from 20 to 50 ft. There is a concrete underpass under the hump, eliminating the necessity of employees crossing the hump track while cars are being handled. A railing across the path just outside the subway at each end prevents direct passage from the subway onto the adjoining tracks, thus reducing the opportunity for accidents.

The classification yard consists of 16 tracks, having a capacity of 47 cars each, and two running tracks; the yard tracks are laid 12 ft. 6 in. and the running tracks 15 ft. center to center. The grade of the yard is 0.25 per cent throughout its entire length with the exception of a few hundred feet at the extreme west end which was made 0.8 per cent to coincide with the grade of the main tracks. There are 5 caboose tracks, providing for 173 cars, 2 repair tracks of 74 cars capacity, 10 local freight and storage tracks having a capacity of 530 cars each, and a 6-track coal storage yard of 35 cars capacity. The coal storage

A special feature in the operation of the scale is an interlocking device for the switch at the upper end of the scale, the purpose of which is to eliminate the possibility of leaving the switch open for the passage of an engine or unnecessary switching over the scale, to prevent cars being run on the scale before the weighmaster has had ample time to put it in proper adjustment for weighing, and to place responsibility for prevalent bad practices in weighing and care of scales with one person. The main and extension levers are of cast iron, the fifth lever is of cast steel and all pivots and bearing steels are of special alloy.



West Half of the Finley Yard

tracks are on a 1.0 per cent grade descending towards the coal hopper to permit gravity handling of the coal cars. The coal and cinder pit tracks are arranged to enable engines to take coal and water, and deposit cinders, with a minimum loss of time.

The ladders for the receiving, classification, caboose and storage yard have No. 8 manganese insert frogs. Main line and running track turnouts and crossovers and the turnouts for engine terminal tracks are nearly all equipped with No. 10 frogs.

TRACK SCALES

The track scale is of the 4-section suspension bearing type and of 150 tons capacity. It is 54 ft. long with a live weighing

The scale is installed in an open pit constructed with concrete approach abutments and two intermediate piers in each side of the scale for the support of the "dead platform." The grade over the scale is 0.6 per cent. Bethlehem steel I-beams were used in the construction of the weigh-bridge and the platform, the latter being made up of main side girders, sidewalk brackets, floor beams and stringers directly under and supporting the dead rails on malleable iron castings the thickness of the timber decking. The scale house is of special design, and, instead of the usual bay, a square front with ample window area is used which gives more satisfactory vision.

For night work the exterior lighting consists of two electric head lights so located that their rays intersect at a point 4 ft.



The Cinder Pits, with Craneways and Overhead Traveling Grab Buckets. Coaling Station in the Background

surface of 50 ft. and equipped with a full capacity 400-multiple beam with automatic weight recorder. The platform is designed for a dead load equal to the weight of the structure and a live load of one E-55 engine without allowance for impact, using 10,000 lb. per sq. in. unit stress in bending. The live and approach rails are connected by Bohannon-Dugger improved flexible easer joints, which prevent excessive impact and reduce the vibration of the scale mechanism. This mechanism is also protected from rain and dirt by splined and grooved timber decking and dirt shields.

above the rail and directly in front of the scale beams. General lighting of the scale and the upper part of the cars is furnished by a cluster of 40-watt lamps placed on the front of the scale house.

When trains having both weigh and non-weigh cars are switched over the hump to the classification tracks, the foreman of the crew notifies the weighmaster of the approach of a weigh car by means of a push button at the apex of the hump, which rings an electric bell in the scale house.

The yard office is a frame structure 25 ft. by 56 ft. with tile

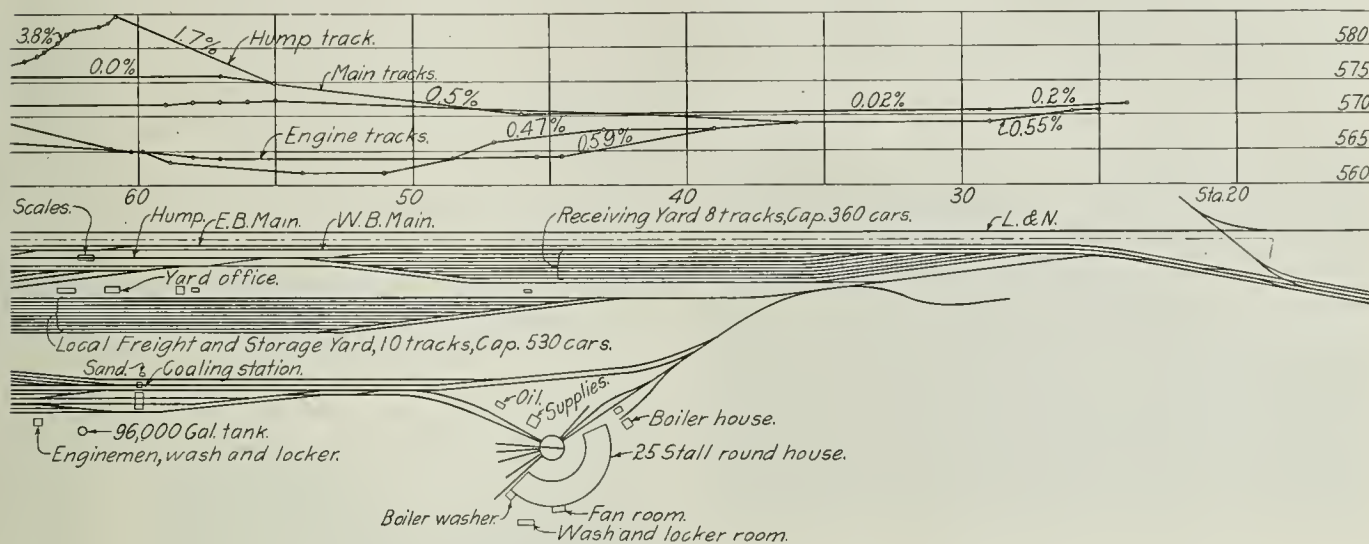
roof, the first floor providing for a telegraph office, conductors' room and clerks' office; the second floor for the yardmaster's office and a record storage room.

In connection with the toilet facilities, two sewage treating plants consisting of settling tanks and intermittent slow sand filter beds were installed, one near the roundhouse, the other near the yard office.

THE ENGINE TERMINAL

The roundhouse has 25 stalls, 92 ft. long and is constructed

with a concrete floor and a tar and gravel roof on a concrete slab; the rooms are equipped with lockers and other conveniences. Water for the yard and for fire protection purposes is supplied by the local water company. The railway furnished and installed all pipe lines on its right of way. Water storage sufficient for the fluctuating demand of the yard is provided by two wooden tanks, one of 96,000 gal. capacity on a 34-ft. frame and the other of 48,000 gal. capacity on a 16-ft. frame. A circulating fire protection, high pressure water main takes water directly from the local water company's pipe line.



East Half of the Finley Yard

of reinforced concrete with a tar and gravel roof on a concrete and hollow tile slab. There are 25 engine pits and one truck wheel and one driving wheel drop pit. The windows are of wire glass and metal sash, each having an area of 284 sq. ft. (58 per cent of the panel area). The floor is laid with creosoted

There are four cinder pits, 160 ft. long, arranged in pairs, each pair being equipped with an electrically-operated overhead traveling crane running the entire length of the pits. The cranes have a span of 46 ft. 8 in. supported by steel runways on bents 20 ft. 6 in. center to center, have an under clearance of 16 ft.



Interior of the Roundhouse

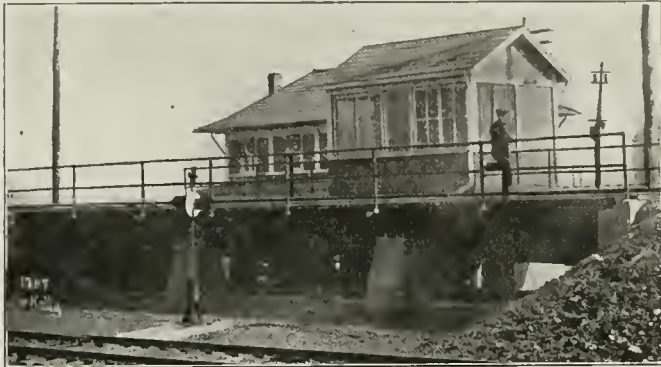
wood blocks on a 5-in. concrete base. The turntable is of the deck type, 90 ft. long, motor operated, and is installed in a concrete pit.

The wash and locker room is a brick building 23 ft. by 63 ft.

over all tracks and are provided with a Brown-Hoist grab bucket of 1.5 cu. yd. capacity. The pits are of plain concrete, 4 ft. deep and 4 ft. wide, with track rails fastened to channels secured to the top of the concrete walls by U-bolts. The bottoms of the

pits are sloped for drainage and are protected from damage by the grab buckets by means of two rails embedded at the surface of the concrete.

The coal and sand handling plant is located in the center of the yard between the cinder pits and the roundhouse. The coal handling and storage facilities consist of a reinforced concrete storage pocket having an overhead capacity of 1,000 tons, of which 60 tons are held in four 15-ton scale pockets. Coal is unloaded from hopper bottom cars into a track hopper and is elevated to the top of the pocket by a motor-driven chain and bucket type elevator, from which it is discharged into the overhead storage pocket. Coal is handled from cars into the overhead pocket at the rate of about 100 tons per hour. Locomotives on any of the four tracks are supplied with coal from the scale pockets which are filled by gravity from the overhead storage.



The Track Scale and House

The scales are fitted with type registering beams which enables the operator to determine accurately the amount of coal taken by each engine.

An independent reinforced concrete sand storage and drying building is located adjacent to the coaling station. It has a capacity of 100 cu. yd. of wet sand, which is unloaded from the cars direct into a hopper, from which it is elevated to the overhead storage pocket by a motor-driven belt and bucket elevator. Three stove driers located immediately under the storage pocket are supplied with wet sand by gravity. Dry sand from the driers is delivered to a steel drum from which it is conveyed by compressed air to a storage tank located in the monitor of the coaling station, from which it flows by gravity through an outlet fixture to each of the four coaling tracks: A motor-driven air compressor is located in the sand drying room. Sand is handled into the wet bin at the rate of 35 tons per hour and is dried at the rate of about one-ton per hour.

AUXILIARY INSTALLATIONS

Elaborate air brake testing facilities have been installed so that each train may be tested as made up. The plant consists of a duplex, 2-stage air compressor, with capacity of 1,000 cu. ft. of free air per minute. An air receiver 54 in. in diameter by 12 ft. long is located about 50 ft. from the compressor house. The main supply is a 2½-in. wrought iron pipe, from which 1¼-in. lines are laid to the center of each yard track, at about the clearance point, and connected to an angle cock and standard hose coupling inside a reinforced concrete service box installed flush with the top of cross ties. Condensation reservoirs, 24 in. in diameter by 3 ft. long, equipped with drain cocks, were placed in concrete pits at the lowest points in the main pipe line. In addition to furnishing air for the brake testing facilities, the compressor also supplies air to the roundhouse.

The entire yard is lighted by 400-cp. 6.6 ampere, series, nitrogen lamps, located to secure adequate light at all points of the yard. Electric lights were installed in all buildings in accordance with the best known practice, the lighting of the roundhouse having received particular attention, 100-watt mazda lamps with enameled steel reflectors are used, and about the engine pits receptacles

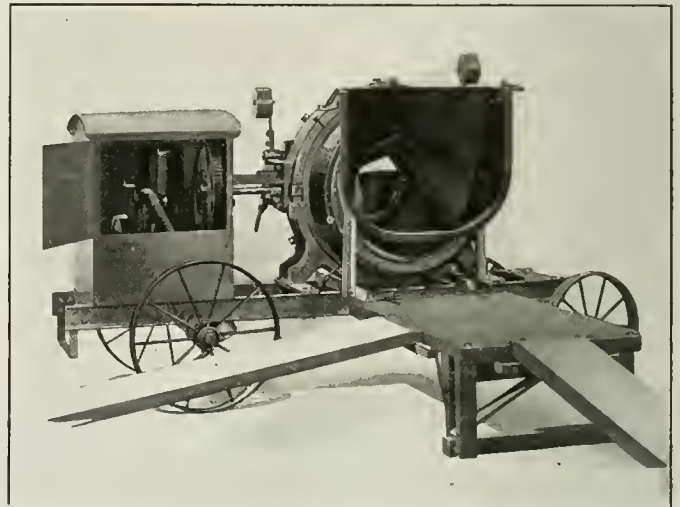
are provided for portable lights. To supply current conveniently, a brick substation was erected to house the switchboards and duplicate 75 kw. motor generator sets. Current is purchased from a local company.

The entire terminal was built under the direction of B. Herman, chief engineer maintenance of way and structures, and T. H. Gatlin, assistant chief engineer maintenance of way and structures, to whom we are indebted for the above information.

A LOW-CHARGING CONCRETE MIXER

The T. L. Smith Company, Milwaukee, Wis., is placing a new type of low charging concrete mixer on the market to meet the demand for a machine of this kind in cases where extensive plant development is not desirable. It is built in four sizes, the smallest being the 3-ft. Low Charging Mixerette, which requires a charging platform only 18 ft. high. The other three sizes—4-ft., 6-ft. and 9-ft. mixers—are provided along the line of the standard Smith-Chicago mixers with the addition of the low charging feature.

To afford rapid charging, the feed end of the drum is left almost entirely open. A narrow hopper is added to facilitate dumping a wheelbarrow by upending. Rapid discharge is afforded by means of a steep-angle discharge chute which extends far into



The Low-Charging Mixerette from the Charging Side

the drum so that it receives the full charge of each blade. These mixers are unusually simple in design and detail and are recommended by the manufacturers, especially for the use of men inexperienced in handling concrete work.

THE SOUTH AFRICAN RAILWAYS AND THE WAR.—The report of the general manager of the South African Railways and Harbors for the year ended December 31, 1914, recently issued, contains a statement to the effect that apart from the execution of work directly relating to the working of the lines, the railway workshops have undertaken work in connection with guns, armored trains and motors, ambulance trains and cars, transport motors, condensing plants, searchlights, X-ray appliances, pontoons and many other military appliances. In fact, the railway workshops have to a certain extent served as the Woolwich Arsenal of the Defense Force. Five "armored trains" have been constructed and manned by employees of the administration; these trains were found to be of great assistance, as, in addition to the duty of patrolling the railways in areas where movement of rebels was taking place, and repairing the line where it had been damaged, they were utilized in assisting the forces in their endeavors to get into touch with the enemy. The trains were commanded by officers of the department, whose knowledge of train-working operations proved of great assistance.—*Engineering, London.*

The Development of Special Steels for Track Work*

A Résumé of the Present Status of this Increasingly Important Study and a Summary of the Results Secured

By W. C. CUSHING

Chief Engineer, Maintenance of Way, Pennsylvania Lines, Southwest System

The following discussion of the present status of special alloy and special process steels was prepared originally for the International Railway Congress, which was to have been held in Berlin this year:

The different kinds of special steels in use, or undergoing trial,

1906) India, Brazil, Russia, Cuba, Germany, Japan, Belgium, United Kingdom and Canada. The proper chemical composition, therefore, compared with Bessemer and open-hearth rail steels, in order to impart the required characteristics, has been determined to be, in percentages, within the following limits:

Kind of Steel	Manganese	Carbon	Phosphorus	Silicon	Sulphur
Manganese steel.....	11-13	1.0-1.20	0.06-0.11	0.25-0.40	0.02-0.06
Bessemer steel.....	0.80-1.10	0.45-0.55	Not to exceed 0.10	Not to exceed 0.20	
Open-hearth steel.....	0.60-0.90	0.62-0.75	Not to exceed 0.04	Not to exceed 0.20	

may be divided under two heads: Special alloy steels, and special process steels. Under the first head are included manganese, nickel, nickel-chromium, high carbon (that is, steel containing 0.75 per cent of carbon or over), and high silicon. Two or more

The physical characteristics, compared with Bessemer and open-hearth rail steel, are about as follows, although it is extremely difficult to obtain specimens which are truly representative of the steel, as it cannot be cut or machined:

Kind of Steel	Tensile strength in lb. per sq. in.	Elastic limit in lb. per sq. in.	Elongation per cent in 2 in.	Reduction of area, percentage	Hardness by	
					Brinell	Scleroscope
Manganese steel.....	75,000-102,000	40,000-58,000	8-27	15-29	230	40-50
Bessemer steel.....	89,000-126,000	44,000-62,000	5-25	5-43	172-230	29-35
Open-hearth steel.....	115,000-156,000	54,000-80,000	9-16	10-30	230-300	32-43
Chilled cast iron.....						65-75

of these have been combined, in some instances, as, for instance, high carbon with nickel and chromium. Silicon is present in all carbon steel rails. By special process steels is meant the steel products derived from special heat treatment, or by the addition of metalloids which do not appear in the test analyses of the resulting product. Such are the so-called titanium-treated, aluminum, electric process and heat-treated steels. The object of their use has been in all cases to bring about additional safety, economy in maintenance by reducing the number of renewals, and smoother passage for trains at high speeds, over the gaps of frogs and at drawbridges.

SPECIAL ALLOY STEELS

Manganese Steel

The special steel which is now most extensively used in the United States and Canada for frogs, crossings and switch-points, outside of those built up from the usual Bessemer and open-hearth steel rails, is manganese. It is also being used experimentally in some South American countries, especially those where the railroads are under English management.

The prime characteristics of manganese steel are its very great strength, toughness and resistance to abrasive forces, and these qualities are imparted by the increase of the manganese and carbon contents in carbon steel to certain proportions which were first made known to the scientific world by the Hadfields. The manganese must lie between the limits of 8 per cent and 35 per cent. If between 7½ and 5½ per cent the alloys are extremely weak and brittle. The upper limit is partially determined by the cost of manganese metal, which is 50 cents per ton unit, when the addition is made by means of ferro-manganese. Also the high carbon content of ferro-manganese interferes with the physical properties induced by the manganese. When enough ferro- is added to make a steel with manganese 20 per cent, the carbon begins once more to dominate and a steel results which is stiff and brittle when cold, and unworkable when hot.

Ferro-manganese is a compound containing about 80 per cent of the element manganese, and is mined chiefly in Russia. It is imported into the United States from (in order of rank in

The above results are for cast manganese steel. The figures for rolled and for forged manganese steel are higher, as shown by the following, given by W. S. Potter, the originator in the United States of rolled manganese steel for rails, in the Journal of the Western Society of Engineers, Vol. 14, 1909:

Kind of Steel	Tensile strength in lb. per sq. in.	Elastic limit in lb. per sq. in.	Elongation, per cent in 2 in.
Cast metal.....	82,000	45,000	30
Rolled metal.....	135,000	60,000	35
Forged metal.....	142,000	55,000	38

To impart the above physical qualities to manganese steel, and especially the great resistance to abrasive forces, special heat treatment is necessary, and it is in this heat treatment in which one manufacturer claims superiority for his product over another. It is his trade secret and is jealously guarded.

Having finally recognized the valuable qualities of manganese steel for track work, the railways found they were coupled with high cost, and therefore instituted tests or experiments to determine the matter of economy in its use. In many locations in the United States, these economics have been well established, and manganese steel is in regular use, but there are also many other places where the first cost will overbalance the economics. In all places of extremely hard service, such frogs are economical, and even absolutely necessary under present conditions, in order to avoid renewals where the traffic is so frequent that it is difficult to find an opportunity for repair work. The more difficult the place, the more economical and indispensable is manganese steel. The Cleveland, Cincinnati, Chicago & St. Louis finds in general that where frogs, switches and crossings made of Bessemer or open-hearth rail require renewal within about 20 months, it is economical to use manganese instead, and the Pennsylvania Lines place the time at 18 months. These are not scientific ways of expressing relative wear so as to be of general service to others, but are suitable only for those special cases for which the rule was determined.

The Northern Pacific states that manganese frogs will outlast open-hearth steel frogs under the same conditions by 6 to 10 times, and the Norfolk & Western from 3 to 6 times. The Lehigh Valley reports that manganese steel frogs will outlast frogs made of Bessemer steel by at least three times, the Bessemer & Lake Erie by from 3 to 15 times, and the Pennsylvania

* Abstract from Bulletin No. 177 of the American Railway Engineering Association.

Railroad by 10 times, the cost being only three times as great. This information is of service also only to those who know the conditions of service, for it is necessary to be made aware of the annual cost or saving in each case of the frogs of different kinds in order to compare them accurately. This information is difficult to obtain, but some results of trials will now be presented, the results being preceded by a table showing the relative cost of frogs and switch-points made of manganese, Bessemer and open-hearth steels about the beginning of the year 1914.

This table gives the relative cost of two distinct types of manganese frogs: The built-up, or rail-bound, frog, and the solid cast manganese steel frog. The first consists of manganese steel for the point and those parts of the wings which receive the wheel treads surrounded by pieces of Bessemer or open-hearth rail, and all bound firmly together with bolts. The second is made of a solid manganese casting without any bolts, except those necessary to join the four ends with the track rails by splice bars.

The first type is the one most generally used by the railways, although for certain locations, where the speed of traffic is slow, the second type is preferred, though of greater primary cost than the first, because it does away with the bolts. There is a certain feeling of mistrust (which may be removed later with experience) in its value for general use, because such great care is required in making the castings that defective material occasionally creeps in, and should a fracture occur, there is sometimes nothing to hold the parts together. This has been remedied in some designs by riveting the frogs to a base plate. This distrust has been expressed by the Terminal Railroad Association of St. Louis. Many frogs and crossings have been in use for the past six years, and a large number of them were of the solid cast type, but on account of having had more or less trouble with breakage, the officers in charge rather favor the inset, rail-bound or built-up work, three terms of synonymous meaning. The manganese frogs last 3 or 4 times as long as those made of ordinary rail, under those conditions.

rolled manganese rail and are being tried by several railroad, report of such use, but with no data, having been made only by the Hocking Valley and the Pennsylvania railroads. They have not been generally used, owing to their high cost and the waste of manganese steel when the point is sufficiently worn away to cause the discard of the whole switch. For that reason the manganese-tipped switch-points are almost universally employed where manganese steel is desired. They can readily be repaired with economy. The short points are about 3 ft. long for 18-ft. switches and 6 ft. long for 30-ft. switches, while the long ones are 6½ ft. long for 18 ft. switches, and correspondingly longer for the long ones, reaching about as far as the planing on the head of the switch-point. A record of the comparative trials of manganese and Bessemer steel switch-points has been kept by the Pennsylvania Lines, which shows that in no case has the monthly cost of the Bessemer been less than that of the manganese. In a large number of the cases the economy of the manganese points is very great, the monthly cost of Bessemer points being as high as 13 times as large.

The first attempt to apply manganese steel to rails of curves was in 1895, in the shape of flat rails for street railways, by William Wharton, Jr., & Co., Inc., and subsequently in November, 1898, 7-in. high girder guard rails were cast in about 12-ft. lengths for the Philadelphia Traction Company. In the beginning of 1902, the Wharton Company had also been approached by the Boston Elevated Railway Company on the question of manufacturing manganese steel T rails for some of the curves of its system, where an unusual condition of rapid wear existed, and in April, 1902, the first manganese steel T rails cast in 20-ft. lengths and ground to section were furnished for a curve of 82 ft. radius near the Park Street station of the Boston subway. The rails were cast straight and afterwards curved. The section was quite heavy, i. e., while the contour of the head corresponded to the 85 lb. per yd. A. S. C. E. design, the web and base were made 1½ in. thinning down at the ends, which were ground to a splice bar fit, and the top and side of the head were also ground smooth and true.

Number of frog	Manganese				Made of Bessemer steel rails		Made of open-hearth steel rails		
	Rail-bound or built-up		Solid castings		Cost	Total weight of frog	Cost	Total weight of frog	
	Cost	Total weight of frog	Weight of manganese	Weight of frog					
No. 8.....	\$80-100	1,800-1,845 lb.	315- 510 lb.	\$83-89	850- 950 lb.	\$34-48	1,500-1,750 lb.	\$36-47	1,500-1,750 lb.
No. 10.....	\$88-102	1,900-2,000 lb.	376- 600 lb.	1100	1,110 1,150 lb.	\$35-50	1,540-1,865 lb.	\$37-50	1,540-1,865 lb.
No. 12.....	\$120-147	2,400-2,800 lb.	660- 750 lb.	\$131-144	1,500-1,900 lb.	\$46-60	2,000-2,300 lb.	\$48-61	2,000-2,300 lb.
No. 20.....	\$166-193	3,100-3,600 lb.	855-1,110 lb.	\$163-220	1,835-2,500 lb.	\$57-73	2,600-2,800 lb.	\$60-76	2,600-2,800 lb.
Crossings at 60 deg. angle	\$480-600	6,265-8,370 lb.	2,430-2,890 lb.	\$450-617	4,100-4,330 lb.	\$270-384	7,630-8,555 lb.	\$275-384	7,630-8,555 lb.

Length of switch points	Manganese				Made of Bessemer steel rails		Made of open-hearth steel rails		
	Rail-bound or built-up		Solid castings		Cost	Total weight of points and rails	Cost	Total weight of points and rails	
	Cost	Total weight of points and rails	Weight of manganese	Weight of frog					
18 ft.	\$79-103	1,450-2,330 lb.	100-170 lb.	\$46-68	1,935-2,300 lb.	\$48-69	1,935-2,300 lb.	\$48-69	1,935-2,300 lb.
30 ft.	\$114-156	2,300-3,580 lb.	142-260 lb.	\$78-104	3,100-3,775 lb.	\$81-105	3,100-3,775 lb.	\$81-105	3,100-3,775 lb.

The Pennsylvania Lines have for a long time been keeping a record of the use of manganese frogs, and manganese tipped switch point, to determine their relative economy in comparison with frogs and switch-points made from ordinary carbon steel, and to establish some rule or guide which would be of use to the officer in charge of maintenance, and enable him to decide in advance whether or not it would be economical to order a manganese frog or switch point for a given location. This proves that the manganese steel frogs are economical in many locations, principally where the service is severe.

In none of the cases reported are reduced dimensions attempted. It is rather the opposite. The thickness of the walls of the casting are made greater because it is difficult to make thin castings of manganese steel, and there must be no question of the strength of such costly material.

Switches are also made in the United States entirely from

Between 1905 and 1908, the successful rolling of manganese rail was accomplished by the Pennsylvania Steel Company of Steelton, Pa. and the Manganese Steel Rail Company of New York City, both of which rolled a quantity for the Boston Elevated Railway, and they were laid in the track November 4, 1908.

The price of the open-hearth rail was about \$30 per ton, and of the rolled manganese rail originally \$180 per ton, but now about \$90 per ton. Between 1903 and 1908 several other elevated railroad companies purchased manganese steel rail for sharp curves with heavy traffic. The steam railroads have been much slower than the elevated railroads in adopting manganese steel rails because of the high cost, while at the same time their curves are not so sharp. Nevertheless, trials have been made by some of them.

The use of manganese steel rail is not well established like

that of manganese steel frogs and switches, but it is still being tried in especially difficult locations, and will in all probability meet with greater favor among railway engineers when some of the objections have been removed. The principal faults found with it at the present time are:

(1) A number of breakages have been recorded, which is disquieting. The ordinary rolled carbon steel shapes are difficult to reproduce in manganese steel, on account of the trouble in quenching the metal without the formation of minute cracks, which may subsequently cause fracture.

(2) It is strong and tough, but the hardness is not superior to that of Bessemer steel, and consequently the resistance to battering at the ends of the rails is not altogether satisfactory. Measurements to show this have been made by the Atchison, Topeka & Santa Fe. The maximum joint depression or "set"

ceived back at \$19.60 per ton for the nickel plus whatever might be the market price for old steel rails at the time of return.

The outline or profile of the rail section was measured with a Sommer & Rauge instrument twice a year at set places in order to determine the rate of abrasion, and ultimately the comparative wear or life. At some points the nickel rail showed some slight superiority in life, but the average of all the tests pointed to the fact that the life of each, and hence the resistance to abrasion, was practically the same. The removals began in 1906, and were continued until 1911 when the last was removed, these differences being due to the differences in degree of curvature and amount of traffic. It is also necessary to compare the relative safety by keeping a record of the failures, and these are given in the table:

TABLE OF NICKEL AND BESSEMER STEEL RAIL FAILURES

Kind of Rail	System	Failures								Broken	Split heads	Crushed heads	Other defects	Total Failures	Ratio of rails laid to 1 failure
		1903	1904	1905	1906	1907	1908	1909	1910						
Nickel	Northwest	22	46	53	51	54	90	28	29	29	95	133	116	373	9
Bessemer	Northwest	16	34	32	40	30	22	14	2	29	53	37	71	190	18
Nickel	Southwest		6	19	16	1				4	19	19		42	86

recorded up to the present time seems to be 0.10 in., after three years and two months' service.

(3) The present primary cost, about \$90 per ton of 2,240 lb., is so high that, although the resistance to wheel flange abrasion on curves is greater than any other metal tried, the resulting economy is not sufficiently great to be attractive to the railways. It is hoped that additional knowledge and skill in manufacture will overcome this, because the price has already been reduced from \$180 per ton. The high price was, of course, partly due to the very small quantities produced, and the lack of suitable manufacturing facilities.

(4) It is impossible to drill or cut it in the field on account of its great toughness. It is beyond the reach of present tools.

The use of manganese steel for guard rails has been introduced within the last four or five years, because of the increasing severity of the service which must be performed by a guard rail in guiding the wheels of the modern extremely heavy equipment safely past the frog point. The wearing away of a guard rail made of Bessemer or open-hearth rail is very rapid, which causes a frequent adjustment or resetting in order to make it perform its work effectively. A more resistant material will reduce the number of resettings and save labor. The relative economy of the manganese steel one-piece guard rail is now fairly well determined, but additional trials are being made, and its use is already quite large.

Nickel Steel Rail

Between 1900 and 1902 some small lots of Bessemer rail with a percentage of nickel were rolled for trial by different roads, some of which were the Pennsylvania Lines, the Baltimore & Ohio, the Bessemer & Lake Erie, the Lehigh Valley, the New York Central Lines and the Pennsylvania Railroad.

Between March and June, 1903, the Pennsylvania Lines laid 3,248 tons, or 22 miles, of nickel rail, weighing 85 lb. per yd., in comparison with Bessemer rail in curved track, some of the curves of which were as sharp as 7 deg. The two kinds were laid in alternate stretches, the change from nickel to Bessemer being made at the centre of the curve so that one-half of the curve was laid with each kind, in order to have them under the same conditions of traffic.

The average chemical composition of the two kinds of rail was as follows:

	Kind of Steel	Carbon	Phosphorus	Manganese	Silicon	Sulphur	Nickel
Pennsylvania Lines							
North West System..	Nickel	0.443	0.090	0.833	0.059	0.030	3.46
	Bessemer	0.498	0.093	0.850	0.105	0.039	
South West System..	Nickel	0.433	0.090	0.800	0.090	0.030	3.44
	Bessemer	0.430	0.095	0.910	0.106	0.037	

The price paid per ton for nickel rail was \$54.50, and for Bessemer rail was \$28, and the scrap nickel rail was to be re-

To test the strength and ductility of the nickel steel, 48 pieces struck by a weight of 2,240 lb., falling from a height of 17 ft. 10 in., the supports for the test pieces being spaced 3 ft. apart, gave a deflection of $1\frac{1}{2}$ to $2\frac{3}{4}$ in., the average being $1\frac{15}{16}$ in. Only one piece broke. This series of tests shows that the nickel rail cost almost twice as much as the Bessemer, lasted only about the same length of time under similar conditions, and was less strong and safe, having a very small ratio of rails laid to one failure.

The Bessemer & Lake Erie Railroad reported that the nickel steel rails tried by that company did not give satisfactory results. On the New York Central & Hudson River, 200 tons of nickel rail, 80 lb. per yard, were laid in 1903, and 100 tons of 100 lb. per yard in 1905. Both lots were Bessemer steel with 0.40 to 0.50 carbon and $3\frac{1}{2}$ per cent nickel. The 80-lb. rails after a short time of service commenced to flow laterally on the curves, and large flakes were detached from the heads, though the loss of metal did not take place quite so rapidly as in the case of the plain Bessemer rails laid with them for comparison. The flow from the heads of the 100-lb. rails was rapid, great slivers being detached on the curves after a few months' service.

Nickel-Chromium Steel Rail

The next step was to add chromium, a hardener, to the nickel steel rail. The nickel-chromium rail was of the usual open-hearth steel with $2\frac{1}{2}$ per cent nickel and 0.50 to 0.90 per cent chromium, and the comparisons were made with ordinary open-hearth rails and with Bessemer steel rails in addition. The hardening effect of the chromium was clearly evident in the diagrams of all the tests, as well as the inferiority of the Bessemer rail to either of the others. In the case of the outside or high rails the abrasion of the open-hearth rail was 10, 13, 35, 38 and 55 per cent greater in the different tests than the nickel-chromium alloy; and in the case of the inside or low rails the abrasion of the open-hearth rails was 14, 22, 37, 58 and 62 per cent greater.

There were 20 rails of each kind in the test, on a 9-deg. 20-min. curve. Five nickel-chromium and no open-hearth rails broke, while 1 nickel-chromium and 4 open-hearth rails had crushed heads. This shows that the greater resistance to abrasion of the nickel-chromium rail is at the expense of greater brittleness. In another test with 16 rails of each kind, on a 7-deg. 32-min. curve, 5 of the nickel-chromium rails broke and one had a split head, while none of the open-hearth rails failed. All of the tests showed that for greater resistance to the forces of the abrasive action of wheels the addition of nickel and chromium to open-hearth steel rails in the quantities and in the manner used is very desirable, but is undesirable on the score of safety. Similar unsatisfactory service has been given by nickel-

chromium rail on the Central Railroad of New Jersey, where the breakages were 1 in 20 rails laid, and on the Erie, where they were 1 in 78 rails laid. On the Lehigh Valley the results of trials were the same in regard to failures, but the rate of abrasion was slower than for ordinary steel under the same conditions, the difference being as high as 70 per cent in some cases. The composition of the rails was carbon 0.50 to 0.60, phosphorus not over 0.04, manganese 0.60 to 0.90, nickel 2.0, chromium 0.4 to 0.75 per cent.

High Carbon Steel Rail

The only road which sent in any information about high-carbon steel rails was the Pennsylvania Lines. These rails have given excellent service from the standpoint of resistance to the abrasive action of wheels, lasting more than twice as long as ordinary Bessemer and open-hearth rail, under similar conditions of traffic, but have developed serious fault from the standpoint of safety, as the breakages have been numerous, 1 in 14 rails laid, and, most alarming of all, the silvery oval spot, called the "transverse fissure," has been found in the head. The carbon was very high for rail weighing 85 lb. per yard, from 0.80 to 0.88 per cent, and in addition nickel and chromium were present, making a very hard and brittle material, and it is not known what the effect might be in the case of rails of heavier section. It is customary to increase the percentage of carbon in the heavier rails. It is evident that the proportions used in the 85-lb. section were too high.

SPECIAL PROCESS STEELS

It has come to be fully recognized by American railway engineers that sound ingots are essential for the production of sound rails, and, although nearly all railways are opposed to interference in the processes of manufacture, believing instead in the principle of specifications for rails which set forth clearly and concisely the physical qualities which they must have, and the methods of conducting tests which will prove that the product offered for sale does or does not possess those qualities, nevertheless, it is the universal practice in the United States and Canada to specify the chemical constituents as well, and a few introduce other clauses relating to mill practice, such as holding in the ladle for a specified time, size of teeming nozzle, length of ingots, etc. While such requirements have generally been excluded from specifications, yet the subject of mill practice has been and is being widely studied by railway engineers.

Bradley Stoughton has admirably summed up our available information on ingot defects. These defects are phosphorus, which has been mastered in the open-hearth steel process, slag inclusions (sub-divided into solid oxidized enclosures and entrained sulphides), blowholes, combined gases, pipes and segregation. The purpose of the addition of aluminum, silicon, ferro-titanium, vanadium and other "physics" or "cleansers," is to remove as many of the defects enumerated as possible. In doing this, aluminum and titanium pass off with the impurities and leave no trace behind in the finished rail.

Titanium

The results of the trials of titanium-treated steel rails have been conflicting up to the present time, owing, perhaps, to the fact that the variables in the tests have been too numerous. In order to obtain accurate information, there should be but one variable, the treatment with ferro-titanium. The conditions in the cases of the Delaware & Hudson and the Lehigh Valley tests were not the same, and it is impossible to say to what extent the sharper curvature for the titanium-treated rail offsets the greater power of resistance to abrasion due to the higher carbon content in it. In the case of the Northern Pacific the results are reported not good on account of the higher percentage of piped rails which shows the necessity for an improved method of making sound ingots or an additional discard. The trials of the two kinds of rails are not exactly comparable, with reference to the titanium treatment, because titanium-treated Bes-

semer steel, with its lower carbon and high phosphorus, is compared with open-hearth steel with its higher carbon and low phosphorus. In the Rock Island trials, the advantage seems to lie with the titanium-treated Bessemer rail over open-hearth and electric-process rail during 17 months' service.

Neither the Maine Central, the Terminal Railroad Association of St. Louis, the Chicago Great Western nor the Delaware, Lackawanna & Western found any appreciable difference in resistance to abrasion by the use of ferro-titanium, but the results on the Boston & Maine were quite favorable to it. The Baltimore & Ohio tests exhibit superiority in resistance against the abrasive action of wheels of titanium-treated Bessemer rail over ordinary Bessemer rail of practically the same composition, but in the case of open-hearth rail, with its higher carbon, the superiority is lost. Of course, the comparison would be fairer if open-hearth steel of the same composition had been treated with titanium.

The principal value of ferro-titanium is in helping to produce solid ingot metal, and that is, of course, a splendid quality. Its tendency to produce a deeper pipe must be counteracted by a greater discard or an improved method for making the top of the ingot sound. It leaves no trace of itself in the resulting metal, and therefore does not make an alloy steel with any greater resistance to abrasion, or any greater strength, than is brought about by its less spongy condition and greater compactness.

Aluminum

Aluminum is used in their daily practice by many of the rail manufacturers at their mills, but its use has not been specifically requested by any railroad administrations for special tests, but, on the contrary, is entirely prohibited in the specifications of some railroad administrations.

High Silicon

Although trials have been made in limited quantities of steel rails high in silicon, that is, over 0.30 per cent, but little information has been furnished to the reporter. On an 8-deg. curve at Hoblitzell, on the Baltimore & Ohio, some rail with carbon 0.596, phosphorus 0.10, manganese 1.11 and silicon 0.69 was tried, but it was too brittle, as 7 out of 8 rails failed. Other tests are now being conducted by other roads.

Electric Process

A few railways are trying small quantities of rail manufactured by this process at the Heroult furnace of the Illinois Steel Company at South Chicago. The Terminal Railroad Association of St. Louis reports that limited experience indicates that it has better resistance to abrasion than ordinary Bessemer steel, and the Lake Shore & Michigan Southern reports that the Electric Process shows less abrasion than the Bessemer. The Rock Island Lines put 287 tons of 100-lb. rail in service and state that after 17 months' service the number of square inches worn off the head was less for the electric process than for the open-hearth, but greater than for the titanium-treated rail. There were no failures of the titanium-treated or of the electric process, while there was 1 failure in 1,008 rails laid of the open hearth.

Heat-Treated Rails

The Carnegie Steel Company is conducting an investigation into the performance of oil-quenched rails and is making service tests on the Union Railroad of Pittsburgh. A number of open-hearth rails of 100-lb. A. R. A. Type B (Fig. 14) section were rolled and treated in April, 1912, and were placed in track June 10 and 11, 1912, on the high and low sides of a 5-deg. curve, about 3½ miles from East Pittsburgh. As far as the profiles and inspections show up to July 1, 1913, the oil-quenched rails show an average improvement of 41 per cent over the untreated rails on the high side of curve, and about 37 per cent improvement on the low side of curve, or an average of 39 per cent for the oil-quenched rails over the untreated rails under exactly the same conditions of service.

Other steel companies are also making experiments with heat-treated rails in order to raise the elastic limit without sacrificing ductility, and the Pennsylvania Steel Company has recently rolled 16 rails of special section, approximating 121 lb. per yard, which are to be laid for service test in the tracks of the Pennsylvania Railroad, where the curvature is sharp and the traffic heavy. The Pennsylvania Steel Company manufactures rail from Cuban iron ore, known as Mayari ore, which naturally contains a small amount of nickel and chromium, and it has been found that this steel when heat-treated possesses the qualities of extreme hardness unaccompanied by brittleness, but it is difficult to heat-treat an unbalanced section like a rail without distorting it, and at a reasonable cost.

Conclusions

1. Cast manganese steel has been proved by long experience, under exacting conditions, to be a satisfactory and safe metal for the manufacture of frogs and switch-points.

2. The trials of rolled manganese steel for rails, and for the manufacture of frogs and switches have not been so extensive as with the cast product, but have been continued to a sufficient degree to enable us to conclude that it will ultimately be entirely suitable for those uses at locations where great strength, toughness and a maximum abrasive resistance are desirable.

3. The experiments with nickel, and nickel and chromium in certain proportions, in rail steel have not, up to the present time, been entirely satisfactory; but the accepted employment of nickel steel in bridge construction, and the trials of nickel and chromium in other proportions in rail steel, especially when incorporated as two of the natural elements of the iron ore, justify continued use.

4. The use of high carbon (over 0.80 per cent) in rails weighing 85 lb. per yard, in combination with 0.92 to 1.00 per cent of nickel, and 0.24 to 0.29 per cent of chromium, has not been satisfactory. The conditions with rail sections of greater weight might be entirely different.

5. Further study of the qualities possessed by high silicon rails, that is, steel with over 0.30 per cent of silicon, is advisable.

6. The value of the use of ferro-titanium in rail steel manufacture as a "physic" for improving the condition of solidity of the metal is conceded, but at the same time steps should be taken to overcome its injurious effect in deepening the "pipe" in the ingot.

7. Heat-treated rails, and those manufactured with the assistance of the electric process are at present in experimental use only, but the possibility of future value is promising, and the study should be continued.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since September 17, 1915:

Grade Crossing Elimination in North Toronto, Ont.—The Canadian Pacific is completing the elevation of its tracks in North Toronto for a distance of $2\frac{1}{4}$ miles, this work also involving the building of a new passenger station at North Toronto. This project was described in an illustrated article in the issue of September 24, page 555.

The First Bridge Built in War Time.—That construction activities have not entirely ceased in those European countries engaged in war is evidenced by the recent completion of a cantilever bridge across the Seine at Rouen, with a total length of 1,065 ft. This bridge was described in a short illustrated article in the issue of September 24, page 564.

Recent Progress in the Federal Valuation Work.—The field forces engaged in federal valuation work are now covering about 4,000 miles of line per month. Recent developments in the methods adopted by the government forces and by the carriers to secure the desired information, were described in an article in the issue of September 24, page 569.

International Engineering Congress at San Francisco.—Five sessions of the International Engineering Congress, held in San Francisco, September 20-25, were devoted to railway engineering and papers were presented by men prominent in the various branches of railway operation and maintenance in this and foreign countries. These papers were abstracted in the issue of October 1, page 599.

Grade Crossing Elimination.—An editorial describing the relation between

the expenditures for the elimination of grade crossings and the number of persons killed and injured in Chicago was published in the issue of October 8, page 634.

Interstate Commerce Commission Hearing on Valuation.—On September 30 and October 1 the Interstate Commerce Commission heard oral arguments by representatives of the railways on important considerations regarding the federal valuation. The arguments presented at this time were abstracted in the issue of October 8, page 651.

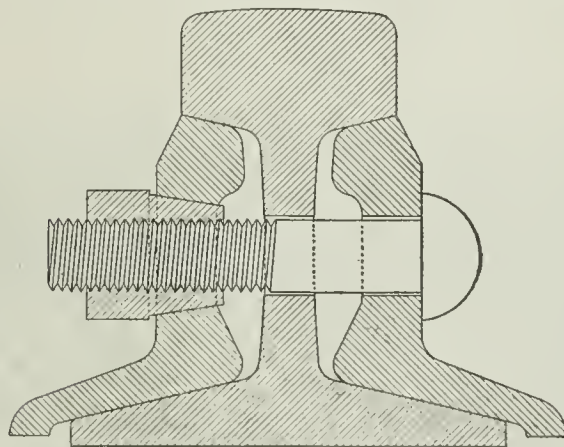
Pennsylvania Track Elevation Through Wilkesburg, Pa.—The Pennsylvania is now completing the elevation of its main line through Wilkesburg, a suburb of Pittsburgh. This work involves a number of interesting construction problems, which were described in the issue of October 8, page 654.

Electrification of 440.5 Miles of the St. Paul.—The Chicago, Milwaukee & St. Paul is now completing the electrification of the first of four engine districts between Harlowton, Mont., and Avery, Idaho, and is actively engaged on the remaining three. The details of this work were described in an illustrated article in the issue of October 15, page 683.

Valuation Methods on the Big Four.—To secure the information required by the federal valuation parties, the large roads now under valuation have organized special departments. The character of the organization developed on the Big Four, on which work has been under way for a year, was described in the issue of October 15, page 701.

A NEW BOLT NUT FOR RAIL JOINTS

The Ballou safety rail bolt nut is the name of a new nut recently put on the market for use with rail joints. The nut is provided with a conical or tapered extension which fits into the bolt hole in the splice bar. This bolt hole is also given a



The Ballou Safety Rail Bolt Nut

conical taper of such size that when the bolt is drawn up the tapered shank of the bolt comes to a secure bearing in the tapered hole without allowing the shoulder of the nut to bear against the face of the splice bar.

Joints equipped with these nuts have been used experimentally on 27 railroads and several street car systems, in some cases



An Application of the Ballou Bolt Nuts to a Depending Flange Joint on the Norfolk & Western

for a period of two years or more. These tests have shown that the frictional resistance of the taper bearing is sufficient to prevent the loosening of the bolts by the ordinary vibration and movement of the tracks under traffic. The axial elongation of the nut serves to strengthen the threaded connection of the bolt to the nut, it shortens the length of the bolt between the

head and the nut and it protects the thread on the bolt from frictional wear and exposure to the weather.

A joint of the angle bar pattern designed for use with bolt nuts of this type is now on the market under the name Ballou safety rail joint, but bolts equipped with the Ballou nut may be applied to any form of joint. An accompanying photograph shows an example of such an application, which follows the ordinary practice of alternating the nuts on the inside and outside of the rail. There is no restriction upon the length of bolts with which these nuts may be used, and in consequence, the nuts are equally applicable to frogs and crossings. This joint is manufactured by the Ballou Safety Rail Joint Company, Roanoke, Va.

THE THOMAS RAIL ANCHOR TIE PLATE

As its name indicates, the Thomas rail anchor tie plate is a tie plate and rail anchor combined. It consists of a malleable iron tie plate with slight corrugations on the bottom and with shoulders on both sides. The plate can be made of any thickness and size desired to conform to the standards of any road. The special features of this design are the means by which it is locked to the rail, eliminating movement between the rail and tie plate. To accomplish this the shoulder on one side is extended up over the flange of the rail $\frac{3}{8}$ in. The lower surface of this extension is inclined to the same angle as the upper surface of the rail flange, providing a drive fit. A set screw of cast

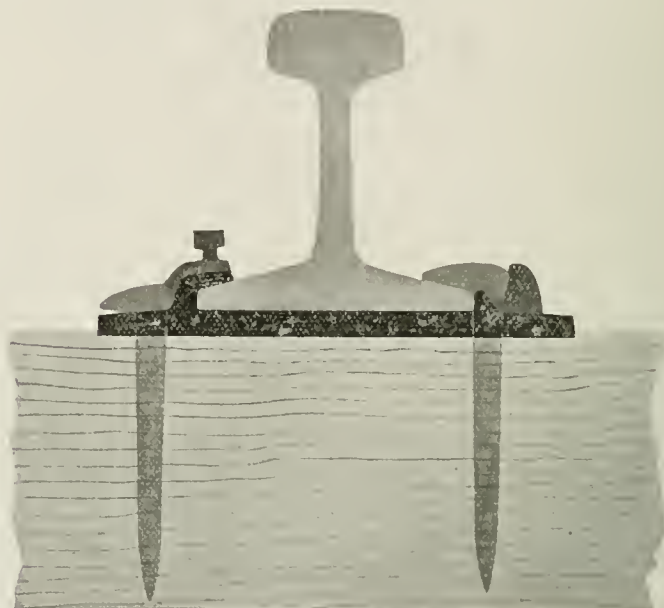


An Installation of Thomas Rail Anchor Tie Plates at Kansas City, Mo.

hardened steel also extends through this extension, engaging the rail. This screw is inclined at right angles to the upper surface of the rail flange, giving it a full, firm contact. Two set screws have been provided on some patterns of this plate, although it is not believed that this is necessary in most cases. On the opposite side of the rail, lugs are provided behind the spike holes, forcing the spikes to their proper position against the rail, and holding them there, thus securing contact with the rail on both sides. With this device the track is anchored against movement in both directions without the use of any additional devices and by making the rail, tie plate and tie a unit, expansion is confined to each individual rail. By reversing the plates on alternate ties, the rail is given increased resistance against overturning.

These tie plates have been in service experimentally for periods up to two years under very severe conditions. One of the earliest installations was made on the Kansas City Terminal two years ago on a track on a heavy grade between the roundhouse and the station. While this track was not subjected to heavy trains, there is an almost continued movement of engines over it. Another test has been under observation since February 1, 1915, in the main tracks of the Chicago, Burlington & Quincy near Canal and Sixteenth Streets, Chicago. These tracks are on a heavy descending grade with about 300 movements per day over

them, the large majority of which are heavy passenger and switching trains. Although this track has been especially difficult to maintain previously, both with reference to creeping and to spreading, neither of these tendencies has been evident since the installation of these plates. A similar installation was made at the same time on the main tracks of the St. Paul at Western Avenue, Chicago, where these plates replaced tie bars, rail anchors, rail braces and tie plates and which has proved equally satisfactory. Other installations have been made on the



A Section of the Thomas Rail Anchor Tie Plate, Showing Its Relation to the Rail and Tie

Chicago Great Western and on the Chicago & North Western at points of heavy grades and soft embankments where the rail was inclined to run. In all of these installations this plate has been effective as an anchor as well as a tie plate.

The Thomas Rail Anchor Tie Plate is made by the Chicago Malleable Castings Company, West Pullman, Chicago, Ill.

EFFECT OF TREATMENT ON THE STRENGTH OF BRIDGE STRINGERS

The United States Department of Agriculture, Forest Service, has made public, in Bulletin No. 286, the results of a number of tests made in co-operation with the Illinois Central and one eastern and two western wood-preserving companies, to determine the effect of commercial creosote treatment on the strength of loblolly pine, long leaf pine and Douglas fir bridge stringers. The timbers were selected for test from stock furnished by the co-operators and they received the regular commercial treatment. The test specimens were 8 in. by 16 in. in section and from 28 to 32 ft. in length, each stick being cut into two stringers of equal length at the time of treatment. Based on these tests the following conclusions were drawn:

(1) Timber may be very materially weakened by preservative processes.

(2) Creosote in itself does not appear to weaken timber.

(3) A preservative process which will seriously injure one timber may have little or no effect on the strength of another.

(4) A comparison of the effect of a preservative process on the strength of different species should not be made, unless it is the common or best adapted process for all the species compared.

(5) The same treatment given to a timber of a particular species may have a different effect upon different pieces of that species, depending upon the form of the timber used, its size, and its condition when treated.

Convention of the Bridge & Building Association

Abstract of the Committee Reports and Discussions at the Twenty-Fifth Annual Meeting Held at Detroit

The twenty-fifth annual convention of the American Railway Bridge & Building Association was held at the Statler Hotel, Detroit, October 19-21, inclusive. About 175 members of the association were present, including a considerable number of the past-presidents and older members. A special feature of this convention, marking the twenty-fifth anniversary of its organization, was the attention paid to the earlier work of the association and to a review of its development.

This convention was the most successful in the history of the organization in point of attendance, character of committee reports and discussion. The officers for the past year were: president, L. D. Hadwen, Chicago, Milwaukee & St. Paul; first vice-president, G. Aldrich, New York, New Haven & Hartford; second vice-president, G. W. Rear, Southern Pacific; third vice-president, C. E. Smith, Missouri Pacific; fourth vice-president, E. B. Ashby, Lehigh Valley; secretary, C. A. Lichty, Chicago & Northwestern; and treasurer, F. E. Weise, Chicago, Milwaukee & St. Paul.

The convention was opened with prayer by Past President J. N. Penwell (L. E. & W.), Mayor Marx of Detroit, and J. C. Bills, assistant general solicitor of the Pere Marquette, welcomed the association. Vice-President G. W. Rear (S. P.) and Past President W. A. McGonagle (D. M. & N.) responded for the association. In his presidential address L. D. Hadwen traced the development of bridge design and maintenance during the 25 years since the association was founded, citing the change from Coopers E. 35 to Coopers E. 55 loading, or heavier; the replacement of wrought iron with steel, and more recently with alloy steels; the substitution of concrete for stone, etc.

The report of the secretary showed 95 new members received during the year and a total membership of 664. The treasurer's report showed a balance on hand of \$1,200.

Committee reports were presented on The Use of Locomotive Cranes; Pile and Timber Trestle Bridges; Railway Water Tanks; Costs of Structures; Warnings for Overhead and Side Obstructions; Reinforced Concrete Bridge Work; Concrete Culvert Pipe and Concrete Piles, and Street Crossing Gates, Towers, Bells, etc. Monographs were also presented on the subjects of Manila Rope by F. E. Weise, chief clerk, engineering department, Chicago, Milwaukee & St. Paul, and on Water Waste by C. R. Knowles, general foreman, water service, Illinois Central.

LOCOMOTIVE CRANES

The entire development of the locomotive crane has taken place within the last 25 years. It was designed to fill the demand for a portable crane that could be moved from place to place around an industrial plant. The first locomotive cranes were of two to five tons capacity with short booms of about 15-ft. radius. They were mounted on short car bodies supported by four small car wheels, and the propelling gear consisted of sprockets and chains. The first real improvement was the adoption of gearing for propulsion, and this feature has now been developed to such an extent that cranes have been built capable of hauling several cars at 20 miles per hour.

The four-wheel car was used exclusively for several years and cranes of 10 and 15 tons capacity were built. These cranes could not be hauled in trains, even at slow speeds, and the need of a crane that could be transported readily led to the adoption of the eight-wheel car about ten years ago, which has permitted increasing the capacity to a maximum of 60 tons. The greatest handicap in the development of cranes is the fixed width of gage, which makes it necessary to have a heavy car and sufficient counterweight to prevent overturning when loads are lifted at right angles to the track. Even with all the weight that can be applied conveniently, the cranes have their full capacity only at

short radius. The use of outriggers, which are provided on the larger cranes, increases the width of the base and adds to the stability at right angles to the track. They should be used on both sides of the crane when handling heavy loads on poor track, as the breaking of the hoisting cable or the slipping of the hitch may cause the crane to tip over backwards.

A modern locomotive crane in capable hands can be used for an endless variety of work. No railroad is so small that one or more can not be kept busy, nor is it necessary to use them every day to make them economical.

USES OF LOCOMOTIVE CRANES

In almost all cases a locomotive crane can switch the cars that it loads and unloads, doing away with the necessity of having the cars "spotted" with a locomotive. Within its capacity a crane will do all kinds of hoisting either with one or two lines, and with a long boom, or extension of a short boom, it can place loads high above it. As a crane can swing its boom through a complete circle and the radius can be varied, loads can be picked up and placed anywhere within its radius. A double-drum crane can operate any two-line clam-shell or orange-peel bucket. When a locomotive crane is equipped with an electric generator and magnet, it will handle all kinds of metal. A leader truss with regular pile driver leaders has been designed to take the place of the boom on the larger sizes of cranes. This arrangement makes a pile driver more capable of doing work than a regular driver. A locomotive crane will switch the cars, unload the material, drive the coffer-dam, make the excavation, drive the foundation piles, handle concrete material, tear out the old structure, erect the new one, and clean up and load the remaining material without the assistance of any other machine and with very few men. In a storage yard a locomotive crane will switch the cars, will load, unload and pile material of all kinds, and will pile it higher than is economical by hand. In a ballast pit it will make a good showing loading ballast, especially if the excavation is below the water line. On the road it is of great value picking up freight that may have fallen from cars. It will pick up and place rip-rap, and will load and unload lumber, rails or any other heavy material.

Cranes are built in sizes ranging from 3 to 60 tons capacity; the lightest ones being used chiefly around industrial plants and the larger ones for special purposes, such as bridge erection. The best crane for maintenance of way work is the eight-wheel crane of 20 to 30 tons capacity. Such a crane will cost from \$7,000 to \$8,000. The cost of operation depends on the number of days worked, the kind of work, etc., it being evident that a crane loading ballast will require more repairs than one doing light work in a storage yard. However, the average cost of operation will be about as follows:

Interest	\$2.00
Depreciation	2.00
Repairs	2.00
Fuel	2.50
Supplies .....	.50
Labor	6.00
Total	\$15.00

This is somewhat higher than is usually claimed, but is probably a fair estimate. Where fuel is cheap and wages low, it may be reduced somewhat, but it is usual to underestimate such items as depreciation and repairs. Depreciation and repairs have been figured on the basis of 20 years' service, but that in the meantime it will have been completely rebuilt once. The daily rate is based on 200 full service days during the year. It is when the use of a crane is compared with manual labor that its great saving is shown. Figures have been obtained from a large number of sources and while they show considerable variation in

general it may be claimed that a crane will save as against hand work as follows:

Handling scrap, etc., with a magnet	\$40 day
Handling coal, etc., with a clam shell bucket	40 "
Handling lumber and timber	30 "
General construction work including switching	40 "

A few comparative costs selected at random, follow:

Material	Handled.	Unit.	By Hand.	With Crane.
Scrap	Ton	\$0.20 to \$0.25	\$0.02 to \$0.06	
Coal	Ton		0.05 to 0.10	
Timber	M. ft.	0.40 to 0.50	0.12 to 0.20	
Lumber	S. ft.	0.40 to 0.50	0.25 to 0.35	
Piling	Lin. ft.	0.004	0.002	
C. I. Pipe (Loading)	Cwt.	0.032	0.016	
C. I. Pipe (Unloading)	Cwt.	0.021	0.012	

GENERAL CONSIDERATIONS

The wheels, axles, journals, boxes, brasses, etc., should be of the standard used by the railroad purchasing the crane, so that repairs to the running gear can be made quickly. The car should be built of steel and of such length that the boiler end of the crane will not extend beyond the end of the car, thus permitting the car to be coupled into the train without removing any parts of the crane, except the boom, which may be carried on an idler flat car. The car should also be long enough (about 24 ft.) to give it riding qualities necessary for handling in ordinary freight trains. At least one truck should be of the standard swivel 4-wheel type.

The propelling gear should be designed to propel the crane and whatever cars it will pull at the rate of four to six miles per hour. Provisions should be made to throw out of gear without the removal of collars or other fastenings under the car, and this feature should be handled entirely by levers or hand wheels at the side of the car or on top. The car should be provided with standard draft rigging and brakes. It is a great advantage to have an air pump and engineer's valve on the crane itself, but this feature is not absolutely essential.

The boom should not be too long except for special service, the ideal length being from 30 to 40 ft. The boom hoist should be of ample capacity and should be operated with a worm gear of such pitch as to require power to operate it in either direction. The A-frame should be of such design and material as to withstand shocks without cracking and should be rigid enough to keep the engine and gears in proper alinement. As far as possible the design of the engine and gears should be such as to permit the removal of any shaft, gear, etc., without having to remove other gears and shafts. The reversible engine is favored by all who use it. Experiences of 15 years with hundreds of machines have proven that there are no objections to a reversible engine and its advantages in lowering a heavy load are enough to overcome any disadvantage.

There should be two drums, so that two-line buckets can be operated. One of these drums should be the main hoist for heavy loads and the other may be an auxiliary drum of lighter capacity to operate the holding line of the bucket, but both should be power operated. An automatic tag-line or take-up device should be furnished to handle the tag-line of the bucket. The operating levers should be in such a position as to give the engineer the best view of what he is doing. The engineer should also have ready access to the boiler compartment, so that he can fire the crane when the class of service will permit without inconvenience.

The boiler is the real limiting feature of the machine. It should be of proper size, well insulated and designed for hard service. It should be a free steamer and economy of fuel should be sacrificed if necessary to provide the maximum amount of steam. Reference to the cost of operating tables will show that the cost of fuel is a small percentage of the total cost and the results obtained are so great that extreme economy is not of importance. Fuel and water should be carried in the greatest quantities for which space can be found.

Probably the most important feature is the fastening of the crane to the car. The up-lift on the center hold-down apparatus, or king pin, is great, and subject to shocks, and in case of breakage there is nothing to prevent the crane from overturning off the car. The sliding I-beam out-riggers are to be preferred over the bracket type on the side of the car. They should be located as low

as possible so as not to require much blocking. Jack-screws for the out-riggers are not necessary.

An efficient device should be provided to take the load off the truck springs. This should be of such design that the crane will ride properly if this device is not removed before the crane is put into a train.

The capacity of the crane at different radii should be plainly marked. An automatic indicator which will indicate the capacity at any position of the boom is simple and should be on every crane.

G. W. Rear, chairman, S. P.; A. T. Mercier, S. P.; D. E. Plank, Pac. Elec.; D. A. Shope, A. T. & S. F.; W. O. Eggleston, Erie; E. T. Howson, *Railway Age Gazette*; G. H. Stewart, B. R. & P.; E. B. Ashby, L. V., committee.

Discussion.—The versatility of locomotive cranes for railway work was emphasized. R. H. Reid (N. Y. C.) uses locomotive cranes in erecting bridge spans, for placing concrete culvert pipe and for similar work at a greatly reduced cost.

G. S. Robinson (C. & N. W.) has unloaded up to 20 cars of coal per day at a cost as low as six cents per ton. The crane was not so successful in unloading rubbish, and could only unload eight tons per day. W. O. Eggleston (Erie), has erected a number of overhead highway bridges with a locomotive crane at a saving of 50 per cent as compared with other methods. A. S. Markley (C. & E. I.) called attention to the demands of the labor organizations that train crews be employed whenever the cranes are used on the main track, stating that the Indiana law now requires this. Even with this added expense he has found locomotive cranes economical. G. W. Rear (S. P.) stated that rubbish can be handled more satisfactorily if the cars are dumped first and the material then picked up. A bucket which will pick this up readily will dig into the floor. He stated that the California law requires an engineer, conductor and one brakeman to accompany a locomotive crane when working over one-half mile from a side-track on any line with more than four trains daily. He defined a locomotive crane as a hoisting apparatus which can be taken anywhere and is ready to work at any time.

PILE AND TIMBER TRESTLE BRIDGES

The sizes of standard parts and the amount of timber used for carrying the same loads under apparently the same conditions appear to be different and a large part of the difference is apparently due to personal equation, and also to a certain extent to the financial conditions of the various roads. For example, standard pile bents vary from 4 to 6 piles under approximately the same conditions. Standard stringers vary from 3-ply 8 in. by 16 in. to 4-ply 10 in. by 18 in. for carrying approximately the same loads on spans of nearly the same length. While, of course, it will never be possible to eliminate entirely the effect of personal equation, a more uniform standard of practice would appear possible.

OPEN DECK TRESTLES

A width of 8 in. appears to be almost universal for bridge ties, the spaces between them varying from 4 to 6 in., placing the ties from 12 to 14 in. center to center. The depth varies from 6 in. to 11 in., the great majority of roads reporting the use of a tie 8 in. deep, which the committee feels is the proper depth to use. A great deal of labor expended in the past by all roads and at the present time by some roads for dapping ties to fit down over the stringers can be avoided entirely, either by purchasing the ties surfaced to the exact height (7¾ in. in the case of 8-in. ties), or by gaining them in the field to exact depth. The first method is recommended.

Lengths of 9 ft. and 10 ft. have been reported for bridge ties, but the committee feels that a length of 9 ft. is sufficient except in those cases where a very heavy chord is used for long panels or for unusually heavy loads.

The lateral stability formerly provided by the shoulders of dapped ties fitting down over the stringers is now secured in some cases by the use of lag screws or drift bolts fastening every fourth tie to the stringers; and in some cases by driving

dowel pins into bored holes in the under surfaces of each end of every fourth tie, the ends of the dowels projecting downward into the packing space between the bridge stringers. The latter method is of advantage in eliminating the damage to the stringers caused by the insertion of lag screws, which frequently start decay on the tops of the stringers.

The committee feels that the track rails should be held securely in place on bridges by the use of tie plates having a length equal to the full width of the face of the tie, that is—8 in. wide, but it does not recommend the use of tie plates with claws piercing into the fiber of the tie as such plates are found to reduce more rapid decay of the tie. This does not necessarily require the use of flat bottom plates, as slight corrugations on the bottoms of tie plates will provide sufficient lateral holding power without breaking the fiber of the wood.

Regardless of all that has been said and written with reference to the dapped guard timber, no more effective means of holding the ties in place has yet been perfected. The committee feels that the practice that now prevails to some extent, i. e., the laying of a flat timber on top of the ties near their ends and fastening that timber to each end of each tie by a lag screw will not prevent the ties from bunching in case of derailment as effectively as the old dapped guard timber. The committee feels that the only effective method of preventing the ties from bunching is to provide between them struts having shoulders at the ends, bearing against the sides of the ties. Such struts made of malleable iron castings have been devised and are being used to a slight extent experimentally. Their advantage rests in the elimination of the labor of framing guard timbers, a very expensive procedure. If their experimental use proves successful, they should be used in preference to a flat timber lag-screwed to the ties.

The committee feels that inside guard rails weighing about 60 lb. per yard spiked to every tie and fully and carefully bolted to eliminate any offsets at the joints, should be laid entirely across every trestle ultimately, and that, as a move in that direction, roads not using such guard rails, commence their installations on high bridges, long bridges and all bridges on curves, the exact length and height to depend upon local conditions and the length of time over which the road desires to extend the expense of this improvement. Such guard rails should extend approximately 30 ft. beyond each end of each bridge and there come to a point either by the use of a casting inclosing the ends of the rails or by the use of an old frog point.

Bridge stringers in use on various roads vary from 6 in. to 12 in. in width and from 15 in. to 20 in. in depth. The most universal sizes appears to be 8 in. by 16 in., of which 3-ply stringers are used most universally although 4-ply stringers are extensively used on the longer panels and under the heavier engines. The panel lengths run from 12 ft. to 16 ft., the heavier stringers being used on the longer panels. All roads report the use of stringers twice as long as the panel length, alternate stringers breaking joints at the alternate bents. Stringers are usually framed to exact depth at the bearings. In the past and to some extent at the present time, stringers have been framed at the packing points to exact dimensions, but the best practice indicates the desirability of using stringers just as they come from the mills as far as width is concerned, thereby eliminating the extra labor and weakening of the stringer caused by cutting into the side to preserve exact dimensions. While the practice of framing the sides of stringers so the chord would pack to exact dimensions was excusable in the past when dapped ties were used, thereby making possible a fit of the dapped tie over the chord, the use of the undapped tie renders the exact width of the chord immaterial and the side framing of stringers should be dispensed with.

The various stringers composing a chord should be packed with spaces not less than $\frac{3}{4}$ in. clear between them, two chord bolts being put through each end of each stringer, making four chord bolts over each bent.

Although in the past when narrow chords were used, it was quite customary to place the chords outside the rails to give greater stability by the greater width of bearing on the caps,

the increase in the width of the chords caused by more and heavier stringers has rendered this generally unnecessary, and, on account of the necessity of distributing the load on the rail equally among the various stringers in each chord with as little danger of over-straining or breaking the tie as possible, it seems desirable to place the center of the chord directly under the center of the rail.

To keep the caps and stringers from changing their relative locations at the bearings, many types of anchors are used, consisting of dapped corbels, packing blocks or boxes, drift bolts, through bolts, straps, etc. The tendency of the best practice today is toward the elimination of corbels, packing blocks or boxes and drift bolts, although drift bolts are still extensively used. Their use results in serious damage to stringers, as it frequently happens that, after they have been drifted down, they must be withdrawn in connection with relining or other work on the bridge and the pulling of such drift bolts is frequently a difficult operation, sometimes necessitating chopping into the stringers to get hold of them. The same result can be secured and the bolts made more accessible by boring entirely through the stringer and cap and placing at least one through bolt, not less than $\frac{7}{8}$ in., entirely through the stringer and cap at each bearing. Although it is desirable for stiffness to have nuts and washers on the lower ends of these bolts, this is not absolutely necessary, as the lower ends extending under the caps provide means of starting them out in case of work on the bridge.

The caps in use vary from 12 in. by 12 in. to 14 in. by 14 in., a few instances being reported of the use of caps composed of several timbers framed over the tops of the piles. The framing of the tops of piles to fit into two or more timbers forming a cap appears unnecessary and has almost disappeared. For ordinary conditions a 12 in. by 14 in. cap 14 ft. long should be sufficient, the 12 in. dimension being vertical and giving a 14 in. width of bearing. There should be one or more drift bolts through the cap into each pile.

Replies indicate the use of four to six piles per bent, some roads using six piles on very low bridges, while other roads use four piles on very high bridges. Most roads report the use of a 5-pile bent. The designs of 5-pile bents submitted almost invariably show the middle pile entirely relieved from load, and the four outer piles of such bents would usually carry the same load per pile if the middle pile were omitted.

A great advantage in the use of a 4-pile bent occurs especially in redriving old trestles when the use of a 5-pile bent would require shifting the chord out of place during the driving of two of the piles under the stringers, while the 4-pile bent can be so arranged that for ordinary conditions the four piles can be driven without interfering with the old chord. This advantage, of course, will not obtain where the largest 4-ply chords are in use on bridges to be redriven.

The same conditions as to the number of posts apply to frame bents as to pile bents, the added requirement being the necessity for a firm, unyielding foundation under the frame bent. This foundation is sometimes provided, especially in new construction, by concrete pedestals, where rock is close to the surface. For high bents footing piles in sufficient number are frequently driven.

Some roads make a practice of cutting off old pile bents and placing frame bents on top of the old pile stubs. While at first glance such construction gives a very rigid support there are many undesirable features. When frame bents are placed on top of the old piles cut off at low-water line and having a considerable unsupported length in the water there is danger of their buckling out of line. Also the sills and lower ends of the legs of such bents and also of frame bents having the sills at or just below the ground line decay very rapidly and introduce an element of weakness into the bridge. Reports have been received indicating that all the pile bents of long, low bridges are frequently cut off when ready for renewal and replaced by frame bents. In such cases adequate longitudinal bracing should be placed at proper intervals to prevent the bridge from

collapsing longitudinally. If floods or other conditions prevent the placing of such longitudinal bracing, a considerable percentage of all the bents should be renewed as pile bents.

The general practice seems to favor the use of 3 in. by 10 in. braces. On some roads the braces are bolted to the posts or piles, while other roads continue to use boat spikes. The committee recommends that the use of boat spikes for such purposes be discontinued, and that not less than 3 in. by 10 in. bracing be through bolted by $\frac{3}{4}$ in. or $\frac{7}{8}$ in. bolts to the caps and piles or posts, double-sash bracing and two sets of "X" bracing being used in bents over 24 ft. high.

All roads reporting use of two or more lines of longitudinal struts or ties, varying in sizes, on all frame or pile bents over 24 ft. in height; these being placed above and resting on the sash bracing, and being bolted or spiked to the posts or piles. The best practice would seem to be that of cutting longitudinals to fit between the posts or piles, obtaining continually by the use of blocks or splices at the post or piles, securely bolted to them.

BALLAST DECK TRETTLES

The committee feels that the use of ballast deck trestles of treated timber should be given further consideration, as it is believed that very considerable economies can be shown by the use of such structures. The best information indicates that the cost of construction of a ballast deck trestle of creosoted material will be approximately 50 per cent greater than the cost of a similar open deck, untreated trestle of standard construction. For ballast deck trestles standard track ties may be used. There should be at least 6 in. of ballast, preferably sandy gravel, between the bottom of the tie and the floor of the trestle. The floor of the trestle should be composed of 4 in. plank 13 or 14 ft. long. To prevent water from getting into the floor and timbers below, the floor should be covered with a built-up roofing of about 4-ply felt and pitch. The sandy gravel ballast will make a sufficient bond with this roofing so that other covering over the pith will be unnecessary. Drainage should be provided by leaving open spaces between the floor of the trestle and the guard timbers at the edges of the ballast by raising the guard timbers 2 in. off the floor and providing a washer at each point, approximately 4 ft. apart, where the guard timbers are bolted through the floor.

The committee recommend that the stringers on ballast deck trestles be not sawed off at the ends, but that they be lapped, the length of stringer to be one foot longer than twice the panel length to provide practically a full bearing at each end of each stringer. It is thought that the equivalent of 4-ply 8 in. by 16 in. stringers under each rail for 14 ft. panels and 5-ply 8 in. by 16 in. stringers for 16 ft. panels will give sufficient carrying strength for any loads now operating. There appears to be no reason for the use of outer guard timbers on ballast deck trestles as the ballast will prevent the ties from bunching on the trestles as well as that service is performed on solid ground. Inner guard rails should be furnished, however, as on open trestle bridges.

A. B. McVAY (chairman), L. & N.; C. E. SMITH; F. G. JONAH, St. L. & S. F.; S. T. COREY, C. R. I. & P.; J. J. TAYLOR, K. C. S.; E. J. AUKE, C. M. & St. P.; A. J. JAMES, A. T. & S. F.; S. C. TANNER, B. & O., committee.

Discussion.—R. H. Reid (New York Central) favored framing the ties over stringers and bolting the guard rails to every fourth tie. He has found the bolting of ties to stringers unsatisfactory, in that it prevents the bunching of ties under derailments and also when renewing ties. J. P. Wood (Pere Marquette) opposed framing the ties at the mill, as it is then impossible to place the best face of the tie up. He had had no bridges go out of line. R. C. Sattley (C. R. I. & P.) favored bolting the ties to the stringers, because the track can be lined up readily by partially pulling the bolts. G. W. Rear (Southern Pacific) has used ties, which were sized up in the mill, for a period of 10 years, in which time he has had experience with 480,000 lineal feet of trestles up to two miles long. Ten bolts

are used per panel for holding the ties to the stringers and two bolts for holding the stringers to the caps. No trouble has been experienced with these bridges going out of line. It is necessary to build bridges properly if they are to stay well built. F. J. Conn (Queen & Crescent) has used treated and dressed bridge ties with tie plates 31 in. long extending under the rail and inside the board rail. The rails are held by screw spikes and the outside wooden guard rail is bolted through every tie.

The paragraphs regarding guard rails caused considerable discussion. G. W. Rear (Southern Pacific) advocated the use of rerailing castings at the ends of high bridges and the spacing of inside guard rails with a 3-in. clearance from the main rails. Most derailments are caused by broken flanges and wheels with broken flanges cannot derail with this construction. I. O. Walker (Western & Atlantic) has eliminated the dapping of guard rails since using creosoted timber. The guard rails are bolted to the ties and the ties are held in place by two castings per tie on the tops of the girders or I-beams. In discussing stringers Mr. Rear thought that all bolts holding the stringers to the caps should have the bolts placed on top. A. S. Markley (C. & E. I.) thought that no span should be of a length to require the use of more than three stringers because of the increased difficulty in driving other piles. R. H. Reid (N. Y. C.) also opposed using more than three stringers, stating that the New York Central Lines are now considering the shortening of the panel length rather than adding more stringers to accommodate heavier locomotives. L. Jutton (C. & N. W.) opposed running the bolt through the stringer and cap and advocated the use of a drift bolt with a square head enabling it to be pulled readily. The remainder of the report was accepted without discussion because of lack of time.

WATER WASTE

BY C. R. KNOWLES

General Foreman of Water Works, Illinois Central Railroad

As an example of what may be accomplished by a campaign against water waste, the Illinois Central has reduced the expense for city water alone from \$225,112.94, during the fiscal year 1913-14, to 190,438.50 during the fiscal year 1914-15, a reduction in the cost of city water of \$34,673.79. This is a net saving accomplished by the elimination of water waste. The expense for city water represents only about 40 per cent of the total cost for water, 60 per cent being for water pumped by company forces and not included in the savings which are given above.

Water is generally considered as free as the air we breathe, and much of the waste is due to carelessness on the part of employees who fail to realize its cost. It follows that careful instruction followed by disciplinary measures, where necessary, is the remedy in a campaign to reduce waste. This lack of co-operation, due to ignorance of the value of water, sometimes aided and abetted by departmental lines and jealousies, causes thousands of dollars' needless expense to the railroads of the country. American railroads consume daily approximately 1,950,000,000 gallons of water, at a daily expense of over \$100,000. These figures should be enough to convince almost anyone that water is not free, and that a saving in water is quite as important as a saving in coal, oil or other supplies. It is safe to say that 15 per cent of the water used by railroads is waste. By waste is meant that quantity of water drawn in excess of the amount actually required. An employee who has the interests of the company at heart will not deliberately destroy property or waste supplies, yet that same employee will often leave a valve or faucet open, allowing water to waste and causing a needless expense that could be easily avoided. The opportunities for water waste on railroads are many and it is within the power of every railway employee to effect a saving in this respect.

A few illustrations of the most common forms of waste will be given with the cost of such waste and suggested remedies.

Large quantities of water may be wasted in taking water at tanks and penstocks, unless care is exercised to properly spot the engine and avoid overflowing the tender. Not only does this cause a waste of water, but it causes an additional expense for removing ice from the track in winter months and repairs to soft track during the summer. A conservative estimate of the total cost of this waste per annum is \$60 per tank. With 30 tanks, the annual expense will be \$1,800, a sum equal to 5 per cent on \$36,000. This will pay the interest and depreciation on the cost of a new 100,000-gal. tank at each station in five years, or will build and maintain a locomotive each year. The remedy is to keep the tank spouts and the penstocks in proper repair and to compel due care in taking water on locomotives.

One of the most expensive sources of water waste is at engine houses, in connection with the use of boiler washout hose and valves. The water used for washing locomotives invariably has to be handled twice to secure the high pressure necessary to properly wash locomotive boilers. The average cost of such water is in excess of ten cents per 1,000 gal. A boiler washout hose with a 1-in. nozzle, at 100-lb. pressure, will easily

coaches, etc., causes a great waste of water that may easily be avoided.

Leaking or improperly adjusted valves in toilet flush tanks will waste from \$3 to \$50 per month for each battery, depending on the number of fixtures and the cost of water. A case was found recently where toilet facilities at a large terminal were causing a loss of over \$400 per month. In another instance the loss was over \$150 per month. The trouble was corrected by cutting down the waste of water and the saving at these two points alone amounts to \$10,000 per year.

Wash basins, slop sinks and other fixtures connected direct to



Leakage from a Buried Water Main

sewers and drains offer opportunity for heavy water losses and a saving can be made in almost every instance by giving attention to valves and faucets, keeping them in proper repair and making it a point to see that they are closed when not in use.

Another source of waste is through leaks in underground mains. These underground leaks are not always easy to detect, for there is nothing in the old saying that "leaks will always show at the surface," for if the pipe is laid in a porous formation or near sewers, the water finds a ready outlet without reaching the surface. The presence of leaks of this kind may sometimes be determined by use of the aquaphone or sonoscope, or by carefully comparing the consumption with the pumpage or meter readings. But locating and repairing the leak is often

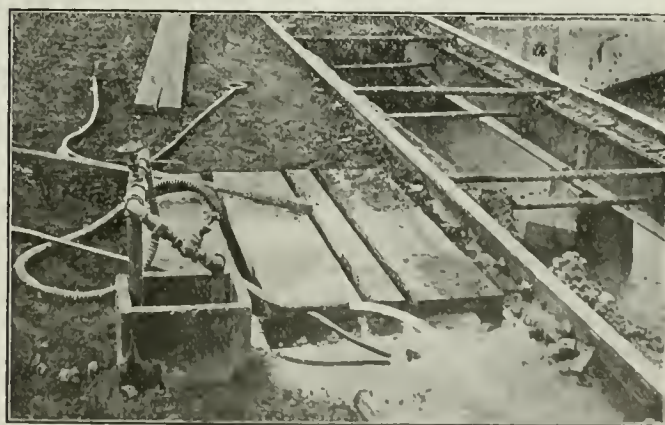


Wasting Water When Filling a Locomotive Tender

waste 12,000 gal. of water per hour at a cost of \$1.20 to \$1.50. This does not take into consideration the cost of heating water where hot water is used for washing. This is a very hard matter to control and results cannot be obtained except through the co-operation of the roundhouse force.

Laws prohibiting the use of public drinking cups have made the bubbling drinking fountains a necessity, but the makeshift affairs commonly constructed of ½-in. to 1½-in. pipe, and flowing constantly, are an abuse to this system of providing drinking water, and will waste from \$150 to \$350 per year for each fountain. The actual amount of drinking water required by a man is about ½ gal. per day. A single bubbling fountain with a ¼-in. opening will deliver 425 gal. per hour, at 25-lb. pressure, ample for 10,000 men, with 50 per cent waste. The only satisfactory way to control this waste is to restrict the size of opening and equip all fixtures of this kind with self-closing valves.

Yard hydrants for sprinkling, filling water jugs, and coach yard service also cause a heavy waste of water. A 1-in. hydrant of this type will waste from 20 to 30 cents' worth of water per hour, or \$5 to \$7 per day. Forty or 50 of these hydrants are often installed in a single coach yard and, as a number of them are nearly always open and running, the loss is enormous. The improper use of hose for sprinkling, washing



Wasting Water at a Submerged Cinder Pit

such a difficult matter that one sometimes wonders whether it is cheaper to permit the pipe to leak or make repairs. However, this question is easily answered. It always pays to stop leaks.

The saving effected in handling cinders with modern cinder-pit facilities is often destroyed by the waste of water through hose connections. The photograph shows an actual condition where the waste is 10 gal. per minute, 600 gal. per hour, 14,400 gal. per day. The cost is \$1.44 per day, \$10.08 per week, or \$524.16 per year.

Fire hydrants are often used for drinking and other purposes with a resultant waste of water. One hundred gallons of water are being wasted to secure a pint of water. A man will require water from 4 to 8 times per day of 10 hours, or an average of

6 times per day, and 20 men will drink 120 times a day. By using this method of securing their drinking water, they waste 12,000 gal. while drinking 5 gal.

Discussion—J. S. Robinson (C. & N. W.), a member of the committee, stated that his road was studying water waste in the Chicago terminals. It has recommended close supervision and minor improvements in equipment, which it is estimated will result in an annual saving of \$24,000. I. O. Walker (W. & A.) told of an instance in which water used to cool an air compressor was recovered with a resulting saving of \$80 a month.

MANILA ROPE

By F. E. WEISE

Chief Clerk, Engineering Department, Chicago, Milwaukee & St. Paul

Possibly there is no article in the outfit of a railroad construction organization or of a contractor that suffers more neglect and abuse than manila rope. In nine cases out of ten, this condition is due more to a lack of knowledge than to wilful neglect. It is the general impression that the use of Manila rope is decreasing and that it is being replaced by wire rope, but this is true only along certain lines and, on the contrary, the field for its use is increasing.

Fibers from which ropes are made are termed by manufacturers as hard and soft. The hard fibers are of Manila, sisal and New Zealand hemp, and the soft fibers are of jute, American hemp and flax. Of the hard fibers, very little New Zealand hemp is used. The best rope for all purposes is made from Manila hemp, and very little rope over one inch in diameter is made from anything else. Sisal hemp is shorter and coarser than Manila, is not as strong and will not withstand water or the weather as well. Considerable rope less than one inch in diameter is made of sisal hemp. The soft fibers are used mainly for the manufacture of small rope and cord. This paper is to be limited to the best and larger ropes, and, therefore, deals entirely with Manila rope.

Until rather recently all rope was made by hand, but its manufacture has been revolutionized by the introduction of modern machinery. In a modern plant the bales of fiber are opened and graded as to quality by expert workmen, and are then passed to machines where the fibers are reduced to suitable size for rope making. After this operation the fiber is spun into yarn by twisting it in a right-hand direction. From 30 to 75 yarns, according to the size of the rope, are put together and twisted in the opposite, or left-hand direction, into a strand. Three or four of these strands are then twisted together in a right-hand direction into a rope. In the manufacture of a very large rope or cable, three hawers or three strand ropes are twisted together in a left-hand direction. It will be noted that each operation is in an opposite direction, and because of this, the rope keeps its form. The rope maker has learned by long experience how to make these twists so that the tendency of one part to untwist will cause another part to twist until an equilibrium is attained. If the twist is great, the rope will be hard and stiff, and will keep its form well, but will not be as strong as a rope with less twist. This is explained by the fact that in the latter case the fibers lie more nearly in the line of tension.

A good hemp rope is hard, but pliant, yellowish or greenish gray in color, with a certain silvery or pearly lustre. A dark or blackish color indicates that hemp suffered from fermentation in the process of curing, and brown spots show that the rope was spun while the fibers were damp, and is consequently weak and soft in those places. Sometimes a rope is made of inferior hemp on the inside, covered with yarn of good material. This may be detected by dissecting a portion of the rope. Other inferior ropes are made from short fibers, or with strands of unequal lengths or unevenly spun, the rope in the first place appearing woolly, on account of the ends of the fibers projecting; in the latter case the irregularity of manufacture is evident on inspection.

A test for ascertaining the purity of Manila hemp rope con-

sists in forming balls of loose fiber for the ropes to be tested and burning them completely to ashes; pure Manila burns to a dull grayish-black ash; sisal leaves a whitish-gray ash; a combination of Manila and sisal yields a mixed ash resembling the beard of a man turning from black to gray. Manila hemp is frequently adulterated with phormium (New Zealand flax) and Russian hemp, both of which are much inferior in strength.

It is not always true that the highest priced material is the best, and there are no doubt many cases where from lack of knowledge or time for investigation, a better grade of material is purchased and used than is necessary. The price of this material is governed largely by its quality, but the selection of the quality should be governed by its suitability to the work in hand.

Rope in service deteriorates in two ways: The wear on the outer surface that can readily be seen, and the stretching, bending, crushing and breaking of the inner fibers that cannot be discovered without a careful examination.

Should these conditions develop more rapidly than the service in which the rope is used seems to warrant, they may be due to the following causes: The first might be caused by chafing, resulting from ropes rubbing against each other or dragging across hard materials, or by running over sheaves having too small grooves. The latter may be due to overload or to running over sheaves or pulleys of too small diameter.

Ropes do not give out all at once, and therefore need much care and attention. The factors that determine the usefulness of a rope and its length of service or life are: the material of which it is made; the care and skill with which it is manufactured; the manner in which it is used or its application, and the care taken of it while in service and while being stored.

Manila hemp is a vegetable fiber and is susceptible to the action of water and air the same as an unprotected piece of wood. In fact, the hardest wear on a rope is exposure to all kinds of weather. This cannot be avoided in construction work; therefore, when a rope has become wet and muddy, it should be cleaned, dried and stored in a well ventilated place. Wet rope placed in a box or unventilated storeroom is likely to rot or ferment and will become worthless in a very short time. Ropes that must necessarily be constantly exposed to the weather are tarred frequently, but as the tar affects the tensile strength, it cannot be used on ropes that are subject to hard use on derricks and cranes. Tarred ropes may be used for guy lines, the rigging of ships or similar work.

It is generally conceded that moisture will not injure a rope in storage, provided the storeroom is well ventilated, and in fact some dealers advocate a damp storeroom. On the other hand, a rope may be seriously injured by becoming too dry, because the fibers become brittle. A rope should not be allowed to freeze after becoming very wet, or if frozen, should not be used, because the frozen fibers will break and thus make it useless. Neither should rope be piled against radiators or steampipes for obvious reasons.

The failure of ropes is more likely to be due to overloading than to any other cause. Should a rope be submitted to an overload, it may be shown by the twist coming out of it, or by one of the strands slipping out of its proper place. In the handling of heavy loads with a derrick or crane, the load should never be applied suddenly or with a jerk, not only because the stress will be many times that of the weight to be lifted, but it will cause deformations in the rope that start deterioration. Should there be a kink in the rope, the damage may be serious enough to cause failure, and in any event the rope will have lost a good deal of its strength and value. Ropes used on derricks, cranes and pile drivers wear out very rapidly. It is said that a rope 1½ in. in diameter will wear out in handling from 7,000 to 10,000 tons of coal, while a transmission rope of the same size, running 5,000 ft. per min. and carrying 1,000 h.p. over sheaves 5 ft. and 17 ft. in diameter, will last for years.

The rapid wear of ropes used on derricks and pile drivers is

due to their passing over comparatively small sheaves under load. When passing over a sheave, the rope is subject to bending, which causes the fibers to slide slightly on each other, and, as they are somewhat rough, the friction ultimately causes the fibers to break. Frequently upon opening up ropes of this kind, it is found that some of the inner fibers have been ground to a fine powder. Manufacturers aim to overcome this difficulty by treating the fibers with tallow or graphite, or both, but there seems to be considerable difference of opinion as to the value of such treatment. Tallow-laid rope is not affected as much by weather conditions as rope not so treated. Should it be necessary for a rope to run over two sheaves, bending first in one direction and then in another, the difficulty last described is much exaggerated, and is much like bending a pliable wire first one way and then the other. It will soon break.

It is frequently necessary to splice the ends of two ropes together in order to make one long rope. Either a short splice or a long splice may be used. If properly made, the short splice will develop the full strength of the rope, but it cannot be used over a sheave because it is considerably thicker than the original rope. The long splice can be used over a sheave, but it cannot be expected to give as good service as an unspliced rope. The short splice is more quickly made.

Manila rope is usually supplied to the storekeeper in coils of 1,200 ft., and shipped out by him in lengths suitable for the work. The shorter pieces left over are used for making slings. After it is worn out, rope is returned to the storekeeper as scrap. The accumulation is disposed of from time to time by selling to scrap dealers at a price approximating \$50 per ton.

Slings made from Manila rope for handling and hoisting heavy materials do not always receive the care and attention that they should, largely because of a lack of knowledge of what a sling will stand. Many advocate the use of new rope, and this is without doubt the safe plan. A new rope, however, is too stiff and it is better, where possible, to use parts of a rope that have been limbered up by a day's service. There are others that advocate the use of old rope for this purpose. If this is done, care should be taken to select pieces that have not been overstressed or that have not been working over sheaves. An examination can easily be made by opening up the strands, and if the inner fibers show deterioration, the rope should not be used for slings. Slings are made by splicing the two ends of a rope together, using usually what is known as the short splice.

On construction work and during wet weather, slings are subject to severe usage. When muddy, they should be thoroughly cleaned, preferably with a hose, before the mud has been allowed to dry. They should then be allowed to dry under shelter, but never in the hot sun.

When slings are sent to the tool car or toolroom for storage, they should be inspected carefully and such as are not fit for continued use should be discarded. Those in good condition should be hung on suitable pegs. Slings are frequently called for in a hurry and under such conditions there is not always time to make an examination, or it may be overlooked. It is well to be on the safe side, because the failure of a sling may result in serious injury to the workmen and a fall of only a few feet may damage or utterly ruin a piece of machinery.

The method of attaching a sling to a load should always be delegated to a reliable and experienced man. Whether one or more slings are to be used will depend not only on the weight of the load to be lifted, but also on its shape. In placing a sling on a load, care should be used to see that the load is evenly distributed on the two sides of the hoisting hook and also that the turns of the sling do not overlap, thereby throwing an excessive stress upon one part of it.

The stresses that are thrown upon slings and ropes vary a great deal with conditions, and they are often influenced to a marked degree by circumstances, which the casual observer might consider trivial and unimportant. In particular, the inclination or obliquity of the sling, in those parts which lie between the

supporting hook and the points at which the sling first touches the load, must be carefully considered, as it is a highly important feature in connection with safety.

COALING STATIONS FOR THE ECONOMICAL HANDLING OF 25 TO 50 TONS PER DAY

There are four types of coaling stations of this class, a platform where the material is unloaded and delivered to the engines by hand shoveling; a stiff leg derrick with the necessary coal storage and operating platforms; a station where cars are pushed up an inclined trestle and the coal unloaded into small pockets and delivered to the engines by gravity; and mechanical coaling stations where the coal is dropped by gravity into hoppers and elevated into large pockets by means of buckets or conveyers operated by mechanical power.

The coal platform can hardly be called a coaling station, as it is only a makeshift.

The stiff leg derrick is probably the one most used at stations where a small amount of coal is handled. The construction of the derrick at this plant is much the same as for any stiff leg derrick. The boom, however, is generally rigid, being placed at a fixed angle and far enough out to properly reach the center of the track. It is, therefore, necessary to operate only the main hoist and the swing of the derrick. Adjoining such a derrick is a storage platform of proper size and length to store as much coal as is considered necessary at the plant. At one of these stations where the average amount of coal handled per day was 12 tons, the cost of handling per ton was 17.9 cents. This station was operated by one man, assisted by the train brakemen in coaling engines. At another such coaling station, where the average amount handled per day was 31.2 tons, the cost of handling per ton was 12.6 cents. Comparatively speaking, the first cost and maintenance of a derrick station is low; the third mentioned type of station is cheaper to operate than the derrick type, although for small amounts the derrick will compare favorably with it. It costs more than the derrick, and the maintenance is much more. For small amounts the derrick is better than the trestle type of chute, and for large amounts the mechanical type is the better.

The mechanical type of station is coming into use more and more and has many things to commend it for economy of operation. It is not the intent here to discuss the merits of the different types of mechanical coal chutes, but rather whether the mechanical chute is adaptable to small stations. At a certain coaling station where an average of 44.5 tons of coal is used the cost of handling is 8.2 cents per ton. One man is employed days and one man nights. If it were necessary this amount of coal could be increased 50 per cent without increasing the number of men employed. The mechanical plant is high in first cost, and the maintenance may be considerable after the plant gets old. Nevertheless, a good mechanical plant is cheap to operate and has many points in its favor even where a small amount of coal is used.

In general the cost of handling coal at small coaling stations is large, as a certain amount of labor is necessary, no matter how small the amount of coal handled. It seems advisable where small coaling stations are necessary that some other occupation should be found for the men employed in the coaling plant. Where conditions are right a water station can be operated advantageously in connection with the coaling station. If the two facilities are properly located with respect to each other and the most improved machinery is installed at both plants, one man working days and one man nights can operate the combined plant where the coal consumption amounts to about one car load per day and the water consumption amounts to about 40,000 gal. per day.

The report is signed by L. Jutton (chairman), C. & N. W.; W. T. Krausch, C. B. & Q.; B. F. Pickering, B. & M.; J. L. Talbott, A. T. & S. E.; A. W. Pamba, C. & S.; G. A. Manthey, M. St. P. & S. S. M.; Wm. Mahan, W. & L. E.

COST OF STRUCTURES

DETAILS TO BE KEPT IN TIME BOOK

The usual practice seems to be for the gang foreman to enter in a time book for each day the time and overtime allowed for each man and sufficient information for making up a distribution and the prescribed reports. Very few roads require any more detail than the title of the job and possibly a few subdivisions. The majority use a monthly or semi-monthly time book, except in a few states where weekly payments are required by law. These time books vary from the small stock book, which can be bought in stationery stores, to a monthly diary giving a complete record of labor and material, an outline of work done, a tool report and other general information required from the foreman.

It would seem desirable that a time book should be adopted of a size to be carried readily in the pocket and to be ruled properly to show one month's or one week's time as conditions require. On a large road it would not seem desirable, however, to combine all of the foreman's monthly reports in one book, as such a book would be cumbersome for the foreman and for the clerks who handle the accounts. The committee recommends a time book using one double page for the time and distribution for each man. The last page of this book should give a recapitulation, distributing the total time of the gang between the different Interstate Commerce Commission accounts, as these greatly facilitate the work of the time clerks in consolidating the distribution. A system of sub-accounts for similar work should be made up to suit local conditions and the structures on which the work is performed, such as excavation, foundation, concrete and masonry above the foundation, concrete forms, steel work, framing, painting, plumbing, lighting, etc.

REPORTS OF MATERIAL USED

The usual practice is for the foreman in charge of a gang to make some form of monthly material report, either in a monthly diary or on loose sheets. The committee considers that the material report should be sent in by itself, either in a special book or on loose sheets, the reports from the different foremen being consolidated in the division supervisor's office, and made up into one material report. If a printed book is furnished to the foreman it should have pages for the material received, used and shipped away, and a record of the cars received.

Material should be distributed to various subdivisions for each job the same as labor, and on the completion of each job a completion report should be made. In addition to the title of the job and the date of completion, this should show the number of units and the cost of each class of work, such as the number of yards of excavation, the cubic yards of concrete, the weight of steel erected, etc. It will, of course, be necessary to have several different forms of completion reports to cover the costs of different classes of work.

RECORDS TO BE KEPT IN DIVISION OFFICES

On most of the larger roads it is the custom to keep all detailed records in the division offices, collecting the information from the various gangs and making a complete cost record to the general offices. The systems in use are varied, some using blank forms or stock ruled books, and in a few cases a special loose leaf or card file. In many cases, so far as the keeping of unit costs or the cost of jobs is concerned, the system is left to be worked out by the individual supervisor so that there is very little uniformity even on different divisions of the same road.

In most cases, the cost records which are being kept at the present time simply cover the accounts required by the Interstate Commerce Commission and the total costs of structures or pieces of work. It would seem desirable that more extensive records be compiled not only to show the costs of all structures, but the costs of the various items going to make up the total, such as the number of cubic yards and the cost per yard for excavation, masonry and concrete work of various classes; also the cost per 1,000 feet for framing and erecting all of the

usual classes of timber work, etc. For keeping such records, a loose leaf ledger or card system would seem to give the best results, as it gives greater flexibility and opportunity for growth and also an opportunity for classifying similar kinds of work.

The complete cost of a piece of work should in all cases include not only the labor and material used, but the system should be such that all other items of expense, such as work train, teaming, board of men and other necessary expenses, should be included. The cost statement should also show any second-hand material used as well as an explanation of any unusual charge due to bad weather, accidents, time lost in traveling or other items which would affect the cost.

A completion report blank to cover all of this information would be so large and complicated as to be out of the question. It would therefore be necessary to make up a number of printed forms for the various classes of work.

With all of the detail records kept in the division offices, the only cost records to be sent forward to the general offices should be cost cards or sheets showing completed structures, cards showing unit costs and graphic tabulations or comparative statements. These records should be submitted in a form so that the cost of similar work on various divisions can be compared and filed with as little labor as possible. By using cards or blanks of a uniform size these can be filed very readily in card index system and comparison readily made. The costs of similar work on the various divisions should be tabulated; this showing which divisions are doing the work most efficiently. Various reports showing the distribution of labor and material to maintenance of way accounts must also be made to the auditing department to comply with the Interstate Commerce Commission regulations.

ANALYSIS OF COST

On many roads complete records are kept for large construction jobs, particularly on concrete construction, the costs being analyzed and unit cost data worked out. This scheme, however, does not seem to be followed very extensively on maintenance work. Cost records on all jobs should be so kept that statements can be made up showing the distribution to the different subdivisions and also worked out for unit costs as outlined under the previous subject.

It is very desirable that graphic tabulations and curves be made up to show both labor and material and the total charges to all of the maintenance accounts to compare with former years. Similar graphic tabulations and curves can be made up where a number of similar structures are built on different divisions or under somewhat similar conditions.

A system of cost records analyzed for unit costs is of immense value to any road, not only for future estimates, but especially in connection with the United States valuation of railroads. The committee recommends that costs of this kind be kept by each railroad, feeling that the expense involved will be more than offset by the benefits to be derived from their use after a few years.

G. A. Rodman (chairman), N. Y., N. H. & H.; F. E. Weise, C., M. & St. P.; J. H. Nuelle, N. Y., O. & W.; J. S. Robinson, C. & N. W.; R. S. Sattley, C., R. I. & P.; C. W. Wright, L. I.; W. A. Pettis, N. Y. C., committee.

WARNINGS FOR OVERHEAD AND SIDE OBSTRUCTIONS

The necessity and the value of giving proper warning to men on top or on the side of cars before passing overhead or side obstructions on railroads is evident. When a train passes some overhead or side structure, tunnel, etc., with less than the requisite overhead clearance to allow a man to stand erect on top of the highest box car, or the necessary side clearance to permit him to hang on the side of a car, his limb or life is jeopardized.

Only four states have enacted legislation regulating the requirements for side clearances and ten states regarding overhead clearances. The following is a tabulated summary of the

statutory requirements of the several states which enacted legislation as to railroad clearances:—

State	Overhead clearances above top of rail	Side clearances from center of nearest track
Connecticut	18 ft. 0 in.	
Ohio	21 ft. 0 in.	18 in. from locomotive cab
Indiana	21 ft. 0 in.	7 ft. 0 in.
North Dakota	21 ft. 0 in.	8 ft. 0 in.
Kentucky	22 ft. 0 in.	
Minnesota	21 ft. 0 in.	8 ft. 0 in.
Mississippi	23 ft. 0 in.	
New Hampshire	21 ft. 0 in.	
Rhode Island	18 ft. 0 in.	8 ft. 0 in.
Michigan.....	7 ft. above roof of freight cars passing over line.	
Width of bridges		
Vermont.....	Single track, 15 ft. 0 in.; double track, 27 ft. 0 in.	

There has been a tendency in the past few years to enlarge the side clearance diagrams for bridges, but, until the maximum size of motive power and equipment is established by legislation or other method, there seems little relief in sight by reason of the enlargement of the clearances. It is an acknowledged fact that, up to this time, the size of motive power and equipment has closely followed the available clearances, and this will, no doubt, continue until some restraint is placed on the enlargement of the motive power and equipment.

E. G. STORCK (chairman), P. & R.; F. E. SCHALL, L. V.; T. E. THOMAS, B. & O.; M. M. BARTON, P. R. R., committee.

REINFORCED CONCRETE BRIDGES

Three methods of procedure in placing slabs are common: (a) constructing slabs at a central point, hauling them to the bridge site on flat cars, and setting them in place with a derrick or wrecker; (b) Building slabs at the bridge site at the side of their permanent location, and skidding them into place; (c) Where there is sufficient head room, the slabs built at the bridge site are, of course, constructed in place. There is a decided preference for casting slabs at a central point and lifting them into place. Fourteen roads with a mileage of 64,700 follow this method, while 11 roads, with a mileage of 31,000, report building slab at the bridge site.

The conditions governing the use of the first method are (a) the renewal of a bridge on the same alignment, while maintaining traffic on all tracks. Where the span is not too long, a temporary trestle to carry traffic is built to clear the finished structure. The slab is then built under traffic. Where long spans of a new structure prohibit the construction of a trestle, the tracks are shifted temporarily beyond the limits of the structure. (b) The renewal of a bridge on the same alignment with traffic closed on one track: The slab is built on sections 13 ft. wide, under the closed track. This method obtains only on large construction, where the forces can be moved to some other part of the work during the time allowed for the concrete to set. When the concrete under the closed track has set, a different track is closed and its traffic diverted to the track on the finished slab. (c) The renewal of a bridge or new construction on a change of alignment: Such work is generally constructed by contract. Company forces are usually employed where the construction interferes with traffic. The conditions governing the use of the second method are where unit construction is used where traffic must be maintained on all tracks without interruption for any length of time without change of alignment. The methods of handling work trains depend largely on whether the work is being done by company forces or by contract. A large system that does the work by company forces necessarily has its work train service well systematized. When called out, the train is kept busy during the full day. In this class of work the train has little to do beside moving the materials. Wherever possible, material is allowed to accumulate at the nearest station until enough is on hand to make a full day's work for a train. Where this is not practicable, it is handled by the local freight. The material is handled by the men on the job, whether on company work or contract. Where the work train service is for contract work, it is quite a general practice to make a fixed charge for this service. Under this

arrangement the contractor can have all the train service he requests, but it will be to his interest to use it only when he actually needs it.

The differences in the work train service on the various roads appear to be due more to the difference in the amount of the service, and to the local conditions, than to any established practice in the handling of such trains.

The question of methods for concreting in cold weather and protection against frost is one on which the southern roads have little to say, but with the roads of the northern states and Canada the question is a live one. Wherever practicable, all concrete work is done during the warm months, but where the winter season is long, it becomes necessary to do considerable concreting in freezing weather. The necessity for heating the ingredients in freezing weather and keeping the concrete warm after it is placed, is generally acknowledged. The methods for accomplishing this vary considerably. The different methods of heating the sand and stone are steam pipes, steam jets and fires in pipes or under grillages laid under piles of material. The protection of the concrete in place is secured either by housing it in and warming with stoves, steam coils, etc., or by covering it with double forms with air spaces, sacks, tarpaulins, hay or anything that will prevent the circulation of air in contact with the forms. Salt is used under certain restrictions, in mass concrete, but, obviously, it cannot be permitted in reinforced concrete on account of the action of salt on the reinforcing steel. The preparation of test pieces during the progress of the work has been recommended frequently. In order to show the condition of the concrete the test pieces must be exposed to the same conditions as the concrete from which they are taken. This test is not recommended as a means for determining the quality of the cement, or other ingredients in the concrete; this must be determined before they are mixed. It has been suggested as a means for determining whether the concrete has hardened sufficiently for the removal of the forms and has been done more frequently perhaps, in connection with building work, than on bridges.

It is evident from the reports of the roads that the making of test pieces is not by any means general. The replies of 21 roads, with a total mileage of 53,500, is "no." Eight roads, with a mileage of 46,500, advise that they make test pieces on certain work, or under special conditions of construction.

The question of the spouting of concrete called for a great variety of answers. Three roads reported that spouting is not permitted on their work under any conditions. Ten roads permit spouting without any specific restrictions as to slope or distance, but subject to the general requirement that the concrete shall be delivered in good condition at the forms. Sixteen roads permit spouting under specific restrictions as to slope, distance, amount of water, etc.

Evidently there is a great deal of dissatisfaction with, or distrust of, this practice. The rules and restrictions under which spouting is permitted on most of the roads reported indicate that the method will give satisfactory results, provided the work is properly conducted and carefully supervised. On those roads where it is prohibited, the belief evidently prevails that concrete can not be delivered in good condition by this method, or that the abuse of the method can not be wholly prevented by their inspection service.

The facility with which concrete can be delivered over a considerable range by spouting makes it desirable to permit the method, provided the work can be supervised so effectively that there will be no abuse of the method. That this is the most general view is shown by the number of roads, and the mileage represented by the roads permitting spouting under specific restrictions.

As to precautions to insure thorough mixing the belief is apparently quite general that if the mixture is left in the mixer long enough, no other precaution is necessary to secure good mixing. The inspector or supervising foreman is left largely to his own devices on hand mixing. If he is an experienced and

competent man he will get the desired results, but there will undoubtedly be many variations in the methods adopted by different men to obtain the same results.

Machine mixing is generally required on all work of sufficient magnitude to justify a mixer, and batch mixers are quite generally specified. Continuous mixers are apparently not in good standing among the engineers who write the specifications and prescribe the methods. When hand mixing is done, the manner of mixing is sometimes specified in detail, requiring the sand and cement to be mixed dry, then the stone added with some water and the mass shoveled until all of it has been turned a specified number of times, water being added during the mixing until the required consistency is obtained.

The cement gun (using compressed air) and the atomizer (using steam) have been developed within the last few years. They are not intended for use in placing concrete where the ordinary equipment will serve, and where concrete of the usual quality is wanted. The duty required of them is to place the material where it is not practicable to deposit it in forms, and to give a dense and impervious product. The deposited mixture is mortar. The cement gun uses no stone. The atomizer uses stone up to $\frac{3}{4}$ in. in the mixture, but the stone rebounds from the surface to which it is applied. Its only function is, apparently, to pack and tamp the mortar against the surface to which it is applied.

These machines can be used to good advantage when applied to the kinds of work to which they are adapted. It appears from the reports received, however, that these appliances are in use on only a very few roads, and the engineers in charge of concrete construction can not speak from personal experience. Twenty-six roads report not having used either kind, but the roads which have used them nearly all report satisfactory results. One road reports that in one instance, at least, the results were unsatisfactory. The kind of work or the nature of the defect was not stated.

It appears to be the common practice to leave it to the engineer in charge to determine the time when forms can be removed safely, without handicapping him with detailed instructions. The weather conditions and the kind of structure enter largely into the considerations. A few roads report tests, such as breaking off exposed portions of the work, or using test pieces that are made at the same time and exposed to the same conditions as the work.

There is a wide range in the time allowed for setting, even under the same weather conditions. This may be accounted for by assuming that structures of entirely different character were in mind when the different replies were written.

A general review leads to the conclusion that in summer weather, mass concrete, such as retaining walls, abutments and piers, should have two to three days, and a little more if the structure is high or massive. When weather is cold, but not freezing, the time should be from one to two weeks. Forms for slabs, arches and culverts should remain in place in warm weather, from one to two weeks, and the structure should not be loaded for 30 days. In cold weather, the time should be correspondingly longer.

O. F. Dalstrom (chairman), C. & N. W.; A. Montzheimer, E. J. & E.; I. L. Simmons, C. R. I. & P.; J. A. Bohland, G. N.; C. J. Scribner, C. B. & Q.; D. C. Zook, P. L. W.; T. J. Stuart, W. P., committee.

CONCRETE CULVERT PIPE AND CONCRETE PILES

Concrete piles are used by the railroads for a variety of purposes and particularly for reinforced concrete slab trestle bridges. This use is of particular interest in that the reinforced concrete pile slab trestle type of construction presents a seemingly perfectly satisfactory and economical solution of the pile and timber bridge replacement question in many instances, for those openings which are too large for small culverts of a permanent character. The Chicago, Burlington and Quincy, which was the pioneer road with this type of construction, has constructed about 20 miles of concrete pile trestles, some of which have been

in service eight years. The Chicago, Milwaukee & St. Paul started manufacturing and using concrete piles for concrete trestles in 1912 and since that time upwards of 30,000 lin. ft. have been made and driven. On account of the delay to trains that might be occasioned by driving on main lines of heavy traffic, this company has constructed most of its concrete pile trestles on a second track or on lines where the traffic is not very dense.

The Great Northern, the Illinois Central, the Minneapolis, St. Paul & Sault Ste. Marie, the Northern Pacific and the Wheeling & Lake Erie are among the roads that make considerable use of concrete piles for trestles. The Great Northern now prefers, however, in place of concrete pile bents, slim reinforced concrete piers extending one to two feet below the surface of the ground, and supported on piles, with longitudinal struts for heights about 20 ft.

Most of the railroads agree that the premoulded reinforced concrete pile is suitable for use in trestle bents, that they allow loads of from 20 to 35 tons per pile and that the penetration required under ordinary conditions varies from about $\frac{2}{5}$ to $\frac{2}{3}$ the length of the pile, while the maximum projection above the ground recommended varies from 10 ft. to 30 ft. Several roads agree on about 20 ft. for the maximum projection above ground unsupported, while some limit this height to about 14 or 16 ft. and build slim concrete piers for greater heights.

The premoulded type of pile seems to be preferred by the greater number of roads, which is due partly to the necessity of using this type for trestle work. The octagonal, straight-sided pile about 16 in. in diameter appears to be the most used shape. The steel reinforcement of concrete piles should be designed not only to take a portion of the load that may be placed upon the pile after it is driven, but also to take care of the bending stresses that occur when the pile is lifted either by the middle or by one end and to withstand the shocks caused in dragging it over rough ground to the loads and the jars occasioned in driving.

While a great many different makes and types of piles have been used, it is comforting to observe that there have been no failures reported and that very few piles have been broken in handling or in driving and none under load. On the strength of this record it would seem that there should be no need of hesitation on the part of railroad engineers and builders to use concrete piles where the conditions make this type of construction the most economical.

CONCRETE CULVERT PIPE

The use of concrete culvert pipe is much more general among the railroads than that of concrete piles. While some of the roads have used this pipe in special instances, or for experimental purposes only, quite a number use the pipe generally for sizes ranging from 24 in. to 48 in. internal diameter inclusive. A few make common use of sizes varying from 12 in. to 72 in. inclusive, while at least one uses as large as 84 in. x 89 in. oval pipe.

It is not the general practice to restrict the heights of embankments under which concrete pipe is used, other than to specify a certain minimum depth of cover over the pipe, which minimum varies from 8 in. between the bottom of tie and the top of the pipe to about 3 ft. from the base of rail to the top of the pipe. The road reporting the 8 in. minimum stated that its only reason for not placing pipe closer than 8 in. to the tie is that a less distance than this does not afford sufficient protection to the pipe from injury from tamping tools. There is involved in this discussion of the restriction of the heights of embankments, of course, the general question of the appropriateness of placing a rather small pipe under a very high fill, even though the drainage requirements are satisfied. Some roads do not place pipe culverts of small diameter under extremely high fills irrespective of the fact that their carrying capacity is ample to take care of the unexpected quantity of water.

It is not the usual practice to have two or more designs of concrete pipe of the same diameter with different amounts of reinforcement and thickness of the walls for use under different

heights of embankments. The Chicago, Rock Island and Pacific, however, does make such a distinction, having a design known as Class "B" for embankments up to 20 ft. in height and another known as Class "C" for embankments from 20 to 40 ft. high. The amount of reinforcement and the thickness of the walls are both increased in the class "C" design.

In 1906 Prof. Arthur N. Talbot of the University of Illinois tested to destruction several sections of 48 in. and 36 in. reinforced concrete culvert pipe. The results of these tests, which were made under laboratory conditions of bedding and loading, are recorded in bulletin No. 22 of the University of Illinois. This bulletin recommends certain formulae for the design of reinforced concrete pipe which are pretty generally accepted.

More roads use head walls on one or both ends of the concrete pipe culverts than do not use them. The bell and spigot continues to be the more popular type of joint, while the roads are pretty evenly divided on the question of cementing the joints. All of the joints, no matter of what type or whether cemented or not, seem to be pretty uniformly satisfactory.

The length of time the pipe should cure before shipping shows a very considerable variation ranging in air from 10 days to 60 days, while some roads do not install pipe that is less than 90 days old, although they ship after pipe has cured 60 days. While there have been a few failures of pipe in place and a considerable number have been broken in handling, many of these are due either to poor concrete or to the pipe being used too green. If a rich, dense concrete, which is allowed to cure a reasonable length of time, is provided in reinforced concrete pipe which are intelligently designed and installed, we believe that the railroads should feel perfectly safe in adopting this construction wherever it seems desirable to do so. H. Rettinghouse (chairman), C. S. & P., M. & O.; S. T. Corey, O. R. T. & P.; G. H. Stewart, B. R. & P.; C. F. Urbutt, C. M. & St. P., committee.

PROTECTION OF GRADE CROSSINGS

All public crossings should be marked by crossing signs placed as conspicuously as possible to indicate the proximity of tracks. This is essential even though flagmen may be on duty, a bell ringing, or other warning given to drivers of approaching vehicles. A whistling post should be placed on the engineer's side of the track a quarter of a mile from the crossing so that trains may give warning of their approach. To further indicate to drivers of vehicles and trainmen the locations of crossings, the cross fences should be painted white or whitewashed.

It is important that the roadway at railroad crossings be kept in good condition. Even in cases where it is only incumbent on the railroad to maintain the roadway between its rails and for two feet outside, the necessary steps should be taken to see that the approaches are maintained on easy and uniform grades, and free of ruts or rough spots which might possibly stall an automobile or otherwise contribute to hazard at the crossing. The area between the rails should be kept well filled, and if a smooth crossing can not be obtained otherwise, guard rails should be used.

Objects which obstruct the view of crossings either from approaching trains or vehicles should be removed as far as possible. Whatever protection may be provided at a crossing will be inefficient if the view from all directions is obscured by trees or other obstructions. Proper care in this respect may greatly reduce the hazard of accident.

The choice between the forms of protection in common use lies between gates, wigwag signals, or so-called automatic flagmen, and flagmen. There is no rule for determining the choice of protection, but the best device may be indicated by local conditions of topography, the widths and layouts of roads or streets, the angle of crossing, etc., or it may be chosen after experience and observation of a particular case.

Crossing gates are suitable for roadways crossing one or two tracks where the traffic is not greatly congested. Where the teams are very numerous, the time required to operate gates tends to block the traffic and create congestion. There is the further

possibility of vehicles being caught between the gates or of the gates being lowered on them. Where the roadway crosses a large number of tracks, gates are least satisfactory. There are cases of well improved highways in suburban or country districts where automobiles are run at high speed where gates are sometimes run through. In an article in the *Railway Age Gazette* of July 16, 1915, a crossing is described and illustrated where the ordinary light gate has been replaced by a spruce pole about 10 in. in diameter as an effective barrier against automobilists who approach the crossing at reckless speed. This gate is painted with spiral bands of black and white to attract attention at a considerable distance. The Southern Pacific has tried red paint and stripes on its crossing gates, but a subsequent canvass of automobile drivers indicates a preference for plain white gates as being easier to distinguish, especially at dusk or dawn. In the opinion of the committee white is the best color for gates.

There are various types of gates, wire-pull, electric and pneumatic, all having the same idea of placing a barrier across the roadway. Some have ticklers and others fence attachments, but these are but variations of the barrier idea. There is also in use an automatic gate which is operated in a manner similar to automatic signals. This has not been found satisfactory as yet. It is apt to lower on a vehicle, or if constructed too high to strike a wagon is too tempting for malicious persons to tamper with it.

A very good additional protection in connection with crossing gates is a red light hung on the gate at night, with blinders on the sides so that it will not be visible to the engineers of approaching trains. This light is replaced during the daytime by a red disk.

The Southern Pacific is conducting experiments with a form of warning signal consisting of a red disk 16 in. in diameter located 200 ft. from the crossing. As automobile associations are providing signs which serve the same purpose it is perhaps better for railroad men to look out for the immediate crossing only.

Where traffic conditions do not require gates or flagmen the best form of signal is the automatic flagman or wigwag, which consists of a red disk displaying a red light at the center, which is suspended from a bracket away from the line of poles. The disk and light swing through an arc in the lower quadrant and attract attention readily from the roadway for a considerable distance. In some respects this device is superior to a flagman. There is no variation in the signaling. The movement is always the same. When in motion it can indicate but one thing—that a train is approaching. A bell may be rung in connection with the visible signal, and this is advisable in certain districts; but in residential sections, where trains are numerous or where the signal may be operated for long periods on account of switching movements, the bell may be removed and the device used as a visible signal only. The cost of installation of the wigwag varies with the number of switches within the limits of the electric circuits, the presence of automatic signal circuits, etc. The minimum cost is approximately \$60 for labor and \$260 for material, or a total of \$320. On account of other circuits and switches within the operating limits of the signal the cost may reach as high as \$500.

No matter what the railroads may do in the way of eliminating danger at grade crossings their efforts are of little avail unless the public co-operates to the extent of observing warning signals set up for its protection. Pomona, Cal., causes the arrest of persons who disregard the city ordinances which require the drivers of vehicles to stop before crossing a railroad track. A personal way of checking up careless drivers is for gatemen or flagmen to note the vehicle numbers and write to owners and employers. It is our experience that employers are glad to be advised of instances where their employees show carelessness in crossing tracks.

CONCLUSIONS

1. Where feasible, grade crossings should be eliminated.
2. Obscure crossings should be opened up to the view as much as possible by the removal of trees, buildings, brush or other obstructions.

3. Roadways at track crossings should be maintained in the best possible condition.

4. An automatic flagman, gates or flagmen should be provided as local conditions may require.

5. All means possible should be used to induce the public to use caution at grade crossings.

E. C. Morrison (chairman), S. P.; A. T. Mercier, S. P.; F. M. Nelson, S. P.; A. Ridgway, D. & R. G.; J. B. Gaut, G. T.; J. H. Johnston, G. T.; C. E. Johnston, K. C. S.; J. B. Sheldon, N. Y., N. H. & H.; G. H. Jennings, E. J. & E.; F. O. Draper, I. C., committee.

OTHER REPORTS

An extended report on Railway Water Tanks was presented by C. R. Knowles, chairman. Because of lack of space it is necessary to hold it out of this issue, but it will appear in the November Maintenance of Way Section.

A report was presented on Efficient Methods of Handling Work and Men by G. W. Rear (S. P.). An abstract of this will also appear in the November Maintenance of Way Section.

OTHER BUSINESS

The following subjects were selected for consideration at next year's meeting:

Brick, Cement, Asphalt and Wood Block Floors for Shops, Roundhouses, Freight Houses, Highway Bridges, etc.

Paint and Its Application to Railway Structures.

Fireproofing Roofs of Wooden Buildings.

Water Supply Intakes and Intake Lines for Internal Combustion Engines.

Caring for and Handling Creosoted Material.

Blank Forms for Bridge and Building Department.

Modern Methods of Driving Piles.

Efficient Methods of Handling Work and Men.

Economical handling of Concrete on the Smaller Jobs.

Station Buildings for Passenger Service Only.

Small Coaling Stations.

On Tuesday evening about 315 members and supply men were guests of the Bridge and Building Supply Men's Association at a dinner and vaudeville entertainment given in the Hotel Statler.

Wednesday afternoon was spent in an inspection trip by special train through the Michigan Central tunnel and over the Windsor terminal. A trip was also made through the plant of the Ford Automobile Company.

On Wednesday evening about 200 members and guests attended a banquet at the Hotel Statler. Special emphasis was placed on the early history of the association. The speakers included Past President W. A. McGonagle, Secretary C. A. Lichty, Vice-President G. W. Rear, J. B. Sheldon, E. T. Howson and C. R. Knowles.

On Thursday afternoon the members and guests enjoyed a boat excursion on the Detroit river.

ELECTION OF OFFICERS

The election of officers on Thursday morning resulted as follows: President, G. W. Rear, general bridge inspector, Southern Pacific, San Francisco; first vice-president, C. E. Smith, consulting engineer, St. Louis, Mo.; second vice-president, E. B. Ashby, chief engineer, Lehigh Valley, New York; third vice-president, S. C. Tanner, master carpenter, Baltimore & Ohio, Baltimore, Md.; fourth vice-president, Lee Jutton, division engineer, Chicago & North Western, Madison, Wis.; secretary-treasurer, C. A. Lichty, general inspector, Chicago & North Western, Chicago. Members of the executive committee were chosen as follows: F. E. Weise, chief clerk, engineering department, Chicago, Milwaukee & St. Paul, Chicago; J. S. Robinson, division engineer, Chicago & North Western, Chicago, and J. P. Wood, supervisor bridges and building, Pere Marquette, Saginaw, Mich.

SUPPLY ASSOCIATION

The Bridge and Building Supply Men's Association held an exhibit in a room adjoining the one in which the meeting was

held, with about 25 firms represented. The exhibits consisted largely of models, samples, photographs and literature. The officers of this association for the past year were: President, J. A. Meaden, Paul Dickinson Company; vice-president, D. A. Bonitz, National Roofing Company; secretary, L. D. Mitchell, Detroit Graphite Company; treasurer, H. A. Neally, Joseph Dixon Crucible Company.

At the annual meeting held on Thursday morning the following officers were elected: President, D. A. Bonitz, National Roofing Company, Tonawanda, N. Y.; vice-president, H. A. Neally, Joseph Dixon Crucible Company, Jersey City, N. J.; treasurer, L. D. Mitchell, Detroit Graphite Company, Detroit, Mich.; secretary, P. O. Jacobs, H. W. Johns-Manville Company, Chicago. Members executive committee: H. H. Husted, Asphalt Ready Roofing Company, New York; M. J. Trees, Chicago Bridge & Iron Works, Chicago; and W. H. Pratt, Heath & Milligan Company, Chicago.

The following firms had exhibits:

American Hoist & Derrick Company, St. Paul, Minn. Represented by F. J. Johnson and W. O. Washburn.

Asphalt Ready Roofing Company, New York City. Represented by C. A. Sparrowhawk and H. H. Husted.

American Valve & Meter Company, Cincinnati, Ohio. Represented by J. T. McGarry.

Barrett Manufacturing Company, New York City. Represented by J. I. Holder, E. J. Caldwell, K. C. Barth and A. C. Wiles.

Philip Carey Company, Cincinnati, Ohio. Represented by C. L. Cockrell.

Chicago Bridge & Iron Works, Chicago. Represented by M. J. Trees and C. S. Pillsbury.

Chicago Pneumatic Tool Company, Chicago. Represented by T. D. Slingman, C. E. Walker and F. McComber.

Joseph Dixon Crucible Company, Jersey City, N. J. Represented by H. A. Neally.

Detroit Graphite Company, Detroit, Mich. Represented by T. R. Wyles, J. J. Hogan, L. D. Mitchell, F. G. Hogan and E. Booth.

Paul Dickinson, Inc., Chicago. Represented by J. A. Meaden and A. J. Filkins.

Fairbanks, Morse & Co., Chicago. Represented by G. J. Akers, A. A. Taylor, E. M. Condit and K. P. Brown.

Heath & Milligan Company, Chicago. Represented by W. H. Pratt.

H. W. Johns-Manville Company, Chicago. Represented by P. C. Jacobs, W. H. Lawrence, C. E. Murphy, H. A. Waldron and J. C. Younglove.

The Lehon Company, Chicago. Represented by Thomas Lehon and D. B. Wright.

C. F. Massey Co., Chicago. Represented by C. F. Massey and Charles Gilman.

National Roofing Company, Tonawanda, N. Y. Represented by D. A. Bonitz.

George P. Nichols & Brother, Chicago. Represented by George P. Nichols.

The Patterson-Sargeant Company, Cleveland, Ohio. Represented by M. R. Stowell.

Pyrene Manufacturing Company, New York. Represented by W. H. Sherman and R. H. Neal.

Railway Age Gazette, Chicago. Represented by L. B. Sherman and E. T. Howson.

T. W. Snow Construction Company, Chicago. Represented by T. W. Snow.

Standard Asphalt & Rubber Company, Chicago. Represented by C. V. Eades and R. E. Kartack.

Toch Brothers, New York. Represented by A. H. Rhett.

United States Graphite Company, Saginaw, Mich. Represented by H. F. Gump, A. W. Walker and J. F. Lee.

U. S. Wind Engine & Pump Company, Batavia, Ill. Represented by C. E. Ward.

PENNSYLVANIA ANNUAL TRACK INSPECTION

The annual track inspection of the Pennsylvania Railroad east of Pittsburgh and Erie was made on October 5 and 6 by S. C. Long, general manager, and a party of about 350 operating officers. This inspection covered the main lines between New York and Pittsburgh and between Philadelphia and Washington. The first, or "Klondyke" prize of \$1,200, divided on the basis of \$800 for the supervisor and \$400 for the assistant, and awarded for the best maintained subdivision throughout the year, went to C. Z. Moore, supervisor, and L. R. R. Fleming, assistant supervisor, in charge of track between Dillerville, Pa., and Harrisburg. Premiums of \$800, \$600 for the supervisor and \$200 for the assistant supervisor, were awarded for the subdivision having the best line and surface on each of the four main line divisions. These prizes went to C. M. Wisman, supervisor, and H. M. Grimm, assistant supervisor, in charge of track between Tullytown, Pa., and Dean, N. J.; W. T. Hanly, supervisor, and J. B. Baker, assistant supervisor, in charge of track between Marysville, Pa., and Thompsonstown; R. H. Pinkham, supervisor, and F. N. Bradley, assistant supervisor, in charge of track between New Florence and Donohoe, Pa., and to G. H. B. English, supervisor, and C. M. Hursh, assistant supervisor, in charge of

track between Wilmington, Delaware, and Perryville, Maryland.

A special improvement prize of \$1,000, divided \$700 to the supervisor and \$300 to the assistant supervisor, offered for the greatest improvement made in line and surface on a supervisor's subdivision, was awarded to W. G. Shaner, supervisor, and T. K. Minsker, assistant supervisor, in charge of track between Baltimore and Springfield, Md.

These awards were not based entirely upon the general manager's inspection, but frequent inspections were also made during the year by a special committee composed of W. G. Coughlin, engineer maintenance of way; A. B. Clark, assistant engineer maintenance of way; J. J. Rhoads, superintendent Media division, and E. J. Cleave, superintendent, Cresson division. The methods of conducting this inspection were described in detail in an article by Joseph T. Richards, consulting engineer maintenance of way, in the issue of January 22, 1915.

THE ADVANTAGE AND COST OF SPIRALING CURVES*

BY W. F. RENCH

Supervisor, Pennsylvania Railroad, Perryville, Md.

It was universally the practice in the early days of railroads, as it very generally is today, to locate a line as a succession of tangents and circular curves with no provision for present or future easements. Although operation is possible over such an alignment it must necessarily be at a very moderate speed and even then accidents are of not infrequent occurrence. When locomotives were small and the greatest speed attainable was comparatively slow, the lack of easements for the lighter curves was not felt, but their absence from the sharper curves was always a source of trouble. Indeed, it is difficult to conceive how operation was otherwise than precarious upon many such curves that were devoid of easements. The presence of superelevation presupposes curvature and the very fact of a tangent track being several inches out of level, whether at the approach to a curve or elsewhere,

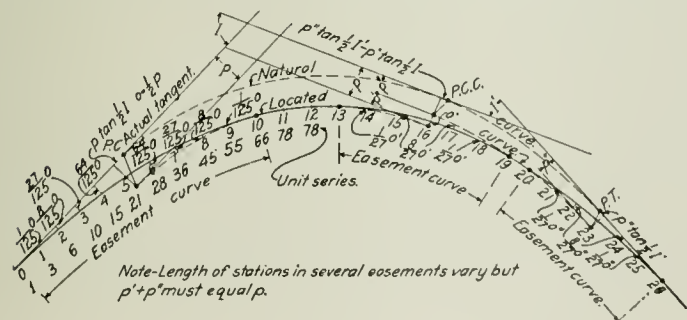
ing of curves the flat places developed by the outward throw of the ends were eliminated by lining the entire body of the curve inward, the throw being often as much as 6 in. Finally, when such methods, at first crude, were further improved, a complete adjustment was made on exact lines, the protrusions being removed, a more efficient easement provided and finer detail line of the curve attained. The last adjustment almost always consisted in making first an inward throw of the ends, both to remove the protrusions that makeshift correction or the natural movement with the traffic had produced and to flatten the curve for the easements, and then an outward throw through nearly the entire body of the curve, varying in amount from 2 in. to 6 in., to modify the sharp places which the previous throws had introduced at each extremity of the remaining arc. The net result of the several changes was a lengthening of the curve amounting to about 75 ft. on each end and a sharpening of the circular portion by about 3 per cent of the initial degree.

As affecting the question of introducing easements into the original location or at least of providing the means for such correction at a later time when the roadbed shall have settled, it will be instructive to study the cost of the relining necessary to attain this end when no such provisions has been made. It will no doubt be thought that the value of the labor thus spent is so indefinite as to be impossible of even approximate estimation. But the record of cost on a typical branch road of medium traffic and maintenance is offered as a suitable criterion. The road, which is cinder ballasted, is 44 miles long and the speed prescribed is 40 miles per hour. The alignment follows the shore of a river through all its points and bays and contains 185 curves, several as sharp as 8 deg., the average of all being 3 deg. 20 min. It is safe to say that each has had the three general lining adjustments referred to during the 20 years of the road's operation. The final correction of one-fourth of the curves was made quite recently and a measure of the expense is therefore readily obtainable.

For this last operation the average cost, including both the throwing and subsequent surfacing made necessary, was $3\frac{1}{3}$ cents per foot of curve. The throws were no greater than 6 in. and the average throw was $2\frac{1}{2}$ in. It is a conservative assumption that the total cost of the several adjustments was three times the cost of the one operation, or 10 cents per foot of curve. For the road in question on which the curves compose 57 per cent of the total length, the expense of adjustment was \$300 per mile of single track line. The labor necessary for spiraling the curves thus amounted to no less than \$13,000, a considerable sum, which would unquestionably have been largely saved if ultimate addition of easements had been provided for in the original alignment.

The type of easement that is most suitable for general use is the one that can be most readily designed for application with an instrument and that can be most easily maintained afterward by string lining. The cubic parabola, a curve whose deflection angles vary as the square of the distance and whose offsets vary as the cube of the distance, fulfills both requirements. The method of developing this curve in string lining was described in the *Railway Age Gazette* of May 15, 1914. The same relation between distance and deflection angles or offsets may be shown to apply to all spirals whose ordinates increase from a unit quantity by successive additions that are in an arithmetical progression with the difference equal to the unit quantity. Thus in the series of ordinates, 1 in., 3 in., 6 in., 10 in., 15 in., 21 in., in which the value of the unit is 1 in. and the maximum addition is 6 units, the curvature through each station would be represented by the mean of the adjacent ordinates or by the series $\frac{1}{2}$ in., 2 in., $4\frac{1}{2}$ in., 8 in., $12\frac{1}{2}$ in., 18 in., in which it is seen that the ratios of the several members to the first are as the squares of successive numerals, 2 being 4 times $\frac{1}{2}$, $4\frac{1}{2}$ being 9 times $\frac{1}{2}$, etc.

The use of such a series extended as far as necessary, with the unit having the value suited to the individual case, will reduce to a minimum the labor of designing an easement.



A Study of a 10 and 6 Station Spiral with Offsets and Unit Series Ordinates

suggests the possibility of accident. The records of most branch roads contain the account of derailments occurring at the ends of curves, the causes of which were never satisfactorily ascertained. But the fact is pertinent that such accidents become noticeably fewer following the proper spiraling of the curves. With the increase of speed in both passenger and freight schedules the addition of easements has become not merely a refinement for comfort but a necessity for safety.

Various methods have been used in providing present easements on old lines. The first was usually to throw the ends of the curve outward, which served to remedy part of the defect. But the resulting protrusions beyond the tangents were both unsightly and to some extent uncomfortable. When adjoining curves turned in the same direction and the tangent between was short it readily appeared that a relining of the entire tangent would effect the necessary correction, although in most cases the protrusion was allowed to remain as the lesser of two evils. But as methods were evolved for the lin-

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The value of the unit to be used with this series in any particular instance may be obtained by dividing the ordinate of the body of the curve by the highest number in the series that is required by the length of easement adopted and the ordinates of the easement by multiplying each number of the series by the value of the unit. For example, if it is desired to use an easement curve five stations long the sixth number in the series, 21, would represent the ordinate coinciding with the ordinate of the main curve. If this were 8 in., the value of the unit for that easement would be 8 in. divided by 21, or $\frac{8}{21}$ in. The ordinates of the easement would then be $\frac{8}{21}$ in., $1\frac{1}{3}$ in., $2\frac{1}{3}$ in., $3\frac{1}{3}$ in., and $5\frac{1}{3}$ in. The mean of the adjacent ordinates changed to degrees of arc would supply the mean curvature through each station and one-half of this would give the deflection angles needed for applying the curve in an original location. Such a curve has been found in many cases to approximate closely the spiral developed by the more expert track foreman in lining by eye, so that it has the sanction of practical experience.

The error of the system in which the ordinates are made proportional to the distance cannot be better shown than by an exhibit in parallel.

Middle ordinate by the cubic parabola	Degree	Super-elevation	Degree	Middle ordinate by regular proportion
$\frac{1}{8}$ in.	0 min.	0 in.	...	...
$\frac{3}{8}$ in.	11 min.	$\frac{1}{8}$ in.	23 min.	$\frac{3}{8}$ in.
$\frac{5}{8}$ in.	23 min.	$\frac{1}{4}$ in.	45 min.	$\frac{5}{8}$ in.
$1\frac{1}{8}$ in.	41 min.	$\frac{1}{2}$ in.	1 deg. 07 min.	$1\frac{1}{8}$ in.
2 in.	1 deg. 00 min.	$\frac{3}{8}$ in.	1 deg. 30 min.	2 in.
$2\frac{3}{4}$ in.	1 deg. 22 min.	$\frac{1}{2}$ in.	1 deg. 53 min.	$2\frac{3}{4}$ in.
$3\frac{1}{2}$ in.	1 deg. 49 min.	$\frac{3}{4}$ in.	2 deg. 15 min.	$3\frac{1}{2}$ in.
$4\frac{3}{4}$ in.	2 deg. 23 min.	$\frac{1}{2}$ in.	2 deg. 38 min.	$4\frac{3}{4}$ in.
6 in.	3 deg.	$\frac{5}{8}$ in.	3 deg.	6 in.
6 in.	3 deg.	6 in.	3 deg.	6 in.

It will be noted that by this scheme a superelevation of $\frac{3}{4}$ in. obtains where the degree of curve is 23 min. and $1\frac{1}{3}$ in. where it is 45 min., but that by the cubic parabola the superelevations for similar degrees are respectively $1\frac{1}{3}$ in., and $2\frac{1}{4}$ in., which have been found by experience to be the correct selection for a speed of 70 miles per hour, and indeed, agree substantially with the theoretical value by the well-known formula of mechanics. No one can doubt that the superelevations by the former method are wholly insufficient and it is this condition mainly which causes the deflection noticed in going on and off such a curve, even when it is newly adjusted. Through the strain introduced by this deficiency there is a tendency toward quick distortion and the defect increases until a lurch is the inevitable result.

A brief resume of the effect of the final correction upon the alinement of the curves through a typical mile on the branch line mentioned above is given below in tabular form. The adjustment also involved some change in the direction of the tangent.

Name of curve	Original degree	Present degree	Original length	*Present length	Length of easement
State Line	7	$7\frac{1}{4}$	468	681	155
Frazer	8	$8\frac{1}{4}$	771	961	155
4th No. M. P. 14....	$1\frac{1}{2}$	$1\frac{3}{4}$	364	496	93
3rd No. M. P. 14....	3	$3\frac{1}{2}$	302	434	124
2d No. M. P. 14....	3	$3\frac{1}{2}$	413	589	124
1st No. M. P. 14....	4	$4\frac{1}{4}$	707	868	124
M. P. 14.....	4	$4\frac{1}{4}$	411	558	124

*Includes length of easements.

While the locating engineer may reasonably claim that in general it is an unnecessary refinement to stake out the detailed spiral curve preliminary to new construction, it cannot be denied that provision ought to be afforded for such adjustment and a statement of the practical working limits from the maintenance standpoint should be of service. It is believed that the situation will be met satisfactorily by the use of the following plan. Stake out the circular curve between imaginary tangents parallel to and a selected distance within the actual tangents. Shorten the circular curve on each end by half the length of the easement and locate points on the actual tangents at the same distance in the opposite direction. Re-locate the stakes marking the original ends of the circular curve a distance outward equal to one-half the se-

lected offset distance. This location will enable the track-laying forces to adjust the curve by eye with sufficient precision for the purpose of the new construction and will allow the final detailed adjustment to be made later at nominal expense.

The amount of the offset will depend upon the length of easement desired and this in turn will be governed by feasibility and the service required. The least offset that is of practical utility is one whose length in tenths of a foot is equal to the figure representing the degree of curve. This will provide an easement curve with a half length of 60 ft. If a longer easement is desired and is not impracticable, the offset distance would be increased in proportion to the square of the half length. For a very satisfactory adjustment upon a branch of medium traffic such as the case described above, the half length of easement might be made 75 ft. and the offset distance would then be equal in tenths of a foot to $1\frac{1}{2}$ times the figure for the degree of curve.

If a run-off at no greater rate than $\frac{1}{2}$ in. to 30 ft. were desired for a 4 deg. curve to be operated at 40 miles per hour with the superelevation of 3 in. attained 60 ft. upon the circular curve the half length of 60 ft. would be proper and the offset distance would be 0.4 ft., but if the same curve were part of an important main line route to be operated at 55 miles per hour and the rate of the run-off for the 6 in. of superelevation necessary were desired to be as low as 1 in. to 100 ft., a half length of 250 ft. would be required and the offset distance would be 7 ft. In the latter case it would be necessary to stake out the entire easement curve, preferably by 50 ft. stations, and the above described methods would apply or, if preferred, the location might be made by offsets, for one-half the easement curve from the actual tangent and for the other half by similar offsets in inverse order from the located circular curve. With this method, equal stations could be used when the several offsets would be the proportion of that at the middle of the easement determined by the cube of their relative distance from the ends of the easement. Thus, in the case cited the first offset would be $1/125$ th of 3.5 ft. or 0.028 ft. and the several other offsets, respectively, 8, 27 and 64 times this, or 0.22 ft., 0.76 ft., and 1.79 ft.

The same methods would of course apply to the easement between two curves of considerably different curvature. The offset distance between the imaginary tangents at the P. C. C. would then be computed from the difference in the numbers representing the degree of the two curves and the several offsets would be measured from the two circular arcs. The unit middle ordinate would be obtained by dividing the difference between the ordinates of the two curves by the highest number of the series applicable and the spiral ordinates then obtained would each be increased by the amount of the ordinate of the lighter curve.

In fitting the spiral curve as determined by its middle ordinates to the same curve as determined by its offsets it must be noted that there necessarily is an ordinate at the beginning of the spiral and while by the geometric requirements of the curve this ordinate will be of the unit value, which should always be used in the design, the actual value when measured with the chord extended half upon the curve and half upon the tangent will be one-half the unit value. It should also be understood that the circular arc commences one station back of the first point of full ordinate and ends one station in advance of the last point of full ordinate.

GERMAN-MADE RAILWAY THROUGH BELGIUM.—It is reported that the construction of the new railway line between Aix-la-Chapelle and Brussels, via Vise, is being vigorously pushed forward. German workmen are busy day and night. The building of a new bridge near Lische will begin shortly. The railway through Belgium will be an almost straight line, without regard to private property or natural obstacles. It appears that the German authorities consider the railway of the greatest importance, not only for the present, but also for the future.

General News Department

The twenty-ninth annual convention of the Canadian Ticket Agents' Association was held at Denver, Colo., on October 18.

A Union Pacific combination passenger and baggage motor car fell off a bridge weakened by high waters into a creek near Randolph, Kan., on October 16, causing the deaths of 16 passengers, it is reported, and injuring a large number of others. A trailer remained on the track.

On Wednesday afternoon Charles S. Mellen, president of the New York, New Haven & Hartford from 1903 to 1913, took the witness stand in the criminal suit against the New Haven directors under the anti-trust law described in detail the traffic situation in New England previous to July 2, 1890.

The Employees' Relief department of the Baltimore & Ohio is now 35 years old and the aggregate amount of its payments, to June 30, 1915, is \$20,096,883. More than half this sum went to pay for sick benefits and death benefits having no connection with accidents. The relief department fund lends money to employees of the road, to assist them in buying homes, and in the last fiscal year the sum of \$1,440,000 was lent for this purpose.

Five men held up a freight train on the Erie Railroad in Bergen cut, near Glen Rock, N. J., on the night of October 20, and attempted to steal part of the contents of a freight car supposed to contain silk. It is thought that the train was stopped by tampering with the air brake hose and when the trainmen got down to make an examination they were held up by five men. While one of the men kept the trainmen covered the others broke into the freight car, but before the contents of the car could be unloaded two railroad detectives, who were riding on the train, came up and began firing into the car. The robbers returned the fire, but managed to get away to an automobile waiting nearby.

The Erie's Eightieth Anniversary

On Saturday, November 6, the Business Men's Association of Deposit, N. Y., will celebrate, with a parade and speeches, the eightieth anniversary of the Erie. On November 7, 1835, the first ground was broken for the Erie Railroad at Deposit, N. Y. At the time that this construction work was begun the president of the company, James G. King, made the prediction that fully 200,000 tons of freight would be transported over the railroad a year. Last year the Erie handled 42,874,315 tons of freight.

The Value of Motor Cars

At the meeting of the New York Railroad Club on Friday, October 15, a paper on "The Value of Motor Cars on Railroad Systems" was read by W. R. McKeen, Jr., consulting engineer, motor cars, Union Pacific. Mr. McKeen laid stress on the value of motor car service in stimulating passenger travel and stated that by this means an increase ranging from 50 to 100 per cent may easily be obtained in from 6 to 12 months. Among those taking part in the discussion were A. W. Jones, General Electric Company; R. B. Williams, Jr., president, Central New York Southern, and D. F. Crawford, general superintendent motive power, Pennsylvania Lines West of Pittsburgh.

Lehigh Valley Buys New Equipment

The Lehigh Valley has announced that it has ordered 10 new Mikado type freight locomotives from the Baldwin Locomotive Works, that it will have 20 other engines rebuilt and equipped with superheaters, Walschaert valve gear, etc., and that it has contracted for a considerable addition to its floating equipment in New York harbor. This will include: a new steel tug, 109 ft. over all, with 28 ft. 1 in. beam and 11 ft. 6 in. depth, with a towing capacity of 10,000 tons; four 12 car capacity

and three 8-car capacity steel car floats; two 120-ft. barges and six 90-ft. barges. The company has also bought a 500-ton capacity gasoline hoisting lighter.

Including the new freight locomotives, the 20 locomotives which are to be overhauled and improved, another 100 locomotives recently rebuilt and equipped with superheaters, and the 2,000 box cars rebuilt in outside shops, together with the harbor boats just ordered, the Lehigh Valley has spent over \$2,500,000 for equipment in the last few months.

Head-On Collision on the Rock Island

In a head-on collision on the Chicago, Rock Island & Pacific between a southbound passenger train, No. 11, and a northbound freight, No. 98, on a curve at Agawam, south of Chickasha, Okla., early Tuesday morning, two firemen, one brakeman and four tramps were killed, and 45 passengers were more or less injured and the two engineers were seriously injured. Both trains received a 31 order for train 11 to wait at Agawam until 1.15 and at Rush Springs until 1.25 for train 98. As the collision occurred half a mile west of Agawam at 1.08 or 1.09, the passenger engineer apparently must have failed to obey the order. On Wednesday he was still unconscious, so there has been no statement from him.

The freight engineer was late with a train of livestock and left Rush Springs at 12.55, with 20 minutes to go about seven miles and clear passenger train by 10 minutes. About one hundred head of cattle were killed and both engines and several cars were seriously damaged. The tramps were killed riding on the blind baggage car. There are no block signals in this territory.

I. C. C. Issues Circular on Car Shortage

The Interstate Commerce Commission has recently issued a circular giving warning of a possible car shortage and urging co-operation to obtain the greatest efficiency in the use of the car supply. The commission says:

"Informal complaints to the commission indicate that the annually recurring failure of transportation facilities known as 'car shortage' is again appearing. The commission urges on all shippers and all carriers that close attention to methods of loading, unloading, moving, and promptly returning to use the cars now available will go far toward making the present supply of cars sufficient for all purposes.

"In order that the business of the country may go forward without interruption, the commission urges shippers, both individually and through their associations, to co-operate to secure the prompt and full loading of cars and their prompt release. One of the chief causes of failure of car supply in past seasons has been the unnecessary detention of cars by careless shippers and by shippers using them for storage purposes. In the general public interest, shippers should endeavor to release cars at the earliest possible moment without regard to the free time given by the tariffs.

"All the efforts of the shippers will be unavailing, however, unless the carriers also use extraordinary measures to eliminate all delays chargeable to them. The failure of car supply is usually a failure of car movement. The congestion of terminals is the ever present feature at times of such failure. The commission therefore urges carriers to make every possible endeavor to improve their methods of operation of terminals in order that cars may move promptly. Also company material should be unloaded with the same despatch that is required of shippers.

"The commission is moved to make this appeal by its desire to save both shippers and carriers from the losses which are occasioned by failures of car supply, and by its knowledge that measures such as are here suggested to have operated in past seasons to save all concerned from heavy losses."

Howard Elliott, president of the New York, New Haven &

Hartford, has sent a copy of the circular to the newspaper editors, with the following letter asking the co-operation of its patrons:

"During the last few years, from various causes, the railroads of the country have been unable to make such additions to tracks, yards, equipment, and facilities as are now necessary to keep pace with the growth of business in the country. This is especially true in New England, and there is danger that there will not be transportation enough produced to meet the daily demands. The condition of the railroads in this respect is not different from many other large industrial plants that have more orders than they can fill.

"The danger of a shortage in transportation can be reduced if every user of it is very prompt and if he co-operates with the railroad in trying to make the best of a difficult situation. Shortage of trackage, oftentimes, causes us much, if not more, trouble than shortage of cars, and close co-operation between shippers and carriers will help prevent congestion, the result of which does harm not only at the particular point where it exists, but all along the line.

"The New Haven management is using every effort it can put forth to obtain the full use of all its facilities and to furnish all the transportation it can, and asks the help of its patrons at this time when facilities in many places are overtaxed."

Summary of Revenues and Expenses of Steam Roads

The Bureau of Railway Economics' summary of revenues and expenses of railways and comments thereon for July, 1915, are as follows:

Net operating income of the railways of the United States for July increased \$39 per mile, or 13.3 per cent, as compared with July, 1914. This increase was due in the main to reductions in expenses, which have been effected in all parts of the country. In July, 1914, net operating income per mile was 3.1 per cent less than in July, 1913.

Total operating revenues amounted to \$258,526,363, an increase from 1914 of \$2,567,724. Operating expenses were \$171,-

90 per cent of the steam railway mileage in the United States.

Operating revenues of the eastern railways per mile show an increase of 3.8 per cent as compared with July, 1914, operating expenses decreased 3.9 per cent, net operating revenue increased 22.5 per cent, taxes decreased 0.3 per cent and operating income increase 26.2 per cent.

Operating revenues of the southern railways per mile decreased 4.5 per cent, operating expenses decreased 9.2 per cent, net operating revenue increased 9.7 per cent, taxes increased 1.9 per cent and operating income increased 11.2 per cent.

Operating revenues of the western railways per mile show a decrease of 1.4 per cent, operating expenses decreased 3.1 per cent, net operating revenue increased 2.1 per cent, taxes increased 2.6 per cent and operating income increased 1.9 per cent.

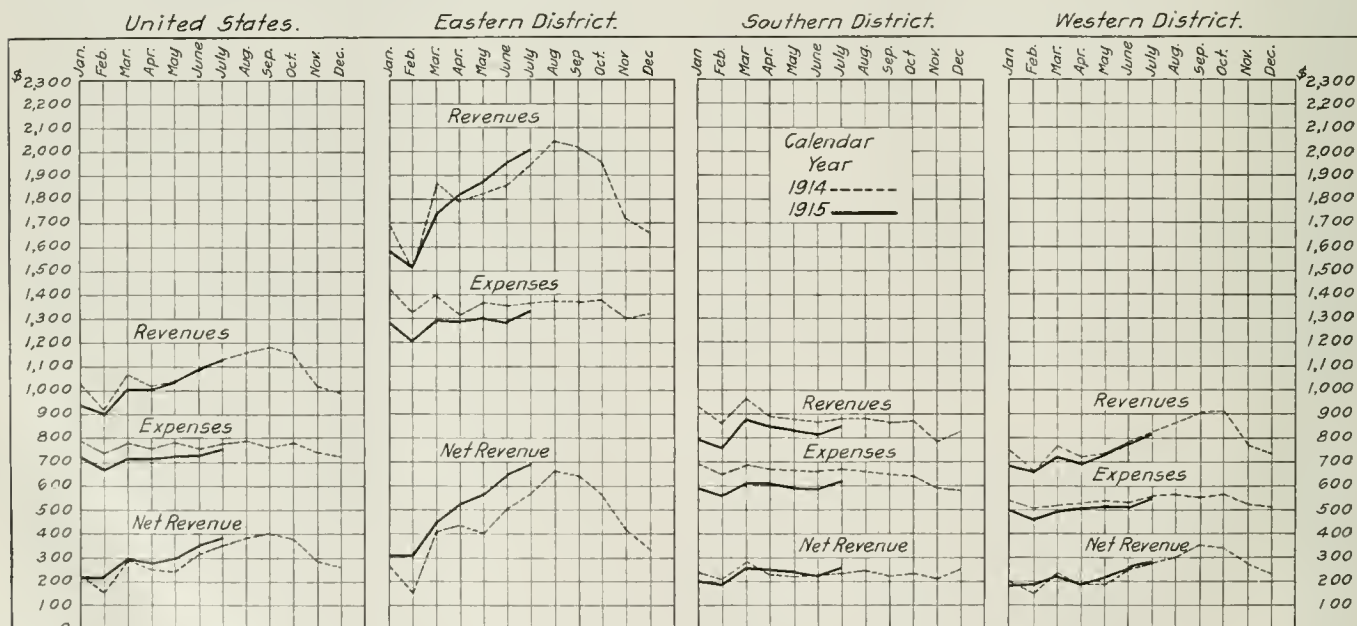
July net operating income per mile was 13.3 per cent greater in 1915 than in 1914, 10.4 per cent greater than in 1913, 7.2 per cent greater than in 1912 and 15.8 per cent greater than in 1911.

Transportation Club of Louisville

The first monthly meeting of the Transportation Club of Louisville, Ky., was held in the Seelbach Hotel in that city on October 19. The address of the evening was made by Samuel O. Dunn, editor of the *Railway Age Gazette*, on the subject of "Government and Business."

Chilled Car Wheel Manufacturers

At the annual meeting of the Association of Manufacturers of Chilled Car Wheels, held in New York on October 12, officers were re-elected as follows: President and treasurer, George W. Lyndon; vice-presidents, E. F. Carry and J. A. Kilpatrick; secretary George F. Griffin; consulting engineer, F. K. Vial. The board of directors consists of E. F. Carry, J. A. Kilpatrick, W. S. Atwood, Chas. A. Lindstrom, F. K. Vial, A. G. Wellington, W. C. Arthurs, J. D. Rhodes, F. B. Cooley, A. J. Miller and



Monthly Revenues and Expenses per Mile of Line in 1914 and 1915

526,861, a decrease of \$6,990,534. Net operating revenue amounted to \$86,999,502, an increase of \$9,558,258. Taxes amounted to \$11,574,582, an increase of \$217,588. This left \$75,377,176 for net operating income, available for rentals, interest on bonds, appropriations for improvements and new construction and dividends. Operating revenues per mile of line averaged \$1,130, an increase of 0.3 per cent; operating expenses averaged \$750, a decrease of 4.6 per cent; net operating revenue per mile averaged \$380, an increase of 11.5 per cent, while net operating income per mile was \$330, an increase of 13.3 per cent. Taxes per mile increased 1.2 per cent. Railways operating 228,713 miles of line are covered by this summary, or about

Wm. F. Cutler. An abstract of President Lyndon's address appeared in last week's issue, page 690.

Milwaukee Veterans' Association

A large number of employees and officers of the Chicago, Milwaukee & St. Paul, who had been in the service of the road for 25 years or more, held a meeting at Chicago on October 14, and organized the Milwaukee Veterans' Association. Among those present at the meeting were President A. J. Earling, who began work for the company 52 years ago as a telegraph operator; John C. Fox, of Janesville, Wis., who operated one of the three

locomotives first operated by the road, now a roundhouse foreman, and J. H. Flynn of Chicago, a conductor, who has been in the service of the road for 52 years.

Association of Passenger Traffic Officers

A special meeting of the American Association of Passenger Traffic Officers is to be held at French Lick Springs, Ind., October 26-27. Several suggested means of economy will be discussed and reports received from committees on printing and distribution of folders, on passenger train service, on economical operation of city ticket offices, and on checking of baggage.

General Baggage Agents' Association

The annual convention of the American Association of General Baggage Agents was held at Kansas City, Mo., on October 13 and 14. The meeting was devoted mainly to a discussion of baggage rules. The question of whether the Western roads should adopt the declaration of value as a protection against unlimited liability under the Cummins amendment was discussed but no action taken. Uniform symbols for recording the

June Mechanical Conventions

A joint meeting of the executive committees of the Master Car Builders' Association, the American Railway Master Mechanics' Association and the Railway Supply Manufacturers' Association will be held at the Hotel Statler, Cleveland, Ohio, Monday, November 15, at 10 a.m. The object of the meeting will be to decide upon the dates for the June conventions, as well as the place of the meetings, and also to discuss other details of the joint work of these three associations. It is planned also to hold separate meetings of the executive committees of each one of the associations after the joint meeting. The meeting is being held at Cleveland because of the illness of President MacBain, of the Master Car Builders' Association, who expects, however, to be sufficiently recovered by November 15 to participate.

Operating Revenues and Expenses of Express Companies for June, 1915

The following statement, which is subject to revision, has been compiled by the Interstate Commerce Commission from the monthly reports of operating revenues and expenses of the principal express companies for June, 1915:

A—FOR THE MONTH OF JUNE

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.*		Great Northern Express Co.	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Mileage of all lines covered (miles)	44,930.22	38,382.94	74,292.79	61,518.83	9,476.50	7,680.31	.....	2,839.78	9,582.80	9,333.29
Charges for transportation.....	\$3,188,128	\$2,732,546	\$4,262,444	\$3,535,967	\$272,671	\$431,186	\$5,150	\$61,463	\$299,022	\$302,617
Express privileges—Dr.....	1,496,811	1,520,511	2,131,540	1,747,330	136,491	286,154	2,290	29,759	172,362	171,760
Operations other than transp.....	49,495	35,204	299,237	160,182	5,450	11,867	8	834	4,839	4,503
Total operating revenues.....	1,740,822	1,246,928	2,430,140	1,968,819	141,831	156,900	2,867	32,538	131,499	136,360
Operating expenses.....	1,529,943	1,483,296	2,120,712	1,982,375	123,239	131,391	2,072	29,706	86,099	101,051
Net operating revenue.....	210,878	236,368	309,428	13,556	13,591	25,508	795	2,831	45,400	35,309
Uncollectible revenue from transp.	516	.....	534	.....	5	.....	.....	.....	20	.....
Express taxes.....	12,407	22,916	39,392	37,103	7,948	7,249	345	649	3,708	3,908
Operating income.....	197,954	259,284	269,502	50,659	5,637	18,259	449	2,182	41,671	31,400

Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for All Companies Named†	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Mileage of all lines covered (miles)	8,233.03	8,118.34	34,665.60	33,704.60	114,692.12	99,017.36	5,232.87	5,174.26	301,105.94	296,708.04
Charges for transportation.....	\$284,846	\$293,910	\$1,120,676	\$1,198,531	\$3,588,923	\$2,674,714	\$120,119	\$107,966	\$13,142,193	\$12,877,185
Express privileges—Dr.....	152,877	157,547	576,713	611,374	1,832,468	1,386,708	55,469	56,881	6,557,026	6,844,858
Operations other than transp.....	3,869	3,329	22,897	23,782	73,667	61,622	3,451	2,655	462,917	324,717
Total operating revenues.....	135,839	139,692	566,860	610,940	1,830,122	1,349,629	68,100	53,740	7,048,084	6,357,034
Operating expenses.....	90,320	99,109	514,900	950,376	1,555,857	1,214,324	53,364	51,497	7,051,509	5,621,321
Net operating revenue.....	45,519	40,582	51,960	60,561	274,264	135,304	14,736	2,243	966,575	264,797
Uncollectible revenue from transp.	0	1	67	.....	1,320	.....	12	.....	2,486	2
Express taxes.....	5,641	10,875	12,922	15,338	30,714	34,426	925	1,109	114,006	146,792
Operating income.....	39,867	29,705	38,970	45,222	242,229	100,878	13,798	1,134	850,088	411,591

B—FOR THE TWELVE MONTHS ENDING WITH JUNE

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.*		Great Northern Express Co.	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Charges for transportation.....	\$34,631,486	\$33,242,622	\$46,735,415	\$41,644,555	\$3,117,113	\$3,341,340	\$601,549	\$669,411	\$3,138,116	\$3,245,470
Express privileges—Dr.....	17,167,041	17,532,432	23,458,860	20,836,894	1,554,427	1,666,472	305,433	286,570	1,903,533	1,970,919
Operations other than transp.....	508,498	370,820	2,387,912	2,143,482	60,570	114,732	8,110	9,882	52,688	50,594
Total operating revenues.....	17,972,943	16,081,010	25,664,467	22,951,142	1,623,255	1,789,599	306,226	342,723	1,287,271	1,325,146
Operating expenses.....	15,068,935	16,642,653	24,660,305	23,214,574	1,536,528	1,661,834	298,630	357,916	1,858,575	1,086,304
Net operating revenue.....	115,992	761,643	1,004,162	263,431	83,726	127,765	7,595	15,193	228,696	238,842
Uncollectible revenue from transp.	6,075	.....	3,149	207	100	.....	.....	.....	123	.....
Express taxes.....	104,931	203,743	417,934	381,337	51,948	28,949	11,195	12,049	45,155	45,650
Operating income.....	316,998	965,386	583,078	544,977	31,677	38,816	3,599	27,242	183,417	136,162

Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for All Companies Named†	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Charges for transportation.....	\$2,778,502	\$3,015,841	\$14,085,099	\$15,664,012	\$38,555,664	\$31,353,229	\$1,183,707	\$1,198,037	\$144,826,744	\$152,717,014
Express privileges—Dr.....	1,515,586	1,637,573	7,278,117	8,041,709	19,724,414	15,816,159	602,151	661,285	73,507,565	78,216,462
Operations other than transp.....	40,250	38,967	300,382	328,812	794,633	668,765	37,522	28,835	4,131,068	4,052,362
Total operating revenues.....	1,303,256	1,417,236	7,107,864	7,951,115	19,565,882	16,205,855	619,073	565,567	75,450,247	78,552,914
Operating expenses.....	1,060,617	1,093,203	6,302,800	6,889,890	17,860,839	14,732,252	623,333	598,655	71,493,566	76,951,121
Net operating revenue.....	242,639	324,032	805,063	1,061,224	1,705,043	1,473,602	4,254	28,068	3,956,681	1,601,793
Uncollectible revenue from transp.	204	41	662	127	10,677	.....	114	.....	21,308	377
Express taxes.....	60,541	60,375	172,957	181,438	413,293	462,425	11,837	10,836	1,379,994	1,470,541
Operating income.....	381,792	263,615	631,443	879,608	1,280,572	1,071,178	16,206	38,904	2,555,479	1,38,873

* Discontinued operations April 30, 1915.

† Figures for 1914 include returns of United States Express Co., which ceased operations as of June 30, 1914.

description of and damage to baggage were adopted for the entire country. It was decided to appoint five standing committees to consider the subjects of standard baggage rules, arbitration, baggage checks; standard forms for office methods and accounting, and telegraph code to which matters pertaining to these subjects will be referred for report. The following officers were elected: President, John F. Dugan, general baggage agent, Baltimore & Ohio, Baltimore, Md.; secretary-treasurer, J. E. Quick, general baggage agent, Grand Trunk, Toronto, Ont. It was decided to hold the next annual meeting at Boston, Mass., on June 21, 1916.

American Association of Railway Surgeons

The twelfth annual meeting of the American Association of Railway Surgeons was held at the Hotel Sherman, Chicago, on October 13, 14 and 15. President George F. Beasley, surgeon of the Chicago, Indianapolis & Louisville and the Cleveland, Cincinnati, Chicago & St. Louis, at Lafayette, Ind., presided. In addition to a large number of papers and discussions on technical medical and surgical subjects, one session of the meeting was devoted to papers and discussions on "The Railway Surgeon and His Work," which included the following papers: "The Local

Surgeon and His Duties," by G. W. Pirtle, surgeon, Chicago & Eastern Illinois, Carlisle, Ind.; "Some Vexations of the Railway Surgeon," by E. T. Easley, surgeon of the Chicago, Indianapolis & Louisville at New Albany, Ind.; "Accidents and How to Prevent Them," by B. M. Hart, surgeon of the Chicago & North Western at Blunt, S. D.; "Railway Accidents in the Country and Care of the Injured," by W. J. Ragan, surgeon of the Chicago & North Western at Shawano, Wis., and "A Plea for Scientific First Aid," by John S. McAtee, surgeon of the Illinois Central at Council Bluffs, Iowa.

The following were elected officers for the ensuing year: F. T. Fort, surgeon Illinois Central, Louisville, Ky.; vice-presidents, J. M. Dodd, Minneapolis, St. Paul & Sault Ste. Marie, Ashland, Wis.; E. H. Griswold, Wabash, Peru, Ind.; C. P. Frantz, Chicago, Burlington & Quincy, Burlington, Iowa; treasurer, H. B. Jennings, Chicago, Rock Island & Pacific, Council Bluffs, Iowa; secretary-editor, Louis J. Mitchell, Chicago, Milwaukee & St. Paul, Chicago, Ill.

Association of Railway Electrical Engineers

The eighth annual convention of the Association of Railway Electrical Engineers was held at the La Salle Hotel, Chicago, October 19, 20, 21 and 22, H. C. Meloy, New York Central (West), presiding. The following is a list of the exhibitors at the Convention:

Adams & Westlake Company, Chicago—Straight and drop handle car brake, roundhouse headlight and lighting fixtures. Represented by W. J. Pierson, A. S. Anderson, G. L. Walters and J. F. Stender.

American Pulley Company, Philadelphia, Pa.—Axle pulleys. Represented by C. P. Englehart and J. F. Forrest.

Albert & J. M. Anderson Manufacturing Company, Boston, Mass.—Plugs and receptacles. Represented by W. W. Hinchey.

Benjamin Electric Manufacturing Company, Chicago—Reflectors and lighting fixtures. Represented by H. E. Watson, J. B. Weher and A. Aelueck.

Central Electric Company, Chicago—Okonite wires and cables, Ralco receptacles and plugs, Maxolite reflectors, fans and other car lighting fixtures. Represented by J. M. Lorenz, L. G. Martin, D. Woodhead, E. C. Wilson, R. N. Baker and A. L. McNeil.

Consolidated Railway Electric Lighting & Equipment Company, New York—Regulator panels and dynamo.

Crouse-Hinds Company, Syracuse, N. Y.—Condolets, panel boards and roundhouse headlights. Represented by A. F. Hills, C. H. Bissell, E. G. Smith, M. J. Kiefer, F. F. Skell, Walter Fagan, C. Dubsky, E. C. Otto and C. N. Crowfoot.

Cutter Company, George, South Bend, Ind.—Switchboards and lighting fixtures. Represented by O. B. Duncan and F. L. Curl.

Darling-Henric Manufacturing Company, New York—Locomotive headlights. Represented by L. A. Darling and M. S. Jordan.

Edison Storage Battery Company, Orange, N. J.—Storage batteries. Represented by H. G. Thompson, W. F. Bauer, E. V. McGinniss and C. A. Luckey.

Electric Storage Battery Company, Philadelphia, Pa.—E S B axle lighting outfit and panel switchboards. Represented by G. H. Atkin, J. Lester Woodbridge, H. M. Beck, H. E. Hunt and O. R. Shortall.

General Electric Company, Schenectady, N. Y.—Lighting cable, testing instruments and arc-welding sets. Represented by B. F. Bilsland, R. H. Parker, S. W. McCune, Jr., J. Scribner and C. C. Bailey.

Gould Coupler Company, New York—Regulating panel, generator and lead battery accessories. Represented by G. R. Berger and J. W. Jepson.

Harter Manufacturing Company, Chicago—Lighting fixtures. Represented by G. A. Harter, W. M. Soffe and D. E. Warrel.

Hart & Hegeman Manufacturing Company, Hartford, Conn.—Paiste switches and taplets. Represented by H. L. Everest, Jr., W. W. Winslip and F. C. Church.

Kerite Insulated Wire & Cable Company, New York—Wire and cables. Represented by B. L. Winchell, Jr., W. N. Feuley and J. A. Hamilton.

Krantz Mfg. Company, Brooklyn, N. Y.—Lighting and control panels with safety switches and automatic emergency relay switch. Represented by I. A. Bennett.

National Lamp Works of General Electric Company, Cleveland, Ohio.—Mazda lamps. Represented by A. M. Klingman and L. C. Kent.

National Metal Molding Company, Pittsburgh, Pa.—Metal molding, Sherardized conduit, Flex-steel conduit, outlet boxes and a complete line of fittings for these devices. Represented by H. C. Moran and J. A. Bennett.

Oneida Steel Pulley Company, Oneida, N. Y.—Corrugated bushing axle pulley. Represented by N. G. Stark.

Pyle National Electric Headlight Company, Chicago—Arc and incandescent headlights. Represented by W. Miller, Crawford P. McGinnis, J. Will Johnson, and W. T. Bretherton.

Safety Car Heating & Lighting Company, New York—Underframe axle equipment, regulating devices and car lighting fixtures. Represented by C. A. Pinyard, A. C. Moore, H. E. Hulse, J. H. Rodger and W. I. Thompson.

Sangamo Electric Company, Springfield, Ill.—Recording ampere hour meters and circuit breakers. Represented by C. H. Koehler, M. B. Southwick, J. T. Hartley and T. M. Torzillo.

Schroeder Headlight Company, Evansville, Ind.—Sunbeam headlights, 32-volt and 6-volt incandescent generators. Represented by J. Henry Schroeder and E. H. Wrenner.

Standard Underground Cable Company, Pittsburgh, Pa.—Cable and fittings. Represented by E. J. Pietzcker, W. M. Rogers, Elbert J. Norton and H. K. Weld.

United States Light & Heating Corporation, New York. Car lighting generators, panels, batteries and various parts of lighting apparatus. Represented by C. C. Bradford, R. C. Halsey, John Roddell, H. A. Mathews, R. E. Stuntz and O. A. Schlesinger.

Western Electric Company, New York—Loud speaking telephone receiver, lamps and portable telephones. Represented by J. C. Benning and George H. Porter.

Westinghouse Lamp Company, New York.—Mazda locomotive headlight lamps. Represented by W. H. Rolanson, A. N. Brown and J. G. Harvey.

Willard Storage Battery Company, Cleveland, Ohio.—No-wash type train lighting batteries and accessories. Represented by L. Sears, W. E. Ballantyne, R. M. Newbold and E. L. Myers.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, October 26-27, 1915, French Lick Springs Hotel, French Lick Springs, Ind.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, Chicago.

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

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.

ASSOCIATION OF RAILWAY ELECTRIC ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual meeting, October 18-24, 1915, Chicago.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.

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

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

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

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

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

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

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

MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

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

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

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

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

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915. Waldorf-Astoria Hotel, New York.

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

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

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

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

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

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

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

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

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

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

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.

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

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

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

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

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF AUGUST, 1915

Name of Road.	Average mileage operated during period.	Operating revenues			Maintenance of way and structures			Operating expenses			Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.
		Freight.	Passenger.	Total (inc. misc.)	Way and structures.	Equipment.	Traffic.	Trans- portation.	Miscellaneous.	General.	Total.			
Atlantic City	170	\$80,558	\$297,551	\$380,209	\$24,362	\$24,145	\$6,160	\$152,183	\$105	\$2,217	\$209,172	\$10,000	\$170,980	\$11,059
Belt Railway Co. of Chicago	24	527,885	273,089	800,974	13,784	26,522	35,786	89,793	810	33,336	135,474	10,758	70,610	63,672
Central of Georgia	1,924	1,643,336	352,992	2,130,328	160,226	321,091	26,873	62,123	23,861	62,888	188,238	56,500	82,678	20,219
Delaware & Hudson Co.-R. R. Dept. ..	886	1,511,444	38,216	200,378	48,345	48,345	8,671	86,006	.....	9,313	211,745	10,110	1,477	26,852
Kansas City, Mexico & Orient	3,931	1,756,269	522,560	2,502,841	364,824	582,983	70,761	835,826	12,806	72,181	1,939,050	99,418	461,938	167,762
Missouri Pacific	1,120	3,360,921	576,944	4,144,200	377,452	876,392	51,128	1,365,362	11,729	65,146	2,745,642	100,654	1,267,697	159,316
Philadelphia & Reading	21	102,504	128,591	231,095	10,928	11,945	38	42,709	.....	354	65,972	10,000	52,970	10,935
Port Reading	468	161,890	125,611	327,198	46,649	55,652	9,843	104,883	1,129	5,183	223,338	9,861	86,998	10,935
Rutland	258	87,869	31,966	129,496	26,961	25,422	4,356	44,763	.....	5,152	106,655	7,620	15,147	7,620
St. Joseph & Grand Island	3,363	1,952,954	474,264	2,608,518	364,167	610,684	64,215	701,707	7,137	64,194	1,811,807	110,935	683,339	78,570
St. Louis, Iron Mountain & Southern ..	943	422,372	117,285	576,520	49,669	98,574	23,607	154,408	3,574	83,252	335,596	30,492	190,199	20,402
St. Louis, Southwestern	4,750	2,376,801	1,003,444	3,600,001	578,380	515,809	64,165	1,133,769	.....	83,252	2,348,595	117,491	1,136,637	4,255
St. Louis & San Francisco	548	1,46,807	74,273	221,079	32,577	38,118	5,106	62,947	.....	10,529	148,939	6,500	85,415	19,663
St. Louis, Brownsville & Mexico	9	.....	195	156,385	16,721	16,721	735	69,578	.....	5,311	100,311	6,540	19,488	1,488
St. Louis, Merchants' Bridge Terminal ..	244	56,600	22,456	85,605	24,087	15,064	1,920	38,765	.....	5,311	85,146	1,216	860	6,600
St. Louis, San Francisco & Texas	811	177,906	84,434	285,675	59,063	81,883	12,021	137,654	606	17,355	294,231	15,032	23,733	6,312
St. Louis, Southwestern of Texas	724	207,434	102,248	335,082	62,995	56,641	6,701	147,559	.....	11,661	285,504	15,732	33,846	693
San Antonio & Aransas Pass	1,132	488,789	369,700	958,193	81,069	128,829	32,994	255,463	29,024	16,892	544,270	51,292	362,604	165,439
San Pedro, Los Angeles & Salt Lake ..	3,123	1,038,542	385,821	1,576,580	214,181	254,116	57,501	553,317	7,851	57,990	1,144,965	92,251	338,763	24,235
Seaboard	7,022	3,300,676	1,573,237	5,311,892	700,675	893,534	156,677	1,767,504	27,774	157,013	3,690,312	228,233	1,390,639	285,487
Southern	6,928	5,633,571	3,872,790	10,571,661	1,075,074	1,411,703	188,761	2,989,412	225,439	215,089	6,090,727	413,035	4,065,538	1,255,070
Southern Pacific	556	227,909	197,780	466,785	42,324	35,888	9,059	92,012	4,298	12,059	195,374	53,400	217,928	14,430
Spokane, Portland & Seattle	11	30,960	33,798	110,601	6,097	3,988	734	37,924	.....	2,548	51,291	5,910	54,310	6,699
Staten Island Rapid Transit Co.	248	63,871	41,470	110,618	17,375	26,445	1,905	39,745	.....	3,589	99,939	4,935	26,979	3,111
Tennessee Central	451	373,790	42,807	444,466	49,221	82,208	15,315	138,112	.....	2,891	111,318	27,334	88,776	19,041
Terminal R. R. Ass'n of St. Louis	35	.....	368,339	1,422,680	175,089	254,096	39,058	557,258	13,033	39,967	1,075,663	72,000	274,487	3,301
Texas & Pacific	1,944	211,343	91,841	331,247	31,666	71,492	6,405	120,954	7,287	10,650	268,419	18,335	44,179	16,644
Texas and New Orleans	468	331,082	58,361	418,381	64,215	73,414	7,173	140,316	1,758	10,650	268,419	18,335	44,179	16,644
Tellico & Ohio Central	436	63,871	41,470	110,618	17,375	26,445	1,905	39,745	.....	3,589	99,939	4,935	26,979	3,111
Tulsa, Ponca & Western	248	63,871	41,470	110,618	17,375	26,445	1,905	39,745	.....	3,589	99,939	4,935	26,979	3,111
Toledo, St. Louis & Western	451	373,790	42,807	444,466	49,221	82,208	15,315	138,112	.....	2,891	111,318	27,334	88,776	19,041
Union R. R. of Baltimore	3,617	3,267,860	1,117,596	4,907,941	670,385	599,039	122,479	1,139,480	98,233	113,067	2,736,640	174,456	1,969,931	127,818
Union R. R. of Pennsylvania	91	649,780	211,859	920,619	142,627	174,715	23,215	329,255	.....	2,861	289,457	8,500	234,362	143,139
Vandalia	30	.....	37,900	116,027	19,905	26,513	3,241	39,796	9,459	23,147	702,454	38,252	239,721	12,280
Vicksburg, Shreveport & Pacific	171	65,975	37,900	116,027	19,905	26,513	3,241	39,796	2,127	4,489	96,071	8,100	11,856	1,986
Virginia & Southwestern	240	133,356	14,667	152,719	25,726	33,186	2,071	40,916	.....	3,301	105,292	47,427	11,305	11,305
Virginian	504	542,968	44,114	622,197	70,484	97,606	5,281	117,672	12,412	13,709	311,775	28,846	289,916	62,907
Wabash	2,519	1,941,168	639,327	2,813,256	363,959	408,826	81,665	972,207	16,462	10,099	1,903,694	90,562	82,309	62,907
Washington	36	37,715	41,903	105,515	9,982	11,437	1,475	36,175	1,147	3,054	63,282	42,234	3,384	3,384
Washington Southern	36	37,715	41,903	105,515	9,982	11,437	1,475	36,175	1,147	3,054	63,282	42,234	3,384	3,384
West Jersey & Seashore	356	224,803	224,803	1,018,421	115,859	115,859	12,593	284,337	.....	13,649	542,075	28,742	47,585	12,408
Western Pacific	941	320,651	340,278	722,592	115,076	61,960	23,018	194,074	24,705	17,453	436,285	30,501	255,761	161,018
Western Maryland	664	757,784	112,638	906,674	106,246	144,102	22,245	290,908	5,386	18,496	587,383	27,000	292,291	90,872
Western Ry. of Alabama	133	46,426	35,777	93,197	16,591	21,371	5,714	28,283	2,827	4,319	79,105	5,113	218,807	1,905
Wheeling & Lake Erie	512	553,937	66,197	667,793	100,570	100,819	10,209	188,666	1,417	13,467	415,118	33,850	218,807	101,586
Yazoo & Mississippi Valley	1,382	762,041	188,502	996,254	171,177	165,501	17,394	323,014	1,337	26,259	706,549	50,000	239,589	69,369

TWO MONTHS OF FISCAL YEAR, ENDING JUNE 30, 1916.

Name of road.	Average mileage operated during period.	Operating revenues			Maintenance of —			Operating expenses				Net from railway operation.	Railway tax accruals.	Operating income (or decr.) comp. with last year.	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total (inc. misc.)	Way and structures.	Equipment.	Traffic.	Trans- portation.	Miscellaneous.	General.	Total.				
Adelphi City	170	\$159,889	\$568,575	\$750,470	\$47,984	\$48,317	\$8,404	\$297,201	\$185	\$5,952	\$408,039	\$20,000	\$322,375	-\$855	
Belt Railway Co. of Chicago	24	527,885	273,089	800,974	13,784	26,522	35,786	89,793	810	33,336	135,474	10,758	70,610	63,672	
Central of Georgia	1,924	1,643,336	352,992	2,130,328	160,226	321,091	26,873	62,123	23,861	62,888	188,238	56,500	82,678	20,219	
Delaware & Hudson Co.-R. R. Dept. ..	886	1,511,444	38,216	200,378	48,345	48,345	8,671	86,006	.....	9,313	211,745	10,110	1,477	26,852	
Kansas City, Mexico & Orient	3,931	1,756,269	522,560	2,502,841	364,824	582,983	70,761	835,826	12,806	72,181	1,939,050	99,418	461,938	167,762	
Missouri Pacific	1,120	3,360,921	576,944	4,144,200	377,452	876,392	51,128	1,365,362	11,729	65,146	2,745,642	100,654	1,267,697	159,316	
Philadelphia & Reading	21	102,504	128,591	231,095	10,928	11,945	38	42,709	.....	354	65,972	10,000	52,970	10,935	
Port Reading	468	161,890	125,611	327,198	46,649	55,652	9,843	104,883	1,129	5,183	223,338	9,861	86,998	10,935	
Rutland	258	87,869	31,966	129,496	26,961	25,422	4,356	44,763	.....	5,152	106,655	7,620	15,147	7,620	
St. Joseph & Grand Island	3,363	1,952,954	474,264	2,608,518	364,167	610,684	64,215	701,707	7,137	64,194	1,811,807	110,935	683,339	78,570	
St. Louis, Iron Mountain & Southern ..	943	422,372	117,285	576,520	49,669	98,574	23,607	154,408	3,574	83,252	335,596	30,492	190,199	20,402	
St. Louis, Southwestern	4,750	2,376,801	1,003,444	3,600,001	578,380	515,809	64,165	1,133,769	.....	83,252	2,348,595	117,491	1,136,637	4,255	
St. Louis & San Francisco	548	1,46,807	74,273	221,079	32,577	38,118	5,106	62,947	.....	10,529	148,939	6,500	85,415	19,663	
St. Louis, Brownsville & Mexico	9	.....	195	156,385	16,721	16,721	735	69,578	.....	5,311	100,311	6,540	19,488	1,488	
St. Louis, Merchants' Bridge Terminal ..	244	56,600	22,456	85,605	24,087	15,064	1,920	38,765	606	17,355	294,231	15,032	23,733	6,312	
St. Louis, San Francisco & Texas	811	177,906	84,434	285,675	59,063	81,883	12,021	137,654	.....	5,311	85,146	1,216	860	6,600	
St. Louis, Southwestern of Texas	724	207,434	102,248	335,082	62,995	56,641	6,701	147,559	.....	11,661	285,504	15,732	33,846	693	
San Antonio & Aransas Pass	1,132	488,789	369,700	958,193	81,069	128,829	32,994	255,463	29,024	16,892	544,270	51,292	362,604	165,439	
San Pedro, Los Angeles & Salt Lake ..	3,123	1,038,542	385,821	1,576,580	214,181	254,116	57,501	553,317	7,851	57,990	1,144,965	92,251	338,763	24,235	
Seaboard	7,022	3,300,676	1,573,237	5,311,892	700,675	893,534	156,677	1,767,504	27,774	157,013	2,745,642	100,654	1,267,697	159,316	

Traffic News

The New York state canals are to be closed at midnight, November 30, unless sooner closed by ice.

The ocean-going ferry, Henry M. Flagler, carrying freight cars between Key West and Havana, is being worked to its full capacity and officers of the Florida East Coast say that the facilities will soon be increased by the addition of another boat. It is proposed to build a vessel with a capacity of 38 cars. The Henry M. Flagler carries 28 cars.

The Chicago, Milwaukee & St. Paul Railway has issued a booklet, entitled "New Towns and Business Opportunities," containing a list of the industrial, business and professional openings existing in the towns and cities along the St. Paul's line, together with valuable information concerning the population and the existing state of business development.

The annual meeting of the National Industrial Traffic League will be held at the Congress Hotel, Chicago, on November 17 and 18. The annual dinner is to be held on the evening of Wednesday, November 17. The speakers will be George T. Buckingham, president, Chicago branch, National Security League, and E. J. McVann, manager traffic bureau, Commercial Club of Omaha, Neb.

According to the Canal Record, on October 5, there were 83 vessels tied up in the Panama Canal on account of the slides at Culebra, awaiting passage. Of these 45 were on the Atlantic side with an aggregate of approximately 167,000 tons of cargo, and 38 were on the Pacific side with approximately 189,000 tons of cargo. A number of boats which had intended passing through the canal are taking their cargoes around via the Straights of Magellan.

The railroads terminating at Hampton Roads, Virginia,—the Norfolk & Western, the Chesapeake & Ohio and the Virginian—announce that after January 1, 1916, the freight rates on coal from the mines to tide water, when intended for use as fuel on vessels, will be advanced from \$1.40 a ton to \$1.50. The lower rate is that on export coal and the advance is in accordance with the Interstate Commerce Commission's ruling that coal to be used on the vessels must not be treated as export freight.

The results of the diversified farming campaign conducted by the St. Louis, Iron Mountain & Southern are now becoming manifest. Already this season 41 cars of wheat have been received from stations on the Arkansas, Memphis and Valley divisions which heretofore have shipped no wheat and where many thought it could not be successfully grown. In all about 225 cars of the grain have been shipped from the cotton territory of Arkansas, and millers pronounce it the equal of any for commercial milling. Four parishes alone along the Iron Mountain, in Northeast Louisiana, raised over 1,500,000 bushels of oats this year, and the farmers had little difficulty in selling their entire surplus for an average of about 42 cents a bushel. Twenty-seven cars of corn have been received from stations on the Arkansas, Louisiana and Valley divisions, which last year supplied only two cars. The United States Department of Agriculture estimates that the 1915 corn crop in Arkansas and Louisiana will be about 36,000,000 bushels in excess of that produced in 1914. D. C. Welty, commissioner of agriculture, has posted in waiting rooms a large placard on marketing corn. It gives valuable information as to gathering the grain, storing it on the farm, fumigating it for weevils, preparing it for market and grading it.

The Florida State Board of Health is having built, by the Pullman Company, three cars to be used for a traveling exhibition of the board throughout the state. Two of the cars will be used for models, photographs, exhibits, apparatus, moving picture outfit and everything connected with this line of work. It is the plan of the board to equip these cars, using the third for living purposes, and to traverse the state, giving exhibitions of first-aid to injured, prevention of disease, clean living methods, and everything pertaining to health operations for the benefit of the young.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Rates on Salt from St. Clair, Mich.

Diamond Crystal Salt Company v. Michigan Central, et al. Opinion by Commissioner McChord.

The commission holds that a through rate of 67.4 cents per 100 lb. on salt in car loads from St. Clair, Mich., to California terminals is not unreasonable or discriminatory and dismisses the complaint. (36 I. C. C., 172.)

Switching Charges at South Omaha, Neb.

Opinion by Commissioner Daniels.

The commission finds that the railroad operated by the Union Stock Yards Company of Omaha, Neb., between the transfer tracks of the carriers and certain industries, etc., has justified an increase from \$1 to \$6 for switching livestock between connecting lines and private chutes of packing houses and an increase from \$2 to \$3 for switching dead freight between connecting lines and other departments of the stockyards company and for switching dead freight as an intermediate carrier between the connecting lines. A proposed increase from \$2 to \$3 for switching dead freight to non-proprietary interests on respondent's line.

Figures were offered to show that the carrier was not earning sufficient return on its investment, but these were not sufficiently accurate and the commission held that even in case the earnings on the railroad property were shown to afford an inadequate return on the investment, the question would arise whether the increase should be sought mainly from dead freight in which the respondent is interested only as a carrier or from livestock in which the respondent is interested not only as a carrier but as the proprietor of a stockyard. (36 I. C. C., 198.)

The Extension of Credit to Consignees

American Coal & Coke Company v. Michigan Central. Opinion by Commissioner Clements.

The complainant, a coal company in Detroit, alleges that it is discriminated against by the action of the carrier in refusing to extend credit to it for freight and demurrage charges on coal in carloads consigned to it at Detroit, while extending such credit to its competitors. The situation was somewhat complicated by the refusal of a number of dealers, including the complainant, to pay demurrage charges on coal consigned to Detroit and held at Windsor, Ont. The complainant, however, had also been delinquent in its payments on other charges than the demurrage in question and suit had been brought against it by the carrier, although no suits had been brought against other dealers who had refused to pay demurrage. The commission holds as follows: The complainant appears to have refused to pay any demurrage charges, whenever and however accruing. This put complainant in a different attitude from that of other patrons and left the defendant no other reasonable alternative but to demand payment of its lawful charges before delivery of the freight. The fact that suit was commenced against the complainant and not against its competitors, does not prove undue prejudice within the meaning of the act. The obligation, under penalties of the law, is upon the defendant to collect its established charges from all by such lawful methods as may be suitable and necessary for the purpose. (36 I. C. C., 195.)

Lateral Allowances on Shipments of Anthracite Coal

In re allowances on anthracite coal at Hauto and Nesquehoning, Pa. Opinion by Commissioner McChord.

The commission in this case orders the Central of New Jersey to cancel tariffs in issue proposing to pay to the Lehigh Coal & Navigation Company certain lateral allowances out of the rates on shipments of anthracite coal from Hauto and Nesquehoning, Pa. These allowances were considered in *Rates for transportation of anthracite coal* (35 I. C. C., 220), reported

in the *Railway Age Gazette* of August 20, 1915, page 314. The Lehigh Coal & Navigation Company leases to the Central of New Jersey the lines of the Lehigh & Susquehanna Railway, for which the New Jersey Central has paid upwards of 10 per cent yearly. The Central of New Jersey in addition has transported coal for the coal company at reductions of from 11 to 23 cents below tariff rates. These so-called lateral allowances result from the tenth covenant of the lease, in which it is provided that on coal delivered by the Navigation company on sidings at the northern end of the Nesquehoning tunnel the rates should not exceed the rates from Penn Haven. The carrier, however, has published in tariff form a higher basis of rates on this traffic and at the close of the month has paid back the allowances mentioned. In the anthracite case the commission held that "the payment of the allowances is an unlawful discrimination against competing shippers, who are charged the full tariff rates," and that "even if the amounts of these allowances were published, their payment is the payment of a rebate, and hence unlawful. But, since these allowances were not published, their payment is also clearly unlawful as being a departure from the published tariffs." These findings are now reaffirmed. (36 I. C. C., 166.)

Loss and Damage Claims on Eggs Delivered at New York City Piers

New York Mercantile Exchange, et al v. Baltimore & Ohio et al. Opinion by Commissioner Daniels.

Complaint is made against the reasonableness of the carriers' rules relating to the delivery of eggs in the metropolitan district of New York. The rules of the Baltimore & Ohio are typical and are as follows:

Where cases of eggs are received at shipping point and receipted for on other than order bills of lading as in apparent good order (contents and condition of contents of package unknown) and arrive at destination in the same apparent good condition and show no external evidence of damage, no inspection of the contents of such cases will be permitted before delivery thereof to the consignee, and the consignee will be required to accept and receipt for same subject to the same conditions under which the shipment was received for transportation, viz., as in apparent good order (contents and condition of contents of packages unknown).

Where cases show external evidence of damage, consignee shall have the privilege of inspecting the contents of such damaged cases, such inspection to be made jointly with carrier's representative and receipt taken in accordance with the actual ascertained condition of the property.

These rules were put in force largely as a result of abuse in the matter of loss and damage claims whereby some of the carriers were obliged to pay as much as from 20 to 60 per cent of their total revenue on this traffic in claims.

The commission holds: The rule in vogue delimits investigation at docks, piers and stations to cases showing external evidence of damage. The demand for investigation at docks, piers and stations of all cases is precluded by considerations of time, space and cost. The rule simply requires of consignees that where external evidence of damage is absent they receipt for the cases in the same terms as the carrier receipted for the cases when offered for shipment, and can not be said to be unjust or unreasonable.

The enforcement of the rules in issue is cared for by the inspection bureau of the Trunk Line Association. The commission finds no reason why the carriers at a common terminal may not intrust to a joint agent work allotted elsewhere to a carriers' immediate employees. (36 I. C. C., 156.)

STATE COMMISSIONS

The Texas Railroad Commission has issued a notice that it will hear arguments in the advance rate case on October 26.

Wells, Fargo & Co. have filed with the Railroad Commission of California a petition for a rehearing to set aside the order of the commission of September 10, denying its application to increase its rates in California for transportation of merchandise.

The Illinois Public Utilities Commission has announced a series of hearings on the tariffs filed by the railroads, advancing freight rates in the state five per cent, to correspond with the advances allowed by the Interstate Commerce Commission last December. The tariffs have been suspended several times by the state commissions. The first hearing will be held on November 9, and four days will be devoted to a general presentation of the case, including financial and accounting matters. Other days

will be devoted to evidence on specific commodities, the hearings to be concluded on January 13.

The California Railroad Commission has issued a circular to shippers, stating that during the next few months a great number of cars will be required to handle California traffic, and that transportation lines fear that the extremely heavy east-bound carload business to be handled will materially affect the number of cars which will be available for local traffic. The commission therefore urges that all shippers and receivers of freight in carload lots use every effort to load and unload cars in the shortest time possible, and wherever practicable to load cars to their full capacity, thereby reducing the number of cars required.

COURT NEWS

The California Supreme Court holds that a railroad employee who was killed while in a roundhouse repairing a switching engine which had been withdrawn from service in the operating department three days before the accident, and was not returned to service until three days afterwards, and which was one of many such engines used both for intrastate and interstate commerce, but 70 per cent of the work of which was interstate commerce, was engaged in interstate commerce within the act, and therefore the case was not within the jurisdiction of the state accident board.—*Southern Pacific v. Pillsbury* (Cal.), 151 Pac. 277.

Flooding Land—"Unprecedented Flood"

The Alabama Supreme Court holds that a railroad company, constructing and maintaining an embankment with a culvert of sufficient size to carry off the water from ordinary rainfall, is not liable for overflowing the land of another because of the insufficiency of the culvert to carry off water caused by an "unprecedented flood," which may be defined as such an unusual and extraordinary rainfall as has no example or parallel in the history of rainfall in the vicinity affected, or as affords no reasonable warning or expectation that it will likely occur again.—*Nashville, C. & St. L. v. Yarbrough* (Ala.), 69 So. 582.

Proportional Rates

The Circuit Court of Appeals for the Fourth circuit holds that a joint proportional rate of 97 cents on coal from the Kanawha district in West Virginia to Toledo, the coal being for lake shipment beyond, does not apply to coal which though originally intended for lake shipment, was sold and delivered at Toledo as bunker coal. The shipper was bound to pay the lawful rate then in force on coal consigned to Toledo, \$1.68, and the railroad had no option except to collect it. The reasonableness of that rate was a question for the commission, not for the courts.—*Hoeking Valley v. Lackawanna Coal & Lumber Co.*, C. C. A., 224 Fed. 930.

Preferential Rates—Unfavorable Locality—Switching Service—Terminal Facilities

The Louisiana Supreme Court holds that there is no rule of reason or of law which imposes on a railroad the burden of compensating, by preferential rates, the disadvantage resulting from unfavorable location under which either a community or a particular shipper may labor. An order of the Railroad Commission which throws on one railroad, out of several, the entire burden of putting an unfavorably situated place on a parity, as to freight rates, with a place that is favorably situated; which declares certain handling of freight cars between different stations, which is necessary to the delivery of the freight at its destination, to be "switch movements," and fixes a flat rate therefor, which is below the cost of the movement, the court holds to be unreasonable and properly annulled. Where freight is received for transportation, and delivered by the same carrier, or by a connecting carrier, who is a party to a through contract, the charge for transportation and delivery is largely regulated by the character of the commodity, and as some classes of goods are more valuable and some involve greater expense than others, the charge is determined accordingly, and includes the entire service. But there is no rational theory upon which

one of the carriers, in any such case, can be entitled to the highest rate and another be required to accept the lowest.

Switching service, as between railroad companies, is usually reciprocal, and it is inconceivable that when a particular company has hauled a carload of high class freight to the end of its road, it should have the right to require a connecting company to continue the haul and deliver the car at its ultimate destination as a switch movement, at a fixed price, without regard to the character of the contents of the car; and especially is that true where there is no possibility of its rendering a reciprocal service to such connecting carrier.

It is also held that it is unreasonable to suppose that a railroad company can afford to acquire extensive terminal facilities, build, maintain and operate a drawbridge, at an original cost of \$276,662 and an annual expense exceeding \$2,000, and charge no more for the use of such facilities, in the hauling, unloading and handling of cars, than for ordinary switching operations upon a track costing \$11,000 a mile.—Vicksburg, S. & P. v. Railroad Commission, La., 69 So. 161.

Where Shipper Accompanies Cattle

Shippers agreed to load, transship and unload horses at their own risk, and during the transportation thereof to unload them whenever necessary, and one of the shippers accompanied them to take care of them. The New York Appellate Division holds that the carrier was not liable under the rest, food and water act for injuries caused by confinement for more than 36 hours, whether or not it had any sufficient excuse to offer to the federal authorities, especially where the shipper accompanying the horses never requested or desired that they be unloaded.

Where the car was equipped with ventilators and windows, it was the duty of the shipper accompanying the horses to open the ventilators, or cause the carrier to do so, and where he made no effort in that direction the carrier could not be held liable for injuries to the horses from lack of ventilation.—Haner v. Fargo, 151 N. Y. Supp., 913.

Extra Fares—Interference by Courts

New York law provides for the filing of tariffs, together with regulations determining the aggregate of rates in each particular case. Section 49 confers upon the commission a supervisory control, and whenever it deems tariffs or regulations unreasonable, it may determine the just and reasonable rates. An interurban electric railway filed a schedule providing for an extra charge to the passenger of 10 cents where he had not purchased a ticket. The plaintiff was ejected from defendant's car for refusal to pay the extra charge, and brought action on the ground that, the regulation being unreasonable, he was justified in refusing to pay. The New York Appellate Division holds that he had no standing to bring the action, the attack being on the rule itself, and not on the manner of its enforcement, and the reasonableness thereof being for the initial determination of the Public Service Commission, and not for the court.—Metzger v. New York State Rys., 154 N. Y. Supp. 789.

"Location" of Farm Crossing

An owner of land crossed by a railroad conveyed land to the company needed in making changes in the railroad, the deed providing that the company at some convenient place should construct an overhead crossing for the landowner, the location to be selected by the latter. The landowner designated a site, on which the company built a bridge at right angles to the track. The landowner claimed that the bridge was useless to him unless built diagonally across the track. There was evidence that it was the uniform method to construct such bridges at right angles to the road, so as to prevent obstructing the view of the enginemen and weakening the bridge, and that, if the bridge had been built diagonally, the approaches would have encroached on the land of another owner. The Kentucky Court of Appeals held that the bridge as constructed was a substantial compliance with the contract, as to "locate" a thing means to place it and not to design or construct it, and neither party could be allowed to arbitrarily exercise his right under the contract to the manifest injury or detriment of the other party.—Chesapeake & Ohio, Ky., 176 S. W. 22.

Railway Officers

Executive, Financial, Legal and Accounting

Z. G. Hopkins has been appointed special representative in charge of publicity for the Missouri, Kansas & Texas, with office at St. Louis, Mo., effective October 12.

Robert J. Mills, assistant to the president of the Streets Company, of Chicago, has resigned, and his duties have been taken over by W. L. Marston, vice-president and treasurer.

W. A. McDowell, secretary and general manager of the Lexington & Eastern, has been appointed general agent of the executive department of the Louisville & Nashville, with headquarters at Lexington, Ky.

Operating

W. McAuley, general yardmaster of the Winnipeg Joint Terminals, at Winnipeg, Man., has been appointed trainmaster, vice H. J. Hunt, promoted.

David J. Hagerty, trainmaster of the Northern Pacific at Missoula, Mont., has resigned to enter the traffic department of the Canadian Pacific at Saskatoon, Saskatchewan.

F. E. Harvey has been appointed assistant trainmaster of the Beech Creek sub-division of the New York Central Pennsylvania division, with headquarters at Jersey Shore, Pa., vice G. W. Bullock.

W. E. Bell has been appointed acting chief assistant to manager of telegraphs of the Grand Trunk and the Grand Trunk Pacific with headquarters at Montreal, Que., during absence on leave of A. P. Linnell.

J. C. Sesser, division superintendent of the Great Northern at Whitefish, Mont., has been transferred to Superior, Wis. J. J. Dowling, superintendent of safety, with headquarters at St. Paul, Minn., has been appointed to succeed Mr. Sesser.

H. C. Grout, general superintendent of the Atlantic division of the Canadian Pacific, at St. John, N. B., having been given leave of absence, A. C. Mackenzie, engineer maintenance of way, at Montreal, Que., has been appointed acting general superintendent, Atlantic division.

G. Collins, superintendent of the Canadian Northern at Trenton, Ont., has been appointed superintendent of branch lines, Toronto district, with jurisdiction over Picton, Maynooth, Tweed, Irondale and Kingston subdivisions with headquarters at Trenton, Ont., and P. H. Fox, chief dispatcher at Trenton, Ont., has been appointed chief dispatcher of the Toronto district with office at Rosedale, Toronto.

W. R. Kelly, assistant superintendent of the Canadian Northern at Trenton, Ont., has been appointed superintendent of the Lake Superior district, with office at Capreol, Ont., and the jurisdiction of this superintendency is extended over the Nipigon subdivision to Current. W. J. Curle, superintendent at Toronto, has been transferred to the Toronto district as assistant superintendent, with office at Toronto, and R. J. Kelly has been appointed trainmaster of the Lake Superior district, with office at Hornepayne, vice A. J. Gayfer, transferred.

C. M. Dukes, general chairman of the Brotherhood of Railway Trainmen, has been appointed assistant to the general manager of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, Ill. He was born at Marion, Iowa, on November 17, 1868, and following a common school education entered the service of the St. Paul as a freight brakeman, in 1890. He was promoted to yardmaster of the same road, at Cedar Rapids, Iowa, and later became a freight conductor. In 1902, he was elected general chairman of the Brotherhood of Railway Trainmen, with headquarters in Milwaukee, Wis. He remained in this position until his recent appointment on October 15.

J. F. Murphy, general superintendent of the Missouri Pacific-St. Louis, Iron Mountain & Southern with headquarters at St. Louis, Mo., has been appointed general manager to succeed J. W. Higgins, resigned, to become chairman of the General Managers' Association of Chicago. John Cannon, superintendent of

the Eastern division, with headquarters at Jefferson City, Mo., has been appointed general superintendent of the Eastern district, vice J. F. Murphy. W. E. Brooks, superintendent of the Illinois division at Illmo, Mo., has been appointed superintendent of the Eastern division to succeed Mr. Cannon. H. H. Berry, trainmaster, has been promoted to the position vacated by Mr. Brooks. Effective November 1.

Traffic

Clarence E. Becker has been appointed district freight agent of the Canadian Pacific, with headquarters at Omaha, Neb.

J. D. Clardy has been appointed commercial agent of the Missouri, Oklahoma & Gulf, with headquarters at Ft. Worth, Tex., vice J. S. Smith, resigned.

H. G. Dowling has been appointed commercial agent of the Atlanta, Birmingham & Atlantic, with office at Waycross, Ga., vice O. M. Williams, resigned.

H. A. Johnson, general freight and passenger agent of the Colorado & Southern, with headquarters at Denver, Col., has been promoted to traffic manager.

P. D. Freer has been appointed division freight agent of the Cincinnati, Hamilton & Dayton and the Baltimore & Ohio Southwestern, at Chillicothe, Ohio, vice N. G. Spangler, resigned. H. E. Warburton has been appointed division freight agent of the Cincinnati, Hamilton & Dayton at Dayton, Ohio, vice P. D. Freer, promoted. Effective October 15.

Engineering and Rolling Stock

Victor R. Walling, first assistant engineer of the Chicago & Western Indiana, has been appointed principal assistant engineer, in charge of construction and maintenance, with office at



V. R. Walling

Chicago. Mr. Walling graduated from Kansas University in 1901, receiving the degree of Bachelor of Science, and in 1911 received the honorary degree of C. E. from the same school. From June, 1901, to December, 1901, he was with the Greene Cananea Copper Company as draftsman and transitman; in 1902 he was with the Southern Pacific on preliminary surveys and location, leaving to return to the Greene Cananea Copper Company, with which he remained until June, 1912, when he entered the service of the Chicago & Western Indiana.

While with the Greene Cananea Copper Company he held the positions of assistant engineer, first assistant engineer and superintendent in charge of railroad, mill and smelter construction and of superintendent in charge of maintenance and operation of the railroad. Since he has been with the Western Indiana he has had charge of the construction of clearing yard and shops, the track elevation on the Belt Railway between Belt Junction and the Pan Handle crossing along Seventy-fifth street and of the present track elevation work south of Seventy-first street on the Western Indiana main line, involving the elevation of over 40 miles of tracks.

J. Graham, assistant roadmaster of the Canadian Pacific, with headquarters at North Bend, B. C., has been appointed roadmaster, with office at Nelson, B. C.

C. R. Hening, roundhouse foreman of the Michigan Central at Kensington, Ill., has been appointed general foreman of the machine shop at Michigan City, Ind.

H. P. Thomas has been appointed supervisor of Division

No. 20 of the Pennsylvania Railroad, with office at Hollidaysburg, Pa., vice W. E. Brown, promoted.

W. E. Guignon, division engineer of the Pennsylvania Lines West at Zanesville, Ohio, has been transferred to Logansport, Ind., vice A. C. Watson, transferred to Cleveland, Ohio.

C. T. Delamere, acting engineer of construction of the Canadian Pacific, at Montreal, Que., has been appointed acting engineer maintenance of way, Eastern Lines, vice A. C. Mackenzie appointed acting general superintendent, Atlantic division.

E. Eley, division car foreman of the Canadian Pacific at North Bay, Ont., has been appointed master car builder, eastern lines, with office at Montreal, Que., vice F. B. Zercher, and Gordon Sproule has been appointed acting engineer of tests, with office at Montreal, vice E. B. Tilt, resigned.

W. C. Moore, master mechanic of the Ottawa division of the Canadian Northern at Trenton, Ont., has been appointed master mechanic of the Toronto district, with headquarters at Trenton, Ont. J. H. McAlpine, locomotive foreman at Winnipeg, Man., has been appointed master mechanic, Lake Superior district, with office at Parry Sound, Ont.

Samuel G. Thomson, superintendent of motive power and rolling equipment of the Philadelphia & Reading at Reading Pa., having resigned, Irwin A. Seiders, fuel inspector at Reading, has been appointed superintendent of motive power and rolling equipment, and Clyde C. Elmes, assistant engineer of motive power, at Reading, has been appointed assistant superintendent of motive power and rolling equipment.

Curtis C. Westfall, whose appointment as engineer of bridges of the Illinois Central has been announced, was born on July 14, 1886, at Bushnell, Ill. He graduated from the University of Illinois in 1907, and in June of the same year entered the employ of the Illinois Central. He remained with this road in the capacities of draftsman and assistant engineer in both the bridge and construction departments until August, 1911. From August, 1911, to January, 1913, he was assistant engineer in connection with the Grand Crossing track elevation work in Chicago, Ill. From January, 1913, to October, 1913, he was chief engineer in charge of the construction of 70 miles of railroad in North Dakota. From November, 1913, to October, 1915, he was assistant engineer in the bridge department of the Illinois Central.

G. P. MacLaren has been appointed division engineer of the Toronto district of the Canadian Northern, with office at Rosedale, Toronto, Ont.; A. J. Gayfer has been appointed division engineer of the Lake Superior district with office at Capreol, Ont.; J. D. Evans, division engineer at Trenton, Ont., has been appointed supervisor of bridges and buildings, with office at Trenton; F. McKay, supervisor of bridges and buildings at Toronto, has been appointed supervisor of bridges and buildings, with office at Capreol, Ont.; E. Myers, roadmaster at Trenton, Ont., has been appointed supervisor of track, with office at Rosedale, Toronto, Ont.; W. M. Jacklin, inspector of tracklaying on construction at Port Arthur, Ont., has been appointed supervisor of roadway, with office at Hornepayne, Ont.; J. MacDonald, supervisor of track, Central Ontario and Quinte districts, at Trenton, Ont., has been appointed supervisor of track with jurisdiction over Maynooth, Picton, Irondale and Tweed subdivisions, Toronto district, with office at Trenton; J. R. Audet has been appointed supervisor of roadway, Capreol to Oba, Lake Superior district, with office at Capreol, Ont., and E. Haystead, supervisor of track at Parry Sound, Ont., has been appointed supervisor of track, with office at Capreol.

OBITUARY

William Byrd King, vice-president and general manager of the Ft. Worth Belt until his resignation on account of ill health about a year ago, died in Ft. Worth, Tex., on October 11. He was born in Orange county, Va., on December 29, 1850, and entered railway service in 1869. Among the noteworthy positions he held were chief engineer of the Ft. Worth & Denver City, from 1889 to 1891; chief engineer, vice president and general manager of the Ft. Worth & Rio Grande, from 1891 to 1902; general manager of the stock yards at Ft. Worth, and his last office, with the Ft. Worth Belt, mentioned above.

John W. Logsdon, formerly superintendent of the Louisville & Nashville, died on October 8, at Pensacola, Fla., at the age of 59. Mr. Logsdon's entire railway service had been with the Louisville & Nashville. He began railway work in 1876 as agent's sistant agent, operator, agent, master of trains, general agent, clerk on that road, and subsequently served consecutively as as-superintendent of the Owensboro & Nashville division, assistant superintendent main stem (Second division) and Nashville & Decatur and Nashville, Florence & Sheffield divisions. From March, 1892, to August, 1900, he was superintendent of the Cumberland Valley division, and then was superintendent of the St. Louis and Henderson divisions, at Evansville, Ind., until December, 1914, when he retired from active duty on account of ill health.

James H. Foulds, Jr., formerly from February, 1910, to January, 1914, auditor of disbursements of the New York Central & Hudson River, died on October 4, at his home in White Plains, N. Y., after a long illness. Mr. Foulds was born at Salmon Falls, N. H., on September 26, 1862, and began railway work in the accounting department of the Boston & Albany at Springfield, Mass., in June, 1882. He was transferred to Boston in September, 1889, when the accounting department was moved to that city, and served as a clerk in the auditor's office until February, 1902, when he was transferred to the auditor's office of the New York Central & Hudson River, at New York city. In January, 1906, he was appointed chief clerk of the auditor's office, and on February 1, 1910, was appointed auditor of disbursements, from which position he retired on January 1, 1914, on account of ill health.

Robert H. Hill, formerly from January, 1895, to May, 1906, auditor of the Lake Shore & Michigan Southern, died on October 14, at West New Brighton, Staten Island, N. Y. He was born on February 25, 1832, at London, England, and began railway work in 1858, as a clerk on the Michigan Southern & Northern Indiana, subsequently merged in the Lake Shore & Michigan Southern. From 1863 to 1864 he was freight agent of the same road at West Detroit, Mich., and then for one year was freight agent at Detroit. He subsequently served for one year as contracting agent at Chicago, and from 1866 to 1869 was chief clerk in the freight department of the same road. In 1869 he was appointed chief clerk of freight accounts of the Lake Shore & Michigan Southern, remaining in that position until 1890, when he was appointed auditor of freight receipts. From June, 1894, to the following January he was acting auditor and then was appointed auditor of the same road, from which position he retired in May, 1906, after a service of 48 years on the Lake Shore & Michigan Southern, now a part of the New York Central.



J. H. Foulds, Jr.



R. H. Hill

Equipment and Supplies

LOCOMOTIVE BUILDING

THE ST. PAUL UNION DEPOT is reported to have ordered 2 switching locomotives.

THE INTERSTATE RAILROAD has ordered 2 locomotives from the Baldwin Locomotive Works.

THE BALTIMORE & OHIO has ordered one Mallet type locomotive from the Baldwin Locomotive Works.

THE RARITAN RIVER has ordered one Consolidation type locomotive from the Baldwin Locomotive Works.

THE CEMENT, TOLENAS & TIDEWATER is in the market for 1 Mikado type locomotive with 20½ by 28 in. cylinders.

THE ARTHUR IRON MINING COMPANY, F. A. Bushnell, purchasing agent, St. Paul, Minn., is in the market for 8 locomotives.

THE CENTRAL OF GEORGIA has ordered 8 Mikado type locomotives and 4 Pacific type locomotives from the Lima Locomotive Corporation.

THE MICHIGAN CENTRAL has ordered 7 Pacific type locomotives from the American Locomotive Company and is inquiring for 6 Mikado type locomotives.

THE ILLINOIS CENTRAL has ordered 47 Mikado type locomotives from the Lima Locomotive Corporation and 3 Santa Fe type locomotives from the American Locomotive Company.

THE LEHIGH VALLEY has ordered 10 Mikado type locomotives from the Baldwin Locomotive Works and has given the latter an order to repair 20 other engines and equip them with superheaters.

THE NEW ORLEANS & NORTH EASTERN has ordered 4 Mikado type locomotives from the Baldwin Locomotive Works to be used on the Vicksburg, Shreveport & Pacific. These locomotives will have 22 by 28 in. cylinders.

THE CHICAGO JUNCTION, reported in the *Railway Age Gazette* of October 8 as having ordered 2 superheater six-wheel switching locomotives from the American Locomotive Company, has increased this order to 3 locomotives.

THE CINCINNATI, INDIANAPOLIS & WESTERN, which was reported in the *Railway Age Gazette* of October 1 as inquiring for prices on 48 locomotives, has issued inquiries for 8 Mikado, 6 Pacific, 15 ten-wheel, 10 Consolidation and 7 six-wheel switching locomotives. This company was at one time a part of the Cincinnati, Hamilton & Dayton and owned that part of its system west of Hamilton, Ohio, including a line from that point to Springfield, Ill., with a branch from Sidell, Ill., to West Liberty, crossing the main line at Hume, and aggregating approximately 361 miles of line. In the latter part of September, 1915, it was bought at a foreclosure sale by the bondholders and has since been operated by them independently of the Cincinnati, Hamilton & Dayton and, hence, of the Baltimore & Ohio. B. A. Worthington is vice-president and general manager and John Simmons, general superintendent, both with offices at Indianapolis, Ind. See also item in *Financial News* under date of September 17, page 548.

CAR BUILDING

THE BALTIMORE & OHIO is inquiring for 500 box car bodies and is also said to be in the market for 1,000 hopper cars.

THE NORFOLK & WESTERN is in the market for 1,000 90-ton gondola cars.

PHELPS, DODGE & Co. have ordered 50 ore cars from the Pressed Steel Car Company.

CINCINNATI, INDIANAPOLIS & WESTERN.—See item above under Locomotive Building.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS is in the market for 1,000 center constructions.

THE MINNEAPOLIS & ST. LOUIS is formally inquiring for 500 40-ton steel underframe box cars.

THE MISSOURI, KANSAS & TEXAS has ordered 200 ballast cars from the Roger Ballast Car Company.

THE CENTRAL OF NEW JERSEY is inquiring for 1,000 steel hopper cars, 1,000 box cars and 250 ice cars.

THE ILLINOIS CENTRAL has ordered 1,000 refrigerator cars from the American Car & Foundry Company.

THE MICHIGAN ALKALI COMPANY, Wyandotte, Mich., has ordered 50 50-ton hopper cars from the Pressed Steel Car Company.

THE CENTRAL OF GEORGIA has ordered 500 freight cars from the American Car & Foundry Company, and 500 box cars from the Pullman Company.

THE BOSTON & MAINE has ordered 6 70-ft. steel coaches and 2 70-ft. steel smoking cars from the Pullman Company and 6 baggage cars from the Laconia Car Company.

THE PHILADELPHIA & READING has ordered 1,000 box cars from the American Car & Foundry Company; 500 gondola cars from the Standard Steel Car Company, and 1,000 hopper cars from the Pressed Steel Car Company.

THE WESTERN MARYLAND, which has been inquiring for 1,000 70-ton steel hopper cars, recently changed its specifications to include the same number of 50-ton hopper cars. It is now further reported to have ordered 2,000 hopper cars from the Pullman Company, but the latter item has not been confirmed.

IRON AND STEEL

THE MISSOURI PACIFIC has ordered 15,000 tons of rails from the Illinois Steel Company.

THE ILLINOIS CENTRAL has ordered 15,000 tons of rails from the Illinois Steel Company.

THE PERE MARQUETTE has ordered 17,000 tons of rails from the Algoma Steel Corporation.

THE SOUTHERN has ordered 2,300 tons of bridge material from the American Bridge Company.

THE LONG ISLAND has ordered 3,500 tons of fabricating materials from the American Bridge Company.

THE NEW YORK CENTRAL is inquiring for 500 tons of steel for a bridge over the Erie barge canal near Rochester, N. Y.

THE CENTRAL OF NEW JERSEY is reported to have ordered 15,000 tons of steel from the American Bridge Company.

THE WABASH has ordered 7,500 tons of rails from the Lackawanna Steel Company and the United States Steel Corporation.

THE GREAT NORTHERN has ordered 15,000 tons of rails from the Illinois Steel Company and 5,000 tons from the Lackawanna Steel Company.

THE BALTIMORE & OHIO CHICAGO TERMINAL has ordered 252 tons of steel from the American Bridge Company for a freight house to be built at Twelfth street, Chicago.

MACHINERY AND TOOLS

THE ARTHUR IRON MINING COMPANY is in the market for 6 steam shovels and 1 locomotive crane.

AMUR RAILWAY, IN SIBERIA, APPROACHING COMPLETION.—The number of railways serving Russia's Pacific ports is increasing. In six months the through traffic on the new Amur Railway will be opened. The most important work still to be done is on the bridges at two points. When the traffic opens from Kuenga, where the line joins the Transbaikal Railway, there will be a double-track line through all Siberia from the Pacific ports, Vladivostok and Nikolaieffsk. The difficulties overcome in the construction of the Amur Railway resemble those of the Transcaucasian Railway 20 years ago. *Railway Gazette, London.*

Supply Trade News

The Hilles & Jones Company, Wilmington, Del., has moved its Pittsburgh office to larger quarters in the Oliver building, Room 235.

At the annual meeting of the American Locomotive Company, held in New York on October 19, Vice-President Leigh Best was elected a director to succeed William M. Barnum.

The American Steel Foundries is reported to have closed a contract with the British government for \$20,000,000 worth of war materials, including principally castings for shell work.

Stanley H. Smith has been appointed district sales manager of the Pennsylvania Steel Company and the Maryland Steel Company at Chicago, Ill., to succeed Robert E. Belknap, transferred to New York city.

Robert Allan, representative of the Burd High Compression Ring Company, Rockford, Ill., has been appointed district branch manager for northern California, with offices at 847 Phelan Building, San Francisco, Cal.

The George E. Molleson Company, sales agents for iron and steel products and railway supplies and New York representatives for the Tyler Tube & Pipe Company, Washington, Pa., has moved its offices from 50 Church street to 30 Church street, New York.

Arthur C. Everham, formerly assistant chief engineer of the Kansas City Terminal, is now engineer of construction for the Kansas City Bridge Company. He will have charge of all construction work of the company and will give particular attention to government and railroad construction.

The Chambers Valve Company, New York, announces that it has received orders for Chambers throttle valves to be installed on 45 locomotives for the Chicago & North Western; 33 for the Erie; 13 for the Texas & Pacific; 30 for the Norfolk & Western, and 2 for the Mobile & Ohio.

W. Hoyt Weber & Co., New York, have completed arrangements with the MacDonald Car Buffer, Limited, of Montreal and Pittsburgh, whereby they will represent the latter in the eastern part of the United States. The members of the firm are W. Hoyt Weber and Horatio S. Schroeder. The firm has offices in the Vanderbilt Concourse building.

The committee on arts and sciences of the Franklin Institute at Philadelphia has announced that it will recommend the award of the John Scott Legacy Medal and Premium to Clement F. Street, vice-president of the Locomotive Stoker Company, New York, for the Street locomotive stoker. This appliance has now been installed on over 700 locomotives, more Street stokers being in use than those of any other make.

The International Oxygen Company is erecting an oxygen and hydrogen generating plant at Verona, Pa., in charge of Phillip J. Kroll as branch manager, for the accommodation of its customers in the Pittsburgh district. The new factory will enable the company to make better deliveries in this district than were possible from its plant at Newark, N. J., and it will serve as a demonstrating installation of the I. O. C. system for inspection by officers of other companies who are considering installing generating apparatus in their own plants.

The Canadian Car & Foundry Company has sold to the Royal Securities Company of Montreal \$250,000 preferred stock, \$250,000 common stock and \$1,000,000 6 per cent debenture notes of the Canadian Steel Foundries, which it controls. The money received from the sale of the securities is to be used in financing the large war orders taken by the company. By the sale of the \$250,000 preferred stock the amount of this stock now outstanding is increased to \$7,250,000 out of a total authorized issue of \$7,500,000. The common stock outstanding is increased by the sale to \$4,225,000 out of \$5,000,000 authorized. War orders placed with the Canadian Car & Foundry Company by the Russian Government amount to \$142,000,000, including only business actually signed for.

Owing to the increase in the demand for the Thomas rail anchor tie plate and other track specialties made by the Chicago Malleable Castings Company, West Pullman, Chicago, that company has established a "Thomas specialty department," which will be in charge of J. W. Thomas, W. H. Kofmehl and Fred F. Bennett. Mr. Thomas, the inventor of these specialties, has had 30 years' practical experience with track work on the St. Paul, the Rock Island, the Burlington, the Missouri Pacific, the Santa Fe, the Ft. Worth & Denver City and other railroads. Mr. Kofmehl has been for 25 years roadmaster on the Chicago, Milwaukee & St. Paul. Mr. Bennett has been identified with the railway supply field for many years. At one time he was representative of the *Railroad Gazette* (now the *Railway Age Gazette*) west of Buffalo and Pittsburgh, and later sales agent of the American Steel Castings Company (now the American Steel Foundries).

Negotiations have practically been completed whereby the Pennsylvania Company will transfer to the Bethlehem Steel Corporation its controlling interest in the Pennsylvania Steel Company, all that is now needed being the assent of the Reading interests. On January 1, 1915, the Pennsylvania Steel Company's outstanding stock consisted of \$20,560,800 preferred and \$10,750,000 common, of which the Pennsylvania Company owned \$9,158,300 preferred and \$7,388,900 common, and the Pennsylvania Railroad \$584,700 preferred. The Reading Iron Company (a subsidiary of the Reading Coal & Iron Company) at present owns approximately \$4,000,000 preferred and \$3,000,000 common. Payment for the stock to be acquired by the Bethlehem Steel Corporation will be provided for through cash and bonds bearing 5 per cent interest. The preferred stock will be exchanged for bonds at par, and the common stock at about \$35 a share. The Pennsylvania Company, which, as noted above, now owns a majority of the Steel Company stock, will acquire the minority interest and the total amount of stock acquired will be turned over to the Bethlehem Company, which will retain the securities as a holding company. Dividends of 7 per cent were paid on the preferred stock of the Pennsylvania Steel Company from November 1, 1901, to November, 1912; no dividends have been paid on the common. The acquisition of the company by the Bethlehem interests will strengthen the latter greatly, more particularly as the Pennsylvania Steel Company controls the Maryland Steel Company, operating a large ship building plant and rail mill at Sparrows Point, Md., and the Spanish-American Iron Company, owning large ore deposits in Cuba. The Pennsylvania Steel Company is said to own the largest deposits of iron ore of any of the independent companies, and much of this is of very high grade.

Westinghouse Air Brake Company

This company's net earnings in the fiscal year ended July 31, 1915, were considerably below those of the preceding year, but as the company is now working on a large order for munitions, it was possible to continue the dividends at the usual rate. The net sales of the Wilmerding plant were approximately one-third less than those of 1914, and only 62 per cent of the average net sales for the past five fiscal years. The net profit for the year was \$1,575,839. This compares with \$3,482,994 in 1914, or \$5,255,259 (after deducting depreciation of \$809,519) in 1913. Charges for depreciation on buildings and machinery in 1915 totaled \$207,768.

During the year the electrical and brake business formerly carried on in France by the Societe Anonyme Westinghouse was divided and the brake business was taken over by a new company, the Compagnie des Freins Westinghouse, the ownership of which is vested in the Westinghouse Air Brake Company and the Westinghouse Brake Company, Limited, of London. This ownership was acquired by transferring to the British Westinghouse Electric & Manufacturing Company, Limited, holdings in the Societe Anonyme Westinghouse, in which the American company is no longer interested.

The report says that the subsidiary companies in England, Italy and Russia are doing well despite the war, although the English company has thought it best to reduce its annual dividend from 20 to 10 per cent.

The outlook for the company is good. The unfilled orders on August 1, 1915, were \$800,000 greater than on August 1, 1914. This total, however, did not include the order for munitions spoken of in the report as follows:

"During the month of April, 1915, your company accepted orders for 18-lb. shrapnel, complete, except propellant power, and additional cartridge cases amounting in total to \$17,930,000. While the terms are favorable, with ample guarantees against contingencies, these orders have necessitated a heavy expenditure for special machinery, and for its installation in temporary, though substantial, buildings, to the end that the maximum output of the company's regular product might not be affected in case of a sudden revival of the railway supply business. It is expected that when the value of this special machinery and the buildings not available for future use shall have been charged off, the net result will represent a substantial but not an unusual manufacturing profit on the amount involved.

"The factor that chiefly influenced the management in deciding to undertake this special line of work was the unfavorable outlook for the railway supply business in general and the desire to prevent, if possible, a repetition of the hardships endured by your working force last winter through lack of employment. There is, however, another consideration which should be mentioned, namely, the conviction arising from a study of the unexampled conflict now raging in Europe that the time has come for some of our larger manufacturing concerns to prepare themselves, by the installation of equipment and especially by the acquisition of technical and mechanical experience now so woefully lacking, to assist the United States government in the defense of our own country, should such a contingency arise."

There follows the general consolidated balance sheet for July 31, 1915. There has been a decrease of \$250,000 in contingent surplus representing the excess of par value of the stock of subsidiary companies over the amount at which they are carried on the books of the parent company. An increase of \$1,203,804 in inventory results from the large accumulation of material on hand for special contracts. The surplus shown of \$4,390,342, compares with \$5,648,865 on August 1, 1914, the dividends paid having slightly exceeded the net returns.

ASSETS	
Cash	\$2,067,761
Accounts and bills receivable, considered good.....	2,551,607
Inventory	6,729,346
Deferred charges to operation.....	51,339
Investments	8,294,904
Factories	6,572,036
Real estate, other than for factories.....	1,892,000
Patents and goodwill.....	2,790,515
	<hr/> \$30,949,509
LIABILITIES.	
Accounts payable	\$692,495
Advances on contracts.....	2,073,050
Accrued liabilities	141,180
Contingent liability on account of sales, subject to future settlements.....	163,810
	<hr/> \$3,070,535
Capital stock	19,638,467
Accumulated funds:	
(1) Reserve for extraordinary repairs and replacements, inventory adjustments and extraordinary losses	\$1,850,165
(2) Reserve to provide for expenditures account of developments, etc.	500,000
(3) Contingent surplus, excess par value capital stock of subsidiary companies over value on books of Westinghouse Air Brake Company.....	1,500,000
(4) Surplus, applicable to dividends.....	4,390,342
	<hr/> \$8,240,507
	<hr/> \$30,949,509

TRADE PUBLICATIONS

INSPECTION OF CREOSOTED TIMBER.—Robert W. Hunt & Co., engineers, Chicago, have issued a booklet describing the inspection of creosoted timber and including specifications for paving with creosote wood blocks, adopted by the Association for Standardizing Paving Specifications.

HIGHWAY BRIDGES.—Robert W. Hunt & Co., engineers Chicago, have prepared a booklet on the inspection and testing of materials for highway bridges, containing specifications for structural steel for bridges, billet-steel and rail-steel reinforcement bars, and for steel castings, adopted by the American Society for Testing Materials.

WATER SOFTENING.—The L. M. Booth Company, New York, has recently issued a bulletin relative to the company's type F water softeners. The booklet is attractively illustrated. It explains the operation of the softeners in detail, showing sectional views of the softeners at work. There are also given a number of views of typical installations.

Railway Construction

ATLANTIC COAST LINE.—Announcement has been made by this company, it is said, that an extension is to be built from the present southern terminus of the line now in operation to Sebring, Fla. The proposed route is southeast from Sebring to a point on the shore of Lake Okeechobee, about 60 miles.

CANADIAN PACIFIC.—Construction work is to be pushed on an additional 25 miles of track from Foremost, Alta., east to a point about 10 miles from Lake Pakowki. This will form part of the through line between Weyburn, Sask., and Lethbridge, Alta., and when this section is finished there will only be a gap of about 44 miles between the line now terminating at Altawan, Sask., and the east end of the Foremost extension.

HIWASSE VALLEY.—Grading work will be finished in about 30 days on the line building from Andrews, N. C., southwest via Peachtree to Hayesville, 25 miles. The maximum grades will be 2.5 per cent, and the maximum curvature 16 deg., and there will be two steel bridges on the line. The company expects to develop a traffic in lumber and forest products. The Wright-Johnston Company, Andrews, N. C., are the contractors. F. A. Cloud, chief engineer, Andrews. (May 7, p. 993.)

ILLINOIS CENTRAL.—The report of this company for the year ended June 30, 1915, shows that during the year new rail was laid on 262.23 miles of track; 99 new industrial tracks were built or extended, making a net addition of 7.46 miles; 401 new company sidings were built or extended, making a net addition for the year of 69.64 miles and second main track between Fulton, Ky., and Memphis, Tenn., under construction last year has been completed. A cut-off was built from Fredonia, Ill., on the Carbondale district to Reeds Junction on the Johnston City branch, 1.77 miles. This involves the abandonment as first main track of 6.64 miles of line between Fredonia and Carbondale Junction. The second main track at Parkway, Ill., was extended to Broadview, 2.46 miles, and additional side track was constructed, for handling passenger traffic to and from Speedway, Ill. At Paducah, Ky., the freight yard was added to by the construction of 6.28 miles of siding, and the freight yard at Fulton, Ky., was increased by 6.59 miles. The reduction of grades between Paducah and Princeton, and the enlargement of yard facilities at the latter point were continued and were about finished at the close of the year. The elevation of the tracks at Memphis, Tenn., also the construction of the new passenger facilities at that place, were also completed, and the raising of tracks and relocating of main line in connection with levee improvements, being made by the city authorities at North Memphis, were undertaken during the year and are about half finished. Grade crossing elimination work at Grand Crossing, Chicago, Ill., track elevation work between Seventy-ninth street and One Hundred and Sixteenth street, Chicago, and through Cicero, also grade revision at Mattoon, were still in progress at the close of the year. Work of strengthening the Cairo bridge to carry heavier rolling stock was completed during the year. To facilitate the handling of coal traffic a double track connection was installed between the junction of the Carbondale and Johnston City districts near Cambria, Ill., for 1.34 miles. A viaduct was completed over Nicholas street, Omaha, Neb., and an overhead bridge constructed at Monticello, Wis. Work was started and is still under way on subways at Prairie avenue, Decatur, Ill., and Plimney Park boulevard, Fort Dodge, Iowa.

KETTLE VALLEY LINES.—It is expected that work will be completed by December on the extension from Coquihalla summit to Hope, B. C., on the Fraser river. Track laying is now under way from the Hope end and has been completed, it is said, to Ladner creek, where a steel bridge is being built. (April 16, p. 871.)

NEWTON, KANSAS & NEBRASKA.—This company has awarded a contract for a railway from Newton, Kan., through Harvey, McPherson, Dickinson, Saline, Clay and Washington counties, to the Newton Construction Company. S. O. Waddell, Newton, Kan., chief engineer.

NEW YORK SUBWAYS.—The New York Public Service Com-

mission, First district, has submitted the proposed form of contract for the construction of Section No. 2, of Routes Nos. 19 and 22, being a part of the Southern boulevard and Westchester avenue branch of the Lexington avenue subway, to the Interborough Rapid Transit Company. This company is made a party to the contract, and will bear part of the construction cost. The underground portion of this line ends at Bancroft street, in the borough of the Bronx, and Section No. 2, which will be elevated, extends northerly from that point along Westchester avenue to Eastern boulevard, or Pelham Bay Park. The commission has completed negotiations with the government for the construction of the necessary fixed bridge across the Bronx river, the last obstacle to the construction of the line.

OREGON, CALIFORNIA & EASTERN.—This company has been incorporated to build a railway from Bend, Crook county, Oregon, to Lakeview, Lake county, with branch lines running from Silver Lake, Lake county, to Kirk, Klamath county, from Millican, Crook county, to Arden, Harney county, and from a point to be determined to Warner Valley, Lake county. The capitalization is \$100,000; the officers are P. B. Ellis, president, L. S. Ellis, vice-president, and William Muller, secretary and treasurer. The Oregon office will be at Portland.

PATTERSON & WESTERN.—This company has been incorporated to build a railway in Santa Clara and Stanislaus counties, Cal. R. J. Pratt, 3388 Clay St., San Francisco, Cal.

PENNSYLVANIA ROADS (ELECTRIC).—According to press reports the project to build a line from Milford, Pa., Pike county, northeast to Port Jervis, about eight miles, is being revived. Residents of Milford have guaranteed an amount of \$25,000, it is said, in aid of the project to build an electric line between these two places. Gifford Pinchot, Milford, may be addressed.

ROACH TIMBER COMPANY.—This company will do some additional grading on its rail line from Sutherlin, Ore., to its timber holdings, in the near future. W. L. Roach, president, Muscatine, Iowa.

SAN ANTONIO & AUSTIN INTERURBAN.—This company has revived its plans for building an interurban electric line between San Antonio, Tex., and Austin, about 80 miles, and negotiations for financing the project are now in progress. The proposed line will pass through the towns of New Braunfels, Hunter, San Marcos, Kyle, Buda and Manchaca. A survey for the route was made some time ago and much of the right of way has been secured.

SEABOARD AIR LINE.—On the section between Sanford, N. C., and Apex, 28 miles, this company is making some corrections and revisions in its grade lines, removing therefrom certain quick changes of gradients and improving the objectionable dips. This is a part of the general scheme of revision in that territory. There will be no change of alignment. Ballasting and the laying of new rail will follow as soon as the grade changes are accomplished.

SOUTHERN RAILWAY.—The report of this company for the year ended June 30, 1915, shows that the double track construction work on the main line north of Charlotte, N. C., including improved alignment and elimination of heavy grades, has been pushed on 100 miles of the 142 between Washington and Charlotte, which was operated as single track at the beginning of the past fiscal year. Of this mileage, 27 miles between Pelham, N. C., and Brown Summit, were in operation as double track at the close of the year, and it is expected that the remaining 73 miles on which work is now under way will be completed before April, 1916. At the close of the year there was 434.03 miles of double track in operation. Since the close of the fiscal year money has been made available for double track work and other improvements. The work in immediate contemplation consists of 56 miles between Spartanburg, S. C., and Central, and the 23 miles between New Holland, Ga., and Cornelia. On the section of 100 miles of main line on which double track work has been under construction, 54 out of 73 grade crossings were eliminated. In addition to the terminal yards at Richmond, Va., at Spencer, N. C., and Winston Salem, at Mobile, at Finlay, Ala., and at Forrest, Tenn., work was carried out on a new yard at Denverside, near East St. Louis, Ill., also on new facilities for both passenger and freight traffic at Spartanburg, S. C., and the separation of busy grade crossings in several cities. Since the close of the year the export coal terminal at Charles-

ton, S. C., has been put into operation. Arrangements have been made to provide a union passenger station at Macon, Ga., and new passing, side and spur tracks comprising 89.27 miles were constructed.

TEXAS ROADS (ELECTRIC).—The preliminary survey for a proposed interurban electric line to be built between Temple, Tex., and Marlin, about 40 miles, has just been made by S. D. Hanna, and the organization of a company to build the line is now in progress. Residents of Temple and Marlin are financing the project, it is said, and plans for building the line are well advanced. It is expected that the construction work will be started this year.

TORRINGTON & THOMASTON TRACTION.—An officer of this company which was recently organized writes that the prospects of building the proposed electric line from Torrington, Conn., south to Thomaston, 10 miles, are good, and that the cost will be about \$200,000. Work on the line, which calls for the construction of two short steel bridges, will be carried out next year. H. Mann, president; H. M. Guernsey, vice-president; G. B. Goodwin, treasurer, and E. T. Canfield, secretary. (October 8, page 670.)

RAILWAY STRUCTURES

BEAR CREEK, MINN.—The Chicago Great Western has ordered 55 tons of steel from the Chicago Bridge & Iron Works to be used in reinforcing a viaduct. Twenty truss spans and 38 tower posts will be strengthened. The steel was shipped early this week.

CHICAGO, ILL.—The engineering department of the Illinois Central is again preparing plans and specifications for a bridge on the St. Charles Air Line over the Chicago river.

EVANSVILLE, IND.—The contract for the new Illinois Central freight house and the extension of the old structure has been let to George P. Swift & Co., of Chicago.

HUNTINGDON, PA.—The state water supply commission of Pennsylvania has approved the plans submitted by the Pennsylvania Railroad to build a bridge over Dotter run, also a bridge over Mill Creek in Rockland township, Venango county; and a bridge over Catfish run in Madison township, Clarion county.

LYNCHBURG, VA.—A reinforced concrete bridge is to be built over the James river, and the tracks of the Norfolk & Western, the Chesapeake & Ohio and the Southern Railway. It is proposed to build a structure with 19 arch and arched girder spans, to cost \$250,000. The cost of the work is to be paid for jointly by the above railroads and the city of Lynchburg. Bids have not yet been asked for this improvement.

MIAMI, FLA.—An officer of the Florida East Coast writes, regarding the report that new car shops are to be built at Miami, that the company does not contemplate that any work will be done on this improvement in the immediate future.

NEW LONDON, CONN.—The New York, New Haven & Hartford will build a bridge over the Thames river between Groton and New London. The proposed structure is to have a concrete substructure with steel superstructure of three 330-ft. riveted truss spans, one 185-ft. fixed span and one 185-ft. bascule span. The total estimated cost of the bridge is \$2,000,000. Contracts for the work have not yet been let.

NONCONNAH, TENN.—The Federal Cement Tile Company, of Chicago, has the contract for the roofing for the Illinois Central repair shop. (October 8, p. 671.)

NORTH TORONTO, ONT.—Work is now under way on a new station at Yonge street to be used jointly by the Canadian Pacific and the Canadian Northern. The new station forms part of improvements being carried out to include the elevation of the railway tracks and the elimination of all grade crossings on about three miles.

OLYMPIA, WASH.—The E. D. Rounds Construction Company of Seattle, Wash., has been awarded a contract for erecting a depot for the Oregon-Washington Railroad & Navigation Company. The cost is estimated at \$25,000.

WINSTON-SALEM, N. C.—An officer of the Norfolk & Western writes, regarding the report that a new steel viaduct is to be built at Winston-Salem, that plans for the viaduct will not be completed for several months.

Railway Financial News

CHICAGO, MILWAUKEE & GARY.—The securities which were pledged as collateral for notes aggregating \$1,813,036 were bid in by a representative of the noteholders at a price equalling the par value and interest of the notes. The collateral consists of bonds with a face value of \$5,764,000 and stock with a par value of \$5,475,000.

CHICAGO, ROCK ISLAND & PACIFIC.—The seven directors agreed upon by various Chicago, Rock Island & Pacific interests were elected at a stockholders' meeting held on October 14. The new directors are: Edmund D. Hulbert, vice-president of the Merchants Loan & Trust Company, Chicago; Charles D. Dawes, president of the Central Trust Company of Illinois, Chicago; John G. Shedd, president of Marshall Field & Co., Chicago; Nathaniel French, Davenport, Iowa; William B. Thompson, director of the Federal Reserve Bank of New York; John R. Morron, president of the Atlas Portland Cement Company, New York, and Joel W. Burdick, Pittsburgh.

FT. SMITH & WESTERN.—This road, running from Ft. Smith, Ark., to Guthrie, Okla., 217 miles, has been placed in the hands of a receiver by the United States District Court on the application of the trustee of its outstanding \$6,240,000 bonds.

GREENVILLE NORTHWESTERN.—Application has been made for a receiver in the suit brought to foreclose a deed of trust for \$63,300.

MISSOURI, KANSAS & TEXAS.—A protective committee has been formed to represent the preferred and common stockholders. The committee consists of Alvin W. Krech, chairman; Frank H. Davis, Charles Hayden, J. J. Slocum, S. A. Mitchell and A. W. Smithers. The Stockholders have been asked to deposit their stock with the Equitable Trust Company, New York.

MISSOURI PACIFIC.—The reorganization committee which is acting with Kuhn, Loeb & Co., New York, has extended the time for deposits of stocks and bonds under the previously announced reorganization plan to December 15.

NEW JERSEY & PENNSYLVANIA.—This road was sold under foreclosure on October 18, following the refusal of Vice-Chancellor Howell, of New Jersey, to confirm a previous sale. The completed portion of the road was bid in by a representative of the bondholders for \$27,000 and the uncompleted portion by G. F. Fisher, of New York, for \$1,600. The sale is subject to confirmation.

NEW ORLEANS, MOBILE & CHICAGO.—The federal court at Mobile, Ala., has confirmed the sale of that property to a committee representing the bondholders.

SEABOARD AIR LINE.—A special stockholders' meeting has been called for November 15 to vote on the question of approving the merger of the Seaboard Air Line and the Carolina, Atlantic & Western (mentioned in these columns last week) and to authorize an issue of \$300,000,000 bonds. Upon the approval of the issue of \$25,644,000 of these bonds of which \$2,750,000 are to be held in the treasury of the consolidated company, approximately \$5,725,000 are to be used to retire an equal face amount or underlying first mortgage 6 per cent bonds of the Carolina, Atlantic & Western and \$17,168,500 have been sold to a syndicate headed by the Guaranty Trust Co., and the National City Bank.

The new company formed by the consolidation will be known as the Seaboard Air Line Railway Company, and will assume all the obligations of the consolidated companies, including the \$300,000,000 first and consolidated gold bonds. It is not proposed at this time that the new mortgage shall be a lien on any of the existing Air Line mileage, but there will be pledged under it approximately \$22,162,000 Seaboard refunding bonds now in the company's treasury or pledged to secure its notes.

The provisions for the issuance of stock of the new company were mentioned in these columns last week.

ANNUAL REPORTS

SOUTHERN RAILWAY COMPANY—TWENTY-FIRST ANNUAL REPORT

RICHMOND, VA., October 12, 1915.

To the Stockholders of Southern Railway Company:

The Board of Directors submits the following report of the affairs of the Company for the year ended June 30, 1915:

It has been a difficult year. After a period of unexampled prosperity throughout the South, attended by growth and expansion in all forms of industry, business had begun to slow up during the early months of 1914. Although for this reason railway revenues were less during the first six months of 1914 than they had been during the peak load of the corresponding six months of the previous year, nevertheless the Company entered upon the fiscal year now under review with an actually large traffic and a large turnover of revenue. The flame of war which burst forth all over Europe at the beginning of August, 1914, had a sudden and withering effect upon industry in the South. Preparing to market the largest crop in the history of cotton growing in the United States, the Southern people were looking forward to the profits from the sale of this their chief staple as a stimulus to their purchasing power and so of every form of industry in which they were engaged. When over night they were apparently shut out by the war from the European market, which has always consumed a large part of the American cotton crop, the people of the South were thrown back upon their own resources with a disturbingly large proportion of their chief money crop on their hands and an inadequate market price in prospect. Despite several futile plans of assistance from without, the South practically suspended for a time its industrial activities. The result was a fall, as vertiginous as that of the price of cotton, in the revenues of the railways at the South, and this lean diet was protracted, with the condition which caused it, throughout the year now under review. For this Company the suddenly changed industrial situation of the South meant a loss in revenues for the fiscal year of \$8,551,487.22, or 12.09 per cent. The development of the loss was precipitous. July showed a small increase in revenue, August a decrease of 1.20 per cent., September a decrease of 8.33 per cent., while in October, November, December and January the decreases in revenue were, respectively, 18.47 per cent., 20.06 per cent., 19.97 per cent. and 18.93 per cent., with gradually improving conditions during the remainder of the fiscal year, as the South again caught its breath.

It was a situation which demanded radical action on the part of management. When the first symptoms of the loss of revenues were felt, plans of retrenchment were made and were thereafter applied progressively. This action could not be brought into full effect for several months, but the effort became both evident and effective in March, 1915. The result for the year was a reduction of expenses amounting to \$5,585,938.68, and a balance of income over all charges of \$1,523,369.32, as compared with the similar balance (but in that case after provision for a dividend) of \$2,047,776.69 carried to the credit of profit and loss at the end of the previous fiscal year. These results and the financial condition of the Company at the close of the year will appear in greater detail by reference to the Income Statement (page 30) and the General Balance Sheet (pages 34 and 35), as well as the other tables which are part of this report.

DIVIDENDS

One of the unhappy results of the year has been the necessity, once again, of suspending dividends on the preferred stock. The regular dividend was amply earned for the six months ended June 30, 1914, but consideration of it, coming before the Board in September, was postponed until it should be apparent what was the tendency of the financial condition of the Company in the crisis which had then developed. Later the Board, being confident that the Company's affairs were well in hand, declared a reduced dividend of 2 per cent. (making $4\frac{1}{2}$ per cent. for the year ended June 30, 1914), but conservatively made it payable in five year scrip bearing interest at the rate of 4 per cent. per annum. No dividend for the current fiscal year was declared, or could be justified during a period of convalescence.

OPERATING CONDITIONS

The characteristic of operating conditions during the year under review has been retrenchment, both by reducing service and by the practice of greater efficiency. What has been accomplished in both these respects will appear in detail in the subsequent pages of this report. It will suffice here to point out the parallel between the conditions of this year with those of the year ended June 30, 1908. That was the year of the financial panic or 1907. The revenues of the Company were at the high tide of its history up to that time until October, 1907, when they fell rapidly and dangerously throughout the remainder of that fiscal year. Then, as during this year, the problem of management was retrenchment, severe and sustained retrenchment, during several months. Attention was called in the annual report for 1908 to what was then done. What is perhaps as significant an illustration as can be made of the contemporary tendency of the railway industry, as well as of the increased strength of the Company today as compared with 1908, is found in a comparison of what had to be done and was done then and this year. In considering these comparisons it should be remembered that because of decreases of 1.74 per cent. in the average receipts per ton mile, 7.35 per cent. in the average receipts per passenger mile and 9.33 per cent. in mail revenues per mile of road, the 1915 revenues are \$2,145,093 less than they would have been had the 1908 averages been maintained on the revenue side of the account, while on the other hand operating expenses for 1915 carry an increase of approximately \$3,881,418 more than those for 1908, due to increased wage scales; therefore the operations for 1915 were burdened with unavoidable decreases in revenues and increases in expenses approximating together the large sum of \$6,026,511. In a comparison of actual results in the two years, 1915 has thus been handicapped to the extent of over six million dollars, which had to be overcome before increased efficiency could be observed. Under these conditions, the causes of which are too well known to all students of contemporary economics in the United States to require explanation here, the hope of the railway industry is that aggregate revenues may increase progressively in greater ratio than aggregate costs. Fortunately for this Company, the conditions making for a continued rapid development of the South, despite temporary setbacks as in this year and in 1908, have realized as well as promise such a result; while the intelligent expenditure of new capital for improvement of the plant in the interest of facility, and so of economy, of operation must in future, as in the past, be made to check, if it cannot altogether control, an abnormal increment of operating costs. A few statistics of 1915 compared with those of 1908 will serve to make the point, viz.:

SOME OPERATING COMPARISONS, 1915-1908

	Per Mile of Road.	Per Train Mile.
Gross Revenues	Increased 23.06%	24.54%
Net Revenues	Increased 29.58%	31.33%
Revenue Train Miles	Decreased 1.31%	.....

Maintenance of Way and Structures	Increased 26.44%	27.48%
Maintenance of Equipment Expenses	Increased 25.05%	26.00%
Transportation Expenses	Increased 14.51%	16.03%
Ton Miles—All Freight	Increased 35.73%	67.59%
Ton Miles—Revenue Freight	Increased 28.35%	57.90%
Freight Train Revenue	Increased 18.98%	.....
Freight Train Miles	Decreased 26.10%	55.85%
Passenger Train Revenue	Increased 16.15%	.....
Passenger Train Miles	Increased 17.09%	.78%
Revenue from Passengers	Increased 20.34%	3.59%
Taxes	Increased 35.83%	.....

Transportation costs per dollar of revenue were 36.59 cents, or 6.97 per cent. less than in 1908. Freight enginesmen, trainmen and fuel costs per 100 ton miles decreased 27.29 per cent. Passenger enginesmen, trainmen and fuel costs per 100 passenger miles increased 7.76 per cent.

Freight locomotive fuel costs per 100 ton miles decreased 37.19 per cent., and pounds of coal consumed per 100 ton miles were 36.93 per cent. less in 1915 than in 1908. While the average cost of coal at coaling stations was the same for both years, the average handling cost at stations was 35.71 per cent. less in 1915 than it was in 1908.

Overtime per dollar of wages was 5.20 cents in 1908; in 1915 it was 1.64 cents, an improvement of 68.46 per cent.

Adjusting the 1915 revenues and expenses to the average receipts per ton and per passenger mile, and mail revenue and wage costs to the averages and scales which prevailed in 1908, the following comparisons are found:

	1908	1915	Increase or Decrease
Cost to earn \$1.00 of Gross Revenue	65.73c.	75.53c.	Dec. 12.97%
Transportation Costs per \$1.00 of Revenue	31.60c.	39.33c.	Dec. 19.65%
Transportation Costs per Train Mile	66.28c.	63.93c.	Inc. 3.67%
The higher transportation costs per train mile this year are due to increased train loading, as illustrated by the following figures:			
Enginesmen, Trainmen and Fuel Costs—Freight:			
Per Train Mile	30.12c.	33.37c.	Dec. 9.74%
Per 100 Ton Miles	7.88c.	14.62c.	Dec. 46.10%

MAINTENANCE:

The obvious and easy method of retrenchment on a railroad, in an emergency, is to reduce unduly the appropriations for upkeep of the property. During the past year the management has steadfastly sought to avoid this temptation. Public announcement was made that retrenchment was necessary and that it was the policy of the Company to reduce its expenses at the cost of the temporary convenience of the people of the South before reducing maintenance of the railroad to the point of endangering their safety. The public accepted this announcement in good part and it has been due to the co-operation of the State Railroad Commissions and of responsible and enlightened citizens everywhere that the Company was enabled to reduce its passenger service more nearly to the requirements of current passenger traffic than it had been for several years past. This large item of retrenchment made it possible to spend on upkeep all that was necessary for the preservation of the integrity of the property. When to this policy was added the splendid response to the emergency by the officers and men charged with maintenance, it resulted that it was possible to say at the close of the year, as it is to-day, that the physical condition of the roadway and structures is better than ever it has been; that the motive power and passenger equipment are in good condition and fully up to normal and that the only deferred maintenance has been in freight car equipment, where upkeep could economically be deferred, because without traffic freight cars must stand idle in any event.

An evidence of the justice of this claim as to the physical condition of the property, as well as of the skillful and careful service of the officers and men immediately charged with the movement of trains, is found in the marked reduction of the number of personal injuries during the year, and the interesting fact that the Company carried this year more than sixteen and a half million passengers, a number equal to the population of the territory served, without fatality in a train accident to more than a single passenger, and he would not have suffered had he not been riding on a car platform in contravention of the rules made for the protection of passengers.

There was, of course, a substantial reduction in maintenance costs, as in other costs, as part of the policy of retrenchment, but, considering only those items of such costs as are included in operating expenses, the total decrease of maintenance costs was 10.61 per cent. compared with a decrease of 12.09 per cent. in revenues. For each dollar of revenue earned there was spent in maintenance 30.78 cents in 1915 compared with 30.27 cents in 1914.

GENERAL EXPENSES:

There were substantial reductions during the year in all the normal items of general expenses, but by reason of a charge to this account during the year of \$98,191.32, representing the cost to this Company of the preparation prescribed to it for the pending Federal Valuation of its property, the total of general expenses is greater this year than last. This statement is made, not in criticism of the valuation expense, but in justice to the loyal officers who, by their sacrifice, made possible the reduction of one of the principal normal items of the account known as General Expenses.

CHARACTERISTICS OF TRAFFIC DURING A YEAR OF DEPRESSION.

FREIGHT:

The effect on the Company's freight business of the conditions which have obtained during the year is expressed in a decrease of 3,754,044 tons of commercial freight.

This decrease was chiefly in manufactures and in raw materials, the principal items being:

Bituminous coal and coke	1,463,480 tons.
Manufactures and miscellaneous	1,134,422 tons.
Forest products	939,687 tons.

These decreases reflect curtailment of industrial and building operations and economics practiced by the people of the South during a period of business depression.

The decrease in manufactures and miscellaneous includes approximately

500,000 tons of fertilizer and fertilizer material, and this decrease is directly attributable to the war.

The war in Europe, by narrowing the market for cotton while broadening the demand for many other farm products, has given great impetus to the movement which was already under way for the broader diversification of Southern agriculture. With relatively a small reduction in cotton acreage, the South is now producing a much larger proportion of the grains, forage crops, and meat and dairy products that it consumes. While one of the effects of this is to reduce the tonnage of agricultural products carried into the South, it is adding to the economic strength of the section, and the consequent increased purchasing power of its rural population may be expected, under normal business conditions, to result in the increased carriage of all classes of commodities except agricultural products; while the reduced movement of agricultural products into the South will be, in a measure, compensated for by an increased movement of these products between Southern points and from the South to outside markets. This change in the character of the Company's traffic is already noticeable. Thus during the year there was no decrease in the tonnage of agricultural products as a whole, viz.:

	1915, Tons	1914, Tons
Grain	655,513	756,215
Hay	150,662	165,902
Leaf Tobacco	169,126	158,919
Cotton	734,539	735,869
Cotton Seed	359,734	316,599
Melons	65,664	59,368
Citrus Fruits	60,557	53,686
Other Fruits and Vegetables.....	291,358	236,552
Peanuts	20,659	24,179
	<u>2,507,812</u>	<u>2,507,289</u>

The maximum grain tonnage handled by the Company in any one year was in 1906-1907, namely, 1,012,692 tons. The tonnage for the year just closed represent a shrinkage from this maximum of 35 per cent and reflects the effort of the Southern farmer to feed himself and emerge from a condition of dependence upon the grain fields of the West. Coincident with this economic change, the South is increasing other classes of agricultural products which find market largely outside the territory of production. Comparing the same years (1906-1907 with 1914-1915) the Company's tonnage of melons, fruits and vegetables increased more than 100 per cent. So that, while rapidly approaching the time when the South will produce grain sufficient to feed itself, and probably have some to sell, the South is now producing fruits and vegetables to feed many of its neighbors as well as itself.

The cotton crop was the largest on record, but there was a decrease in exports in excess of 800,000 bales, yet the Company's tonnage of cotton was not appreciably less than during the previous year, the difference being approximately 5,000 bales, and this was more than compensated for by an increase in tonnage of cotton seed and its products of 168,282 tons, due to a large crop and to a strengthened position with relation to the seed crushing industry. It is interesting to note that, compared with 1906-1907, the tonnage of cotton seed and its products for the year just closed represents an increase of 168 per cent.

The South has had but a small part in the business of supplying munitions of war for the armies in Europe, but in the latter months of the year the Company handled a substantial movement of horses from the west and southwest destined to the battlefields. In all some 20,000 horses were so transported for export. Special arrangements were made for the prompt and comfortable movement of these unfortunate animals, and, by preventing loss and damage in transit, this business was profitable to the Company.

The South enters the new year with a much more hopeful outlook, which, it is fairly expected, will be reflected in freight revenues.

PASSENGER:

For the past twenty years, up to the third week in July, 1914, the passenger revenues of the Company have shown increases, month after month, over corresponding periods of the previous years, except during the period December, 1907, to April, 1909, when decreased passenger revenues resulted from a passenger fare reduction in the States of Virginia, North Carolina, Georgia and Alabama, along with a general depression in business during the latter part of the year 1907 and the first part of the year 1908.

Since the third week in July, 1914, passenger revenues have shown decreases ranging from 2.05 per cent to 34.02 per cent, the greatest decrease occurring during the second week in May, 1915, since when the passenger revenues have improved.

The increased use of automobiles, especially for short distance travel, is the only permanent cause contributing to a reduction of railway passenger travel in the South. The use of automobiles has largely increased, owing to the great reduction in the cost of the automobiles and the material improvement of the highways throughout the Southern territory. The short distance travel is principally affected by the automobile competition, and while it costs more to travel by automobile than it does by train, the automobile affords a convenience of time to which no local railway schedules can be adjusted.

The travel on the Southern Railway is of two kinds, local and competitive. Approximately 70 per cent is local, short distance travel between non-competitive stations, and 30 per cent long distance travel between points where other lines compete.

The local travel, approximately 70 per cent of the total, will increase with the agricultural and manufacturing development of the country, but during times of business depression this short distance local travel is more affected than is the through travel. The farm laborer, as well as the factory employee, travels for the most part for pleasure, and as soon as his wages are affected he quits traveling. The farmer, particularly in the cotton sections, has discontinued during the past year his old-established custom of advancing money to laborers above their actual requirements for living necessities.

The long distance competitive travel in the Southern territory is susceptible of great development, and as train service improves, as the result of double track and other physical facilities, revenues from long distance passenger travel may be expected materially to increase. While the travel from the North and the East to Southern resorts during the winter seasons increases each year, the travel of the Southern people to the mountain resorts of the Carolinas and Virginia and to the resorts in the Northern States increases to a greater extent and will continue to increase with the prosperity of the Southern people. The mountain sections of Western North Carolina grow more popular and each year attract a larger number of people for their summer vacations. The importance of this is shown by the fact that the months of July, August and September yield the Company's largest passenger revenues. But the principal development and improvement in through long distance travel may be expected to come from increased travel of business men between the Southern business communities and the Eastern and Northern commercial and

banking centers. The people of the South are given to much traveling, and as their incomes, both from manufacturing industries and from farming developments, improve, that much more will they travel for business and for pleasure.

INDUSTRIAL AND AGRICULTURAL DEVELOPMENT OF THE TERRITORY SERVED

MANUFACTURING:

Although industrial development was restricted by the prevailing business depression, the ground swell of the prosperity prevailing in the South prior to the war in Europe carried over into this year a substantial addition to the manufacturing plants established on this Company's lines. While less than in former years, the record is an earnest of what may be expected in the future. The new industrial plants on the Company's lines completed during the year numbered 519 and may be classified as follows:

Brick, Tile, etc.....	19
Cotton Seed Products.....	47
Fertilizer	7
Flour and Feed.....	54
Furniture	12
Iron Products	17
Lumber	57
Stone (mineral)	38
Textile	24
Woodworking	47
Miscellaneous	197
Total	<u>519</u>

The capital involved in these new industries is \$17,492,850. During the year there were additions made to 219 manufacturing establishments at a reported cost of \$8,162,047. Industries reported under construction June 30, 1915, were 57 in number with a capital of \$15,456,250. New buildings of all kinds (except those used in manufacturing) and other general improvements represented an expenditure of \$66,422,856.

AGRICULTURE:

The September 1, 1915, estimates of the United States Department of Agriculture show increases this year over the 1914 yields of sundry crops, other than cotton, in the Southern States as follows:

Corn	100,341,000 bushels
Wheat	6,162,000 bushels
Oats	14,253,000 bushels
Irish Potatoes	13,344,000 bushels
Sweet Potatoes	6,705,000 bushels
Hay	1,227,000 tons
Tobacco	97,923,000 pounds

The South may, this year, well quote Virgil's verse: "Gargara is astonished at her own fertility."

In these figures, as well as in the development of the cattle industry, hereafter referred to, lies a promise of an enduring, because a self-contained, prosperity in the South; they indicate, as has already been suggested, that our section may expect in the future to provide the bulk of its own food supplies, with some surplus of such commodities for sale, while it will maintain its leading position as the source of one of the principal staples upon which civilized man depends to clothe himself.

The Company has continued active co-operation with the State and Federal governments, agricultural colleges and Southern farmers for the advancement of Southern agriculture. A preliminary report of the Agricultural Division of the Company's Industrial and Agricultural Department shows a total of 18,172 acres being cultivated in accordance with the advice of our Field Agents, embracing 7,882 acres in corn, 3,570 acres in cotton and 6,720 acres in miscellaneous crops. These figures do not by any means measure the work being done, as they embrace only those fields or parts of fields in which farmers agree to follow the advice of our agricultural field agents. Much larger areas are cultivated substantially in accordance with this advice, and the good results of the agricultural uplift work being done by the Company and, of course, by the State and Federal governments, as well as by other intelligent agencies, public and private, are noticeable in almost every agricultural community on the Company's lines. In 1914 the average yields of both cotton and corn per acre on fields in which the advice of the Company's agents was followed were more than double the average yields obtained on similar lands in the same localities where this advice was not followed, and as good results may be expected in 1915, when the figures are available.

The Agricultural Agent reports 313,000 fruit and nut trees planted during the year.

The live stock industry is making rapid progress in all of the territory contiguous to the Southern Railway. The numbers of beef and dairy cattle and hogs are rapidly increasing, and their quality is being improved through the introduction of pure-bred animals. The Live Stock Agent of the Company reports the location of 1,468 pure-bred cattle along the Company's lines during the year, the construction of 1,475 silos, and the organization of thirty live stock associations. The climate of the South and the large range of forage crops that can be produced are exceptionally favorable to all kinds of live stock, and the United States Department of Agriculture has demonstrated that beef and pork can be produced cheaper in the South than in other parts of the United States. The only obstacle to the development of the beef and dairy industries has been the cattle tick which carries the germ of Texas fever. The agricultural agents of the Company are co-operating with State and Federal agencies in the eradication of this insect. Large areas along the Company's lines have already been released from the cattle tick quarantine and large additional areas will be released in the autumn of this year.

GOOD ROADS:

Recognizing the importance of good country highways to the development of the territory traversed by its lines, the Company has, at all times, co-operated with the Office of Public Roads in the United States Department of Agriculture and other organizations engaged in the promotion of the good roads movement. The latest figures for road construction are those for the calendar year 1914, which show that during that year there were approximately 5,400 miles of improved roads built in counties traversed by Southern Railway lines, and that in the same year those counties issued bonds for road construction aggregating \$5,000,000. The total length of improved country highways in those counties at the end of the calendar year was approximately 50,000 miles.

LATIN-AMERICAN TRADE:

One of the interesting developments of the public service of a private corporation which looks forward, as does this Company, to its educational activities. Attention has been called to the notable work of this kind in behalf of better agriculture. Another work, germane to that in agriculture, has been the stimulation of the people of the South to take advantage of

current opportunities for a mutually profitable trade with Latin America. While this Company's South American Agency has been in operation only a short time, it has already laid the foundation of a foreign trade which is entirely new to many manufacturers in the South, and, while the beginnings are necessarily small, they contain the germ of what can become an important factor in the industrial activities of the South and so in the revenues of this Company. One interesting result of this movement is that fifteen thousand school children are now studying Spanish in the schools of the South as a direct result of recommendations to educational authorities by the South American Agency.

THE ADDITIONS TO CAPITAL ACCOUNT AND TO PROPERTY INVESTMENT

In the matter of additions and betterments the policy of the Company is better railroad, not more railroad. All suggestions of buying or building new railroads into new territory have been laid aside, and, in justice to the urgent demands of the existing property in the interest of economy of operation and convenience of the public served, cannot be properly considered at this time.

The Company has been fortunate in its ability to continue and to push forward, during this year of depression, the additions to its plant which will be necessary, before they can be completed, to handle the traffic of the industrial South. The capital for this work was provided during 1914, and its disbursements during the current year, when most other construction work had been suspended in the South, has not only enabled the Company to get more for a dollar invested than ever before, but has contributed substantially to the welfare of many Southern communities, which were refreshed, when they most needed refreshment, by the flow of our money through all the arteries of the commercial body. In this connection special attention is called to the table (page 45), included for the first time in this report, which sets forth the use and application of all the bonds issued by the Company since its organization.

During the year the investment in Road and Equipment increased \$11,021,684.56, of which \$9,004,934.79 was in Roadway and Structures and \$2,016,749.77 was in Equipment. This increase represents net additions made during the year. (See pages 36 and 37).

There was an increase of \$1,551,000 in Mortgage and Collateral Trust Bonds and Miscellaneous Obligations, and a decrease of \$3,193,000 in Equipment Trust Obligations. (See pages 42 and 43).

First Consolidated Mortgage Five per cent Bonds in the total amount of \$7,136,000 were sold and the proceeds applied as follows: On July 1, 1914, \$2,414,000 to redeem a like amount of matured Western North Carolina 6 per cent bonds; in December, 1914, \$4,722,000 to redeem a like amount of Richmond & Danville 6 per cent bonds. These transactions resulted in no increase in the funded debt, while the difference in the interest rates borne by the old bonds and the new means a reduction of \$71,360 in the annual interest charges.

There were drawn and taken into the treasury \$456,000. Development and General Mortgage Four per cent Bonds, representing in part the equipment trust obligations paid during the year and charged to Property Investment Account.

The total amount of Development and General Mortgage Four Per Cent Bonds available for disposition on June 30, 1915, was \$32,579,000, of which \$16,667,000 are pledged as collateral under Southern Railway Three-Year Five Per Cent Collateral Trust Indenture, dated March 2, 1914, leaving \$15,912,000 of such bonds in the treasury.

DOUBLE TRACK:

The double track construction work on the main line north of Charlotte, N. C., carrying with it improved alignment and elimination of heavy grades, has gone forward rapidly on 100 miles of the 142 miles of main line between Washington and Charlotte operated as single track at the beginning of the past fiscal year. Of this mileage, 27 miles, between Pelham and Brown Summit, N. C., were in operation as double track at the close of the year, and it is expected that all of the remaining 73 miles upon which work is now under way will be completed before April, 1916. There were 434.03 miles of double track in operation at the close of the year.

Since the close of the fiscal year there has been made available for the provision of double track and other improvements on the main line between Charlotte, N. C., and Atlanta, Ga., the sum of \$3,500,000 through the sale of First Mortgage Thirty-Year Five Per Cent (Series B) Gold Bonds of The Atlanta and Charlotte Air Line Railway Company. The work in immediate contemplation consists of the fifty-six miles between Spartanburg and Central, S. C., and the twenty-three miles between New Holland and Cornelia, Ga.

SEPARATION OF GRADE CROSSINGS:

One of the difficulties of modern railroading is the existence of grade crossings of highways with railroads. These crossings, which in some instances were actually required by the early charters, have become, with the growth of population, a menace to the public, and cause, in deplorable accidents for which those in charge of railroad trains are not always responsible, but are usually held responsible, a drain on the revenues of the Company. The increased use of automobiles in the South has accentuated this risk and this drain, and this Company is alive to the advantage of separating such grades wherever reasonably practicable. As, and when, the community recognizes its share in the responsibility and evinces a willingness to participate in the expense, much can be done, has been done and will continue to be done on our lines. Moreover, on all revision of line undertaken in connection with the policy of constructing double track, this Company has separated important and busy grade crossings wherever physically practicable and not prevented by selfish local interests. Thus, during the past year, on 100 miles of the main line on which double track has been under construction, 54 out of 73 dangerous grade crossings were eliminated, and this policy will be continued. The enormous investment required for perfection in this respect is, however, an unfortunate assurance that for many years more reliance must be placed, for the prevention of accidents at grade crossings, upon human care than upon physical elimination of risk. This is one of the most serious problems in the South, as in other parts of the United States.

YARDS AND TERMINALS:

In addition to the terminal yards at Richmond, Va., at Spencer and Winston-Salem, N. C., at Mobile and at Finley (near Birmingham), Ala., and at Forrest (near Memphis), Tenn., mentioned last year, work upon other important terminal improvements progressed during the past year, including a new yard at Danverside (near East St. Louis), Ill., new facilities for both passenger and freight traffic at Spartanburg, S. C., and the separation of busy grade crossings in several cities. Since the close of the year the modern export coal terminal at Charleston, S. C., has been put into operation. Arrangements have been made to provide a union passenger station at Macon, Ga., to meet the long continued and insistent demand for improved passenger traffic facilities in that city. New passing, side and spur tracks aggregating 89.27 miles were constructed.

AUTOMATIC ELECTRIC BLOCK SIGNALS:

These signals were placed in operation on the 190.3 miles of double track between Amherst and Whittle, Va., Danville, Va., and Pelham, N.

C., Atlanta and New Holland, Ga., Austell and Howell, Ga., Knoxville and Morristown, Tenn., and Ooltewah and Citico, Tenn. It is the policy to so equip all new double track as constructed. A total of 365.6 miles of such signals was in operation at the close of the year.

SERVICE OF EMPLOYEES

There has never been a year of the Company's history in which the stockholders have had as much reason for pride in and appreciation of the officers and employees, their work, their spirit, their loyal self-sacrifice. The manner in which a grave emergency was met and dealt with illustrates at its best that discipline which distinguishes a true organization from a mere co-operative society. Our organization, which has in recent years been built and cemented by a strict adherence to the principle of promotion for merit and reliance upon men made on the road, who have faithfully stood by during all our vicissitudes, has proven in this year of need the greatest of the Company's assets, for it has fought a losing fight and won.

ACCOUNTS AND STATISTICS

Statements of the accounts and statistics of the Company in detail will be found in the tables hereto annexed.

The accounts have been examined, as usual, by independent auditors and accountants, Messrs. Patterson, Teele & Dennis, and their certificate is made a part of this report.

Appended to this report is a minute of the resolution adopted by the Board upon being advised of the death of Alexander Boyd Andrews, for many years a Director and First Vice-President of the Company, who died at his home in Raleigh, North Carolina, on April 17, 1915.

Respectfully submitted, by order of the Board,

FAIRFAX HARRISON,
President.

TABLE 1.
INCOME STATEMENT FOR YEAR ENDED JUNE 30, 1915, COMPARED WITH YEAR ENDED JUNE 30, 1914.

1914.	OPERATING REVENUES:	1915.
\$45,632,207.12	Freight	\$40,458,857.85
19,016,098.50	Passenger	16,175,673.75
414,638.31	Miscellaneous Passenger-Train	353,842.55
1,443,151.58	Mail	1,459,883.47
1,902,563.25	Express	1,688,471.19
988,389.26	Other Transportation	931,630.35
1,068,364.41	Incidental	884,531.81
285,584.32	Joint Facility	246,618.56
<u>\$70,750,996.75</u>	<u>TOTAL OPERATING REVENUES.....</u>	<u>\$62,199,509.53</u>
	OPERATING EXPENSES:	
\$9,283,238.66	Maintenance of Way and Structures	\$8,452,117.17
12,133,828.71	Maintenance of Equipment	10,691,267.40
2,244,350.52	Traffic	2,110,466.58
25,713,747.03	Transportation	22,757,597.47
463,598.19	Miscellaneous Operations	388,228.83
1,987,879.39	General	2,019,621.01
65,093.23	Transportation for Investment—Credit	244,589.87
<u>\$51,760,649.27</u>	<u>TOTAL OPERATING EXPENSES.....</u>	<u>\$46,174,710.59</u>
<u>\$18,990,347.48</u>	<u>NET REVENUE FROM RAILWAY OPERATIONS..</u>	<u>\$16,024,798.94</u>
2,679,389.67	RAILWAY TAX ACCRUALS.....	2,595,828.27
<u>\$16,310,957.81</u>	<u>UNCOLLECTIBLE RAILWAY REVENUE.....</u>	<u>28,916.09</u>
	<u>TOTAL OPERATING INCOME.....</u>	<u>\$13,400,054.58</u>
	NON-OPERATING INCOME:	
\$212,112.35	Joint Facility Rent Income	\$284,477.24
65,000.00	Income from Lease of Road	65,880.00
110,291.69	Miscellaneous Rent Income	124,440.58
26,123.51	Net Income from Rail Leased	23,280.85
1,331,794.24	Dividend Income	1,080,243.89
1,380,317.26	Income from Funded Securities	1,071,544.35
131,722.78	Income from Unfunded Securities and	
10,044.53	Accounts	504,761.05
	Miscellaneous Income	84,289.79
<u>3,267,406.36</u>	<u>TOTAL NON-OPERATING INCOME.....</u>	<u>3,238,917.75</u>
<u>\$19,578,364.17</u>	<u>Total Gross Income.....</u>	<u>\$16,638,972.33</u>
	DEDUCTIONS FROM TOTAL GROSS INCOME:	
\$601,713.96	Hire of Equipment—Balance	\$837,616.06
1,052,062.51	Joint Facility Rents	1,046,522.17
1,790,637.01	Rent for Leased Roads (See Table 2)	1,621,040.59
38,276.45	Miscellaneous Rents	40,837.36
189,215.84	Separately Operated Properties	183,608.84
37.93	Interest on Unfunded Debt	2,204.52
127,118.50	Miscellaneous Income Charges	98,556.26
<u>3,799,062.20</u>	<u>TOTAL DEDUCTIONS</u>	<u>3,830,475.80</u>
<u>\$15,779,301.97</u>	<u>TOTAL AVAILABLE INCOME.....</u>	<u>\$12,808,496.53</u>
	INTEREST ACCRUED ON LONG TERM DEBT	
\$10,053,022.78	(See Table 2)	\$10,156,021.65
660,565.59	INTEREST ACCRUED ON EQUIPMENT OBLIGATIONS	
	(See Table 2)	737,784.54
	INTEREST ACCRUED ON DIVIDEND CERTIFICATES	
	226,008.00	32,000.00
	DIVIDENDS ACCRUED ON SOUTHERN RAILWAY—MOBILE AND OHIO STOCK TRUST	
	CERTIFICATES	226,008.00
<u>10,939,596.37</u>	<u>BALANCE OF INCOME OVER CHARGES.....</u>	<u>11,151,814.19</u>
<u>\$4,839,705.60</u>	<u>FROM WHICH DEDUCT DIVIDENDS ON PREFERRED STOCK:</u>	<u>\$1,656,682.34</u>
\$1,500,000.00	No. 27 (2½%) paid in April, 1914	
1,200,000.00	No. 28 (Scrip Dividend—2%)	
<u>\$2,700,000.00</u>	<u>TOTAL DIVIDENDS</u>	<u></u>
<u>\$2,139,705.60</u>	<u>BALANCE OVER DIVIDENDS ON PREFERRED STOCK</u>	<u>\$1,656,682.34</u>

APPROPRIATION OF INCOME:

\$91,928.91	For Additions and Betterments.....	\$77,187.72
.....	For Miscellaneous	56,125.30
\$91,928.91		\$133,313.02

\$2,047,776.69 Balance carried to Credit of Profit and Loss \$1,523,369.32

TABLE 3.

PROFIT AND LOSS, YEAR ENDED JUNE 30, 1915.

Balance at Credit of this Account June 30, 1914.....	\$18,676,904.51
Add:	
Credit Balance of Income for the Year.....	1,523,369.32

Net Miscellaneous Credits.....	72,916.09
	\$20,273,189.92
Deduct:	
Discount on Securities charged off during the year	\$425,293.47
Property Abandoned and not Replaced.....	45,210.79
Advances to Proprietary Companies written down	50,923.93
	521,428.19
Credit Balance June 30, 1915.....	\$19,751,761.73

TABLE 4

GENERAL BALANCE SHEET, JUNE 30, 1915, AND JUNE 30, 1914

ASSETS		LIABILITIES	
INVESTMENTS:		CAPITAL STOCK:	
June 30, 1914.	June 30, 1915	Common	\$120,000,000.00
\$310,963,668.27	\$319,968,603.06	Preferred	60,000,000.00
66,639,385.49	68,656,135.26		
\$377,603,053.76	\$388,624,738.32	Total Southern Railway Company Stock	\$180,000,000.00
Cash Deposited in Lien of Mortgaged Property Sold	2,112,590.04	Southern Ry. M. & O. Stock	
3,676.40		Trust Certificates	\$5,670,200.00
498,359.17	503,161.93	Less: Owned by the Company	20,000.00
INVESTMENTS IN AFFILIATED COMPANIES:			5,650,200.00
Stocks	\$27,453,480.11	Total Stock	\$185,650,200.00
Bonds	31,582,577.04		
Notes	2,115,080.94	LONG TERM DEBT:	
Advances	2,163,429.30	Funded Debt Unmatured (Table 5).....	\$261,599,700.00
Miscellaneous (Matured interest coupons)	51,455.00	Less: Owned by the Company.....	34,755,200.00
			\$226,844,500.00
62,561,188.11	63,366,022.39	Equipment Trust Obligations (Table 6)...	15,191,000.00
OTHER INVESTMENTS:		Total Long Term Debt	\$242,035,500.00
Stocks	\$297,506.00		
Bonds	5,158,913.45	GOVERNMENTAL GRANTS:	
Notes	52,652.82	Grants in aid of Construction.....	13,378.25
		Total Capital Liabilities	\$427,699,078.25
10,982,886.45	5,509,045.27		
\$451,649,163.89	\$460,115,557.95	CURRENT LIABILITIES:	
		Loans and Bills Payable	\$455,000.00
CURRENT ASSETS:		Traffic and Car Service Balances.....	1,156,567.52
Cash	\$3,075,178.83	Audited Accounts and Wages.....	5,415,499.79
Time Deposit	2,126,700.63	Miscellaneous Accounts	633,395.38
Special Deposits	2,932,371.45	Interest Matured, including Interest due July 1	2,740,952.65
Loans and Bills Receivable	1,517,048.80	Funded Debt Matured—Unpaid	22,673.80
Traffic and Car Service Balances Receivable	884,055.85	Dividends Accrued—Unmatured	56,502.00
Balances due from Agents and Conductors	191,527.39	Interest Accrued—Unmatured	1,576,496.72
Miscellaneous Accounts Receivable.....	3,207,412.32	Rents Accrued—Unmatured	249,266.09
Material and Supplies (Table 22).....	4,530,946.24	Other Current Liabilities	376,357.87
Interest and Dividends Receivable.....	612,433.51		
Other Current Assets	170,327.67	Total Current Liabilities	12,684,711.82
31,575,392.23	19,248,002.69	DEFERRED LIABILITIES:	
		Equipment of Leased Lines Retired; De-	
DEFERRED ASSETS:		ferred Payments Account Reconstruction	
Working Funds Advanced to Agents and		Rogersville Branch; Contractors' Per	
\$232,377.94	\$146,360.90	Cents. Retained and Sundry Items.....	1,385,586.66
920,208.73	954,979.63		
229,402.02	235,228.19	UNADJUSTED CREDITS:	
1,381,988.69	1,336,568.72	Taxes	\$1,011,687.22
		Insurance Reserve	954,979.63
UNADJUSTED DEBITS:		Operating Reserves	1,898,431.28
Insurance Premiums and Rents paid in		Accrued Depreciation on Equipment Owned	
advance	\$11,809.10	by the Company.....	15,333,948.50
Unextinguished Discount on Funded Debt		Accrued Depreciation on Physical Property	
(Proportion chargeable to Additions and		Reserve for Accrued Depreciation on	
Betterments to be made).....	162,047.57	Leased Line Equipment; Expenses Ac-	
Additions and Betterments Expenditures		crued not Vouchered; Mileage Ticket	
Suspense; Freight Claims in Suspense;		Suspense and Sundry Items.....	1,521,825.57
Foreign Mileage Suspense and Sundry			
Items	2,283,665.64	Total Unadjusted Credits	\$20,795,023.38
Securities of the Company owned by it:			
1914		CORPORATE SURPLUS:	
1915		Additions to Property, since June 30, 1907,	
\$15,652,200.00	\$16,108,200.00	Through Income	\$577,519.68
18,667,000.00	18,667,000.00	Appropriated Surplus not Specifically In-	
\$34,319,200.00	\$34,775,200.00	vested	263,970.15
		Total Appropriated Surplus	841,489.83
2,068,983.00	2,457,522.31	PROFIT AND LOSS—Balance.....	19,751,761.73
\$486,675,527.81	\$483,157,651.67	GRAND TOTALS	\$483,157,651.67

ILLINOIS CENTRAL RAILROAD COMPANY—SIXTY-FIFTH ANNUAL REPORT

REPORT OF THE BOARD OF DIRECTORS

To the Stockholders of the Illinois Central Railroad Company:

The Board of Directors submit herewith the following report of the operations and affairs of your Company for the year ended June 30, 1915: The number of miles of road operated on June 30, 1914, was.....4,769.27

January 9, 1915—Fredonia and Reeds Railroad—Reeds Junction, Ill., to Fredonia, Ill.....	1.77
Mileage added account of trackage rights, revision of line, and remeasurements	3.16
	4,774.20

Less:

January 9, 1915—Reclassification of first main track, Carbondale Junction, Ill., to Fredonia, Ill., as other main track, due to construction of Fredonia and Reeds R. R....	6.64
May 26, 1915—Reduction due to construction of cut-off between Kuttawa, Ky., and Cumberland, Ky.....	.42 7.06

The number of miles operated on June 30, 1915, was.....	4,767.14
The average number of miles of road operated during the year was	4,770.03

INCOME

The following is a statement of the Company's income for the year compared with the previous year:

	1915	1914	Increase + Decrease —
Average miles operated during year	4,770.03	4,768.51	+
Freight	\$41,212,270.70	\$43,871,271.70	—
Bridge tolls and miscellaneous freight	3,263,246.00	3,464,624.56	—
Passenger	12,640,597.28	13,715,979.06	—
Bridge tolls and miscellaneous passenger.....	211,080.10	247,762.37	—
Mail	1,050,706.59	1,042,042.96	+
Express	1,589,501.31	1,770,646.75	—
Other passenger train.....	457,177.96	475,668.53	—
Other transportation	753,786.52	804,580.88	—
Revenue from operations other than transportation	522,006.02	481,123.21	+
Total railway operating revenues	61,700,372.48	65,873,700.02	—

Railway operating expenses:			
Maintenance of way and structures	8,839,472.06	9,205,946.38	— 366,474.32
Maintenance of equipment	13,892,443.73	14,510,079.49	— 617,635.76
Traffic expenses	1,238,439.64	1,290,777.98	— 52,338.34
Transportation expenses	22,299,815.12	24,150,039.98	— 1,850,224.86
General expenses	1,603,255.98	1,618,483.63	— 15,227.65
Transportation for investment—Cr.	303,278.88	.....	— 303,278.88
Total railway operating expenses	47,570,147.65	50,775,327.46	— 3,205,179.81
Net revenue—rail operations	14,130,224.83	15,098,372.56	— 968,147.73
Outside operations:			
Revenues	411,179.77	499,802.61	— 88,622.84
Expenses	405,049.10	517,453.45	— 112,404.35
Net revenue—outside operations	6,130.67	*17,650.84	+ 23,781.51
Net railway operating revenue	14,136,355.50	15,080,721.72	— 944,366.22
Railway tax accruals	3,233,838.38	3,341,247.07	— 107,408.69
Uncollectible railway revenues	24,044.24	.....	+ 24,044.24
Railway operating income	10,878,472.88	11,739,474.65	— 861,001.77
Other income	7,659,428.03	7,320,600.33	+ 338,827.70
Gross income	18,537,900.91	19,060,074.98	— 522,174.07
Deductions from gross income	11,678,739.25	10,921,250.55	+ 757,488.70
Net income	6,859,161.66	8,138,824.43	— 1,279,662.77
Disposition of net income:			
Applied to sinking and other reserve funds ..	107,875.00	.....	+ 107,875.00
Appropriated for additions and betterments	46,027.77	41,642.66	+ 4,385.11
Balance transferred to credit of profit and loss ..	6,705,258.89	8,097,181.77	— 1,391,922.88

* Deficit.

REVENUES

For the current year the operating revenues amounted to \$61,700,372.48 as compared with \$65,873,700.02 in the previous year, a decrease of \$4,173,327.54, or 6.34 per cent.

Freight revenue amounted to \$41,212,270.70, a decrease of \$2,659,001.00, or 6.06 per cent. The principal portion of the decrease was on the southern lines, the northern lines showing a comparatively small decrease and the western lines an increase. The bituminous coal traffic showed a substantial increase both in tonnage and revenue over last year and there was also a heavy increase in the movement of grain through the port of New Orleans which added materially to the revenue for the year. These gains, however, were not sufficient to offset the loss in revenue due to the falling off in lumber traffic and the heavy shrinkage in merchandise and miscellaneous freight business.

The revenue from the transportation of passengers was \$12,640,597.28, a decrease as compared with last year of \$1,075,381.78, or 7.84 per cent. There was a substantial decrease in the revenue north of the Ohio River; but the greatest falling off in business was in the territory served by the southern lines.

Statistics as to freight and passenger traffic will be found by reference to Table No. 12.

EXPENSES

The operating expenses were \$47,570,147.65 this year as compared with \$50,775,327.46 last year, a decrease of \$3,205,179.81, or 6.31 per cent.

MAINTENANCE OF WAY AND STRUCTURES

Maintenance of way and structures expenditures amounted to \$8,839,472.06, being a decrease of \$366,474.32, or 3.98 per cent, as compared with the previous year. This decrease was due in part to the smaller quantity of new rail laid in renewals and partially by the fact that the previous year's expenses were increased by substantial charges on account of the construction of the new passenger terminal at Memphis and other additions and betterments work, while the operating expense portion of additions and betterments work was not so large this year.

Included in the renewals, the cost of which was charged to operating expenses, were the following:

2,087,531 cross ties were renewed, this being equivalent to 672.92 miles of continuous track, or 8.99% of all ties in track, including sidings.
10.21 miles of track were relaid with new steel rail and 5.65 miles with second-hand steel rail, replacing rail of the same weight.
7,428 lineal feet of timber and pile bridges were replaced by embankments.

1,504 lineal feet of iron and 4,136 lineal feet of concrete pipe culverts were put in.

486 miles of ballasted track were repaired or renewed to restore the track to its original standard.

As to work, the cost of which was charged wholly or in part to "Road and Equipment," comments will be found on page 10 of this report under "Physical Changes."

MAINTENANCE OF EQUIPMENT

The expenditures for maintenance of equipment were \$13,892,443.73, a decrease of \$617,635.76, or 4.26 per cent, as compared with last year. The decrease is accounted for by a reduction in repairs to freight equipment, both locomotives and cars. Considering the volume of business handled the equipment was well maintained during the year.

Depreciation charges amounted to \$2,076,094.24, being an increase over the preceding year of \$376,478.28.

246 locomotives received general repairs this year as against 306 in the preceding year, and 404 were given thorough repairs this year as compared with 398 last year.

561 passenger-train cars received medium repairs this year as compared with 459 last year, and 148 were given heavy repairs this year as against 165 last year.

The average mileage per serviceable locomotive for the year was 27,802.

The average age of locomotives was 12.27 years this year and 12.63 years last year, of revenue freight-train cars 8.93 and 9.49 years for the respective years, and passenger-train cars 14.67 years this year and 15.62 years last year.

TRAFFIC EXPENSES

Traffic expenses amounted to \$1,238,439.64 this year, a decrease of \$52,338.34, or 4.05 per cent, as compared with last year.

TRANSPORTATION EXPENSES

Transportation expenses were \$22,299,815.12 for the year, a decrease as compared with the previous year of \$1,850,224.86, or 7.66 per cent. The reduction in the volume of traffic was, in part, responsible for this decrease; but an important saving was occasioned by the substitution on portions of the main lines of superheater locomotives of greater tractive power, resulting in the movement of heavier trains with but slight increase in the expense. In the freight service the increase in the average tons moved per train mile, including Company's freight, was 7.16 per cent.

A special campaign was carried on in connection with fuel economy, resulting in a decrease of 10.16 per cent in the cost of fuel for locomotives, notwithstanding the larger locomotives in service on some parts of the line and a decrease of only 6.01 per cent in engine miles. Special attention was also given to the elimination, as far as possible, of the causes for loss and damage and other claims, the result being that there was a decrease of 27.48 per cent in the amounts paid for loss and damage to freight, and of 20.69 per cent in the sums paid for all claims and damages during the year as compared with last year.

GENERAL EXPENSES

General expenses amounted to \$1,603,255.98, a decrease of \$15,227.65, or .94 per cent.

TAXES

The amount of taxes for the year was \$3,233,838.38, a decrease of \$107,408.69, or 3.21 per cent less than the previous year.

There was a substantial decrease in the amount accruing to the State of Illinois on account of the charter tax owing to the decrease in the revenues on the charter lines during the year as compared with last year. There was also a material decrease in the amount of taxes paid on the non-charter lines in Illinois and on the lines in several of the other states due to reductions in the rates of taxation.

FINANCIAL

The financial condition of the Company at the close of the year as compared with the previous year is set forth in the general balance sheet, Table No. 4, which table, together with Table No. 7, "Long Term Debt and Interest," has been stated in somewhat different form from the previous year. These changes were made in accordance with the form of balance sheet prescribed by the Interstate Commerce Commission to take effect July 1, 1914.

CAPITAL STOCK AND FUNDED DEBT

There were no changes in the Capital Stock during the year. \$1,980,000.00 of Illinois Central Equipment Trust Certificates, Series "C," were issued and sold in April, 1915.

Illinois Central Railroad Company Four and One-half Per Cent Secured Gold Notes, amounting to \$10,780,000.00, matured July 1, 1914, and were retired.

Under the terms of the mortgage \$2,000,000.00 Illinois Central Railroad Company First Lien Equipment Bonds were delivered to the Trustee and cancelled. An additional \$881,000.00 of the same issue of bonds were also turned over to the Trustee for cancellation in connection with the sale to The Yazoo & Mississippi Valley Railroad Company of 105 locomotives released under the mortgage and which were a part of a total of 134 locomotives sold to that Company.

There were retired and cancelled under the terms of the respective Trust Agreements \$800,000.00 of Illinois Central Equipment Trust Certificates, Series "A," and \$350,000.00 of Illinois Central Equipment Trust Certificates, Series "B."

SECURITIES OWNED

In December, 1914, the Chicago, St. Louis & New Orleans Railroad Company issued under the terms of the Trust Agreement \$5,700,000.00 of its Equipment Trust Certificates, Series "A." The Illinois Central Railroad Company purchased \$700,000.00 of this issue. Of the latter amount \$35,000.00 matured and were redeemed in May, 1915.

\$2,586,000.00 of The Yazoo & Mississippi Valley Railroad Company Five Per Cent Gold Improvement Bonds were acquired as follows: In July, 1914, from the Trustees of the Western Lines, Omaha Division and Chicago, St. Louis & New Orleans Railroad Sinking Funds, \$852,000.00; in September, 1914, from The Yazoo & Mississippi Valley Railroad Company for the purchase price of one hundred and thirty-four locomotives sold to that Company, \$912,000.00; and in the same month that Company also issued and turned over to the Illinois Central Railroad Company in liquidation of indebtedness for improvements made to its property \$822,000.00.

\$2,500.00 par value of the Dubuque & Sioux City Railroad Company capital stock was purchased in November, 1914.

\$10,000.00 par value of the Central Elevator and Warehouse Company stock was purchased in October, 1914.

In addition to the above the Company also acquired \$3,600.00 par value of miscellaneous stocks.

The Company sold during the year Illinois Central Railroad Company and Chicago, St. Louis & New Orleans Railroad Company Joint First Refunding Mortgage Bonds as follows: \$5,000,000.00 in February, 1915, \$1,750,000.00 in March, 1915, and \$3,250,000.00 in April, 1915.

There were delivered to the Trustees of the several sinking funds in exchange for The Yazoo & Mississippi Valley Railroad Company Five Per Cent Gold Improvement Bonds as above mentioned, \$944,000.00 of the Louisville Division and Terminal Three and One-half Per Cent Bonds of 1953.

The Peoria and Pekin Union Railway Company redeemed \$12,500.00 par value of its Five Per Cent Debenture Bonds, maturing August 1, 1914.

\$86,000.00 par value of The Yazoo & Mississippi Valley Railroad Company Five Per Cent Gold Improvement Bonds were transferred to the Insurance Fund, and \$30,000.00 par value were sold.

\$100,800.00 par value Cuban American Sugar Company preferred stock was sold during the year.

INSURANCE AND OTHER FUNDS

The changes in the Insurance Fund during the year and the condition of the fund at the close of the year are shown in the following table:

	Year Ending June 30, 1915	Year Ending June 30, 1914
Amount at credit of fund July 1	\$2,129,835.52	\$2,089,844.54
Added through monthly charges to operating expenses	60,000.00	60,000.00
Collected from lessees account of insurance	1,099.92	2,106.68
Interest received on investments of the fund	107,875.00	94,630.00
Fire losses collected	12,604.82	6,941.30
	\$2,311,415.26	\$2,253,522.52
Losses by fire	\$80,714.86	\$80,479.61
Premiums paid for reinsurance	45,327.84	43,207.39
	\$96,042.70	\$123,687.00
Amount of credit of fund June 30	\$2,215,372.56	\$2,129,835.52

The balances in the sinking funds as of June 30, 1915, and the increases during the year were as follows:

The Farmers' Loan and Trust Company, Trustee—Cairo Bridge Contingent Fund, \$504,180.00.
The Farmers' Loan and Trust Company, Trustee—Cairo Bridge Sinking Fund, \$344,580.24, an increase of \$32,412.97.
United States Trust Company of New York, Trustee—Sinking Fund for Western Lines Bonds, \$1,417,887.73, an increase of \$100,294.21.
United States Trust Company of New York, Trustee—Sinking Fund for Omaha Division Bonds, \$192,921.50, an increase of \$17,076.65.

ROAD AND EQUIPMENT

There was expended during the year for Road and Equipment (including improvements on subsidiary properties) \$10,323,622.76. The following is a classified statement of these expenditures:

	Additions and Betterments on Owned Lines	Advances for Additions and Betterments to Lines of Subsidiary Companies
ROAD:		
Engineering	\$32,033.80	\$72,392.91
Land for transportation purposes	112,241.70	43,987.82
Grading	395,845.74	773,502.14
Tunnels and subways	356.93	
Bridges, trestles and culverts	434,984.44	819,451.44
Ties	36,002.33	148,473.05
Rails	174,526.95	347,765.16
Other track material	243,346.17	348,520.74
Ballast	19,326.48	149,360.12
Track laying and surfacing	120,492.58	335,814.21
Right of way fences	2,763.47	11,949.17
Crossings and signs	112,596.08	20,200.14
Station and office buildings	97,414.43	488,890.75
Roadway buildings	2,314.39	5,212.32
Water stations	5,613.72	56,602.84
Fuel stations	14,854.20	10,431.65
Shops and enginehouses	66,152.72	148,289.48
Grain elevators	828.18	11,890.31
Storage warehouses		46.31
Wharves and docks	69.13	8,416.57
Coal and ore wharves		26,275.88
Telegraph and telephone lines	29,676.73	18,717.18
Signals and interlockers	91,828.96	188,489.05
Power plant buildings	2,714.30	5,543.24
Power transmission systems		1,909.17
Power line poles and fixtures		1,336.00
Miscellaneous structures	5,084.25	82.74
Paving	69,866.11	44,542.41
Roadway machines		1,934.99
Roadway small tools	25.23	6,394.02
Assessments for public improvements	32,988.77	18,148.93
Cost of road purchased	1,500.00	
Other expenditures—Road	154,126.43	193,016.35
Shop machinery	33,384.13	23,765.48
Power plant machinery	23,761.86	458.86
	Covered by Equipment Trust Series "C"	
EQUIPMENT:		
Steam locomotives	\$1,256,065.82 Cr. 260,280.44	*1,749,341.90
Freight-train cars	1,078,535.52 Cr. 39,316.03	
Passenger-train cars	168,250.14 Cr. 123,997.17	
Work equipment		452,213.15
GENERAL:		
Organization expenses		291.04
Taxes	1,053.62	
Interest during construction	4,619.82	10,618.81
Other expenditures—General		55.00
	\$2,502,851.48	\$2,350,839.01
Less amount transferred to "Miscellaneous physical property," due to change in classification		623,969.53
	\$2,502,851.48	\$1,726,869.48
		\$6,093,901.80

*Balance covered by outstanding C. St. L. & N. O. R. R. Equipment Trust Series "A."

The following shows the amount advanced during the year to each of the subsidiary Companies, these amounts being included in total advances shown in Table No. 6 of this report:	
Chicago, St. Louis & New Orleans R. R.	\$5,676,567.14
Canton, Aberdeen & Nashville R. R.	50,862.26
South Chicago R. R.	Cr. 1,964.85
Blue Island R. R.	1,898.65
Dubuque & Sioux City R. R.	188,747.36
Kensington & Eastern R. R.	12,323.99
Batesville Southwestern R. R.	1,121.58
Bloomington Southern R. R.	1,589.95
Johnston City Southern R. R.	48,679.80
Benton Southern R. R.	72,500.33
Herrin Northern R. R.	1,358.76
Fredonia & Reeds R. R.	40,216.83
Total	\$6,093,901.80

PHYSICAL CHANGES

Substantial improvements were made in the physical condition of the Company's road and equipment during the year.
Below is a statement as to the more important improvements, the cost of which was charged either wholly or in part to Road and Equipment.

ROADWAY AND STRUCTURES:

During the year 90 pound new steel rail was laid on 262.23 miles of track, and second-hand steel rail was relaid on 62.74 miles, all of which replaced rail of lighter pattern.
Ninety-nine new industrial tracks were built or extended, making a net addition of 7.46 miles after allowing for industrial tracks taken up.
Four hundred and one new Company sidings were built or extended; allowing for tracks taken up there was a net addition for the year of 69.54 miles.

The second main track between Fulton, Ky., and Memphis, Tenn., which was referred to as being in the course of construction in last year's report, was completed.

In order to facilitate the handling of coal traffic a double track connection was installed between the junction of the Carbondale and Johnston City Districts, near Cambria, Ill., the length of track constructed being 1.34 miles.

A cut-off was built from Fredonia, Ill., on the Carbondale District to Reeds Junction, Ill., on the Johnston City Branch, a distance of 1.77 miles. This involved the abandonment as first main track of 6.64 miles of line between Fredonia, Ill., and Carbondale Junction, Ill.

The second main track at Parkway, Ill., was extended to Broadview, Ill., a distance of 2.46 miles, and additional side tracks were constructed for the purpose of handling passenger traffic to and from Speedway, Ill., the site of the new automobile race course a short distance east of Broadview, Ill.

At Paducah, Ky., the freight yard was added to by the construction of 6.28 miles of sidings. The freight yard at Fulton, Ky., was increased 6.59 miles.

The reduction of grades between Paducah, Ky., and Princeton, Ky., and the enlargement of yard facilities at the latter point were continued and were practically completed at the close of the year.

The elevation of the tracks at Memphis, Tenn., as also the construction of the new passenger facilities at that place, referred to in previous reports, were completed. The raising of tracks and relocating of main line in connection with levee improvements being made by the city authorities in North Memphis, Tenn., were undertaken during the year and are about half completed.

The grade crossing elimination work at Grand Crossing, Chicago, Ill., track elevation work between 79th Street and 116th Street, Chicago, Ill., and through Cicero, Ill., also grade revision at Mattoon, Ill., were still in progress at the close of the year.

The work of strengthening the Cairo Bridge so as to be able to operate heavy locomotives over it was performed during the year.

An interlocking plant was installed at Aulon, Tenn.

New station buildings were erected at Grand Crossing, Chicago, Ill., Marion, Ill., Buckner, Ill., Toone, Tenn., and Masonville, Ia., and others are in course of construction at Storm Lake, Ia., and Millwood, Ky. A new freight house was erected at Starkville, Miss.

The freight and passenger station at Winona, Miss., was enlarged and improvements made to the station building at La Salle, Ill.

New water plants were installed at Obion, Tenn., and Dyersburg, Tenn. Water stations were improved at Storm Lake, Ia., Rock Rapids, Ia., Sioux City, Ia., De Koven, Ky., Cecilia, Ky., Fulton, Ky., McComb, Miss., and Crystal Springs, Miss. New steel water tanks of 100,000 gallon capacity, replacing wooden tanks, were installed at Dubuque, Ia., Central City, Ky., and Jackson, Miss.

New mechanical coaling plants were erected at Amboy, Ill., and Jackson, Miss. At Harahan, La., new coal handling facilities were installed for transferring coal from cars to barges.

New mechanical buildings, consisting of car repair shed, sand house, six stall roundhouse, power house, oil and store house, were erected at Princeton, Ky., and a five stall roundhouse and machine shop, store and oil house, sand house, and car repair shop and shelter were built at Jackson, Miss. The plant within the city limits at the latter place was abandoned.

New 85-ft. steel turntables were installed at Princeton, Ky., Dyersburg, Tenn., Nonconah Yard, Memphis, Tenn., and Jackson, Miss. A second-hand 66-ft. turntable was put in at Kenner, La.

One hundred and sixty-two miles of electric automatic block signals were constructed at various points and placed in operation. There were 1,262.4 miles of protected track at the close of the year.

Electric block signals are being installed between Branch Junction and Centralia, Ill., 4 miles; Marine to Glen Carbon, Ill., 13.7 miles; Coleman to Plato Center, Ill., 11.5 miles; and Mona to Benson, Ia., 10.7 miles; a total of 39.9 miles.

6,063 lineal feet of permanent bridges and trestles were constructed, replacing timber and pile bridges, trestles, and embankments.

1,501 lineal feet of permanent bridges and trestles were rebuilt or replaced by embankments.

29,402 lineal feet of timber and pile bridges or trestles were rebuilt or replaced by embankments.

EQUIPMENT:

Fifty Mikado type freight locomotives and twenty-five switching locomotives were added during the year, and sixty-eight locomotives were disposed of, resulting in an increase of seven locomotives, and an increase in tractive power of all locomotives as compared with the previous year of 1,181.65 tons.

One hundred and one passenger-train cars were acquired and thirteen were sold, destroyed or transferred to other service, making a net increase of eighty-eight cars.

Nine thousand three hundred and thirty-two freight-train cars were added during the year; six thousand four hundred and nineteen were new cars and two thousand nine hundred and thirteen were cars purchased from the Central Fruit Dispatch; four thousand nine hundred and sixteen cars were sold, destroyed or transferred to work service, leaving a net increase of four thousand four hundred and sixteen cars. The average capacity of cars owned at the close of the year was 41.46 tons as compared with 41.52 tons last year. The total capacity of cars was 2,647,730 tons this year and 2,467,995 tons last year.

GENERAL REMARKS

Your Company during the past year has suffered from the depression in business prevalent throughout the country, and this has been most pronounced on the lines south of the Ohio River.

The crops in the territory served by your Company's lines were generally good; but the practical discontinuance of lumber exports and the general depression in the building trades seriously affected the lumber business; this, together with the low price received by cotton growers for their product, not only affected the revenue your Company received from the transportation of lumber, but also, in connection with both commodities, had a depressing effect on the revenues from the transportation of general merchandise and on passenger travel.

The substantial amounts expended by your Company during the past few years in additional facilities, as well as in the upkeep of existing tracks and structures, together with the acquisition of a large number of new locomotives of increased tractive power and cars of greater capacity than those formerly in service, enabled your Company to curtail its expenses in line with the decrease in revenue. As a result, while the total railway operating revenues decreased 6.34 per cent, the ratio of railway operating expenses to railway operating revenues was 77.10 per cent this year as against 77.08 per cent the previous year.

Under date of December 1, 1914, an equipment trust, known as the "Chicago, St. Louis and New Orleans Equipment Trust, Series 'A,'" was made in the amount of \$5,700,000.00 with which to provide funds, in part, for the acquisition of 72 locomotives and 6,500 freight cars. The Illinois Central Railroad Company guaranteed the payment of the trust certificates and entered into an agreement with the Chicago, St. Louis and New Orleans Railroad Company under which your Company became the sub-lessee of the equipment covered by the lease. Under date of April 1, 1915, the Illinois Central Railroad Company issued \$1,980,000.00 of equipment trust certificates known as "Illinois Central Equipment Trust, Series 'C'" for the purpose of paying, in part, for 75 locomotives and 1,000 refrigerator cars. The equipment covered by both of these trusts was received and placed in service during the year.

The Board takes this opportunity of expressing its appreciation to the officers and employees for their loyal and efficient services during the past year.

By order of the Board of Directors.

C. H. MARKHAM President.

Railway Age Gazette

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WE GUARANTEE, that of this issue 8,750 copies were printed; that of these 8,750 copies 7,230 were mailed to regular paid subscribers to the weekly edition, 122 were provided for counter and news companies' sales, 1,047 were mailed to advertisers, exchanges and correspondents, and 351 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 405,200, an average of 9,209 copies a week.

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GENERAL NEWS SECTION.....

*Illustrated.

Many railroad officers other than those in the executive and accounting departments do not realize the scope of the Association of Railway Accounting Officers or the importance of the work which is being done by it. The association has 600 individual members, representing over 280,000 miles of railroad, some express companies and some steamship lines, and has members in the United States, Canada, Mexico, South America, Cuba, Porto Rico, Philippine Islands and South Africa. With the change that has been taking place in the attitude of railroad managements

toward the quantity and quality of the information which they give out about the company's affairs has come an opportunity for the association to make its work better understood and more fully appreciated by the layman. Two little leaflets have recently been published by the association, one setting forth concisely its objects and what it accomplishes, and the other containing abstracts from the comments of some of the members on the work of the association. One thought that runs through all of these comments is that an accounting officer must continually guard against losing touch with the other branches of the service and of the progress being made in the science of his own work. Frank Nay, controller of the Chicago, Rock Island & Pacific, puts this aptly:

Our work is done in offices in the top stories of buildings; rarely do we meet the patrons of the road, and only occasionally meet our own brother officers outside of the circle of a certain half dozen with whom we come in contact regularly; that very fact makes our work more difficult, and it is apt to appear to be drudgery. Without the constantly broadening influences of contact with people outside of our own department, and outside of railroad service, as is the case with nearly all other departments of railroad operations, it is no wonder that we do sometimes become narrow.

The work of the association deserves not only the support of its members but more attention than it is getting from a great many railroad officers in other branches of the service. On the other hand, the association itself can help, and apparently realizes the fact, in making a better understanding between accounting officers and other officers of the railroad possible.

No more complete statistical demonstration of the overwhelming superiority of the railways of the United States over those of the

The Superiority of Railways in United States

rest of the world has ever been made than that afforded by the bulletin just issued by the Bureau of Railway Economics, presenting comparative statistics for the United States and 38 foreign countries, covering 606,000 miles of line, or seven-eighths of the total railway mileage of the world. In the tables published elsewhere in this issue it is shown that with one exception the railways of the United States pay a higher average wage than prevails in any other country, yet with one exception, freight rates per ton per mile in the United States are lower than the rates in any other country. In most other countries freight rates are 50 per cent higher than in the United States, and average wages are 50 per cent less than in the United States. In capitalization per mile of its railways the United States is exceeded by every one of the principal countries of the world. The one important particular in which the railways of the United States are surpassed, from the viewpoint of the public, is in the rate per passenger per mile, and even in this respect, taking into account the accommodations furnished and the service performed, rates in the United States are lower than in any of the countries with which comparison is made. The low fares in many countries are shown to be due to the different character of the service, which is indicated very clearly by the figures showing the great density of low class passenger traffic, such as we do not have in this country, and the average number of passengers per train.

In only one country, Denmark, are so few passengers carried per train as in the United States, where the average is 53, although the trains have space accommodations for many more. In most European countries the number of passengers per train is from 30 to 60 per cent greater, and in India the average reaches 176. Just as the low freight rates in the United States are made possible by the fact that the freight density is greater than in any other country except Germany, and that in hauling 406.8 tons of freight per train the United States leads every other country by a long interval, the low passenger fares in some other countries are made possible by heavy loading—in other words, crowding—of passengers. In fact, in many of the countries where the prevailing fares are

Passenger Fares in the United States and Elsewhere

lower than in this country the passengers are handled very much like freight. Instead of crowding the passengers we crowd the freight. The fact that the freight rates in Germany or Russia more closely approximate our passenger fares than our freight rates, while their fares are nearly as low as our rates for freight, may indicate the relative degree of respect paid to people and to property in a country where the boys are raised to be targets. A Chicago newspaper recently printed a story that about one thousand college students are trying to make arrangements with the railroads to transport them to a football game in Minneapolis in cattle cars, so that the reduction in railroad fares thus obtained will enable the university to have a larger representation at the game and to make its "beef" count in the cheering section as well as in the scrimmage line. The rates which the railroads quote for such an occasion may give us something to compare with the low European fares. Such a proposition ought to appeal to the railroad rate-makers on the theory of charging what the traffic will bear, but the Cummins amendment, which imposes on the railroads full liability, presents a possible obstacle, unless it be held that a college student under such circumstances constitutes a shipment the value of which is concealed by the package, in which case the value could be declared to be "not over \$100." As this scheme is said to have originated at the University of Iowa, railroad men are liable to suspect in it a crafty inspiration on the part of Clifford Thorne, moving in this mysterious way to establish a precedent for lower passenger fares. With the rate once established it might not be impossible to persuade the Iowa legislature to impose some legal requirements as to the service and equipment, such as padding for the interior of the cars or springs for the trucks.

The total amount of time that might be devoted to a study of the big problems that are involved in government regulation of railroads and public utilities by members of the Interstate Commerce Commission and state commissions that is wasted through having to hear complaints that ought never to have been brought is astonishing. The "residents" of Port Ewen, Ulster county, N. Y., recently brought a complaint before the New York Public Service Commission, Second district, against the Western Union because it discontinued the use of a telegraph wire, about a mile long, to that village, and instead of a Morse operator at the village had an agent who transmitted the telegraph messages by telephone to a telegraph office about a mile distant. A local druggist, who was also a telegrapher, had been the company's telegraph operator at Fort Ewen, receiving half the amount taken in as compensation for his work as telegrapher. This amounted to considerably less than the regular wages of a telegrapher. Card—that was the local druggist's name—was so slow in getting his accounts in that the Western Union decided to make a change. Another man was hired to transmit telegraph messages by telephone to the nearest office. Card and other "residents" of Port Ewen brought a complaint before the Public Service Commission. Commissioner Emmet, in dismissing the complaint, calls it a fairly typical one. It is hardly believable, however, that there is not one touch of the unique in this case. When Card was notified that the commission would hold a hearing on his complaint at Albany on a certain date he informed the commission by letter that Albany was inconvenient as a place for a hearing and asked that further public hearings, if any were necessary, should be held at Port Ewen. There is no doubt that one of the important functions which the Interstate Commerce Commission and state commissions perform is to offer an open court where any one's grievance against a railroad or public utilities company can be thrashed out. Might it not be just possible, however, to divide some of the state commissions into two sections, one to hear complaints of the Port Ewen order and the other to study the somewhat broader problems of government regulation and pass on such questions as a two-cent rate for passengers?

THE PANAMA CANAL AND RAILWAY RATES

THOSE who think of the railways as always demanding increases in rates and quarreling with their customers, the shippers, should take note of the fact that the transcontinental railways recently have been appearing, together with the shippers of the middle west, at a hearing before the Interstate Commerce Commission at Chicago for the second time within a year, asking permission to make further extensive reductions in their rates to the Pacific coast. The purpose of these is to meet water competition via the Panama Canal and to enable some of the middle western shippers, whom Uncle Sam's waterway has left high and dry, to retain some of their former business on the Pacific coast.

This is in spite of the fact that the railways of the middle west, including some of the same lines, are still seeking advances in rates by asking the commission for a rehearing of the western rate advance case. Of course, both the western and the transcontinental groups of roads are trying to increase their revenues, the western trunk lines by advancing rates which they consider unremunerative and the transcontinental lines by reducing rates to a point which will restore to them a part of the traffic they have been obliged to relinquish to the canal route during the past year.

Last fall the transcontinental roads asked the commission to approve reductions in the rates on a list of about 100 commodities which were not low enough to prevent the water lines through the canal from taking business away from them. These were to be made without corresponding reductions to intermediate points. The commission granted the authority asked with some modifications. Now the canal has been in operation for over a year and both the railways and the middle western shippers, as they testified at the hearing, have found that it is necessary to make reductions in the rates on several hundred more commodities, if they are to retain any considerable portion of the business. Ever since the canal was opened the Interstate Commerce Commission has been bombarded with petitions and letters from shippers in the middle west for some relief from a condition under which their competitors on the Atlantic seaboard have been given such low rates by water through the canal that they can undersell the shippers in the Mississippi valley who are dependent on the through rail routes to the coast. The railroads could not, without the permission of the commission, reduce their rates to the coast without at the same time reducing their rates and revenues on traffic to intermediate points not subject to the water competition. These petitions and letters the commission turned over to the railroads and from March 1 until September 1 a committee of representatives of the transcontinental lines was in session at Chicago hearing the stories of shippers whose business has been hurt by the canal.

The result has been the presentation of a petition for relief from the commission's fourth section orders, similar to that granted in connection with the application of last fall—relief which would allow reductions to the coast without proportionate reductions to interior points on a large number of additional commodities.

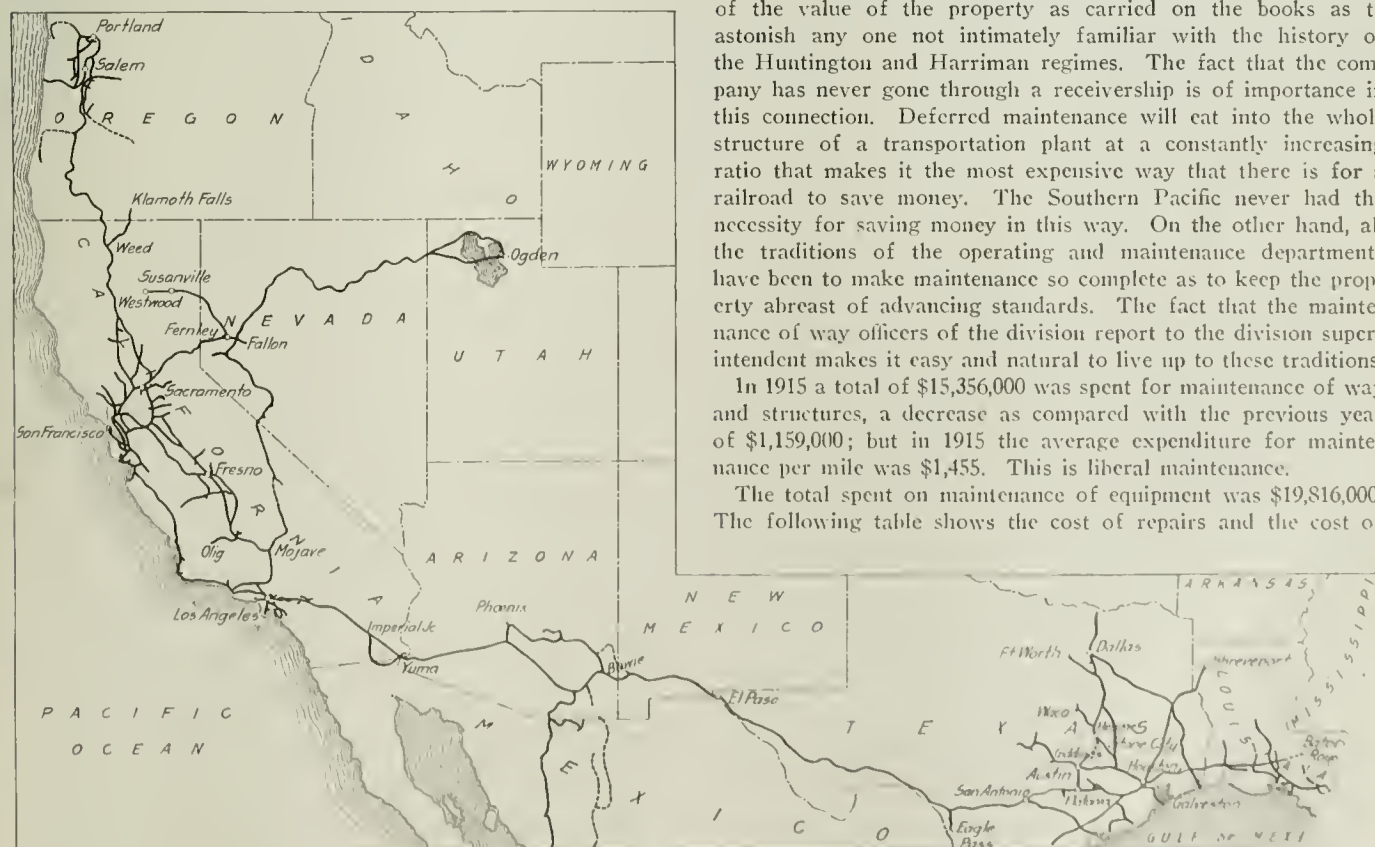
It was testified at the hearing that many commodities which have never before been considered subject to water competition are now moving almost entirely by water; that during the past four months 42 vessels have been operated through the canal westbound with general cargoes between the Atlantic and Pacific ports of the United States; and that in the first 11 months after the opening of the canal the tonnage of this class of traffic had amounted to 900,000 tons, substantiating the estimate made by the roads last fall that it would amount to 1,000,000 tons a year. A large number of shippers who appeared at the hearing described in detail how their business was being affected, and asked that the reductions be allowed, while the representatives of western intermountain cities were on hand to protest against any reductions in the rates to the coast, unless they are to be given similar concessions.

The controversy over transcontinental rates now presents very much the same features that it always has during the quarter of a century it has been before the commission. The interior cities always have been at a disadvantage as compared with the coast cities that have both rail and water transportation, and this disadvantage the government has increased by building the canal. Although the commission a few years ago reduced the difference between their rates and the coast rates, it has not yet been able to give the interior cities the advantages that the coast cities derive from their location on the water. So far as the present case is concerned, if the rail rates are not reduced the business will go to the coast by water, and while the intermountain cities would thus be spared the chagrin of seeing the freight pass by rail on its way to the coast they would be no better off than if reductions in the rail rates enabled some of the business to move by rail to the coast. In fact, it is better for the interior cities to have traffic move to the coast by rail than by water, because the railways do employ people, buy supplies and pay taxes in intermountain communities, while the water lines do not; and, therefore, whatever causes the water carriers to take business from the railways injures the intermountain communities by injuring the railways.

The Panama canal was built by the people of the United States, partly for benefit of the shippers of the United States. As it has turned out, the canal is benefiting only the shippers of the Atlantic and the Pacific coasts, and it is necessary for the railroads to come to the assistance of the remaining shippers to prevent them from being harmed while the shippers on the coasts are being benefited.

SOUTHERN PACIFIC

ABOUT as severe a test as is likely to be applied to a railroad company operating in eight states was applied to the Southern Pacific in the two years ended June 30, 1915. The law of chances would be strongly in favor of prosperity in some of these states—they include the Southwest, Pacific coast and mountain states—in at least one out of two successive years.



The Southern Pacific

Operating revenues for the 10,311 miles of railroad operated by the Southern Pacific in 1913 amounted to \$142,775,000. In 1914, with 111 more miles in operation, operating revenues amounted to \$138,520,000, and in the fiscal year ended June 30, 1915, with 10,554 miles of line in operation, operating revenues amounted to \$129,866,000. Operating expenses and taxes in 1913 amounted to \$98,567,000; in 1914 to \$100,825,000, and in 1915 to \$94,125,115. In 1913 the Southern Pacific earned a surplus available for dividends of \$26,868,000, the equivalent of 9.85 per cent on its stock. In 1915, notwithstanding all the difficulties which it had to contend with in the two years, the company earned \$20,452,000 surplus available for dividends, or the equivalent of 7.50 per cent. The Southern Pacific is paying 6 per cent.

Two years previous to the floods and crop failures of 1914 the Southern Pacific had just finished going through a strike of machinists which would have tried the resources of the strongest of American railroads. In 1915 the prostration of industry, and with it the cessation of all but the most necessary purchases and of all but the most necessary railroad journeys, was a factor which all of the railroads serving the cotton producing states had to face, and while only a small proportion of the Southern Pacific's lines are in the cotton producing states, the loss was considerable. The lumber trade was in as bad a way as cotton. What increase there was in passenger business from the expositions at San Diego, Cal., and San Francisco was more than offset by the effect of the business depression on passenger traffic.

Passenger revenue in 1915 amounted to \$36,865,000, a loss of \$3,550,000, or 8.78 per cent, as compared with the previous year.

The real reasons which underlie the Southern Pacific's ability to get through such a long period of continuously and severely adverse conditions date back to the early history of the company. For years and year Collis P. Huntington poured money back into the Southern Pacific to an extent that it would be almost impossible to determine from the records. What is known of these records, however, leads one to suspect that when the valuation of the Southern Pacific is concluded the cost of reproduction new for that property will be so far in excess of the cost of the value of the property as carried on the books as to astonish any one not intimately familiar with the history of the Huntington and Harriman regimes. The fact that the company has never gone through a receivership is of importance in this connection. Deferred maintenance will eat into the whole structure of a transportation plant at a constantly increasing ratio that makes it the most expensive way that there is for a railroad to save money. The Southern Pacific never had the necessity for saving money in this way. On the other hand, all the traditions of the operating and maintenance departments have been to make maintenance so complete as to keep the property abreast of advancing standards. The fact that the maintenance of way officers of the division report to the division superintendent makes it easy and natural to live up to these traditions.

In 1915 a total of \$15,356,000 was spent for maintenance of way and structures, a decrease as compared with the previous year of \$1,159,000; but in 1915 the average expenditure for maintenance per mile was \$1,455. This is liberal maintenance.

The total spent on maintenance of equipment was \$19,816,000. The following table shows the cost of repairs and the cost of

depreciation and retirements together for locomotives and cars:

	1915	1914
Per locomotive:		
Repairs	\$3,443	\$3,920
Depreciation and retirements	448	309
Per passenger-train car:		
Repairs	682	838
Depreciation and retirements	251	137
Per freight-train car:		
Repairs	81	93
Depreciation and retirements	33	21

The higher charges for depreciation and retirements are made in compliance with the orders of the Interstate Commerce Commission, which require a charge to operating expenses for the depreciation portion of rental paid on equipment, which in 1914 the Southern Pacific charged to income and not to expenses.

Transportation expenses in 1915 amounted to \$44,007,000, a saving as compared with the previous year of \$2,393,000, or 5.16 per cent. The average trainload of all freight was 464 tons in 1915, as against 471 tons in 1914. One reason for the smaller trainload was the greater proportion of unbalanced traffic on the lines east of El Paso. The percentage of loaded freight car miles to total car miles in 1915 on the lines east was 69.22, as against 70.91 in the previous year. There was an increase in the price of locomotive fuel, which resulted in a cost for the fuel used in 1915 \$765,000 greater than would have been the cost for the same quantity of fuel in 1914. To offset this there was a saving of \$450,000 made through the more economical use of fuel. The same amount of fuel in freight service moved 6.83 per cent more gross tonnage in 1915 than in 1914, and in passenger service, 2.85 per cent more gross tonnage.

The total tonnage of revenue freight in 1915 was 31,857,000. The tonnage of all classes of freight, except agricultural products, was less than in 1914, the total in 1914 being 31,960,000. The greatest falling off was in lumber and other forest products, which furnished 4,992,000 tons, or 15.80 per cent of the total tonnage in 1915, while in 1914 these classes of commodities furnished 5,717,000 tons, or 17.89 per cent of the total tonnage. In 1915 products of agriculture furnished 6,881,000 tons, or 21.78 per cent of the total tonnage, while in 1914 they furnished 5,803,000 tons, or 18.16 per cent of the total tonnage.

It will be recalled that in 1914 the United States Supreme Court decided that proven fraud alone could defeat the Southern Pacific's title to its oil lands. Since that decision the attorney general has brought suit to show that there was fraud in the Southern Pacific land case and that because of the fraudulent concealment of its acts by the railroad company the six-year period of limitation does not apply. The chairman of the executive committee says that the institution of these suits does not lessen the confidence expressed last year as to the ability of the company to sustain title to the lands in question. The Supreme Court during the past year decided the case that was brought by the government to compel the Southern Pacific to forfeit its title to unsold lands which had been granted to the Oregon & California Railroad, holding that an injunction should be granted against the disposition of these lands and the timber thereon until Congress should provide legislation for their disposition, "and at the same time secure for the defendants all the value the granting acts conferred upon the railroads."

During the year there was an increase in funded debt of the Southern Pacific and proprietary companies of \$3,832,000, and in non-negotiable debt to affiliated companies of \$4,425,000. There was \$6,080,000 spent for additions and betterments to road and equipment and an additional investment in affiliated companies' securities and in advances to these companies of \$20,559,000. The company had on hand at the end of the year \$16,308,000 cash and demand loans and deposits, which was \$2,863,000 less than at the beginning of the year, with no loans and bills payable and but \$7,693,000 audited accounts and wages payable. For a company doing a business of more than one hundred and a quarter millions this is a particularly good showing for accounts and wages payable.

Mention should be made of the Southern Pacific's safety record. With one exception, no passengers have been killed in

train accidents for six years and 11 months, and during this time 12,046,000,000 passengers were carried one mile. During the year six employees out of 8,664 employed in train service lost their lives in train accidents.

The following table shows the principal figures for operation in 1915, as compared with 1914:

	1915	1914
Average mileage operated	10,554	10,422
Freight revenue	\$80,020,751	\$85,864,379
Passenger revenue	36,864,998	40,414,932
Total operating revenues	129,865,675	138,520,259
Maintenance of way and structures	15,356,356	16,515,452
Maintenance of equipment	19,815,973	21,475,526
Traffic expenses	2,915,010	3,114,348
Transportation expenses	44,006,753	46,400,045
Miscellaneous expenses	2,031,857	2,292,153
General expenses	3,955,027	3,864,742
Transportation for investment—Cr.	327,133	—
Total operating expenses	87,753,842	93,662,267
Taxes	6,371,273	7,162,625
Operating income	35,689,614	37,695,367
Gross income	53,481,178	53,580,277
Net income	20,570,319	21,257,918
Applied to sinking funds	939,725	805,702
Dividends	16,360,464	16,361,088
Surplus	3,270,130	4,090,128

NEW YORK, NEW HAVEN & HARTFORD

THERE have been numerous instances in the history of American railroads where far too much emphasis has been laid either on the traffic problems of a road or on its financial exploitation to the eventual detriment of profitable operation of the property. In the testimony last week of Charles S. Mellen, former president of the New York, New Haven & Hartford, before the jury which is trying some of the former directors of the company under indictment for violation of the anti-trust law, there was ample evidence that the traffic problems of New England at the time of the formation of the present New York, New Haven & Hartford were complex and difficult enough to tax the resourcefulness of any group of railroad men or bankers. It was not a question of stifling competition but of organizing the transportation facilities of New England in such a way as to meet the competition of Canadian ports on the north, New York and the southern Atlantic ports on the south, and the varying interests of the trunk lines. With this attempt at organization went a series of financial problems of the first magnitude. The result was that these two large problems were allowed to overshadow the importance of the fundamental fact underlying all railroad operation, which is that the business of the railroad is to manufacture and sell transportation of the best quality at the lowest cost.

The financial problems of the New Haven in the last three years have been difficult beyond any conception of an earlier time. The underlying competitive conditions have been just as necessary to meet; but while never losing a grasp on these two factors in the situation, the management has applied itself to the task of more economical operation with results that must go far toward compensating for the almost heartbreaking strain of the last three years.

Total operating revenues in the fiscal year ended June 30, 1915, were \$65,379,000, a decrease as compared with the previous year of \$2,073,000. Operating expenses amounted to \$44,127,000, a saving of \$5,106,000. The New Haven, after paying all fixed charges and without including in its income account interest due it from subsidiary companies, except that which was actually paid, had a net income (profit belonging to the stockholders) of \$2,308,000. Needless to say, stockholders were called on by their directors to leave this net income in the property; but the fact that it was earned is something which should be a gratification to them. More especially is this so because the saving that was made in expenses was in large part in transportation expenses.

Maintenance expenditures were somewhat lower than in the year before, but apparently do not represent deferred maintenance, except in the case of repairs to freight cars. President Elliott frankly points out that the company is somewhat behind in repairs to freight cars and in varnishing and painting of passenger cars and locomotives. As a matter of fact, only 11.26 per cent of all freight cars were in need of repairs, either light

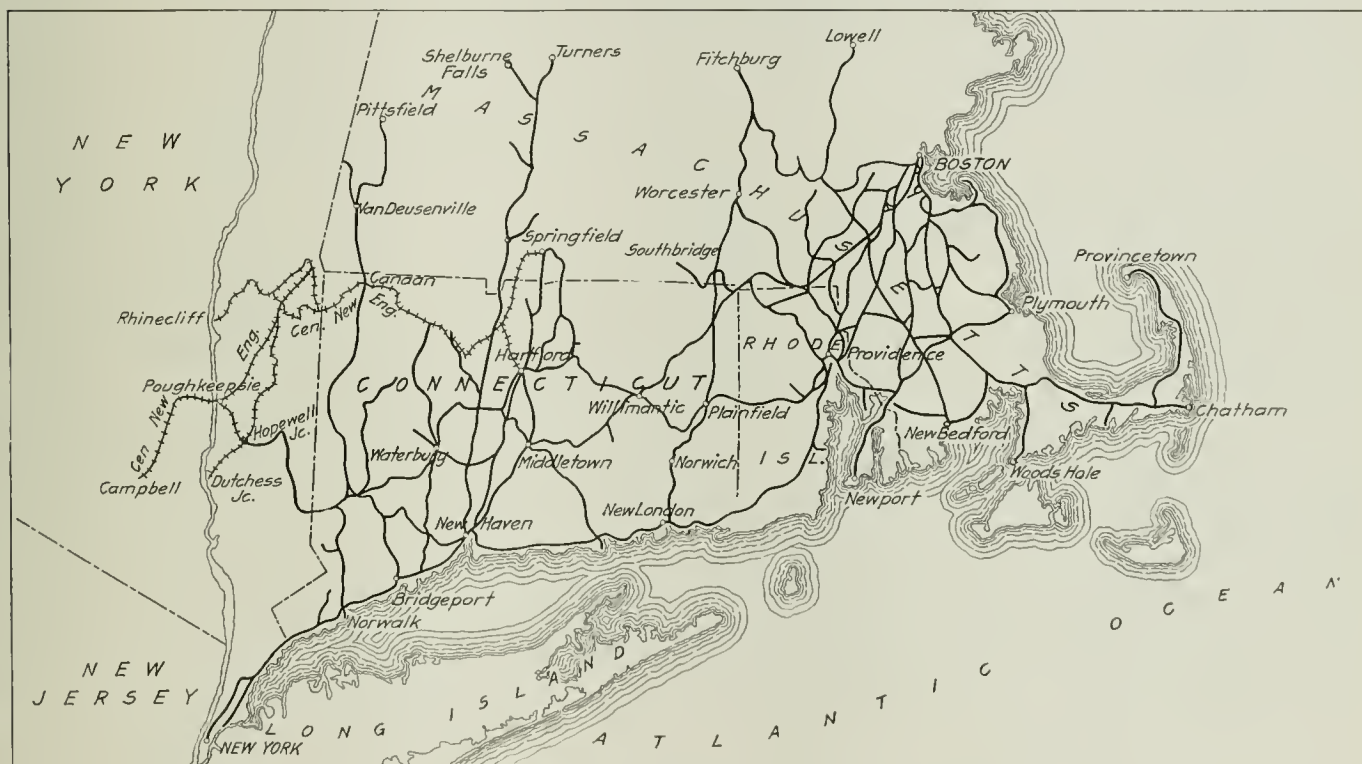
or heavy, at the end of the year, and although this is not as small a number of bad order cars as should be permitted in years of good business, it is not an unusually high one.

Maintenance of way and structures cost \$7,729,000, or \$1,102,000, (12.48 per cent) less than in the previous year. The item in which there was the largest reduction was in maintenance of signals and interlocking plants, which cost \$370,000 in 1915, or \$309,000 less than in the previous year. The fact was, probably, that in 1914 and in 1913 extraordinarily large amounts were spent for maintenance of signals and interlocking plants. The road had had a series of bad train accidents and the management probably felt that insofar as it was possible there would be safety first, cost what it might. There was also a reduction of \$101,000 in the amount spent for rails, the total in 1915 being \$400,000, and of \$156,000 in the amount spent for other track material, the total in 1915 being \$227,000.

Transportation expenses is where the New Haven has been weak for a number of years. It is argued, and correctly so, that

in fuel was due to less train mileage, which is also shown in a reduction in wages of trainmen of \$278,000, the total in 1915 for trainmen being \$2,818,000. Thus, the reduction in trainmen's wages is a little more than 9 per cent and if fuel were in the same proportion there would have been a saving of about \$400,000, leaving \$377,000 to be accounted for in some other way against a total increase in cost of power produced and purchased of \$176,000.

The average trainload in 1915 was 333 tons, an increase of 29 tons, or 9.61 per cent, over the previous year. The average number of freight cars, including caboose, per train was 31.78 as compared with 28.35. President Elliott says: "This is a step in the right direction, but there is much chance for further economies through the purchase of heavier locomotives, in lengthening side tracks, and the creation of better terminal facilities." In other words, the gains made in 1915 were through the more effective use of the old facilities. Other roads, through the introduction of heavier locomotives, have increased their average



The New York, New Haven & Hartford and Its Subsidiary the Central New England

a road with so large a proportion of its business made up of passenger transportation and so large a proportion of the freight business short haul, high class freight, necessarily has high transportation expenses; but that these transportation expenses are capable of reduction has at last been demonstrated. These expenses in 1915 amounted to \$23,959,000. This is a decrease as compared with the year before of \$3,020,000, or 11.19 per cent. The largest saving was made in fuel and in the payments for loss and damage and injuries to persons, and for clearing wrecks. The amount spent on loss and damage and injuries was \$1,413,000, a decrease of \$553,000. Fuel for train locomotives cost \$3,768,000 in 1915, a decrease of \$777,000 as compared with the previous year. The use of electric locomotives for hauling freight trains from New York has been gradually extended towards Stamford, Conn., and this quite surely has helped materially in the reduction in expenses for fuel. If this assumption is right the economies of electric operation are beginning to show themselves. Train power produced cost \$412,000 in 1915, an increase of \$155,000 over the previous year, and train power purchased cost \$190,000, or \$21,000 more than in the previous year. Part, of course, of the \$777,000 saving

trainload by 50 per cent or more. Whether or not the nature of the New Haven's traffic will permit of any such increased trainload as this is too much to say; but that there are large possibilities is evidenced by Mr. Elliott's remarks. As it is now, the New Haven has 1,165 locomotives, and of these, 343 are Moguls, with an average tractive power of 27,427 lb., and 367 are American type, with a tractive power of 17,115 lb. The New Haven has such a large volume of light passenger business, branch line trains, etc., that its American type locomotives can be used to advantage; but the opportunity for increased trainloading by the substitution of Mikados for Moguls and the equipment of more locomotives with superheaters—the New Haven now has 88 locomotives equipped with superheaters—is very large.

Since July 1, 1903, the New Haven has issued \$317,203,000 of its own securities, of which \$87,217,000 has been stock and the remainder interest bearing debt; and \$37,200,000 of bonds and notes of the New England Navigation Company, the New York, Westchester & Boston, and the New York Connecting, making a total of \$364,403,000 of securities, and for all of these securities the New Haven must be responsible, although the guarantee of the Connecting railroad's \$8,000,000 bonds is shared by the

Pennsylvania Railroad. The New Haven received \$388,049,000 for these securities and spent \$171,669,000 on additions and betterments to its own property and to its leased lines and on obtaining securities of leased lines. About \$39,000,000 was spent on the New York, Westchester & Boston; about \$9,500,000 on the New York Connecting, and about \$6,000,000 on the Grand Central terminal, making a total of \$225,971,000 spent on steam railroads and terminal properties. In addition there has been an investment of \$167,000,000 in outside property, including \$100,527,000 spent on trolley lines and their securities.

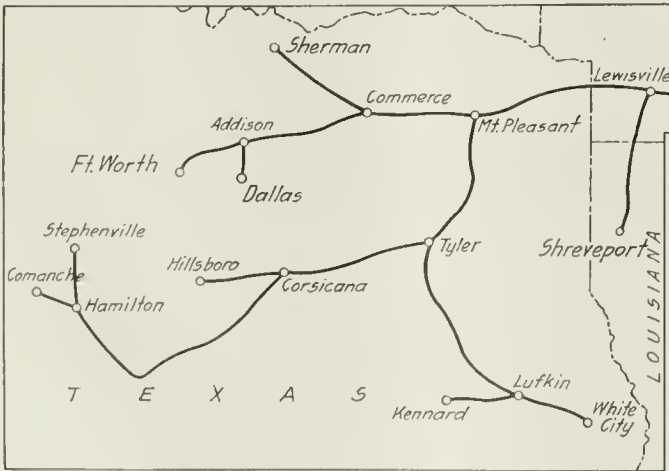
The balance sheet at the end of the year has a credit to profit and loss surplus of \$3,733,000; but as the annual report points out, if under the terms of the settlement of the government suit against the New Haven the company has to sell its trolley and steamship lines at a heavy loss, it may be forced to show a very considerable debit to profit and loss. On the other hand, a physical valuation of the property will pretty surely show very much higher cost of reproduction new than the cost of assets as shown by the books, and it may be that loss on securities which the company will have to sell will be offset, or even more than offset, by the appreciation in its property, as shown by valuation.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated.....	2,003	2,046
Freight revenue	\$31,179,310	\$32,476,640
Passenger revenue	27,010,799	27,643,836
Total operating revenues.....	65,379,264	67,452,594
Maint. of way and structures.....	7,729,241	8,831,064
Maintenance of equipment.....	9,780,330	10,392,278
Traffic expenses	473,368	502,020
Transportation expenses	23,958,702	26,978,871
Miscellaneous expenses	592,054	614,447
General expenses	1,611,243	1,924,120
Transportation for Investment—Cr.....	18,314	9,790
Total operating expenses.....	44,126,624	49,233,010
Taxes	2,743,921	3,578,444
Operating income	18,500,888	14,641,138
Gross income	24,357,133	22,471,648
Net income	2,307,971	268,662

ST. LOUIS SOUTHWESTERN

OF the total tonnage carried by the St. Louis Southwestern only about 12 per cent is made up of cotton, cotton seed and cotton seed products. While there was a decrease in the fiscal year ended June 30, 1915, of 7 per cent in the tonnage of cotton and 9 per cent in the tonnage of cotton seed, there was a 16 per cent increase in the tonnage of cotton seed products, so that the total tonnage of these three commodities was about 297,000 tons in 1915, as compared with 309,000 tons



in 1914. The direct loss, therefore, from an unprecedentedly bad year for the cotton growers of the territory served by the St. Louis Southwestern was not serious; but the indirect loss to the railroad, due to the loss of purchasing power of the cotton growers and the economies both in traveling and in purchases, hit the railroad hard.

In 1915 the St. Louis Southwestern, operating 1,754 miles of

road, earned \$10,628,000. This is less by \$2,164,000 than the revenues in 1914, and amounts to a decrease of 16.92 per cent as compared with the year 1914. The number of passengers carried one mile totaled 88,411,000 in 1915, a decrease as compared with the previous year of 22.15 per cent, and the ton mileage of freight totaled 747,474,000, a decrease of 9.95 per cent. Furthermore, the receipts per passenger per mile averaged 2.29 cents in 1915, or 2.14 per cent less than in the previous year, and the receipts per ton per mile averaged 1.06 cents, a decrease of 5.36 per cent, as compared with the previous year. With this reduction in business to be handled the company's transportation expenses amounted to \$3,809,000, or 8.29 per cent less than in the previous year. The total saving made in expenses was \$1,473,000, of which \$344,000 was in transportation expenses. It will be seen, therefore, that the greater part of the cut in expenses was made in maintenance.

Maintenance of way and structures cost \$1,586,000 in 1915, or



The St. Louis Southwestern

\$351,000 (18.13 per cent) less than in the previous year, and maintenance of equipment \$2,076,000, or \$587,000 (22.03 per cent) less than in the previous year. President Britton states quite frankly that a considerable portion of the saving in maintenance of equipment expenses is due to deferred repairs of freight cars, which with the smaller traffic were not needed in service. The fact also that the company received 2,120 new freight cars early in the year made it easier to store bad order cars and allow their repairs to await better business.

The St. Louis Southwestern did not reduce its passenger service in anything like the proportion of the reduction in business. It is almost never possible for a railroad to cut off passenger service in full measure with the loss in passenger mileage, but the Southwestern runs only two passenger trains each way a day on most of its lines. Its service is highly competitive and to cut off one of these trains was considered to be out of the question. On branch lines the passenger service consists of a mixed train each way each day and this service cannot

very well be cut. There was a reduction of 6 per cent in passenger car miles and of 17 per cent in parlor and observation car miles, but a very large increase in the mileage of dining cars—from 314,000 miles in 1914 to 794,000, or one and a half times as many more. Competitive conditions through the Memphis gateway were such as to make it advisable, the management thought, to change from a buffet parlor car to a full dining car service.

For the first time the company began running motor cars and a total of 238,000 miles was made by these cars. Much of this service was necessary to forestall orders of the state commissions for putting on passenger trains, the service rendered by the motor cars being just as satisfactory and the saving, as compared with the cost of running steam trains, being quite considerable.

This decision not to reduce passenger service accounts pretty surely in large measure for the failure to reduce transportation expenses to a greater extent. President Britton also mentions some large judgments for personal injuries which were settled in 1915, although the accidents occurred in a previous year. The total payments for injuries to persons were \$243,000, an increase as compared with 1914 of \$54,000. This was in part offset by a reduction of \$43,000 in payments for loss and damage.

The tons of revenue freight per train-mile averaged 304 in 1915 as against 394 in the previous year, an increase of 3.32 per cent, and the total trainload, including company freight, averaged 345 tons in 1915, as against 338 tons in the previous year, an increase of 2.24 per cent.

The apparently low trainload is due very largely to competitive conditions. For probably three-quarters of the time at least the fast freights out of St. Louis at night could haul from half as much again to twice as much tonnage if the necessities of this service did not preclude waiting to fill out full rating. In connection with transportation economies, however, mention should be made of the results which were obtained in getting foreign cars off the line so as to avoid per diem payments. The miles run per car per day for foreign cars in 1915 was 44.63, as against 40.21 the year before, and the average number of days each foreign car was on line was five in both years, while the average number of days each home car was on foreign lines was 153 in 1915 and 203 in 1914.

The company spent a total of but \$2,783,000 on additions and betterments to its property, of which \$2,048,000 was for additional equipment. Nearly all the money for this additional equipment had been raised in the previous year and at the beginning of the year was deposited in the form of cash. At the end of the year the company had still on special deposit \$383,000 and had current cash on hand amounting to \$676,000, and during the year had borrowed and carried on its balance sheet as loans and bills payable \$1,622,000. The outstanding securities of the company were reduced through the payment of equipment trust certificates by \$350,000.

The prospects for the present year are much brighter. The Arkansas Railroad Commission has approved of rates which went into effect May 20, 1915, which will give the company approximately 7 per cent greater revenue on its Arkansas intrastate traffic than it had been getting under the old rates. The company has petitioned the Interstate Commerce Commission to increase its interstate passenger fares, which it had previously reduced to two cents a mile because of intrastate rates, to three cents a mile, and the Interstate Commerce Commission has permitted increases on hardwood lumber which will give the St. Louis Southwestern from two to five cents better rates per hundred pounds on this commodity. Cotton prices are, of course, much better than they were and the outlook in the Southwest as in the Southeast has been much improved by the restriction in acreage planted to cotton and by more diversified agriculture.

In regard to operating conditions President Britton says: "In order to handle the present volume of traffic more economically, there should be expended on the property, including the Texas lines, as soon as financial conditions justify, about \$1,100,000,

which includes the development of terminals at East St. Louis, Ill., extension of yards at Illmo and Malden, Mo., Pine Bluff, Ark., and other points; re-establishing incline at Birds Point, Mo., washed out by flood; completion of ballasting on the Texas lines from Lavon to Ft. Worth and Addison to Dallas, Tex., a distance of approximately 75 miles; also, the relaying of branch lines with second-hand 75-lb. rail secured from main line where necessary to remove it on account of worn condition. There should be provided at once, however, at least 20 miles of new 75-lb. rail to replace worn rail in the track, and in order to release 56-lb. rail from branch lines for use in industry and business tracks."

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average miles operated.....	1,754	1,735
Freight revenue	\$7,891,642	\$9,295,143
Passenger revenue	2,030,950	2,659,656
Total operating revenues.....	10,627,861	12,791,904
Maintenance of way and structures.....	1,585,884	1,937,045
Maintenance of equipment.....	2,076,048	2,662,760
Traffic expenses	450,245	505,820
Transportation expenses.....	3,808,827	4,152,955
Miscellaneous expenses	47,770	60,130
General expenses	521,878	515,091
Total operating expenses.....	8,361,154	9,833,801
Operating income	1,682,741	2,356,217
Taxes	581,778	601,883
Gross income	2,909,164	3,424,435
Net income	280,993	335,771

* Deficit.

MISSOURI PACIFIC

THE Missouri Pacific's report for the fiscal year ended June 30, 1915, furnishes all the information which is available to the general public upon which to base any estimate of the chances for success of the present reorganization plan and is therefore of special interest. The road went into the hands of a receiver since June 30, so that the report for the 1915 fiscal year is made by Mr. Bush as president and chairman of the board and not as receiver.

The company* finished the year with a deficit, after paying interest and rental charges, of \$1,241,000. In 1914 it just broke even. There was a loss of \$1,295,000 in passenger revenue, the total being \$9,865,000 in 1915, and an increase in charges for maintenance of equipment of \$468,000, due to a charge made for the first time for depreciation, which two factors were not offset by a saving in transportation expenses of \$756,000, the total spent on this account in 1915 being \$20,576,000. The operating ratio in 1915 was 73.11 and in 1914, 72.33. If either through increased revenues or decreased expenses, or both, the Missouri Pacific cannot earn more than the \$13,054,000 operating income earned in 1915, the total capitalization on which it could earn 7 per cent would be but \$25,600 per mile on its 7,285 miles of road.

A lower operating ratio might be the result either of a higher average ton-mile rate or decreased expenses per unit of business handled, or both. The ton-mile rate in 1915 was 7.69 mills, comparing with 7.90 mills the year before. In 1915 operating revenues per mile of road amounted to \$7,990. The freight density (revenue ton-miles per mile of road) was 780,000, an increase as compared with the previous year of 3.16 per cent. The passenger density was 67,625, a decrease as compared with the previous year of 10.25. A single-track road with as low a density of freight and passengers as the Missouri Pacific has an opportunity for materially decreasing its expenses per unit of business handled if it can obtain an increase in traffic. This holds good, however, only if the road and equipment are in such shape as to permit of the use of modern methods of reducing transportation expenses. The physical condition of the Missouri Pacific has been very greatly improved under Mr. Bush's management, but any heavy increase in traffic could probably only be handled with the purchase of some new equipment and especially of heavy locomotives. Together with this would have to go further improvements of the roadway and the bridges,

* Except where otherwise specifically mentioned the figures are for the system including with the Missouri Pacific and the St. Louis, Iron Mountain & Southern.

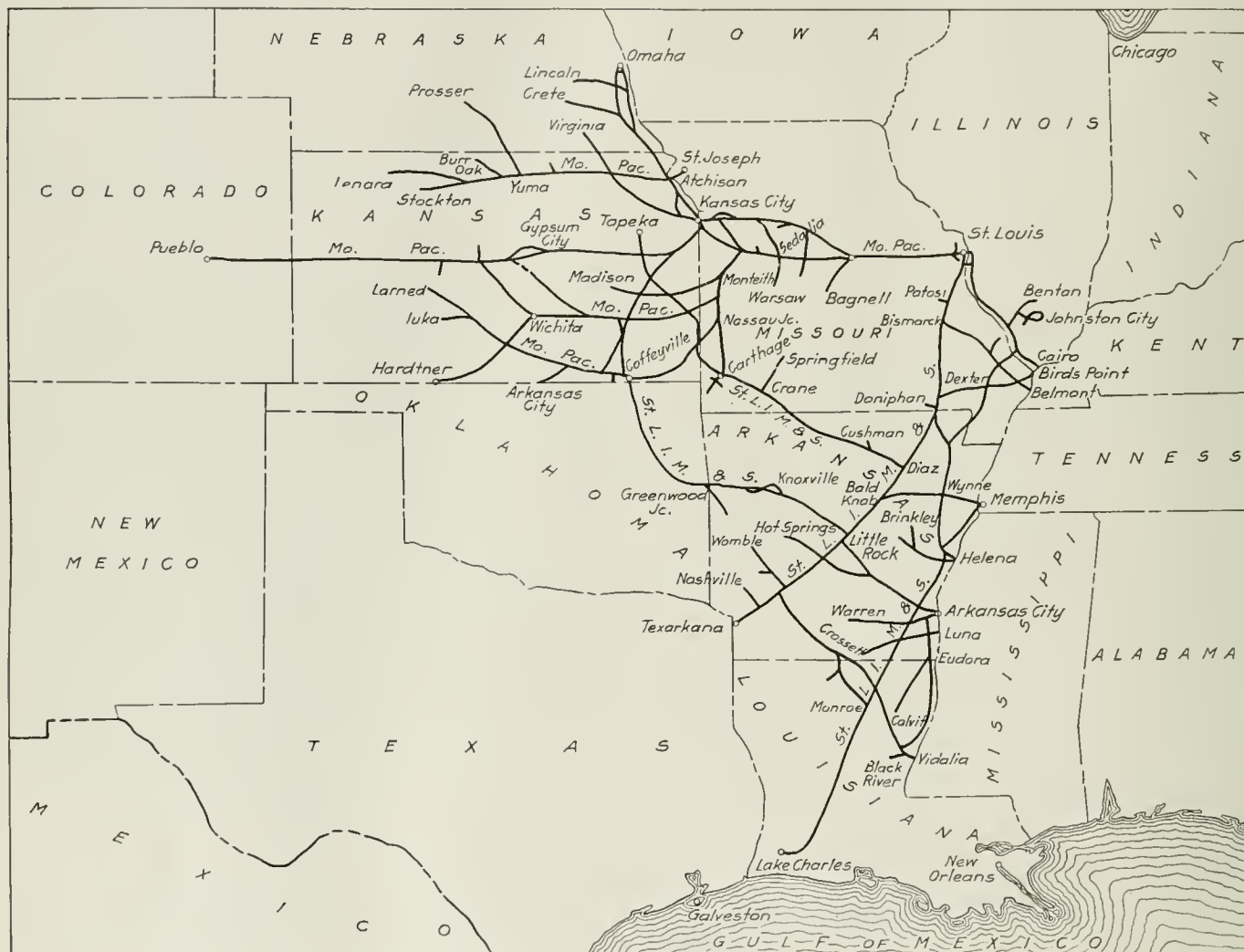
along the lines which have already been laid down by Mr. Bush.

To secure additional traffic, however, the Missouri Pacific has got to get it in competition with the other roads serving the same territory, and the only way that this can be done is through service. It is possible to greatly improve freight service and passenger service and still to reduce operating costs, as has been shown in the case of the Erie, but this means the expenditure of a large amount of additional capital. The Missouri Pacific has the backing of Kuhn, Loeb & Co., New York, which assures strong and adequate banking support, but additional capital expenditures can only be justified by a reasonably safe prospect of earning adequate returns on them.

Under normal conditions the total tonnage of freight for the Missouri Pacific is divided about as follows: Products of mines,

The Iron Mountain serves a territory which is either industrial or whose principal money-making crop is cotton. The Missouri Pacific's territory is agricultural, the chief crops being corn, wheat and oats. The Missouri Pacific's freight revenue in 1915 was \$21,256,000, or nine per cent greater than the revenue in the previous year. The Iron Mountain's freight revenue was \$22,438,000, or 8.43 per cent less than in the previous year. The total tonnage of freight carried by the system was 22,873,000 tons, or 1.75 per cent less tonnage than in 1914. Products of agriculture, however, furnished 4,846,000 tons, or 19.93 per cent more than in 1914. Products of forests furnished 4,411,000 tons, or 15.18 per cent less than in 1914.

Some years ago the criticism could properly be made that the Missouri Pacific was not being operated in such a way as to



The Missouri Pacific System

36 per cent; forest products, 22 per cent; agricultural products, 17 per cent; manufactures, 14 per cent; live stock and meat products, 4 per cent, the remainder being merchandise and miscellaneous. The year 1915 was, however, by no means normal. There was severe depression in the lumber trade and in all lines of business in the south, and, as more railroad annual reports come out, it is becoming more apparent that there was retrenchment and conservatism in buying even in the parts of the country that had unusually large crops. On the other hand, the Missouri Pacific exclusive of the Iron Mountain, serving Kansas, southeast Nebraska and northern Missouri, had the benefit of the traffic furnished by record crops in these states. If we take the income accounts of these two companies separately the adverse and favorable factors in 1915 are at once contrasted.

get the greatest net revenue year in and year out. By this is meant that often a short-sighted policy was pursued as to maintenance to the detriment of possible economies in transportation expenses. So far from this criticism being justified now, the Missouri Pacific is unusually well operated. In 1915 even with the big falling off in lumber, which loads heavily, and the big increase in agricultural products, which load comparatively lightly, the average revenue train load was 417 tons as against 389 tons in 1914, and 294 tons in 1910. With an increase of 3.12 per cent in the total ton mileage, including company freight, there was a decrease of 5.19 per cent in freight-train miles. The larger train load of revenue freight was shown notwithstanding an increase of 4.29 per cent in empty car mileage with almost no increase in loaded car mileage. The number of cars per train averaged

33.26, or 5.25 per cent more than in the previous year. The Missouri Pacific found it possible to cut down some passenger train mileage to meet the large loss in passenger revenue. The total number of passengers carried one mile in 1915 was 492,664,000, a decrease as compared with the previous year of 10.24 per cent. The total passenger train mileage was 11,156,000, or 6.77 per cent less than in 1914.

A study of these figures and of traffic conditions in the territory served by the Missouri Pacific, when taken in connection with the present feeling of investors and bankers toward railroad securities, leads to the conclusion that the Missouri Pacific's only salvation will be better intrastate rates for both passengers and freight and higher interstate rates on at least a considerable portion of its freight traffic, which in turn should lead to a renewal of confidence in the earning power of the property. With the restoration of its credit the company can command a large amount of new capital and put the plant in such shape as to give the most economical operating results.

The following table shows the principal figures for 1915 as compared with 1914:

	1915	1914
Average mileage operated.....	7,285	7,285
Freight revenue	\$43,683,712	\$43,995,027
Passenger revenue	9,864,626	11,159,634
Total operating revenues.....	58,209,306	59,985,731
Maintenance of way and structures.....	8,141,892	8,593,601
Maintenance of equipment.....	10,769,047	10,301,335
Traffic	1,417,094	1,330,992
Transportation	20,576,420	21,332,567
Miscellaneous	192,890	265,195
General	1,484,807	1,563,877
Total operating expenses.....	42,559,670	43,387,567
Taxes	2,552,429	2,513,432
Operating income	13,053,640	14,084,731
Gross income	14,156,814	15,215,452
Net income	*1,240,546	74,692

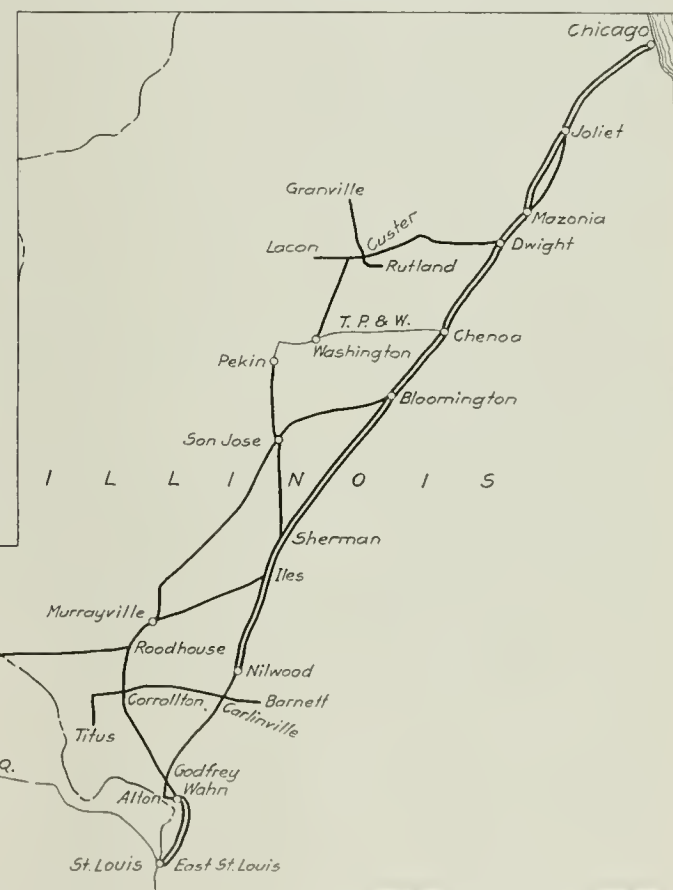
* Deficit.

CHICAGO & ALTON

THE Chicago & Alton has made a most unusual showing in a reduction in the direct items of train expense of 12.38 per cent in the fiscal year ended June 30, 1915, as compared with the previous year, despite an increase of 3.20 per cent in freight train mileage, and a decrease of only 1.04 per cent in passenger train mileage. Since the new regulations of the Interstate Commerce Commission in regard to the division of freight

1914. The trainload in 1915 was 454 tons, as compared with 479 tons the year before. The transportation expenses per train mile for all classes of service were 75.1 cents, in 1915, and 80.1 cents, in 1914, or a decrease of 7.17 per cent, with a decrease of but 5.22 per cent in the tonnage per freight train.*

The Chicago & Alton operates 1,050 miles of road. It has double track for most of the way between Chicago and St. Louis. On this line the business is highly competitive, and some of it, such as dressed meats and other packing house products, of which the Alton carried 344,000 tons in 1915, has to be carried on a very small margin of profit over and above actual out-of-pocket expense. The line between Kansas City and St. Louis is a single-track line, and is also in highly competitive territory. In the fiscal year ended June 30, 1915, total operating revenues amounted to \$14,246,000, a decrease as compared with the previous year of about \$14,000. The passenger business of the Alton, like other roads in its territory, was adversely affected by the business depression, and the freight business was better than the year before, because of the large tonnage of agricultural products resulting from extraordinarily good crops. Passenger rev-



The Chicago & Alton

and passenger expenses were not in effect in 1915, it is not possible to allocate the economies as between these two classes of service. For a number of years very few roads have shown any decrease in transportation expenses per train mile; in fact, almost all of them have shown increases per train mile, due to higher wage schedules, and increased cost of fuel and train expenses, which were increased by the running of longer trains. In some cases the economies effected by heavier average trainloads have offset the increased costs per train mile; in many others they have failed to do so. The Alton shows a very considerable decrease in the transportation expenses per train mile, with, however, a somewhat smaller trainload, the saving in expenses per train mile more than offsetting the loss of tonnage per train, so that the expenses per ton-mile were lower in 1915 than in

1914. The trainload in 1915 was 454 tons, as compared with 479 tons the year before. The transportation expenses per train mile for all classes of service were 75.1 cents, in 1915, and 80.1 cents, in 1914, or a decrease of 7.17 per cent, with a decrease of but 5.22 per cent in the tonnage per freight train.*

Total operating expenses amounted to \$11,112,000, a decrease of \$1,195,000. This is before the subtraction from expenses of the income account prescribed by the Interstate Commerce Commission Transportation for Investment—Cr. Incidentally it might be mentioned that the report of the Alton makes a distinction between total operating expenses and net operating expenses, making clear the fact that total operating expenses, in 1915 and 1914, are comparable, and the net figures are not com-

* These figures, of course, do not prove conclusively that transportation expenses per ton mile were reduced, since, as is mentioned above, the transportation expenses are not divided as between passengers and freight; but since the transportation expenses per train mile in passenger service are less susceptible of variation, the strong presumption is that the figures given above do indicate a reduction per ton mile.

parable. The decrease of \$1,195,000 in total operating expenses was the result of a reduction of \$321,000 in maintenance of way, \$355,000 in maintenance of equipment and \$377,000 in transportation expenses. The saving in transportation expenses has already been commented on. The amount spent for materials for renewals and repairs, as distinguished from track labor and the labor for applying these materials, was about the same for ties and rails in 1915 as in 1914. For bridges, trestles and culverts, however, it was very much smaller in 1915, the 1914 expenditures being abnormally high because of the elimination of previously deferred maintenance. There was an average of 285 tie renewals per mile of main track in the year 1915, as compared with 255 in 1914.

Maintenance of equipment cost \$3,335,000, in 1915. The cost of repairs per locomotive, in 1915, was \$3,129, and in 1914, \$3,505; of passenger cars, \$912, in 1915, and \$1,022, in 1914; of freight cars, \$67, in 1915, and \$87 in 1914.

Apparently the condition of locomotives in service was better at the end of the year than at the beginning. There were 93 locomotives out of service at the beginning of the year, in shop or waiting for repairs; at the end of the year there was a total of 73, which included 15 in outside roundhouses undergoing light repairs. At the end of the year the company had 34 locomotives stored, as compared with 28 at the beginning of the year. During the year 17 locomotives and 414 freight cars were scrapped. For heavy power the Alton has 50 Mikado locomotives, and there are two Mallets. There was no new equipment acquired during the year.

A total of \$767,000 was spent for additions and betterments to road, the two principal items of expenditure being \$224,000 for land for transportation purposes, and \$115,000 for shops and engine houses.

The company had on hand at the end of the year \$976,000 in cash, and \$466,000 cash in transit, with \$1,675,000 loans and bills payable. At the beginning of the year there was but \$145,000 loans and bills payable.

One cannot help asking what is going to happen to the Alton. The Union Pacific owns a controlling block of its stock, and if it is possible for good railroading and strong financial support to pull the company out of its difficulties the Alton will come out all right; but, as in the case of other roads in its territory, it is a real and very serious question as to whether, under present rates and present competitive conditions, it will be possible to so improve operating conditions as to make the operation of the property even pay the interest charges on its borrowed money without any immediate prospect of profit to the owners.

There is a cheerful note touched in the discussion of transportation expenses in the following paragraph:

"The increased expense in operation of joint facilities, \$32,508.15, is due principally to the inauguration of Kansas City Terminal on November 1, 1914, although at practically all points where joint facilities are used by this company an increased expense is apparent. This refers not only to transportation accounts but also to both maintenance and general expenses, and is due to a relatively greater share of traffic handled through such joint facilities."

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated.....	1,050	1,046
Freight revenue	\$9,200,547	\$8,892,256
Passenger revenue.....	3,839,893	4,130,289
Total operating revenues.....	14,245,624	14,259,479
Maintenance of way and structures.....	1,647,541	1,968,047
Maintenance of equipment.....	3,334,943	3,689,709
Traffic expenses	436,498	512,128
Transportation expenses	5,216,447	5,593,546
Miscellaneous expenses	115,435	136,814
General expenses	361,520	407,500
Total operating expenses.....	11,112,384	12,307,744
Transportation for investment—Cr.....	39,677	.....
Taxes	508,839	568,938
Operating income	2,660,584	1,382,797
Gross income	2,757,821	1,478,107
Net deficit	1,690,156	2,762,290

Letters to the Editor

IMPORTANCE OF CAB LIGHTS

PUEBLO, Colo.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Every locomotive should be provided with a cab light in a convenient place to enable the engineman to read his train orders, instructions and time table by night, clearly and without strain, and the proper officer should see to it that such equipment is provided and kept up.

In these busy days, especially on single-track lines, train orders and messages play an important part in the movement of trains, and it is essential that an engineer may be able to read his orders quickly and easily, in order that his attention to the track ahead be not unduly diverted. This particularly where Form 19 is used extensively for orders and trains pick them up without stopping.

The majority of engines on western railways are now equipped with electric headlights, and an auxiliary cab light for the illumination of the steam gage, etc.; but in only a few cases have I found a mechanical department which takes interest in placing a light in a convenient position for the purpose which I now speak of. Too often an engineman has to hold his orders up to a gage light and let the light shine *through* them. In case of a dim carbon it is difficult to read an order in that way.

The proper place for a reading lamp is immediately over the engineman's seat box, with a switch by which it may be turned on or off at will. Some similar provision should be made for use on engines not equipped with electric lights. Such engines as are provided with acetylene lighting can be easily equipped; and where oil lights are used a lamp similar to a gage light can be placed in a convenient position for the engineman's use. The desideratum is a light in such a position that he can conveniently use both of his hands to hold the paper.

WILLIAM E. WATTS
Despatcher, Denver & Rio Grande R. R.

OROVILLE SIGNALING CRITICIZED

NEW YORK CITY

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In your editorial note, printed October 8, commenting on the installation, described in your columns, at Oroville, Cal., on the Western Pacific, comprising cab signals to be used without any visual roadside signals, and an automatic stop, you say that it is to be hoped that the world will be given the benefit of the experiments which are to be made with this installation. Well said! There is great need of full and impartial reports of experiments in this line, more thorough than anything that has yet been published. Is the American railroad world going to continue to witness the expenditure every year of good money by the thousands for experiments in automatic train stops which never get anywhere? Will anybody venture to say that the devices which you have noticed in your columns within the last two or three years have swallowed up less than half a million dollars? And what do these investors, who have put up this money, think of their investments?

The railway officers of the country are cautious in their expenditures in this line. But are they not justified in being so? What are the lessons of experience?

The other parts of your comments seem pretty mild. Why not describe the situation just as it is? One of the first requisites in the automatic field is that every device shall detect its own failures; but the National Safety Appliance Company's devices, both the signals and the automatic stopping device, are arranged on the open circuit plan. The apparatus on the engine is complicated and of such design that severe cold weather will probably interfere seriously with its operation. The line circuits required, except for the overlapping features, are practically

the same as for the control of a system of semaphore signals, but the devices installed to give the signal indications in the cab of a locomotive appear to be of such a character that this will cost more than semaphore signals.

The current consumption is apparently in excess of that required for semaphore signals, and there is little in this regard to recommend the National devices.

In the operation of the track transformer, 28, Figs. 1 and 3, on which dependence for applying the brakes on the engine is placed, current must flow through this magnet to induce a reverse current in the engine magnet, and a failure of contact 35 to close when it should, or a failure of relay 9 to pick up its armature through exhaustion of battery 26, or even a cross connection between certain wires of the engine equipment will result in a failure of the brakes to apply when they should. That this open circuit feature is a great and serious objection is obvious, as experience has often shown that it is just at the time protection is most needed that devices are apt to fail. Any one who has tried to get in at the front door late at night and found the bell did not ring on account of the breaking of a wire, or an exhausted battery, will know, without too much explanation, what the objections are, and what are the chances of an open circuit device failing.

Two magnetic devices of the general type of the National Safety Appliance Company's device have been given service applications by roads near New York, although with both of these there was not the chance of failure from the circuits used that there is with the installation on the Western Pacific. Two other devices, one promoted by a prominent Buffalonian and another by a resident of New York state, have been brought to the attention of the railroads and have been given very careful consideration and study; one from a model and the other from an installation approximating service conditions. That the magnetic induction type of apparatus seems to be the most promising is a growing belief of many signal engineers; but that they are prepared either to recommend or to use open circuit devices, which may so readily fail, is a step which does not seem to be warranted by the development and the working of any automatic stopping devices the design of which has been disclosed up to the present time.

The circuit arrangement in your description shows that the brakes are applied by the automatic stop at a point beyond that at which the stop signal is displayed in the engine cab and that an overlap is provided to insure a certain distance in which, it is assumed, there will be length of track sufficient for the train to be brought to a stop before meeting with an obstruction. While it may be satisfactory, from an operating standpoint, to use the overlap on a road having light traffic and one where there are no interlockings, the delay to traffic occasioned by the use of the overlap is such that Eastern roads and those which have a number of interlockings, particularly grade crossing and junction points, have decided that they can not afford the delay to trains that will result through the additional spacing required, and particularly where an automatic stopping device is depended on to enforce the keeping of the overlap distance free of trains.

A number of roads have given the overlap a fair trial and have been forced to give up its use owing to the impossibility of running the desired number of trains.

There is no road using the overlap as a complete installation. On all of those roads where it may be found there are one or two places which are not protected. Complete overlap protection, such as the protection which is provided against running over a misplaced or open switch, as well as where there is a train in the block ahead, may be said not to have been provided by any railroad up to the present time. If the protection is to be such that the stop would be applied at certain places and not at others, so that an engineman running by the signal at a point where the overlap was not provided could cause a collision, even though the stopping device were in use, it would undoubtedly be held by the public authorities that the road was at fault for not having provided complete protection everywhere.

The magnets on the engine clear those on the track three inches, while the track magnets stand one inch above the top of the rail. With most roads it is a requirement that no part of the track apparatus project above the top of the rail and a clearance of the parts on the locomotive of but four inches is not sufficient to insure against damage from contact with objects on the right of way.

Track circuits arranged as are those shown in Figs. 1, 2 and 3, where one rail is common to two circuits, will be found unreliable in operation and should not be depended on for such important service as the control of an automatic stop. It has been found, by extended experience with circuits so arranged, that currents will flow from one circuit through parts of the other under the varying conditions due to poor insulation, broken or loose connections, broken rails, etc., to such an extent as to occasionally cause wrong working of one or the other of the relays of the two connected track circuits.

The action of the dash-pots of relay 9, Fig. 5, may be exceedingly unreliable and irregular under the varying conditions of lubrication, humidity and temperature that will be experienced under general use. If the relay should not operate to close contact 35 no application of the brakes would be made. If a back contact were not made at contact 35 no application of the brakes would be made, although the block ahead might be occupied. It is within the range of possibility and probability that armature 14 of relay 9 may not be lifted at the time the engine magnet passes over track magnet 28. Should this occur no application of the brakes would be made. With but two magnets to be energized, as in this case, it has been found by a certain Western road that to permit enginemen to observe signals returned from the proceed to the stop position, before the engineman should pass the signal, it was necessary to place the signals 220 ft. in advance of the commencement of the track circuit, thus showing apparently that a longer time to operate than has been allowed for is probably desirable.

The use of time-limit relays, cutting off current from the track magnets, would seem to be economizing at the expense of reliable and safe working. The advisability of using the short track sections and slow releasing relays is surely questionable when the expense of installation and maintenance is considered, irrespective of the complications introduced by the use of such apparatus. Time-limit relays, of the pattern shown, do not appear to be nearly as reliable as those of the ordinary free-acting type.

The elimination of wayside signals and the use of cab signals only can not be recommended as good practice, as the engineman's attention is likely to be occupied in observing the signal in the cab and not looking ahead. Eliminating the wayside signals makes it practically impossible to check the display of signals made on the engine; so that in case of collision an engineman need only say the indication called for the action taken by him and there would be no means of ascertaining whether or not he told the truth.

As has been shown by the working of an automatic stopping device on a short section of an Eastern road, where road-side signals have not been installed, it is extremely difficult, if not impracticable, to get satisfactory maintenance, owing to the difficulty that the maintainers experience in locating trouble and determining whether or not the trouble, when apparently located, has been entirely removed.

Again, it seems unwise to place all of the signal indicating apparatus and the automatic stop on the engine where, in case of a failure of any of the essential parts, there would be no information by which the engineman might be governed while the engine was making its run to the end of the division or to a point where repairs might be made. It is a case very much of "putting all of the eggs in one basket," and is very different from that of the ordinary signal installation, where signals are placed along the track. With an installation of semaphore signals a failure generally results in but one or at most a few signals being affected, and the time lost at such places is comparatively short. The movement is readily protected by flagging or by

running at low speed. The results, however, with an installation like Oroville would be very different and would on single track call for sending a flagman ahead of the train for the entire distance to a point where orders for the movement of the train could be obtained or where the train could be run under its time table rights without block signal protection.

I believe I am justified in saying that the conservative signal engineers of the country hold imperatively that an automatic stopping device, in addition to being safe and reliable in its working, shall be operative between the distant and the home signal, and be so arranged that when the engineman is reducing the speed of the train to bring it to a stop at or before reaching the home signal, the brakes should not be applied or the action of the engineman interfered with; but that, however, should the engineman permit the speed of the train to be such, at any point between the distant and the home signal, that the home signal would be run by while it was indicating stop, the device should operate to stop the train. Should the brakes be applied by the stopping device it should not be possible for the engineman to effect their release until the train has been brought to a stop. This method is an essential requisite for practicable and successful operation, if the automatic stopping device is to be put in service on trains as at present run without requiring the use of the overlap. As before stated, complete overlapping protection can not be provided on the average steam surface railroad; and, even if this were practicable, the restrictions to traffic resulting would be such that it would not be possible to move, in a given time, the trains that are now being safely and satisfactorily run through important junction and crossing points.

M. TAINER.

FRENCH PASSENGER SERVICE

PARIS, France

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The following tables show the make-up and schedule of the Havre-Paris express of the French State Railways, which it may be of interest to compare with similar data for American express trains.

This train runs usually with 19 cars, which are well filled. The cars are mostly of the steel underframe type, fitted with truss rods and are steel sheathed. They are steam heated and have Westinghouse air brakes, but no air signal system. Second class is equivalent to our day coach, the character of the third class being such that it would not be put up with in America.

For a while this train was hauled by ten-wheel locomotives, but it is now hauled by Pacific type locomotives, as before the completion of the bridge over the Seine at Rouen [described in the RAILWAY AGE GAZETTE of September 24, page 564] Pacific locomotives could not be operated to Havre.

HAVRE-PARIS EXPRESS

No. of cars	Description--	Type wheels	Wt., tons	Length, ft.	Seats	Total seats	Total Wt. per wt., pass., tons lbs.
1	Luggage van	4	16	30	...	...	16 ...
1	Postal car	4	18	36	...	...	18 ...
2	Second-class vestibule corridor	8	37	60	72	144	74 1,028
1	Dining vestibule corridor	8	40	60	40	...	40 ...
2	First-class vestibule corridor	8	37	60	42	84	74 ...
2	Second-class corridor	4	20	36	50	100	40 800
5	Third-class corridor	4	20	36	58	290	100 690
2	Luggage vans	4	16	30	...	...	32 ...
1	Combination first and second-class corridor	4	20	36	44	44	20 ...
1	Third-class corridor	4	20	36	58	58	20 ...
1	Luggage van	4	16	30	...	...	16 ...

		SCHEDULE			
		Distance, miles			
Havre			17.10		
Bréauté-Beuzeville	15	ar. { 17.38 lv. { 17.45		Last 3 cars attached	
Yvetot	30		18.09		
Motteville	34.8	ar. { 18.16 lv. { 18.18			
Rouen	55.2	ar. { 18.43 lv. { 18.51			
Paris	136.8		20.58		

The approximate fares per mile are as follows: First class, 3.8 cents; second class, 2.5 cents, and third class, 1.6 cents.

RIPLEY, E. P.

An Ode to the President of the Santa Fe on the Occasion of His Seventieth Birthday

By FRANCIS W. LANE

Through desert and canyon and mountain and plain
The Santa Fe follows the trail;
Prunes and lemons it takes
From Pacific to lakes,
And thereby accumulates kale.
But when Ripley, E. P.,
Came up to the tee,
Though he didn't play golf much—not yet—
According to Poor,
Four millions or more
And big D, represented its "net."

When the line was first built from the lakes to the sea,
Outgrowing Topeka and Kansas,
South and West, wild and woolly,
Liked the road; it was bully!
And everyone dreamed of bonanzas.
Its patrons had class,
For each rode on a pass;
Every greaser had one in his hat;
If you offered a ticket
That was bought through a wicket:—
"Blast my eyes," said the con.; "What is that?"
When Ripley, the wizard
With brains and with gizzard,
Took hold twenty winters ago,
The whole of its stock
Was just out of hock—
For the road was quite busted, you know.

Now this is the course that Ripley pursues:—
He is leary of those of the Street;
When Wall Street beguiles
This canny boy smiles
And replies in a manner discreet:—
"I'm busy with whacks
On old Brass Tacks
When the hammering seems to be good;
And it's best for the health
To accumulate wealth
By industriously bisecting wood.

"It is not good when the railroad man
Cahoots with those on the Street;
When the railroader blows
The whole Street knows
And prepares itself for a treat;
At the end of the score
The Street's back door
Has a heap of bones nearby;
For the railroader's meat
Has been pickled to eat
And his hide hung up to dry."

So, at three-score and ten we congratulate him
And the road whose Moses he's been;
Since his drives are still strong
May his course yet be long
To the clubhouse over yon on the green;

May he stick to the game and keep up his form,
For lo! these many more moons;
May he gather much kale
For the Santa Fe trail
Out of lemons and livestock and prunes!

Elimination of the Tower Grove Crossings, St. Louis*

A Complicated Grade Separation Problem Was Solved Recently by the Missouri Pacific and the Frisco

By E. L. WONSON

Bridge Engineer, Missouri Pacific, St. Louis, Mo.

The tracks of the Missouri Pacific and the St. Louis & San Francisco lie closely adjacent from the St. Louis union station westward nearly to the city limits. Between Grand avenue and Kings Highway boulevard, a distance of $1\frac{1}{2}$ miles, the only main thoroughfares for north and south traffic are Tower Grove and Vandeventer avenues, which intersect at an angle of 52 deg. at the point of crossing of the railways.

The general location of the railways and streets is shown on the accompanying map. At Tower Grove avenue the Oak Hill branch of the Missouri Pacific diverges from the main line. This is a double track belt line connecting with the main line of the St. Louis, Iron Mountain & Southern in South St. Louis and is used by all St. Louis passenger trains over the Iron Mountain, as well as by a considerable industrial switching service. This line crosses the Frisco at grade. Connecting with

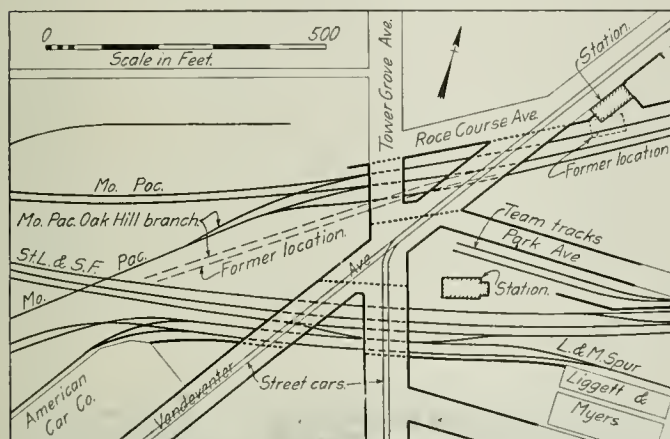
as by a long ascending grade on the Oak Hill branch, a short distance south.

The question of eliminating these crossings was first taken up by the city in 1905, on a basis of track depression. After further study, however, by the Board of Public Improvements of the city of St. Louis, and the engineering departments of the railways, an agreement was arrived at early in 1907 on the basis of street depression. Ordinances embodying this agreement were rejected by the Municipal Assembly in 1908, considerable popular opposition having developed to what was called the "tunnel plan."

New ordinances, requiring depression of tracks under the existing street levels, were passed in April, 1909, requiring an approximate expenditure of \$3,000,000, as compared with about \$500,000 for street depression. They were considered by the railways as unduly oppressive and by the industries as destructive of their railway connections, and it became necessary to determine the rights of the parties in court.

The ordinances were upheld by the St. Louis Circuit Court, and appealed to the Supreme Court of Missouri, which in a unanimous opinion, handed down in December, 1912, held in brief that, while the city had power to require elimination of the crossings and to prescribe the general method, as by track or street depression, the ordinances in question were void, both as being unreasonably burdensome in their requirements and as not having originated as prescribed by the city charter.

Meanwhile the present management of the Missouri Pacific had assumed charge of the property, and general plans and

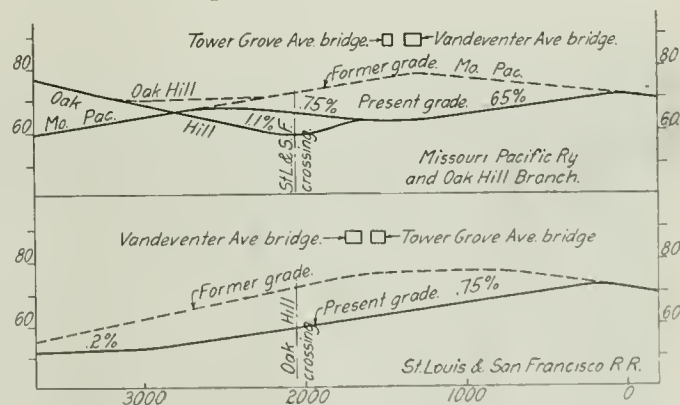


Location Plan at Tower Grove and Vandeventer Avenues

the Oak Hill branch, the Missouri Pacific also has a track crossing the streets south of the Frisco tracks and leading into the plant of the Liggett & Myers Tobacco Company, it in turn being crossed at grade by two Frisco connections to the plant of the American Car Company.

With the development of this section of St. Louis by industries, stores and residences, together with the rapid growth of a large residence territory to the south, served by Tower Grove and Vandeventer avenues as through thoroughfares, the street traffic over the crossings become continually heavier, amounting in 1909 to approximately 400 street cars, 2,400 vehicles and 6,000 pedestrians per 24 hours. Protection by gates and watchmen was afforded for some years prior to the elimination of the crossings. Both railways maintain passenger stations at Tower Grove at which practically all passenger trains stop; this, although contributing largely to freedom from serious accidents, increased the inconvenience and delay to street traffic by the necessity of occupying the crossings during stops. The total train movements over the crossings average 250 per 24 hours, of which 100 are passenger trains.

The main lines of both railways rise to a natural summit at Tower Grove, while the intersecting streets are practically level, indicating the possibility of a separation of the crossing, either by street depression as less costly, or by track depression as removing the summit in the railway profile. Actually the track depression is limited by considerations of economical adjustment and practical operation of important industry connections, as well



Profiles of the Missouri Pacific and the Frisco at Tower Grove

estimates were prepared for six different methods of elimination, of which one contemplated partial depression of tracks and elevation of streets, being the general method finally adopted.

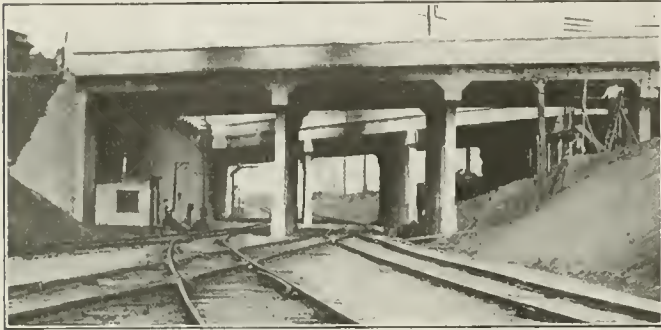
Immediately following the Supreme Court decision of December, 1912, the Board of Public Improvements called a conference with the railways, and announced a preference for partial track depression and street elevation as a basis of elimination. The details were worked out for a new ordinance rapidly, which was passed and approved in March, 1913, and formally accepted by the railways. Actual work was started on November 1, 1913.

ADOPTED PLANS

The streets were elevated 13 ft. over the tracks on reinforced concrete bridges, the tracks being depressed 13 ft. to afford a 22-ft. clearance above top of rail. The filled street approaches are on $3\frac{1}{4}$ per cent grades with retaining walls along the street lines, except where abutting property is raised to conformity with the new street grade.

* Abstract of a paper presented before the St. Louis Engineers' Club.

The railways endeavored to induce adjoining property owners to raise their buildings and lots, offering to provide the necessary filling, and pointing out that the expense of restoring the property to the street grade would constitute a definite and easily-adjusted claim for damages. Several owners proceeded along these lines, but the majority preferred to await a definite adjustment with the city, which, under the ordinance, assumed



West Elevation of Viaduct Over Missouri Pacific Tracks

the damages. The city officials were successful in making such an adjustment in a number of cases, and under waiver of damages, raised the buildings and built retaining walls at the rear of the lots, the railways providing the filling.

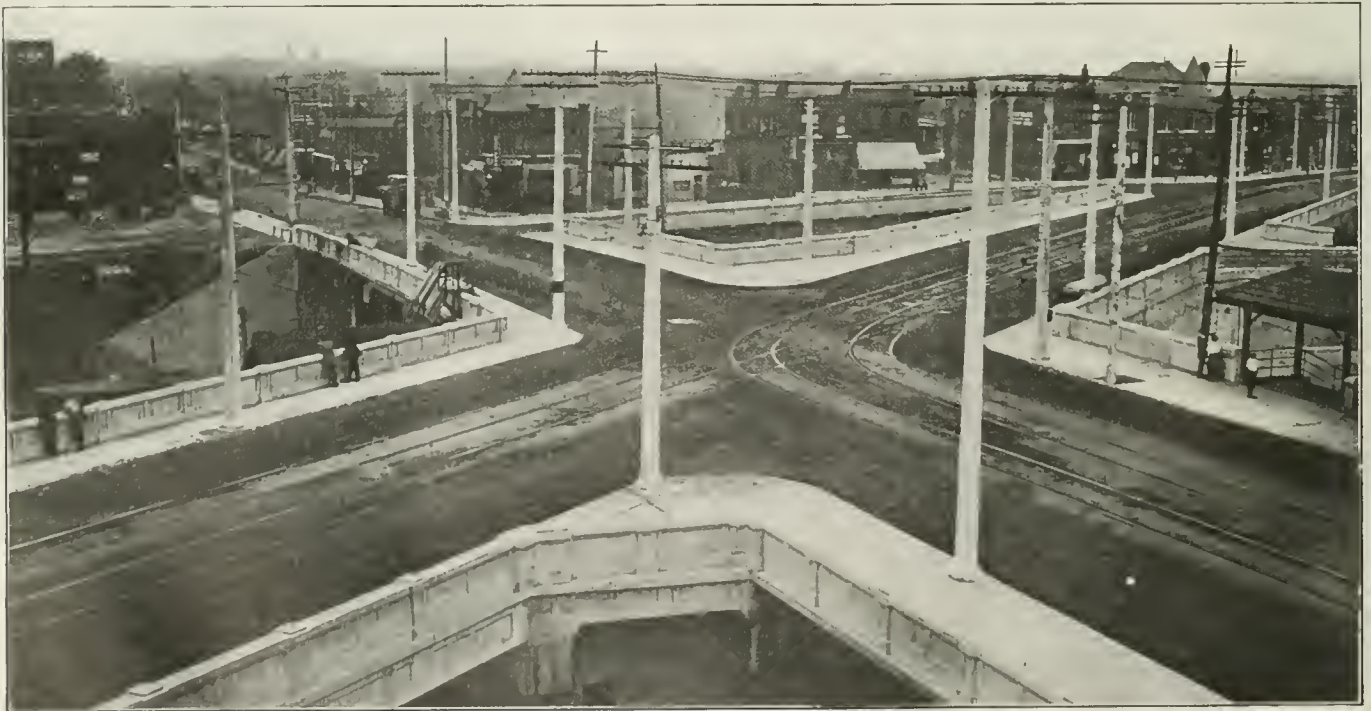
A profile shows the former and present railway main line grade lines with the summit lowered by the depression. The most unsatisfactory features as to gradient are found on the tracks leading into the Liggett & Myers Tobacco Company and American Car Company, upon which, although depressed as far as practicable into the plants, grades of from $2\frac{1}{2}$ to 3 per cent are required, which add materially to the expense of operating and maintaining these connections.

have rectangular columns and footings spaced about 12 ft. center to center. The columns are 18 in. by 24 in. and 20 in. by 24 in.; they are joined at the tops by cross girders supporting the deck beams, and at the bottoms by continuous diaphragms extending to 4 ft. above the top of rail, serving primarily as a guard against damage to the bridge from derailed equipment. The footings of bents and abutments are designed for a maximum pressure of $2\frac{1}{2}$ tons per sq. ft. on the firm yellow clay found at this point. At Vandeventer avenue the angle of intersection between street and railway is only about 27 deg. at the Missouri Pacific tracks, and $42\frac{1}{2}$ deg. at the Frisco tracks; consequently the deck beams are built normal to the bents, and are supported with the deck slab at the street lines by fascia girders from 26 to 72 ft. long, those over 35 ft. being steel plate girders encased in concrete. The abutments of the Frisco bridges are of gravity section, while for the abutments and connecting retaining walls of the Missouri Pacific bridges, a reinforced counterfort type is used on the north side, and a bent and slab design on the south side.

At Race Course avenue, requirements of street width at the elevated level and track room at the depressed grade, necessitated the use of cantilever brackets for supporting the sidewalk and concrete rail along the retaining wall, between the Tower Grove and Vandeventer bridge abutments. As the face of the retaining wall and the street line are not parallel, the overhang of the sidewalk slab is variable throughout.

With the exception of Park avenue, which is paved with granite blocks, the elimination ordinance required all streets affected by the work to have creosoted wood block paving on a concrete base, full width concrete sidewalks, steel curbs on the viaducts and granite curbs on the approaches.

Material changes were required in the brick station buildings of each railway. It was decided to relocate the Missouri Pacific station at the new street grade on a slightly different location. New foundations were built in trenches down to the depressed



Overhead View of the Viaduct Looking North

A photograph shows the finished street bridges, which, with their limiting abutments and retaining walls, form an X-shaped structure with a section of solid fill at the central portion between the railways. The construction, except the abutments of two bridges, is of reinforced concrete throughout, consisting of a beam and slab deck resting on abutments and intermediate bents and forming four and five spans as shown. The bents

track level and partly under the building, which was kept in service until the new foundation walls were brought up to the former street level. Station service was then transferred temporarily to two large box car bodies fitted up for the purpose, location and the foundations completed. The Frisco station has been maintained without change in level or position; it was underpinned with new foundation walls to the depressed track

level and stairway connections to street and tracks were constructed.

DIVISION OF COST

The elimination ordinance provided that the construction cost, including the relocation of municipal sewers and water mains, should be assumed by the railways, and the damages to abutting property, by the city. The expense of rearranging utilities other than those municipally owned, such as street car tracks, gas mains, conduits, wires, etc., was assumed by the proprietary interests. Prior to starting work, an agreement was reached between the two roads whereby each should build the viaducts over its own tracks and the approaches thereto; this agreement also provided for a specified division of the work of raising Park avenue and those portions of Tower Grove and Vandeventer avenues between the tracks. There resulted a distinct division of the work on the basis of location, except as to the construction by the Missouri Pacific of two spans over its Liggett & Myers spur south of the Frisco tracks and of the retaining walls and building underpinning required by its depression. With the exception of these latter items and of the raising and moving of its station building, the Missouri Pacific handled all work with its own forces. The Frisco performed its track depression and rearrangement with its own forces and the remainder of its work by contract.

CONDUCT OF THE WORK

Owing to the considerable volume of street traffic and the absence of other crossings in the vicinity, it was necessary to provide for maintenance of street traffic throughout the construction. The plan carried out involved closing the two west legs of the "X," that is, Tower Grove north and Vandeventer avenue south of the intersection, the plan being to complete the elevation of these sections and turn street traffic over them, permitting in turn the closing and elevation of the other two legs of the "X."

In making the Missouri Pacific track depression, the two main tracks were first thrown over to the south side of the right of way, and a steam shovel cut was started as wide as practicable along the north side from the west end of the depression. In the vicinity of the streets the cut was widened to include

street, sufficient width could not be left between the operated surface tracks and the edge of the excavation for the proper accommodation of passengers and the handling of baggage and a temporary platform 500 ft. long was built along the tracks for this purpose, connection with the station being provided by a temporary foot bridge over the excavation.

A permanent track was then laid in the excavation, to which



Construction View. Temporary Crossing of Street Car Tracks Over Missouri Pacific Westbound Tracks and at Grade with Missouri Pacific Eastbound Track

westbound Missouri Pacific traffic was transferred, the temporary street bridge at Vandeventer avenue being raised about 4 ft. to provide overhead clearance. This permitted the removal of one of the two surface tracks, widening the excavation and the construction of the second permanent track at the depressed level. The depression of the Oak Hill branch was performed in a similar manner, except that for a distance of 1,000 ft. from the Frisco crossing south to McRee avenue only one track has been depressed, pending a possible relocation at this point.

The greater portion of the material for raising streets and private property was dumped from the dirt trains brought on



West Elevation. Frisco Tracks on the Right Crossing Missouri Pacific Oak Hill Branch in the Foreground

excavation for the bridge abutments and retaining walls along the north side of the tracks in order that the concrete work might be started. When the cut had been carried up to the street car tracks in Vandeventer avenue, a wooden bridge was built behind the shovel to carry the street traffic over the excavation by a slight detour. The cut was then continued through the street and to the east end of the depression. East of the

a temporary track from the west end of the depression into Tower Grove, Race Course and Vandeventer avenues. A considerable amount was also deposited directly on the ground by the steam shovel, when working near the streets and spread by teams. The balance of the excavation not required for filling, was disposed of at nearby points on the line.

The Frisco excavation was also made by steam shovel under somewhat less difficult operating conditions, as it was possible here to divert traffic on two temporary tracks largely clear of the excavated area. A portion of the cutting beneath and between the street bridges was handled successfully by a Thew shovel loading on cars or into wagons as conditions dictated.

It had been intended to change all railway traffic to the depressed level and the highway traffic to the elevated level on the same day, but unforeseen delays and complications made it impossible to abandon all the surface tracks at this time. A temporary bridge was therefore built to carry street traffic over the incomplete portion of Tower Grove avenue north, and Vandeventer avenue south of the street intersection. To provide for clearance over the surface track used by Oak Hill trains and the Frisco detour tracks, this bridge was raised about 4 ft. above the permanent street grade with runoffs on the completed concrete viaducts. After this change in street traffic, a comparatively free opportunity was afforded for the remaining steps



Construction View Showing Conditions Before Grades Were Separated

of the work. All railway traffic was removed from the surface in February, 1915, and on July 31 all streets were opened for travel.

To handle concrete the Missouri Pacific installed a tower plant with chutes at the corner of Park and Vandeventer avenues, served by a temporary spur track. Sand and gravel were unloaded by a derrick and clamshell bucket into a divided bin and drawn by gravity into a divided truck, which was moved to the mixer and dumped into the hopper by a cable attached to the hoisting engine. On the Frisco work, a small portable tower traveling with the mixer was used, and the material was hauled to it in wagons from the team tracks at Park avenue. The total cost of the construction work to the railways, the city and the public utility companies was \$830,000. It involved 220,000 cu. yd. of excavation, 60,000 cu. yd. of filling, 17,400 cu. yd. of concrete, 540 tons of reinforcing steel, 78 tons of structural steel and 23,300 sq. yd. of paving. Owing to the conditions imposed upon both design and construction, the work required attention out of proportion to its magnitude. More than 200 drawings covering the permanent work as constructed were prepared by the Missouri Pacific alone. The engineers in charge of the planning and execution of the work were F. G. Jonah, chief engineer, and Perry Topping, assistant engineer, for the St. Louis & San Francisco; C. E. Smith formerly assistant chief engineer; E. A. Hadley, chief engineer during the later stage of construction, and the writer, assisted by W. D. Hudson, L. H. Davis and S. M. Bate, assistant engineers, for the Missouri Pacific.

RAILWAY ELECTRICAL ENGINEERS' CONVENTION

The eighth annual convention of the Association of Railway Electrical Engineers was held at the Hotel La Salle, Chicago, October 18-22, H. C. Meloy, chief electrician, New York Central Lines West, presiding. Mr. Meloy spoke of the good work that had been done by the various committees in co-operating with other associations, such as the Master Car Builders', Illuminating Engineers', and the American Railway Engineering Associations. The secretary-treasurer reported a cash balance of \$1,357.29, and a membership of 507, of which 170 are senior active members, 95 junior active members, 20 honorary members and 222 associate members. Reports of progress were submitted by the committees on Reciprocal Relations, Loose Leaf Binders, Wire Crossings, Electric Headlights, Wireless Telephone and Telegraph, Industrial Trucks, Metal Conduit Specifications and Rating of Train Lighting Lamps.

The committee on Standards for Train Lighting Equipment presented as its report the standards adopted by the Master Car Builders' Association, with the exception of the design of the armature pulley. It was believed that by relocating the web of this pulley it will be possible to use the same patterns for the ball bearings and the sleeve pulley. The chairman was instructed to confer with the chairman of the Train Lighting Committee of the Master Car Builders' Association, with a view of having this matter again drawn to the attention of the M. C. B. Association.

The committee on Wire Specifications presented a revision of the former specifications to conform to the best engineering practice.

The committee on Car Wiring presented a set of specifications covering the complete installation of an electrical wiring system for the lighting of passenger cars to meet the requirements of the Board of Fire Underwriters' rules. These specifications are in considerable detail and were accepted by the association as recommended practice for car wiring.

DATA AND INFORMATION

The committee, reporting on this subject, stated that, as in previous years, it has been difficult to obtain the necessary information from the railroads, regarding their equipment. From that which was obtained it was found that there has been little or no change in the electric car lighting situation during the past year. There has been a great increase in the number of gas-filled Mazda lamps used and the number of Cooper-Hewitt lamps reported this year is considerably larger than last year. The number of electric arc headlights has increased from 12,432 to 16,446 and the number of incandescent headlights from 932 to 1,287. It was also shown that although the total number of shops reported this year is practically twice that of last year, the percentage of the shops at which the power is purchased remains the same, being 42 per cent in each case. The total horsepower of the connected load at the shops at which the power is purchased represented 30 per cent of the total last year and 29 per cent of the total this year.

The report was signed by Edward Wray, chairman, Railway Electrical Engineer; C. J. Causland, P. R. R.; G. W. Cravens, C. & C. Electric and Manufacturing Company; W. A. Del Mar, I. R. T.; A. J. Farrelly, C. & N. W.; J. E. Gardner, C. B. & Q., and W. M. Wiggins, Pullman Company.

ILLUMINATION

The committee stated that an investigation is to be made on the study of illumination for classification yards. Regarding the development of the incandescent lamp, it was stated that since 1907 the sale in this country of the Mazda lamp has been increased from 0.1 per cent to 71 per cent of the total lamps sold, while that of carbon lamps has decreased from 93 per cent to 7 per cent, the remainder being practically entirely Gem lamps. The only justifiable use of the Gem lamps is where mechanical break-

age is excessive, due to vibration of the courses. The Mazda C or gas-filled lamp bulbs are now commercially available in the multiple burning type from 1,000 watts down to and including the 100-watt size and in the 110-volt class. The development work in the Mazda C lamps for train lighting service has progressed to a point where they will soon be commercially available. In this connection there is an important question to be settled regarding the sizes that should be provided, as it is highly desirable to avoid the multiplicity of sizes that the railroads have been using in the vacuum type. In the Mazda B, or vacuum type lamp, the improvements made have been almost entirely in increasing the efficiency. These have amounted to approximately 6 to 9 per cent, and in a few sizes somewhat more.

The report is signed by L. S. Billau, chairman, B. & O.; C. W. Bender, National Lamp Works, General Electric Company; L. C. Doane, Holophane Works of the General Electric Company; H. C. Meloy, N. Y. C.; J. L. Minick, P. R. R., and G. O. Moores, B. & O.

Discussion.—Preston S. Millar, Electrical Testing Laboratories, New York, stated that the modern Mazda lamps have been found to be more rugged than the Gem lamps. He also believed that the gas-filled Mazda lamps of small wattages would be so expensive to make and the increase in efficiency so small that together with the increase in the intrinsic brilliancy of the filament which is objectionable to the eye, they would not be desirable in train lighting service. At the present stage of development of the gas-filled lamp the 100-watt sizes do not seem practical.

STANDARDIZATION OF CRANE MOTORS

The committee in making a study of the existing conditions of traveling crane equipment in railway shops has found that the present installations are in a rather chaotic condition, so far as any attempt at the standardization or uniformity of a motor size is concerned.

After making a careful analysis of the problem with a view to fully meeting the needs of the modern locomotive repair shops and at the same time reducing the number of different crane capacities to a minimum, the committee believed that the following nine crane sizes would suffice, these capacities being in tons, 2, 5, 10, 15, 30 (single and double trolley), 60, 75, 120 (double trolley), 150 (double trolley). The 30-ton, 120-ton and 50-ton cranes each having the double trolley hoist, will actually reduce the number of sizes to the following: 2, 5, 10, 15, 30, 60 and 75. The committee states: "There may be individual preferences on the part of many engineers for odd sizes of cranes, but it is no trade secret that odd crane sizes specified by railroad engineers usually are made up as a compromise equipment from a few standard sizes, and not always with the best results for either the crane manufacturer or the railroad company."

The great advantage of standardization in crane motors would be the reduction in the number of spare parts, armatures, etc., to be carried in stock, which would greatly facilitate the repairs or replacements. It was recommended that the committee be continued for another year. The report was signed by H. C. Meloy, chairman, N. Y. C.; T. V. Buckwalter, P. R. R.; J. E. Gardner, C. B. & Q.; A. J. Farrelly, C. & N. W.; Edward Wray, Railway Electrical Engineer; C. J. Causland, P. R. R.; P. L. Batty, Arnold Company; R. M. Gaston, George P. Nichols & Brother; B. F. Bilsland, General Electric Company.

AIR COMPRESSORS

The committee made a careful study of the motor-driven, oil engine-driven and steam-driven air compressors. It was reported that a well-designed motor-driven compressor would have an over-all efficiency of 72.5 per cent, while the efficiency of the same type of air compressor, steam-driven, would be 77.7 per cent, and 81.3 per cent when driven by an oil engine. It was believed that at a large railroad shop or terminal, which would require a 3,000-cu. ft. compressor and where live steam was to be supplied to other units, the steam-driven compressor

would be the most economical. A motor-driven compressor would be desirable where but little live steam is used in the operation of the plant for either power or heating, and where the electrical power may be purchased in the neighborhood of one cent per k. w. hour. The synchronous motor has proved satisfactory for motor-driven compressors. It has given excellent service on units from 200 cu. ft. to 1,200 cu. ft. per minute. The oil engine-driven compressor is the most suitable at isolated points, such as at large terminal yards, or at some small special shops where there is no demand for steam, and where the cost of electric current makes its use prohibitive. The best type of compressor to be driven by an electric motor or an oil engine is one designed to operate at a constant speed, with the proper form of valve gear and unloading device, as this prevents complication of electric motor speed variations and the oil engine speed variations. The report was signed by F. Wanamaker, chairman, C. R. I. & P.; H. R. Bucks, O. S. L.; L. C. Hensel, S. L. & S. F.; J. F. Gardner, C. B. & Q.; F. G. Baker, Frisco Line; H. C. Meloy, N. Y. C. West.

SHOP PRACTICE

The Committee on Shop Practice considered this year the subjects of crane magnets, magnetic chucks and the tempering of tools in electric furnaces. It showed how by the use of the locomotive crane and magnet the cost of handling material in scrap yards and large store yards would be materially reduced. One road handled with a locomotive crane and magnet 41 tons of old locomotive grates in 40 minutes, 56 tons of old track spikes in 33 minutes and 44 tons of miscellaneous scrap in 35 minutes. Another road is handling this class of material at a cost of less than 2 cents a ton, as compared with 25 to 35 cents by hand. Another road reports the cost of handling No. 1 wrought iron scrap with the electric crane as 4 cents, against 22 cents where it was done by hand. Busheling No. 2 wrought iron and malleable iron cost 2 cents as against 10 cents, handling cast iron and mixed steel cost 2 cents as against 9 cents, and handling sheet steel cost 20 cents as against 30 cents. The locomotive crane with a magnet can be used to good advantage for picking up scrap along the right of way on roads where the traffic is dense. The information obtained indicated that the cost of maintenance of a crane magnet is practically negligible, and consists in most cases simply in the renewal of the cable. Where power for operating the magnet is supplied by generating equipment mounted on the crane there will also be some slight maintenance expense for this apparatus.

Magnetic chucks are used in railroad shops to a very limited extent. They consist of two general types—the flat and the rotary type. The use of the magnetic chuck is principally in connection with grinding operations, either flat or cylindrical, although it is occasionally used for light machining operations. The greatest merit lies in the fact that light thin work may be supported rigidly without distortion of the material. The power required for a magnetic chuck is small, and if the shop lighting or power circuits are direct current the chucks can in most cases be connected directly to the shop lines.

In tempering tools by the electric furnace the temperature can be more accurately regulated and, by means of the pyrometer, accurately determined. The report was signed by D. C. Wilson, U. P., chairman; W. E. Heald, B. & O.; H. R. Bucks, O. S. L.; George H. Cravens, C. & C. Electrical Manufacturing Company; J. M. Craig, P. R. R.; J. L. Hayes, S. A. L.; L. R. Pomeroy, U. S. L. & H. Company; J. H. Bryan, West. Elec. & Mfg. Co., and A. L. Chapin, I. C.

CLOSING EXERCISES

H. D. Rohman, chief electrical engineer, Franklin Railway Supply Company, New York, gave an interesting talk during Wednesday's session on Electric Train Lighting in South Africa and Roumania. He stated that out of 2,000 passenger cars in South Africa 1,900 were electrically lighted. The individual train lighting equipment is not of as large capacity as is used

in the United States, nor are the passenger cars as well illuminated.

The following officers were elected for the ensuing year: President, E. W. Jansen, III. Cent.; senior vice-president, C. J. Causland, P. R. R.; junior vice-president, J. E. Gardner, C. B. & Q.; secretary-treasurer, Joseph A. Andreucetti, C. & N. W.; E. Wanamaker, C. R. I. & P., and E. S. M. MacNab, C. P. R., were elected to the executive committee.

It was voted to hold the semi-annual convention at the time and place of the convention of the Master Car Builders' Association, and to hold the next annual convention in Chicago.

THE RAILWAY AND THE AUTOMOBILE*

BY T. C. POWELL

Vice-President, Queen & Crescent Route

From the earliest time mankind has found it necessary to move from place to place, and the means of doing so which we enjoy to-day, are simply the responses to that demand. But simply to move from one locality to another has not satisfied the human race. Running all through the world's progress will be found the same desire for speed, the same admiration for the success resulting from the application of speed.

The substantial long-distance means of transportation in this country have been the steam railroad and the steamboat. The river steamboat service has been largely superseded by the railroad, not only because of cheaper rates and faster time, but because the railroad traffic and transportation organizations have been more efficient. Had the steamboat people recognized this in time, they would not have been eliminated to the extent that has come to pass. Their organization would have grown also, and they would have retained at least part of the through and they would have developed new local traffic.

With this example staring us in the face, the railroad fraternity in every department must lead in transportation methods and not simply follow. It must be remembered that the "steam propelled carriage," as it was first called, was not invented to run on rails, but on the public highways. It was put in competition with the stage coaches, and from the beginning, made better time than the coaches drawn by horses and very shortly made lower rates. The owners of the coach companies, many of whom were in Parliament, succeeded in having passed such restrictive laws against the "steam carriages" operated on the turnpikes, that they were driven off and compelled to provide their own roadways, and the automobile industry in England, as it is now known, was set back nearly two generations.

The automobile, both for freight as well as for passengers, is coming into its own again. Highways are being improved for its benefit, and part of the very taxes paid by the steam railroads is being used to provide smooth roads and streets for the benefit of a possible and very probable future competition.

My own experience in this country and abroad, that is, where the roads are good, shows that the average mileage made is 20 miles per hour, and this is confirmed by the experience of others. Short distances can be made in better time per hour. The same kind of service can be obtained on some freight, and when it is understood that this time applies from door to door, the serious nature of the competition can be realized. There are now nearly 2,000,000 motor cars in this country. In a year there will be at least 2,000,000 automobiles exclusive of auto trucks. Allow each automobile an average annual mileage of 5,000 miles—many travel 20,000—and you have a total mileage of 10,000,000,000 automobile miles. Allow an average of two passengers to each automobile and you have at total of 20,000,000,000 passenger miles. Not all of this is taken from the steam roads, but the proportion of people traveling by automobile who otherwise would travel in some direction by railroads, is very important.

"Touring" is not a Twentieth Century invention; on the contrary, a writer who has made a study of it and has written a

book called "Touring in 1600," says that he had the opportunity of consulting thousands of diaries, letters and other accounts of that period, descriptive of the various journeys throughout the world entered upon for reasons other than business. All the world likes to travel, and travel brings about an exchange of products. The point I want to emphasize is that this desire for travel is as strong now as it ever was, and is probably stronger. The facilities are better, but the serious feature for us to consider is whether these facilities are the ones which the steam railroads furnish or whether the public is turning to the automobile, the motorcycle, the motor boat, the electric traction line or perchance the aeroplane for a medium of transportation.

Travelers have the right to ask that the passenger stations shall be well arranged and clean; that the attendants shall be courteous and attentive, that the officers and all those in authority shall be intelligent and well fitted for their positions. They have the right to demand that upon paying the price they shall be provided with the accommodations for which they pay, and that they shall be transported to their respective destinations in comfort and safety.

The shipping public, upon paying the price, is justified in asking that its goods shall be handled with care at all times and delivered at the designated point promptly and without unnecessary detail or harassing regulations.

In short, the traveling and shipping public is becoming posted as to the relative merits of all forms of transportation, and to retain its patronage, the steam railroads must enhance the efficiency of their organizations, recognizing that the only reason for the existence of a common carrier is to transport from place to place passengers and merchandise, safely and expeditiously and without undue or unreasonable charges or regulations.

RESULT OF THE M. M. LETTER BALLOT

Fifty-four subjects were submitted to the members of the American Railway Master Mechanics' Association for action by letter ballot and of these only one was unfavorably acted on, that being the engineer's torch made of steel tubing and shown in the report of the Committee on Standardization of Tinware as Fig. 1. The entire 14 recommendations of the Committee on Standards and Recommended Practice were adopted, these including specifications for steel axles, fire-box steel, forgings, cylinder castings, etc., and steel castings. The changes made in the specifications for inspection and testing of locomotive boilers to have them conform to the Federal regulations were adopted, as were the regulations covering the operation of brakes on engines and tenders handled dead in trains and offered in interchange.

The methods of photometering locomotive headlights, as proposed by the Committee on Locomotive Headlights, and the rules for determining stresses in longitudinal barrel seams and patches, longitudinal gusset braces and flat surfaces, and stay-bolts, radial stays and crown bar bolts in locomotive boilers as presented by the Committee on Design, Construction and Inspection of Locomotive Boilers were also adopted.

Thirty-nine of the 40 examples of tinware presented by the Committee on Standardization of Tinware were adopted, which should prove of material assistance to the manufacturers and users of this material. The instructions in fuel economy on locomotives prepared by the Committee on Fuel Economy for the instruction of the enginemen and firemen were adopted, the vote lacking one of being unanimous. These instructions, it is understood, will be printed in pamphlet form and sold at a nominal cost by the association.

The three recommendations of the Committee on Forging Specifications covering the fiber stresses for heat treated and alloy-steel materials, and the specifications for quenched and tempered carbon steel axles and alloy-steel forgings (separate specifications) were adopted by a large majority. The rules outlined by the Committee on Boiler Washing for washing boilers were also adopted.

*From an address before the Cincinnati Railway Club, at Cincinnati, Ohio, on September 14, 1915.

Comparative Statistics of the World's Railways

Bureau of Railway Economics Compiles Data for United States and 38 Foreign Countries; 606,000 Miles of Line

In only one country in the world do railways haul freight so cheaply as the railways of the United States. That country is India, where the cost of labor is so little as to be almost negligible. On the other hand, wages of railway employees in the United States are higher than in any other country, except Western Australia, in which country average receipts per ton are almost twice as great as in the United States. In our own country the average annual wage of the railway employee in 1912 was \$730. Only in Australia, New Zealand and Canada does the average annual wage reach one-half that amount. In Japan it is \$114 per year. In capitalization per mile of its railways, the United States is exceeded by every one of the principal countries of the world. The list is headed by the United Kingdom, with a capitalization of \$277,147 per mile. Belgium comes next with \$216,143 per mile. Russia has an average of \$149,814; France, \$148,436; Switzerland, \$122,010; Austria, \$121,327; Germany, \$116,365. The average for the United States is \$63,535. In no country in the world has so much progress been made in efforts to perform railway service in a manner which shall best serve the business interests of its patrons. In none of them is the service performed so cheaply.

These are a few of the facts indicated in a bulletin just issued by the Bureau of Railway Economics on "Comparative Railway Statistics, United States and Foreign Countries." Numerous comparative statements have heretofore been compiled covering such statistics in a more or less fragmentary form; but no previous compilation has approached in completeness of vital statistics those contained in the present work.

The bulletin presents comparative data regarding the railways of the United States and of the principal foreign countries. In the list are included 38 countries or states for which are given in tabular form the principal information covered for the United States in the statistical reports of the Interstate Commerce Commission. The statistics cover for 1912, the latest year for which fairly complete comparable statistics are available, the principal facts concerning an aggregate mileage of 606,000 miles, or approximately seven-eighths of the world's total railway mileage. Figures for the railways of the United States for 1913 and 1914 also are given. The data are presented separately for each country and in comparative form relative to leading heads under financial condition and operating results. The eighth of the total mileage which is not included comprises that of insignificant or backward countries and the mileage of local, narrow-gauge or otherwise unimportant railways in the principal countries.

Inevitably the strict comparability of certain of the items for the different countries is affected by the inclusion or omission of items in the statistics of one country that are not included or omitted in all; but the slight error does not appear to be sufficient to impair the general usefulness of the data. Some points in which differences exist in the significance of certain items are pointed out under the various heads.

FREIGHT TRAFFIC

In average receipts per ton mile the railroads of the United States receive about 60 per cent of the average receipts in the principal European countries. The rate in the United States is lower than that of any other country except India. Brazil stands highest in the list, with receipts nearly 10 times the average amount for the United States. Several countries receive from two or three and even four times as much for hauling a ton of freight one mile as the railroads of the United States. The only country which has substantially the same rate is Canada. The average receipts per ton mile for 25 countries are shown in the accompanying table.

AVERAGE RECEIPTS PER TON-MILE.

	Cents.		Cents
United States.....	0.744	Holland	1.240
Algeria and Tunis (1911)....	1.691	Hungary	1.215
Australia:		India	0.703
New South Wales.....	1.611	Japan	0.814
South Australia.....	1.756	Mexico (National Railways)...	1.359
Austria	1.494	Norway	1.448
Brazil (1911).....	6.914	Roumania	1.297
Canada	0.757	Russia (1910).....	0.933
China (Peking-Mukden Line)...	0.815	Siam	1.565
Cuba (1911).....	2.944	Spain (1909).....	2.226
Denmark	2.113	Sweden	1.373
France (1911).....	1.181	Switzerland	2.640
Germany	1.244	Union of South Africa.....	1.834

In freight revenue per mile of line the average for the United States is \$7,962. This amount is exceeded in five European countries, viz., Belgium, \$14,440; Germany, \$13,898; the United Kingdom, \$13,295; Austria, \$11,237; and Switzerland, \$8,629. Yet in freight density, ton miles per mile of line, the United States is exceeded only by Germany. The effect of the difference in rate per ton per mile in Germany and in the United States is clearly brought out by a simple comparison based upon the two following tables, showing freight density and freight revenue per mile of line. Freight density is 3.6 per cent greater in Germany than in the United States. Freight revenue per mile of line is 75 per cent greater in Germany.

FREIGHT REVENUE PER MILE OF LINE

United States.....	\$7,962	Germany	\$13,898
Algeria and Tunis (1911)....	2,981	Holland	6,293
Australia:		Hungary	5,995
New South Wales.....	3,199	India	3,672
Queensland	4,759	Italy	7,581
South Australia.....	2,279	Japan	4,780
Victoria	4,487	Mexico (National Railways)...	3,586
Western Australia.....	3,443	New Zealand	3,697
Austria	2,273	Norway	2,066
Belgium	11,237	Portugal (1910).....	4,229
Belgium	14,440	Roumania	5,807
Brazil (1911).....	4,981	Siam	1,012
Bulgaria (1911).....	2,465	Spain	6,149
Canada	5,539	Sweden	3,154
China (Peking-Mukden Line)...	4,510	Switzerland	8,629
Cuba (1911)	3,184	Union of South Africa.....	5,435
Denmark	6,264	United Kingdom	13,295
Egypt	6,764		
France (1911)	7,459		

TON-MILES PER MILE OF LINE (Freight Density)

United States.....	1,078,580	Hungary	494,002
Australia:		India	522,758
South Australia	256,139	Japan	587,610
Austria	752,767	Mexico (National Railways)...	263,950
Brazil (1911)	72,047	Norway	129,524
Canada	731,776	Roumania	445,523
China (Peking-Mukden Line)...	553,383	Russia (1910).....	1,033,254
Cuba (1911)	108,154	Siam	67,088
Denmark	293,900	Spain (1909)	240,166
France (1911)	631,736	Sweden	229,468
Germany	1,117,376	Switzerland	326,887
Holland	507,637	Union of South Africa.....	296,406

In average receipts per ton the comparative record for the United States appears somewhat better, but this is because of the longer haul. The more important European countries receive from 50 to 75 per cent of the amount received by the railways of the United States, but in none of the countries in this comparison is there a rail haul per ton comparable to the 256.9 miles average haul in the United States. Next to the United States in this respect stand Mexico, with 222 miles, and Canada, with 218. In important European countries the average haul per ton is from one-fourth to one-third the average for the United States.

It should be noted, however, that the figure above given for the United States is the average haul per ton when all railways are considered as one system. The average haul per ton on the individual railway in the United States in 1912 was 143.44 miles. This haul per ton is exceeded in five countries, in each of which, however, by reason of the extent of the country it is probable that conditions of transfer comparable with those customary in the United States prevail. Of the countries which have a longer average than the United States haul on the individual railway, the Union of South Africa and Mexico have nearly

three times the average receipts per ton of railways of the United States; India has 31 per cent more; and Canada has 55 per cent more. Figures for Russia are not given. The figures for each of the countries are given in the accompanying table:

AVERAGE HAUL PER TON

	Miles		Miles
United States.....	256.9	Germany	61.8
Algeria and Tunis (1911)...	73.8	Holland	55.2
Australia:		Hungary	71.8
New South Wales.....	81.1	India	199.2
South Australia.....	120.1	Japan	92.6
Austria	65.5	Mexico (National Railways)...	222.1
Belgium	52.3	Norway	34.7
Brazil (1911).....	80.1	Roumania	99.8
Canada	218.0	Russia (1910).....	160.1
China (Peking-Mukden Line)...	86.8	Siam	126.2
Cuba (1911).....	26.3	Spain (1909).....	60.9
Denmark	33.5	Sweden	45.8
France (1911).....	78.4	Switzerland	45.5
		Union of South Africa.....	171.2

PASSENGER TRAFFIC

In the consideration of passenger rates, the facts for the various countries are not at all comparable with those for the United States, unless full consideration is given to the distribution of passengers into classes. Such distribution prevails in every other country except Canada included in this compilation. It appears that while receipts per passenger per mile are higher in the United States than in most countries, in only 15 of the countries in the list have railways less passenger revenue per mile of line than those of the United States, and those in eight countries have less passenger density. Belgium has the greatest passenger density and naturally the highest passenger revenue per mile of line. The statistics are given in the accompanying table.

AVERAGE RECEIPTS PER PASSENGER-MILE

United States.....	1.987	Germany	0.908
Algeria and Tunis (1911)....	1.466	Holland	1.020
Australia:		Hungary	0.967
New South Wales.....	1.948	India	0.414
South Australia.....	1.318	Japan	0.690
Austria	1.662	Mexico (National Railways)...	1.435
Brazil (1911).....	2.424	Norway	1.208
Bulgaria (1911).....	1.457	Roumania	1.451
Canada	1.943	Russia (1910).....	0.699
China (Peking-Mukden Line)...	0.964	Siam	1.188
Cuba (1911).....	2.868	Spain (1909).....	1.522
Denmark	1.294	Sweden	1.246
France (1911).....	1.075	Switzerland	1.280

PASSENGER-MILES PER MILE OF LINE

(Passenger Density)

United States.....	136,699	Germany	678,385
Australia:		Holland	583,155
New South Wales.....	287,204	Hungary	236,556
South Australia.....	145,995	India	457,498
Austria	363,415	Japan	706,884
Belgium	1,046,614	Mexico (National Railways)...	78,344
Brazil (1911).....	70,963	Norway	131,114
Bulgaria (1911).....	121,216	Roumania	250,637
Canada	108,888	Russia (1910).....	359,268
China (Peking-Mukden Line)...	359,002	Siam	126,767
Cuba (1911).....	62,216	Spain (1909).....	139,736
Denmark	405,338	Sweden	123,972
France (1911).....	432,630	Switzerland	520,666

PASSENGER REVENUE PER MILE OF LINE

United States.....	\$2,704	France (1911)	\$4,707
Algeria and Tunis (1911)....	1,644	Germany	6,147
Australia:		Holland	5,948
New South Wales.....	3,009	Hungary	2,260
Queensland	1,007	India	1,895
South Australia.....	1,962	Italy	4,854
Victoria	3,169	Japan	5,324
Western Australia.....	1,047	Mexico (National Railways)...	1,124
Austria	3,858	New Zealand	2,505
Belgium	7,347	Portugal (1910).....	2,910
Brazil (1911).....	1,720	Roumania	3,637
Bulgaria (1911).....	1,766	Siam	1,511
Canada	2,116	Spain	2,294
China (Peking-Mukden Line)...	3,462	Sweden	1,536
Cuba (1911).....	1,785	Switzerland	6,666
Denmark	5,169	United Kingdom.....	9,183
Egypt	6,059		

The apparent facts shown by the tables above are very greatly modified by the statement of the distribution of passengers. In the United States practically all passenger traffic is first-class. In nearly all of the countries with which comparison is made a very large proportion of the passenger traffic is second, third, or even fourth class. The percentage of passenger travel in the lower classes ranges from over 98 per cent for Siam, 96 per cent for the United Kingdom, 96 per cent for France, 95 per cent for Japan, 91 per cent for Germany, down to about 50 per cent in some of the Australian colonies. The average revenue per passenger mile is greatly reduced on account of this pre-

ponderance of low class traffic. No comparison of rates for this service that is at all accurate can be made without taking into consideration the averages for the different classes and considering them in connection with the class of accommodation furnished for each class. The cheaper accommodations in most countries are greatly inferior to the service of the day coaches in ordinary use in United States and Canada. The distribution of passengers by classes for the various countries is shown in the accompanying table.

DISTRIBUTION OF PASSENGERS CARRIED, BY CLASSES

(Total for each Country = 100.0)

	Per cent		Per cent
UNITED STATES		4th class.....	49.2
AUSTRALIA:		Military	1.2
New South Wales:		HOLLAND:	
1st class.....	6.9	1st class.....	4.1
2nd class.....	36.4	2nd class.....	24.5
Season tickets.....	32.9	3rd class.....	69.3
Weekly tickets.....	23.8	4th class.....	0.4
South Australia:		Military	1.7
1st class.....	9.0	HUNGARY:	
2nd class.....	46.4	1st class.....	1.1
Season tickets.....	37.3	2nd class.....	14.6
Weekly tickets.....	7.3	3rd class.....	82.2
Victoria:		Military	2.1
1st class.....	49.1	INDIA:	
2nd class.....	50.9	1st class.....	0.2
Western Australia:		2nd class.....	0.8
1st class.....	10.4	Intermediate	2.6
2nd class.....	46.1	3rd class.....	90.0
Season tickets.....	29.4	Season & vendors' tickets...	6.4
Workers' tickets.....	14.1	JAPAN:	
AUSTRIA:		1st class.....	0.3
1st class.....	0.4	2nd class.....	4.6
2nd class.....	5.9	3rd class.....	95.1
3rd class.....	92.6	NEW ZEALAND:	
Military	1.1	1st class.....	15.5
BELGIUM:		2nd class.....	84.5
1st class.....	0.9	ROUMANIA:	
2nd class.....	10.3	1st class.....	3.9
3rd class.....	87.8	2nd class.....	15.0
Electric line.....	1.0	3rd class.....	79.6
BRAZIL (1911):		Military	1.5
1st class.....	33.2	SIAM:	
2nd class.....	66.8	1st class.....	0.3
BULGARIA (1911):		2nd class.....	1.3
1st class.....	0.4	3rd class.....	98.4
2nd class.....	6.3	SWEDEN:	
3rd class.....	93.3	1st class.....	0.1
DENMARK:		2nd class.....	4.9
1st class.....	0.1	3rd class.....	93.8
2nd class.....	8.9	Military	1.2
3rd class.....	91.0	SWITZERLAND:	
FRANCE (1911):		1st class.....	0.5
1st class.....	4.1	2nd class.....	6.9
2nd class.....	19.6	3d class.....	86.9
3d class.....	76.3	Special class.....	5.7
GERMANY:		UNITED KINGDOM:	
1st class.....	0.1	1st class.....	2.3
2nd class.....	7.5	2nd class.....	1.2
3rd class.....	42.0	3rd class.....	96.5

The average receipts per passenger on the railways of the United States are considerably greater than those on the railways of the principal European countries for the reason that the average haul is much longer and because the traffic is substantially all first-class. Some indication of the difference in accommodations furnished in the different countries is afforded by the statement of the average number of passengers per train. Although the trains in the United States have space accommodation for very many more passengers than trains in any of the countries named, with the possible exception of Canada, yet only Denmark has so small an average number of passengers per train. The limit in the other direction is reached by India, which carries 176 as the average number of passengers per train. In most of the European countries the number of passengers per train is from 30 to 60 per cent greater than in the United States, notwithstanding the smaller amount of space accommodation afforded by smaller coaches and less number of coaches in the train.

The statistics for various countries are presented in the following table:

PASSENGERS PER TRAIN

United States.....	53	Germany	84
Australia:		Holland	63
New South Wales.....	109	Hungary	66
South Australia.....	82	India	176
Austria	73	Japan	111
Belgium	99	Mexico (National Railways)...	86
Canada	62	Roumania	76
Denmark	53	Switzerland	69
France (1911).....	69		

WAGES

One of the most important comparisons that can be made as to cost of operation between the railways of the United States

and those of other countries is in the average compensation of employees. With the exception of Western Australia, the United States pays a larger average yearly compensation than any other country. The country having the lowest average yearly compensation per employee of which the available figures can be placed on a comparable basis with the United States is Japan. The average yearly compensation in that country is \$113.88 as compared with \$729.64 for the United States (in 1912). It appears that the Australian colonies and New Zealand are, with the exception of Canada, the only countries in which the wages of employees stand on anywhere near an even basis with those of employees of the railways of the United States. In Germany the average yearly compensation is a little more than half that in the United States. In Holland, Italy, Switzerland, Austria and Hungary the compensation is less than one-half the average for the United States. The facts are shown in the accompanying table for all the countries of which data upon this subject can be reduced to a basis which is comparable with statistics for United States.

AVERAGE YEARLY COMPENSATION PER EMPLOYEE

Based on average number of employees during year:	Switzerland	\$366.96
Australia:	Based on number of employees at end of year:	
New South Wales.....	United States	\$729.64
Western Australia.....	Australia:	
Germany	Victoria	608.52
Holland	Austria	329.88
Italy	Canada	604.47
Japan	Hungary	300.41
New Zealand.....	Roumania	249.40
Sweden	Russia (1910)	211.40

OPERATING REVENUES AND EXPENSES

From the facts already stated and taking into consideration the density of both freight and passenger traffic, it is to be expected that the operating revenues per mile of line of the principal European countries should show amounts greatly in excess of those for the railways of the United States. In Germany and Belgium the operating revenue per mile of line is practically twice that in the United States; in the United Kingdom the operating revenue is about two and one-half times that per mile in the United States, while France, Austria, Denmark, Holland, Italy, Russia and Switzerland show operating revenues per mile considerably in excess of the figure for the United States. The figures for 38 countries are shown in the accompanying table.

OPERATING REVENUES PER MILE OF LINE

United States	\$11,482	France (1911).....	\$14,521
Algeria and Tunis (1911)...	4,681	Germany	22,026
Argentina	6,302	Holland	13,440
Australia	5,621	Hungary	8,599
New South Wales.....	8,315	India	5,971
Queensland	3,562	Italy	13,868
South Australia	6,964	Japan	10,495
Victoria	7,168	Mexico (National Railways) ..	5,099
Western Australia.....	3,713	New Zealand.....	6,813
Austria	16,049	Norway	3,841
Belgium	23,665	Portugal (1910).....	7,239
Brazil (1911).....	7,324	Roumania	9,830
Bulgaria (1911).....	4,505	Russia (1910).....	12,424
Canada	8,209	Siam	2,604
Chile (1913)	5,732	Spain	8,551
China (Peking-Mukden Line) ..	8,680	Sweden	4,975
Cuba (1911).....	5,709	Switzerland	15,945
Denmark	12,141	Union of South Africa.....	7,996
Egypt	13,024	United Kingdom.....	26,689

Comparison of operating expenses per mile of line shows somewhat similar relation to that which obtains in respect to operating revenues. In this respect, however, Germany and Belgium show a larger excess of operating expense per mile of line over that of United States railways, while the relation for France, Holland, Switzerland and Austria is not materially different from the relation shown in regard to operating revenues. The United Kingdom stands highest in operating expenses as in operating revenue. However, in the United Kingdom operating expenses absorb only 63 per cent of operating revenue, this, with that of France, 62.6 per cent, being the lowest operating ratio of any important country. In the United States operating expenses absorb 69.3 per cent of operating revenue.

OPERATING EXPENSES PER MILE OF LINE

United States	\$7,968	Victoria	\$4,545
Algeria and Tunis (1911)...	2,949	Western Australia.....	2,647
Argentina	3,977	Austria	11,976
Australia	3,669	Belgium	16,406
New South Wales.....	5,341	Brazil (1911).....	6,352
Queensland	2,252	Bulgaria (1911).....	2,837
South Australia	4,312	Canada	5,639

Chile (1913)	\$5,092	Mexico (National Railways) ..	\$3,189
China (Peking-Mukden Line) ..	2,516	New Zealand	4,643
Cuba (1911).....	3,430	Norway	2,900
Denmark	10,192	Portugal (1910).....	3,644
Egypt	7,619	Roumania	6,340
France (1911)	9,084	Russia (1910).....	8,348
Germany	14,860	Siam	989
Holland	9,332	Spain	4,099
Hungary	5,451	Sweden	3,489
India	2,922	Switzerland	10,575
Italy	11,644	Union of South Africa.....	5,193
Japan	4,859	United Kingdom.....	16,863

Results of operation as shown in the two preceding tables are more clearly reflected in net operating revenue. Under this head the United Kingdom leads the list with \$9,826 per mile; Belgium is second and Germany third. Chile, Norway and Brazil are at the foot of the list.

Net operating revenue per mile of line for 38 roads is represented in the accompanying table.

NET OPERATING REVENUE PER MILE OF LINE

United States	\$3,514	France (1911).....	\$5,437
Algeria and Tunis (1911)...	1,732	Germany	7,166
Argentina	2,325	Holland	4,107
Australia	1,951	Hungary	3,148
New South Wales.....	2,974	India	3,050
Queensland	1,310	Italy	2,224
South Australia.....	2,652	Japan	5,616
Victoria	2,623	Mexico (National Railways) ..	1,910
Western Australia.....	1,066	New Zealand	2,170
Austria	4,073	Norway	941
Belgium	7,259	Portugal (1910).....	3,595
Brazil (1911).....	972	Roumania	3,490
Bulgaria (1911).....	1,668	Russia (1910).....	4,076
Canada	2,570	Siam	1,615
Chile (1913)	639	Spain	4,452
China (Peking-Mukden Line) ..	6,165	Sweden	1,486
Cuba (1911).....	2,278	Switzerland	5,370
Denmark	1,949	Union of South Africa.....	2,803
Egypt	5,405	United Kingdom.....	9,826

A summary of these series of comparisons of railway statistics between the United States and 38 foreign countries may be presented in a few words. With one exception, railways of the United States pay a higher average rate of wage than prevails in any other country. Also, with one exception, freight rates per ton-mile in the United States are lower than the rates per ton-mile in any other country. It is not an exaggeration to state that freight rates in most other countries are 50 per cent higher than in the United States; and that average wages are 50 per cent lower in other countries than in the United States is an understatement. Passenger rates, also, taking into account the accommodations furnished and the service performed as a part of the traffic, are lower than in any of the countries with which comparison is made. In other words, in no other country does the passenger receive so great a return for the value of his fare.

TRAIN LOADING, TRAIN DENSITY AND TRAIN REVENUES

How the railways of the United States have been able to conduct business under these difficult conditions, in some instances with marked success, is suggested by one or two other comparisons that are included in the bulletin from which these facts are taken. Passenger service in the United States is undoubtedly, though for causes that are apparently unavoidable, conducted upon an extravagant basis. Economics of operation must therefore be looked for in the freight branch of the railway service. It appears that the most conspicuous source of economical operation has been found in increasing the unit of transportation and in the consequent reduction in number of units relative to the volume of business carried on.

In number of tons of freight hauled per train, the United States leads every other country by a long interval. The average number of tons per train in 1912 was 406.8. Next in order is Canada with an average of 325.3. German trains carried an average of 240.3 tons and Mexican trains 224 tons. In all other countries the average trainload was less than 200 tons. The following table presents the facts:

TONS PER TRAIN

	Tons		Tons
United States	406.8	Germany	240.3
Australia:		Holland	137.1
South Australia.....	109.6	India	184.4
Austria	180.5	Japan	110.7
Canada	325.3	Mexico (National Railways) ..	224.1
France (1911)	141.7	Roumania	143.7
		Switzerland	132.8

The effect of this heavy average train load, brought about by the universal provision of ample track facilities and the adop-

tion of large motive power units, cars of large capacity and numbers of cars per train limited only by the capacity of the locomotive, is reflected in train density, or train miles per mile of line. Train density in the United States is about 26 per cent of that in Belgium; less than 30 per cent of that in the United Kingdom; about 40 per cent of that in Germany and Holland; and approximately 50 per cent of that in France, Switzerland and Japan.

The corresponding result is also shown in a comparison of average receipts per train mile. Railways of the United States receive more per train mile than those of any other country except Mexico; and in Mexico the average rate per ton per mile is 82 per cent higher than in the United States.

The statistics as to train density and average receipts per train mile are presented in the two accompanying tables.

TRAIN-MILES PER MILE OF LINE

	(Train Density)		
United States	4,950	Germany	12,454
Algeria and Tunis (1911) ..	2,839	Holland	12,888
Australia	3,339	Hungary	6,100
New South Wales	4,875	India	4,562
Queensland	2,492	Italy	8,356
South Australia	4,127	Japan	10,525
Victoria	3,905	Mexico (National Railways) ..	1,859
Western Australia	2,115	New Zealand	3,175
Austria	8,492	Norway	3,635
Belgium	18,827	Roumania	5,901
Bulgaria (1911)	2,804	Siam	1,901
Canada	3,776	Spain (1909)	4,458
China (Peking-Mukden Line) ..	3,751	Sweden	4,010
Denmark	7,157	Switzerland	10,048
Egypt	7,004	Union of South Africa	3,707
France (1911)	9,764	United Kingdom	17,598

AVERAGE RECEIPTS PER TRAIN-MILE

United States	\$2.24	Germany	\$1.65
Algeria and Tunis (1911) ..	1.62	Holland	0.95
Australia	1.71	Hungary	1.37
New South Wales	1.68	India	1.27
Queensland	1.43	Italy	1.49
South Australia	1.65	Japan	0.96
Victoria	1.80	Mexico (National Railways) ..	2.64
Western Australia	1.66	New Zealand	2.07
Austria	1.80	Roumania	1.61
Belgium	1.25	Siam	1.34
Bulgaria (1911)	1.54	Spain (1909)	1.61
Canada	2.13	Sweden	1.21
China (Peking-Mukden Line) ..	2.13	Switzerland	1.52
Denmark	1.57	Union of South Africa	2.11
Egypt	1.83	United Kingdom	1.40
France (1911)	1.46		

CAPITALIZATION

A fitting conclusion to a series of comparisons of operating results of railways in various countries is afforded by a statement of the amount of capital involved in their operations. The opening paragraph of this article covers the most conspicuous facts. The data for the several countries are presented in the following table:

CAPITAL PER MILE OF LINE

United States	\$63,535	Germany	\$116,365
Algeria and Tunis (1911) ..	55,108	Hungary	71,226
Australia	46,130	India	45,051
New South Wales	67,970	Japan	89,102
Queensland	31,657	Mexico (National Railways) ..	59,579
South Australia	44,120	New Zealand	53,789
Victoria	61,586	Norway	43,187
Western Australia	26,060	Roumania	90,093
Austria	121,327	Russia (1910)	149,814
Belgium	216,143	Siam	40,074
Bulgaria (1911)	47,133	Spain (1909)	89,348
Canada	64,054	Sweden	33,940
Chile (1913)	48,265	Switzerland	122,010
China, Peking-Mukden Line ..	32,902	Union of South Africa	49,218
Denmark	61,839	United Kingdom	277,147
France (1911)	148,436		

Comparative statements of railway capital in different countries are apt to be misleading. This is particularly the case when a part or all of the mileage of a country is under government ownership. In the United States "capital" means outstanding stocks and bonds. In Canada and in the United Kingdom the term is used in the same sense. But statistics of railways under government ownership ordinarily report only the amounts expended in construction and equipment of the railway plant. The term "capital," therefore, as used in the table may not mean precisely the same thing for all countries. The result, however, of supplying any omission in the data would probably invariably be to add in the capitalization per mile of the average of all such countries as have railways under the ownership of the government. Railways are owned by the government in all the countries in the list except the United

States, the United Kingdom, Spain and China. In South Africa, Russia, India, Germany, Austria and Australia, government ownership predominates. Any allowance for increase in the stated amount of capitalization per mile would be, at best, indefinite and would vary according to the system of accounting prevailing in each country. Without any such allowance, however, as shown by the table, the capitalization per mile of railways in the United States is less than that of the railways in any other important country of the world.

RESULT OF M. C. B. LETTER BALLOT

Of the 91 propositions submitted to the members of the M. C. B. Association for adoption by letter ballot only five were rejected. Of those rejected the specification describing the door of wooden construction and the question as to whether or not standards should be established for limiting dimensions for the cast steel design of side frames with pedestal jaws and designs of journal boxes for them were the most notable. The Committee on Brake Beams succeeded this year in providing specifications for testing all classes of brake beams that was adopted by a large majority. The adoption of the recommendation of the Committee on Train Brake and Signal Equipment, that truck clasp brakes be applied to all four-wheel truck passenger cars weighing 96,000 lb. or over, and to all six-wheel truck passenger cars weighing over 136,000 lb. or over, is indicative of the success of this type of brake throughout the country and is surely a step in advance.

Another plan of considerable importance that was adopted by a large majority and which, if carefully followed, will be of material benefit to the railroads, is covered by the rules governing the minimum strength requirements for reinforcement of the draft gear of existing wooden cars, as formulated by the Committee on Car Construction. The recommendations of the Committee on Specifications and Tests for Materials were adopted. These include new specifications for structural steel, steel plate and steel sheets for passenger equipment cars and for freight equipment cars (separate specifications); for malleable iron castings; miscellaneous steel castings; mild steel bars; rivet steel and rivets, and galvanized sheets. They also include the revised specifications for journal bearings, chains, steam heat hose and air-brake hose.

The proposals of the Committee on Train Lighting were approved, with the exception of the recommendation regarding the use of emergency fuses between the dynamo and field on wooden cars equipped with the axle dynamos. The Committee on Car Trucks, acting on the suggestion of those roads which voted negatively on the subjects submitted to letter ballot at the 1914 convention, has succeeded in reconstructing its recommendations so that 17 of the 18 proposals presented this year were approved.

The following are, in brief, the results of the letter ballot by committees:

Committee	Number of Subjects*	Number Rejected	Rejected Subject
Standards and Recommended Practice	9	1	Height of platform buffer for passenger cars.
Train Brake and Signal Equipment	3	1	Conductors' valves
Brake Shoe and Brake Beam Equipment	1	..	
Loading Rules	15	..	
Car Construction	17	1	Specification for construction of wooden side doors.
Specifications and Tests for Materials	20	..	
Train Lighting	8	1	Emergency dynamo fuses on axle equipment on wooden cars.
Car Trucks	18	1	Desirability of having standards for limiting dimensions for truck sides with pedestal type jaw.
Totals	91	5	

*For an itemized record of the recommendations of the various committees that were submitted to letter ballot see the abstracts of the reports of those committees in the *Daily Railway Age Gazette* for June 10, 11 and 12, 1915.

Completing the Summit Cut-Off of the Lackawanna

The Last Concrete Has Just been Placed in the
Nicholson Viaduct. Other Work Practically Finished

On September 8 the last concrete was poured for the Tunkhannock viaduct, the largest structure on the new line of the Delaware, Lackawanna & Western, between Clarks' Summit, Pa., and Hallstead. All the other structures on this line have been completed and only a small amount of excavation remains to be removed from a large rock cut about four miles east of Nicholson. It is expected that the entire line will be completed and placed in service by November 1.

A section $3\frac{1}{2}$ miles long between New Milford and New Milford Summit was placed in operation last fall. The 5 miles between New Milford and the connection with the old line near Hallstead was turned over to traffic on June 5, 1915. Track has been laid from New Milford Summit up to Tunkhannock viaduct and from the east end of the cut-off to the rock cut, leaving only four miles still to be laid.

This project has been of unusual interest because of its magnitude as a whole, because of the size of the structures involved and because of the high standards adopted in its construction. This line, 39.6 miles long, saves 3.6 miles in distance, 327 ft. of rise and fall and 2,440 deg. of curvature. It reduces the maximum grade eastbound from 1.23 per cent

to a maximum of 1,600,000 yd. The methods of handling this earthwork were described in detail in the *Railway Age Gazette*, November 14, 1913, page 903.

All structures are of permanent construction, 35 bridges being of concrete and 6 of steel. All grade crossings with highways were eliminated. Likewise, with two exceptions, all farm crossings at grade were avoided, entire farms being purchased in some instances to make this possible.

The most noteworthy structure is the Tunkhannock viaduct, a 12-span concrete arch bridge with a total length of 2,375 ft. and a height from bed of stream to top of coping of 242 ft., making it the largest structure of its type ever built. This structure, which is built for double track, consists of ten 180-ft. and two 100-ft. arches. It involved 167,000 cu. yd. of concrete, requiring unusual construction methods. As much as 14,000 cu. yd. of concrete has been deposited in one month by two mixers; nine thousand cu. yd. being deposited in forms. The methods employed by the contractor in placing this concrete were described fully in the issue of the *Railway Age Gazette* of February 5, 1915, page 235.



The Completed Tunkhannock Viaduct at Nicholson, Pa.

uncompensated to 0.68 per cent compensated, and westbound from 0.52 per cent uncompensated to 0.237 per cent compensated, while it reduces the maximum degree of curvature from 6 deg. 22 min. to 3 deg. Eastbound, the pusher service consisting of two pusher engines for tonnage trains between Hallstead and New Milford on the old line and three from Nicholson to Clarks' Summit will be reduced to one pusher engine at each point. The one pusher engine now required from Clarks' Summit west to New Milford on all tonnage trains will be eliminated. The importance of this saving will be realized from the statement that the tonnage moving over this line averages over 20,000,000 ton miles per mile of line annually.

This line cost approximately \$12,000,000. The grading amounted to over 13,318,000 cu. yd. or over 336,000 cu. yd. per mile of line. This was divided between 7,600,000 cu. yd. of rock, 5,100,000 cu. yd. of earth and 618,000 yd. of miscellaneous excavation.

Very careful attention has been paid to the waterproofing of this structure. The floor and sides up to the elevation of the base of rail are covered with 3-ply Minwax membrane covered with 1 ply of asbestos felt. Above this, $1\frac{1}{2}$ in. of Johns-Manville mastic concrete consisting of Johns-Manville asphalt and torpedo gravel was applied hot in two layers, each $\frac{3}{4}$ in. thick, with the joints lapped. An expansion joint was placed over each pier and over the quarter point of each span. These joints are flashed with copper sheeting covered with 3 ply waterproofing and the interstices are then filled with mastic. The total area being waterproofed on the viaduct is approximately 78,000 sq. ft. Ten down spouts lead to drains between the centers of the tracks on each span. Cast-iron drains extending to within 2 in. of the top of the tie are placed in recesses in the waterproofing directly above these down spouts, discharging freely between the arch rings.

The Martin's Creek viaduct was the next largest structure, containing 78,000 cu. yd. of concrete. The last concrete was poured in this structure on November 14, 1914.

With the exception of one double barrel 24-ft. arch culvert, 471 ft. long under an embankment 120 ft. high above the top of barrel, the remaining structures were nearly all for the purpose of carrying highways across the tracks. These struc-

tures were carried to a depth capable of sustaining a load of $3\frac{1}{2}$ tons per sq. ft. and with a head room of 14 ft. it was necessary for the abutments to be about 28 ft. high. Mass abutments for this situation would have required large foundations and much



Skeleton Arch Near New Milford, Pa.

tures show a considerable diversity of design, the result of a variation in local conditions. One of the most interesting is a reinforced concrete arch carrying a highway over the tracks, one mile east of New Milford, Pa. This structure consists of a skeleton arch with a span of 76 ft. 6 in. and a rise of 23 ft. 9 $\frac{3}{4}$ in. with vertical bents at the haunches and at the top of



Church Street Subway at Hallstead, Pa.

concrete. For this reason a special design consisting of a face wall to the level of the sidewalk and counterforts of sufficient size to carry the load below were adopted. These counterforts were spaced 15 ft. between centers and extended forward to the piers on the curb line. This type of construction permitted the earth pressure to be transmitted through



A Closer View of the Tunkhannock Viaduct

slope. A design involving end spans and bents was more economical than one requiring abutments at the skew backs. This design not only gave an attractive structure but an economical one.

Another interesting structure of a different type was constructed to carry the tracks over Church street in Hallstead. This was on a skew of 50 deg. 21 min., giving a distance between abutments of 50 ft. With the excavation for the abutments

between the counterforts and very materially decreased the amount of concrete required in the wall. The fill was tamped carefully as it was laid up to the sidewalk level.

This entire cut-off has been built under the direction of George J. Ray, chief engineer, and F. L. Wheaton, engineer of construction. A. B. Cohen, concrete engineer, has been in charge of the design of the structures, and C. W. Simpson is resident engineer on the Tunkhannock viaduct.

THE RAILROAD SOLDIER AT THE FRONT

BY WALTER S. HIATT

Our Special European Correspondent

The victory of the French and English in Northern France, late in September (the first of any consequence since the battle of the Marne 13 months ago), revealed the existence of about 1,000 miles of new railroad tracks which had been built on the two sides of the trench front by the English, French and Germans. Mighty railroad construction jobs had been going on quietly for many months on both sides, and one of the big purposes of the Anglo-French advance was to destroy the new railroad lines of communication so carefully built by the Germans to the north of Reims, at Lens, and elsewhere.

That the work of the railroad and the railroad man in war time is not all behind the lines of the battling armies, safe from shot and shell, and that this work does not merely duplicate peace transportation under war conditions, was distinctly shown during this advance. It was the final touch that cleared the railroad men of the reproach that they constituted the only class of strong men not serving under arms. It showed that many thousands of them were enduring all the danger and hardship of the men in the trenches, and that they in fact were soldiers, too.

Despite the incomparable need for railroad men in France and Germany to keep up the transportation facilities of the civil populations, and despite their tireless efforts to handle the huge movements of troops, arms and ammunition quickly and safely, and to whirl the wounded of the battles back to the hospitals, for many months there was a popular prejudice against the railroad man who had to go about this task wearing his train uniform rather than that of the soldier of the nation. This prejudice crept up in France last June in connection with the Dalbiez law, aimed at the cowards who sought to evade military service at the front, and for a time it seemed that this prejudice would result in crippling the railroad services by taking sorely needed men from their posts and mobilizing them as soldiers for the trenches.

Dating from the present conception of war as a task not altogether done in the very trenches or by the baring of the naked breast to projectiles, but rather as an industrial task having for its purpose the manufacture of munitions, in abundant quantity, the role of the railroad man has come to be understood by the civil population. In England there are 500 factories turning out war materials, working 12 hours a day, and in France there are 200 factories working 21 hours a day. And one-third of the men in these factories are skilled workmen who have been taken out of the trenches because of their technical training and put in a place where they can serve the nation best.

"Every man at the war job he can do best," is now the slogan. While the majority of the railroad men must necessarily be behind the lines, there are a large number at the front, not 400,000 of them in Germany and France as has been loosely stated; yet enough to do the immense railroad war work required.

The work at the front in which the railroad men have taken their proud share certainly surpasses in both immensity and quality all other colossal construction jobs which history, past or present, has regarded with wonder. Though not so lasting, and the more difficult because it changes daily, the mere digging of trenches and mines would seem to have surpassed in immensity the excavation work of the Panama Canal, 41½ miles long and with a channel hundreds of feet deep and wide. On the two sides of the 500-mile front between the North Sea and Switzerland no less than 2,000 miles of excavation has been made, counting communication trenches and the second and third lines of defense trenches. It has been estimated that more than 100,000,000 tons of earth have so far been shifted, a modest estimate when it is considered that the 6½ million coal miners of the world annually dig out a billion and a half tons of coal. Much of this earth and debris must be cleared away by trains.

At 600 tons a train load, if all of it had to be moved, more than 100,000 trains would be needed.

The mere citation of this trench work, which is but a part of the whole war job, involving the transport by train or motor van of heavy machinery, of cannon and cannon foundations, conveys a conception of how railroad men are helping at the front.

According to the *Zeitung des Vereins*, the total number of German railroad men engaged in the war service is 125,000 (or 22 per cent of the total), of whom 58,000 are on the firing lines and 67,000 engaged on war trains. When the head of the German state railways was asked if he could furnish more men at the front, he replied that he could do so only by crippling the service of the interior of the country, and at the risk of costly accidents.

In France some 37,000 railroad men are enrolled as soldiers and some 16,000 are detailed for campaign railroad work at the front. The latter form a body known as the *sections de campagne*. They are an arm of the engineering corps and take part in destroying enemy tracks and trains, in operating and laying new lines and in helping build new bridges. In times of peace there was a special railroad regiment, practised in hasty railroading, which was constantly on duty and operated the portion of the State Railway connecting Orleans and Chartres in every detail.

From this nucleus has grown the special railroad army now on duty at the front, at Compeigne, at Longpont, at Cumieres, at Fismes, everywhere operating army trains, building new lines, repairing track destroyed by bombs or clearing away trains wrecked by enemy cannon. Every railroad department is represented—engineers, train despatchers, even way bill clerks and bookkeepers. When men of this army are killed they are replaced by other men from some one of the ten sections of campaign railroaders or else by men taken from the regular commercial service. All of the men of this railroad army are engaged in active railroading. The work of guarding the tracks is left to the soldiers of the regular army at the front. Behind the lines, throughout France, where every foot of railroad track and every station is guarded by sentinels, day and night, this work is done by the reserve army composed of older men who, because of their age, are not sent to active trench fighting.

One of the big construction tasks in which this railroad army has been involved has been the laying and operation of connecting track just behind the front between the Eastern and Northern railroad lines. This was a task neglected before the war, and in order to get quick communication at all points of the front without doubling back to Paris, or even to the way stations between, many miles of new track were required. In the far north of France, where the English hold some 30 miles of the extreme end of the Allied front, the same situation forced the English into railroad building, and as early as last April 10,000 navvies were brought into France from England and put to work at building connecting lines along the front. Some of the English railroad work has extended back as far as Havre, the terminal port of the English army.

What the French army thinks of its railroad soldiers has been indicated by the numbers of them that have been decorated with the cross of the Legion of Honor or cited in the Order of the Day. Some of them fell too early to get either the cross or the *Medaille Militaire* that comes with such citation. One of these was M. Nigond, director of the Orleans system, who died almost at his desk November 2, 1914. The overwork that came with mobilization during the first two months of the war killed him.

Many of the men of the Southern Railway, serving at the front from the very beginning of the war, have been noticed. The Cross of Honor has been given to Charles Jufflet, operating manager, and to M. Vassal, station agent at Toulouse, and the military medal to Frederick Pailheres. The Director of the Railroads of the Army, in September, published a notice that the military medal had been given to the following members

of the Southern Railway's staff: Fireman Gassiot, "who during the bombardment of his station, refused to seek shelter and stayed on his engine to keep up steam despite the hail of bursting shell;" Charles Bibie, master workman, "who acting as switchman, during the bombardments of the 18th and 20th, did not leave his post, although shells of large calibre burst about him, covering him with earth, and to Louis de Peyralade, employee of the first class, who "serving as agent in a station which has been bombarded nearly every day, continued his service under fire, both night and day, undisturbed by his danger, and has given a splendid example of courage, coolness and attention to duty."

For such reasons as the above, just before the recent victory, General Joffre invited to his headquarters a delegation from the Union Nationale des Cheminots (National Union of Railway Men), and there complimented the railroad men through them for their patriotic valor, their calmness and perseverance, saying in part:

"With all Frenchmen united in the same firm determination to win, we will go to the end, and persevere to a last victory which will permit us to dictate peace."

THE PROSPECTS OF RAILWAY LEGISLATION

By W. L. STODDARD

WASHINGTON, D. C., October 26

In spite of the fact that the main attention of the Administration and of the country centers upon the program of preparedness, already announced in part, there are indications that Congress will seriously consider at least one measure of railroad legislation—the bill to regulate the issuance of railroad securities. This bill is an item of "unfinished business," left over from the Wilson trust program. It has long been advocated by the Interstate Commerce Commission, which will unquestionably renew its recommendation in its next annual report. It has the backing of many conservative and constructive thinkers in the railroad, financial and economic world. Lately the Brotherhoods of Locomotive Engineers and Firemen have issued statements endorsing this legislation on the ground that its enactment will guarantee to the roads a fair return on their actual investment, to the employees a wage commensurate with their service, and to the public "a square deal."

When the bill in question was brought before the House of Representatives on June 2, 1914, for debate and passage, Mr. Rayburn, of Texas, its nominal author, declared that it contained three provisions deemed necessary by a majority of the committee. The first of these was greater publicity in the financial transactions of railroad corporations; the second, making it illegal for railroad corporations to issue stocks and bonds "or other evidence of indebtedness" except for certain specified purposes to be approved in advance by the Interstate Commerce Commission; and the third, that within two years after the passage of the act, it should be illegal for one man to hold a Directorship or official position in more than one railroad, and for any official to "appropriate, pay or receive as salary or dividends any money resulting from the sale of stocks and bonds."

On June 5, 1914, after several days of desultory debating, the Rayburn bill passed in the form in which the Committee on Interstate and Foreign Commerce had prepared it. The vote was 325 in favor, 12 against, 2 answering "present," and 94 not voting. Going up to the Senate, the bill found its way to the committee on commerce, which reported it on July 23, cutting out, however, the interlocking directorate provision and making several amendments to the text, the nature of which it is not necessary to go into at this time. The session closed with the bill still on the Senate calendar. It was not revived at the winter session.

As Chairman Adamson, of the House committee, pointed out in his report on the bill, the investigations of the Railroad Securities Commission, appointed by President Taft, and headed by President Hadley, of Yale, were used as a basis for many

of the sections of the measure. Provision was made for the avoidance of friction or conflict of jurisdiction between the federal commission and the state authorities by requiring that notice of every application for approval of stock and bond issues should be given to the regulatory authority of the state concerned, so that the states might appear and be heard. "There is no doubt in our mind," said the report, "that that provision will rapidly lead up to a satisfactory working of the law and to absolute harmony and agreement between the two authorities." As to the interlocking directorate clause, the House committee declared:

"It has been represented to us that . . . railroad men are now no longer dishonest or incompetent, and that it is a matter of convenience for the same men to handle different enterprises without having to consult so many different people; but our observation is that there are good men enough in the world to fill every responsible position and then not have enough positions to go around, and we observe, in answer to the suggestion, that if the practice has ceased the provision in the law will not hurt anybody, for no man will be punished unless he is guilty."

It has already been intimated in newspaper despatches from Washington that the Rayburn bill will be reintroduced in December and pressed. This is to be expected, and does not necessarily mean that Congress will actually make any move in the matter. Everyone who is familiar with the present political machinery of the federal government knows that as Congress is now operated, the successful passage of legislation depends not upon the attitude of the membership of that body, but upon the desire and purpose of the President alone. Almost without exception, every important bill enacted by Congress during the last two years has been enacted because it was urged by the President; and, by the same token, practically no important bill was enacted during this period that failed to secure the President's support. The exceptions to this rule were measures such as the Seamen's bill, which had been for years before Congress, and which were supported by a large and powerful body of public opinion.

Railroad investors and officials, then, will await with interest any intimation from the White House of intention to recommend the Rayburn bill. No one close to the President at this time will give out any hint as to Mr. Wilson's attitude on this matter. The fact that he failed to secure its enactment when the trust program was before Congress over a year ago, would seem to indicate that the regulation of railroad securities was not a pressing subject in the executive's mind.

Of course, as has been indicated above, public sentiment may secure the passage of the railroad security bill, even without a sign of encouragement from the Administration. In view, however, of the great mass of appropriation bills which must be passed before the end of June, 1916, and in view, also, of the preoccupation of Congress with preparedness and the political campaign, the fate of any other legislation is not to be predicted with any confidence whatever.

A NOISY YARD ENGINE

The Toledo Terminal Railroad recently received the following expressive letter which we are permitted to reprint:

Is it absolutely necessary, in discharge of his duty day and night, that the engineer of your yard at the upper Terminal bridge should make it ding and dong and fizz and spit and clang and bang and buzz and hiss and bell and wail and pant and rant and yowl and howl and grate and grind and puff and bump and click and clank and chug and moan and hoot and toot and crash and grunt and gasp and groan and whistle and wheeze and squawk and blow and jar and perk and rasp and jingle and twang and clack and rumble and jangle and ring and clatter and yelp and croak and howl and hum and snarl and puff and growl and thump and boom and clash and jolt and jostle and shake and screech and snort and snarl and slam and shake and throb and crink and quiver and rumble and roar and rattle and yell and smoke and smell and shriek like hell?

Railroad Sessions of National Safety Congress

Enthusiastic Representatives from 35 Roads Report Instructive Experiences; Motion Pictures Becoming Popular

The National Safety Council held its annual congress at Philadelphia last week, and in connection therewith the railroad section, Marcus A. Dow (N. Y. C.), chairman, held well-attended and instructive sessions on Wednesday forenoon and afternoon and on Thursday morning. Nearly 100 railroad men were present, representing 35 roads; and in this number the New York Central Lines and the Pennsylvania Lines East of Pittsburgh are each counted as one. The New York Central sent 15 men, representing safety committees from all parts of the system, and the Pennsylvania, east of Pittsburgh, 14. The Lackawanna sent nine. Two men came from California and two from Canada.

The chairman, in his opening address, took occasion to emphasize the high degree of safety already attained by American railroads, quoting the statistics of 115 companies which during the fiscal year ending in 1914 had no passengers killed in train accidents. At the same time the harvest of death reaped among the trespassers, a field in which the railroads are helpless, continues large. Mr. Dow, called attention to the importance of the personnel as the most fruitful field in which safety-first work must be carried on. For many bodily injuries the victim himself is largely or wholly at fault and the problem is to make men think. A certain track repairer, seeing a shopman from an establishment near the road start to cross a deck bridge where he was in danger of being struck by a train, called the shopman to account, and very likely saved him from death or severe injury; that railroad man was engaged in true safety work. He is as much a hero as many who perform more spectacular services. Employees must be trained, and training implies a great amount of work on the part of safety committees and all who have a duty to see this work promoted.

The first discussion was on a paper by W. C. Wilson, (D. L. & W.) delivered before the general congress the day before. Mr. Wilson, in his paper, outlined what the railroads have been doing for safety during the past few years, and contrasted this with the inaction of public authorities. He cited a recent decision of the United States Circuit Court of Appeals in which the judge, at considerable length, pointed out the advantages which the driver of an automobile has, as compared with one driving horses, in avoiding danger at railroad crossings; he has better control of his machine than does any man over a horse, especially in circumstances where a horse may become frightened; and the courts should hold the automobile driver rigidly to account for reasonable care and precaution. Mr. Wilson alluded to the good work which has been done by some manufacturing establishments and said that the general public must be educated, in the same way, in knowledge of railroad conditions. The public really has a duty to co-operate with the railroads, not simply to wish them good luck in their tasks. To indulge in superficial talk about the need of abolishing grade crossings is a waste of energy, oftentimes. This problem is a big one, and such talk has about the same weight as to say that the way to stop a drought is to make it rain. The National Safety Council should be a powerful molder of public opinion.

THE TRESPASS EVIL

In the discussion of Mr. Wilson's paper, F. M. Metcalf, (Northern Pacific) told of a circular which he had issued to station agents to be distributed among school teachers, explaining the dangers of trespassing on tracks. This had been noticed and copied, in whole or in part, by local newspapers throughout the Northern Pacific lines, many notices of this kind filling a half column.

G. S. Locker (D. & I. R.) holds meetings for the enlightenment of the public, much of the time as often as once a month. These have been held in four important cities and in some

smaller places. He uses both the stereopticon and motion pictures. In each city he has made it a point to show pictures taken in that city; and in some cases children attending the exhibition saw themselves climbing on freight cars and doing other dangerous things. Some of these meetings have been held in the afternoon and with an attendance of more than a thousand children. A sentiment has been created in favor of the meetings by interviews with editors and with representative citizens.

G. C. Martin (Toronto, H. & B.) has been educating section foremen and crossing watchmen and also many employees of factories along the line. To accomplish results with this last class it is necessary to go personally to the manager of the establishment.

Mr. Dow, replying to questions, and to the suggestion that the education imparted to school children at meetings, however successful for the time being, will need to be repeated, said that the policy of his road was to keep up the agitation. A year ago, a man was employed to go to every important town on the line and carry on a little local campaign. In New York the law, if enforced, would be adequate; and this traveling agent of the road went to every local magistrate, also to local editors and made sure that they understood the situation. In both these classes many were found who were surprised at the records of casualties which to railroad men are so familiar. As a part of the campaign little notices giving a warning against trespassing were printed and distributed among manufacturers to be put by them in the pay envelopes of employees. Having disseminated information thoroughly, agents were sent out to make arrests; and from five to ten a day were made by each of these officers. The arrests were made first in the towns where the magistrates who had been interviewed were believed to be alive to the situation. A large number of convictions were secured and some fines imposed as high as \$25. Jail sentences varied from five days to three months.

E. F. McKenzie (Penn.): Why should the railroads have to drive off trespassers? Partly because, in many situations, the railroad right of way is the best path available; some of the roads adjacent to the tracks are mostly mud-holes. It is desirable to stir up the towns and counties to build better highways.

S. G. Watkins (B. & M.) had found very satisfactory results from getting school teachers to arouse the interest of pupils by asking them to write letters. In letters from pupils of all grades, from the high school down, a prominent expression is "I did not realize the danger." In the past year Mr. Watkins in his addresses to schools has reached the ears of 40,000 children, including hundreds of high school pupils. He secures the co-operation of the superintendent of schools, who goes around with the lecturer. Mr. Watkins has been a claim agent for twenty years and so has stories of real experience with which to illustrate his exhortations to the pupils. In his circulars, which he puts into each home, he keeps the legal end of the subject out of sight. There is no question about the attractiveness of this subject as it has been presented during the past few years; the problem is how to keep it up.

G. L. Wright (C., St. P., M. & O.): In Wisconsin there is a law requiring teachers to preach safety-first to the pupils 30 minutes a week. This has been found very beneficial. There is room for education of teachers, however; a certain principal of a large school, whose pupils were careless, was found to be ignorant of the law.

L. F. Shedd (Rock Island): Railroad employees (trainmen) neglect the duty of keeping trespassers off trains. They should be made to obey the rules.

AUTOMOBILE ACCIDENTS

The first paper before the railroad section was one on automobile accidents at grade crossings, by J. C. Rose, chief claim agent

of the Pennsylvania Railroad. Mr. Rose, briefly outlining what the railroads have done to secure safety at crossings, and noting the fact that the public has done nothing at all, declared that there must be legislation; and it must be national, not state. The education of school children is well enough in its place, but who can expect that this great task will continue to receive adequate attention? On a certain road in the Pennsylvania System the school propaganda has been carried out to some extent, but apparently this teaching has no more influence on the children than has the brief prayer at the opening of school. The magnitude of the problem, and the seriousness of its dangers are not appreciated. There are now in this country two million automobiles and speed regulations are not enforced adequately anywhere. Licenses are granted too freely and liquor drinkers get them without trouble. A person who uses any intoxicants whatever should never receive a license. Grade crossings cannot be abolished for years; on the Pennsylvania System alone there are 13,000 crossings and to abolish them would cost \$600,000,000. The only solution, therefore, is a drastic law; a federal law applying to all interstate railroads, requiring all persons approaching a grade crossing to stop, look and listen, not less than 10 or more than 40 feet before reaching the crossing. Punishment should be a fine of \$50, one-half to go to the informer.

After a brief discussion the meeting voted unanimously to endorse Mr. Rose's proposed law.

In the discussion on this paper G. C. Martin (T. H. & B.) spoke of the nuisance of automobilists running through gates, especially at night. His road has adopted a light, to be hung on gates, which shows red to the wayfarer. Red lights are also in use on the Lehigh Valley, the Southern Pacific and, to a limited extent, on the New York Central. At obscure crossings Mr. Martin would have a distant signal 100 ft. back from the track. The owner of an automobile, receiving a license, ought to be required to acknowledge in writing that he had read the conditions.

R. C. Richards (C. & N. W.) said that his road, sometime ago, had put up distant signals on the highway at many crossings, placing them from 100 ft. to 1,000 ft. from the tracks, according to conditions. He thought the National Safety Council might do much good by formulating a notice of warning for automobilists the council to use its endeavors and influence to have such notices sent out by the officers of the several states who issue the licenses for automobiles.

Mr. Rose called attention to the uncertain dependence to be placed on red lights. These lights are used so much to indicate places along the roadway, usually at one side, which are temporarily impassable, that drivers of automobiles become careless and do not treat the red light as a stop signal; they simply aim to run around it, and often without slackening speed. The Pennsylvania has put up distant signals for automobilists at some points in New Jersey. The railroads, however, have done their full duty, and more than their duty, in the matter of protecting crossings; there is something for the public to do.

F. V. Whiting (N. Y. C.) advocated more attention to the crossing watchman and to giving him adequate power and authority. All flags should be taken out of the watchman's hands. A disk is better. Disks are used on the Central of New Jersey. The New York Central has had some gates painted red; and proposes to make the red light standard for the night crossing light. Every large road should have an overseer of crossing attendants; this work is important enough to demand constant expert supervision.

PRIZES FOR COMMITTEEMEN

W. C. Wilson (D. L. & W.) gave a brief account of the action of his road in recognizing the best work of the committeemen by prizes. Last year, on each division, a watch charm was given to the committee which had made the most useful or the most numerous suggestions looking to better safety. On each division the division committee, by vote, selects that one of its members who is to receive the prize.

H. J. Bell (C. & N. W.): In four years our committees have received 21,000 recommendations and all but 678 have been adopted. The committee lets the men know that their suggestions are adopted. The North Western has a banner which is given to the division making the best record; and now, in addition to the banner, the members of the committee who have won it are allowed a week's vacation with pay.

Mr. Dow (N. Y. C.): From May, 1912, to the present time our committees have received about 20,000 recommendations. Of the faults pointed out by these recommendations about 89 per cent have been corrected, and of the balance a considerable number are still under consideration. It is important to acknowledge recommendations made by employees. On the New York Central members of safety-first committees are paid their time while attending meetings and also, when away from home, their expenses. Meetings are held usually every month.

C. H. Baltzell (St. L. & S. F.): On our road a prize for excellence in safety-first activities is given annually to the best division and the best shop. Our division has taken the prize three years in succession; and this was done by keeping up the interest by constantly bringing out new things. Mr. Baltzell told of his success in regulating boys who trespass his yards, with which the readers of the *Railway Age Gazette* are already familiar.

ELECTION OF OFFICERS

A brief discussion on Mr. Wilson's suggestion ended the morning session. At the afternoon session the meeting adopted a code of by-laws for the guidance of the railroad section of the National Council and elected officers for the ensuing year as follows: M. A. Dow, general safety agent, N. Y. C., chairman; J. M. Guild, superintendent of safety, Union Pacific, vice-chairman; H. J. Bell, safety inspector, C. & N. W., Chicago, secretary.

MAINTAINING INTEREST

The first paper in the afternoon was on how to create and maintain interest among the members of committees, by W. B. Spaulding (St. L. & S. F.). Mr. Spaulding outlined the most common criticisms of safety-first work. It has been charged that it is too one-sided; that the shortcomings of the railroad company are never mentioned. The method of choosing committeemen is often at fault and critics say that a committeeman always has to take the company's view of everything. When an employee makes a recommendation and hears nothing from it he feels neglected, and this leads to a silent unfriendly feeling, if nothing worse. The thing to do is to establish reciprocal and unwavering confidence between officers and the rank and file. The superintendent who acts as chairman of a committee should put aside all his ideas of authority. Where the superintendent does this the employees value membership on a committee. The employees should be leaders in this matter; the company should co-operate with them, not they with the company. Why should not each class of employees select its representative to serve on the committee?

HOW TO REACH FOREIGNERS

C. T. Banks, of the Erie, recently from the Northern Pacific, spoke informally on how to reach non-English speaking employees. One of the principal weaknesses is in not recognizing that many employees who do not speak English are, from a mental standpoint, not over 14 years old. With men of this kind, education in their work, which means education in safety, must be very elementary and very clear. Teaching a track laborer or a freight house man how to handle freight or materials without injuring himself must be done by example. Moreover, such teaching is a vehicle by which the foreman can make the laborer his friend, and this stimulates the man's pride in his work. There is danger that we may go too far in classing personal injuries as due to the negligence of the victim; often this negligence is a thing for which the boss, perhaps the trainmaster, is partly responsible; he has not done his best to educate the man.

A paper on this subject by Isaiah Hale (A. T. & S. F.) was read by chairman Dow, Mr. Hale being unable to be present. On the Sante Fe the foreigners are all Mexicans. Half of these are out of reach of the general office and Mr. Hale had made extensive trips throughout his territory to educate the men in safety, giving them ten-minute talks. He had an automobile fitted to run on the track and was able to reach practically every workman in the company's service. In most cases printed matter could not be used. A phonograph was used to spread the lectures to men who could not be otherwise reached, and this was used not only for direct instruction, but also for little talks on loyalty, which are believed to have been very profitable, both for employer and employee. The phonograph was also used to give musical entertainments, which the men warmly appreciated.

Following this paper there was a general discussion of the three addresses of Messrs. Spaulding, Banks and Hale.

Vincent Colelli: I am the instructor in Italian (and teacher of the English language for Italian employees) for the Pennsylvania Railroad. Beginning about three years ago I found that the men who were unable to speak English felt that they were substantially laid aside. I began by teaching them the English language. Contrary to the view expressed here today, I have to say that the foreigners in the service of American railroads are intellectual men. We have track laborers who have attended technical schools in Italy. The Pennsylvania has issued 13 pamphlets for the benefit of non-English speaking employees and will issue many more. These deal not only with the ordinary subjects embraced under the head of safety, but on how to use tools, how to save lives, etc. Over 3,000 Pennsylvania employees are now taking the correspondence course in English.

In dealing with foreigners it is important to get foremen who are not narrow-minded and who understand the importance of the humanities in dealing with workmen. We have safety-first meetings which are carried on in the Italian language, using also a lantern. Important permanent impressions are made. We listen carefully to all complaints.

T. H. Carroll (P. R. R.): The most important desideratum, especially in the work of the trackmen, is to make employees realize the hazard of their work. On the Pennsylvania the proportion of trackmen killed is no greater among the foreign born than among the native men. Too much confidence must not be placed in percentages. If business increases in 1916 it is not likely that the railroads will be able to continue the decided diminution in fatal and non-fatal injuries to persons which has been shown in the last year or two. Comparisons are of little value unless it is known what service the man was engaged in. In comparing percentages each occupation should be taken by itself. Our form for analysis contains 700 causes. A great majority of personal injuries may be classed as due to "misadventure"; that is, it is some little carelessness or thoughtlessness which even men classed as careful are liable to.

S. G. Watkins (B. & M), finding that foreign workmen on the track were struck by trains, because they did not understand the warning shouts of the foreman, issued a circular, printed in the Italian language, and there was a marked improvement. Mr. Watkins has used a lecture car, going to different points on the road. Besides lectures, men are invited to the car in the evening for conferences. These include the use of the stereopticon which not only shows safety-first pictures, but also, by way of variety, scenery and other interesting subjects. Conferences are held also at midnight to get to the night workers. At the small towns, the men are invited to bring their wives to the car. Sometimes an employee who is not much impressed by the lecture is brought to a realizing sense of the situation by a look from his wife sitting at his side. A drill has been adopted, something like a fire drill. The men are called upon, without notice, to step off the track, when no train is approaching.

E. F. McKenzie (P. R. R.): Mouth whistles are the proper thing to warn trackmen to get out of the way of trains. A shrill whistle should be used.

C. H. Blakemore (N. & W.): To get reliable figures of the

proportion of men injured or killed to the total number employed, we make comparisons, for each class, with the payroll.

Mr. Martin (T. H. & B.): We calculate percentages by taking the number of hours the men work, all the men in the class to which the casualties are to be charged.

Dr. R. I. Randolph (B. & O.): In all this discussion I notice little mention of discipline. It is a problem to get men to carry out the rules, for example the rule requiring workmen to wear goggles where there is danger of injury to eyes. Since January last there have been on the Baltimore & Ohio 200 injuries to eyes serious enough to be brought to the chief surgeon. It is important to get after the true reasons for neglect; for example, men will go without goggles from no other motive than vanity.

J. S. Rockwell (B. R. & P.) agreed that discipline should be more carefully attended to. The records of every injury should show whether or not the victim was himself careless. Strict discipline requires that a man shall be reprimanded or punished, even in the case of an injury to himself. There are cases, even, where a man should be discharged when he has injured himself. Speaking of foreigners, Mr. Rockwell said that his road had efficient Italian foremen.

Mr. Dow.—We make goggles compulsory in the shops.

THE NATIONAL SAFETY COUNCIL

R. C. Richards (C. & N. W.), who is a vice-president of the National Safety Council, spoke on the value of this national organization to the railroads. That people having common interests should cultivate each other's acquaintance for mutual benefit is a fundamental principle which has been frequently illustrated from the time of the Continental Congress, in Philadelphia, in 1776, to the present day. The railroads can learn from the other industries and in turn they can learn from the railroads. Mr. Wilson's paper before the general council on Tuesday will have far-reaching effects for good. With the backing of the council he will get a nation-wide hearing, whereas, if he had spoken only as a railroad man, he might have had from the daily papers only three-inch notices in obscure places.

MOTION PICTURES

C. H. Blakemore (N. & W.) read a brief paper on this subject. After trying all available methods he was satisfied that motion pictures constituted the one best means of securing the interest of employees. During the past five months he has been using a car equipped with a high-class machine, showing pictures as attractive as any of those displayed in the professional houses. Employees are entertained by a program that takes about one hour, of which one-third is occupied by lantern slides and 20 or 25 minutes by two reels of motion pictures. "Steve Hill's Awakening," is a forceful and comprehensive safety-first lecture. It has been shown to 8,000 employees during these five months and the effect is remarkable. There is no trouble in getting the men to attend; the difficulty is to keep them out so as to make room for others; and the most pleasing effect is on the older employees. It is important to have the "human interest" element. Unemotional pictures will not answer. Mr. Blakemore thought that one or another of the large producers of motion pictures would get up what the railroads want if enough roads would join to assure them of a reasonable price. Ten or fifteen roads, willing to pay \$300 each could get 2,000 ft. of films. That length is necessary for a satisfactory show.

C. T. Banks (Erie) has bought a motion picture machine, and intends to show "Steve Hill's Awakening." The Erie also has a machine for taking motion pictures.

M. A. Dow (N. Y. C.): The motion picture car on the New York Central has now been in use for about a year. Shopmen attend this exhibition on the company's time. About 75,000 employees have visited the car. It is the intention to produce another scenario.

AN EXPERIENCE MEETING

The second day of the meeting was given over to informal discussion. M. A. Dow (N. Y. C.), replying to a question as to

how best to awaken interest in committees, told of experiences on his road. After devoting attention pretty exclusively for a considerable time to physical conditions, it was decided to put more emphasis on the personnel; and he drew up a brief code of rules for the guidance of committees on all parts of the system. These rules were in substance as follows: (1) The superintendent to preside at all meetings. (2) If absent give the reason for the absence and have this go into the minutes of the meeting. (3) Detailed comparisons of the casualties on each division, and with the figures of other divisions, to be furnished by the general safety agent, and to be discussed at every meeting. (4) Meetings to discuss not only the tabular statements, but also the causes of selected typical cases, the reports of which are prepared by the general safety agent, and sent to all division committees, names of persons being omitted. (5) At each meeting, live topics, assigned by the general safety agent to be announced for discussion at the next following meeting. (6) Each of the 15 to 25 members of each committee requested to caution at least two employees in the matter of safety before the next meeting, and report the names of these employees and the subject on which they were cautioned. (7) A member who has no report to make must explain the reason; and must tell what safety work he has done, all to go into the minutes. (8) The committee must make a trip of inspection over the division at least once a year, sub-committees being appointed, on these trips, to attend to particular subjects. (9) In matters of importance members to send written reports to the superintendent at once, without waiting for the next regular meeting.

J. M. Guild (U. P.), referring to the omission of names from reports of accidents, said that when his road, a few years ago, began the investigation of train accidents in public, with outsiders on the investigating board, there was much discussion as to the possible harm of making public the names of employees at fault; but the fears were proved to have been groundless. On the other hand the legal department finds the public hearings a help. The officers of the road try to show the men that a square deal may be relied upon in all cases. The personal injury lawyers will get the information that they want, in spite of any amount of secrecy.

Mr. Dow said that the assignment of topics beforehand was one of the best moves that had been made on the New York Central. Division meetings now frequently sit all day, and longer, where formerly they sometimes were unable to occupy the time in a satisfactory manner. The safety-first committee should never ignore the foreman of any force of workmen. If he is a good leader, he is a great help; if he is a bad leader or is lukewarm on the subject of safety, good results cannot be secured. The general managers of the New York Central System sent out circulars to foremen, reminding them that any foreman, knowing of an unsafe practice, who should not make suitable efforts to stop that practice would be morally responsible for the results. This circular was approved by the legal department of the road. The wide-awake foreman is a safety committee in himself. One yardmaster on the New York Central established a sub-committee on safety; and his example has now been followed by many others.

E. F. McKenzie (P. R. R.): Why should we not more generally employ personal appeal? Let us adopt the methods of Billy Sunday. I have tried this with fellow employees on the booze question, with good results. This would be carrying out the Scriptural injunction to love your brother as yourself. As business picks up there will be many new men in the service, and only by personal efforts of the experienced can men be made to appreciate the dangers of the work.

T. H. Carroll (P. R. R.): How do your division superintendents feel on this subject? The superintendent is all important. All the good things on the division should originate in his office. Why should a safety committee have to take up matters which the superintendent ought to have attended to? It is important not to confuse the duties of the superintendent with those of the safety committee. On the Pennsylvania, inspectors

are going over the different divisions all the time; but safety committees cannot do the things that the superintendent ought to do.

H. J. Bell: On the Chicago & North Western we try to give the safety committee men the feeling that every employee is important. If a careless man is to be reprimanded or cautioned the letter is sent, not by the superintendent, but by the safety committee. We expressly agree that no one is to be disciplined for a first offense reported by a safety committee. The State Railway Commissioners, recently in convention, are to be commended for formulating a statute empowering station agents and section foremen to arrest trespassers, acting, in this matter, not as employees of the railroad but as deputy sheriffs. To further diminish trespassing by children, the North Western is getting out a postal card to be sent to parents.

E. R. Scoville (B. & O.): On the Baltimore & Ohio those members of safety committees who are not officers are rotated every three months, oftener than on many roads; this with a view to getting a large number of men interested. The dates of the meetings of the safety committee on the divisions are so arranged that members of the general safety committee can visit each division meeting. At the close of each committee meeting we post bulletins containing suggestions which have been made by employees, with the name of the employee. On the whole system, in the last fiscal year, the number of suggestions was 15,352 of which 93 per cent represented faults which were corrected. In the state of Ohio there is a specific statute relating to trespassing, and the road has a form letter which is sent to individuals, where occasion seems to demand, calling attention to the law and to the addressee's violation of it. This written notice does abate trespassing. Letters also are sent to owners of automobiles who disregard the flag signals given at crossings. In the company's shops a safety committee posts a bulletin each day, calling attention to matters of interest, good and bad. A foreman who has had three injuries in his department in one month due to the same cause is liable to have his name put on the bulletin; and this arouses him to activity.

THE VALUE OF MOTOR CARS*

By W. R. McKEEN

Consulting Engineer, Motor Cars, Union Pacific

A transcontinental railroad passenger department officer stated in my presence that his road did not receive any profit whatever from passenger train service until the earnings showed approximately one dollar per mile. A railroad director and financial representative stated that one road has 300 branches on which every passenger train operated loses money. While it is true that competent authorities are at times inconsistent in their expression of costs and profits of passenger train service, I think I am safe in saying that very few if any three-car passenger trains are operated at a profit, and branch line passenger trains and the passenger coaches on mixed trains are a source of financial loss every day, the whole year through. The heavy fixed expenses of passenger train operation are too high and too great to be offset by the limited and restricted passenger receipts; with mixed trains the situation is even worse.

At first thought, it seems that to place a passenger coach on the rear end of a freight train, thereby having the advantage of additional revenue to help offset the operating expense of the freight train, is good economy and indicates a thrifty management. As a matter of fact a mixed train as a rule is a source of trouble, and represents false economy with no visible benefits other than being, as it is, an expedient, and a poor one at that. A mixed train's schedule that suits the passengers as to leaving and arriving time, is as a rule disadvantageous to the freight and stock shippers; the passenger stops slow up the freight time, the freight stops make tedious delays to the passengers, the train crews run into overtime, the service becomes uncertain, unreliable

*From a paper read before the New York Railroad Club, October 15, 1915.

and is poor railroading at best, and never will be a source of profit and satisfaction.

The financial success and universal popularity of the trolley car is not entirely the result of its operating on the city streets, picking up passengers at street corners; on the most successful interurban electric systems the passengers are taken aboard at depots or central stations just the same as steam railroads take their passengers. The interurban cars stopping on city street corners is a detriment to electric car service, just the same as doing local work with 12 and 15 car steam through trains is bad railroad practice. The electric interurban cars with frequency of service, however, can be scheduled to suit the convenience of and please the public and in consequence they get the business. Thus I reach the subject, the gasoline motor car, a transportation unit which offers a means of earning profits on branch lines, where the present steam service loses money. It has a great value to railroads operating mixed trains; they can be divided, producing two services instead of one, it is true, but both on an acceptable as well as revenue earning basis. The motor car will stimulate increased passenger travel and a 50 to 100 per cent increase thereby is easily attained in six to twelve months, resulting in a handsome increase in passenger earnings and at the same time the freight train is scheduled to suit freight business, the cost of operation is reduced and the improved service always tends to better freight earnings.

The branch line passenger business responds most actively to motor car service. The motor car can make road crossing stops, pick up one or two passengers at a time, stop more often and maintain the same average speed as the steam train; the absence of cinders, smoke and jar are attractive features. Often on branch lines the public, having one passenger service a day, is much dissatisfied and demands two services per day. The single service loses money and the railroad cannot consider doubling or trebling its present losses by putting on double passenger train service; yet a disgruntled local public is not desirable. A motor car for the new or second service not only can operate at a profit, but frequently stimulates and increases the travel on the steam train. It is a constant complaint of motor cars that they are too small. Originally a 30-ft. car could handle the business, then a 55-ft. car was more than ample, next a 70-ft. car seating 105 people was thought to be more than ample. The motor car always increases and continues to stimulate travel. The 70-ft. car having stimulated and increased business beyond its capacity, we have recently inaugurated the gasoline double unit motor car service, the baggage, mail and express on the front or the power car and the passengers in the second car. However, where a 70-ft. car is loaded to capacity, I believe additional service is the economical and preferable practice—the additional service continues not only to stimulate travel, but the rate of increase is also stimulated.

While motor cars are more necessary to branch line service, they are also a source of much economy on main lines. One portion of a through line of a large railroad system was through a sparsely settled country and the fast through trains were doing the local work with the usual irregular arriving time and generally unsatisfactory service. A gasoline motor car service was inaugurated running about 40 minutes ahead of the through train; the express, mail, and passengers were collected from the small stations and deposited at the terminal where the through train picked them up. The motor car made reasonable profits and the local business increased about 60 per cent, but the improved time, the regularity of arriving at destination on time and the greater comfort and satisfaction to the through passenger service was of more real value than the increased profits. I have in mind one branch line operated for 30 years without any profit earning passenger business. There are now two motor car services daily with two coaches instead of one on the mixed train; besides the freight train is now scheduled to suit the freight and stock business and as a result the pleased freight shippers are a valuable asset, outside of the improved freight receipts. On another sixty-mile road where the passenger train

service showed a deficit since the road had been built, in thirty days after the gasoline motor car had been substituted for the steam train the passenger service showed a profit, the cost of operation had been cut over 60 per cent and the favorable showing has been maintained ever since, some eight years or so.

From annual reports I notice the average number of passengers per train was 33, 30, 31 and 34 for four successive years; in other words, one-third of a load; on another road with excellent local business the average for three and four car trains was 37 passengers; another road shows 40 passengers per train, including, however, ten and twelve car through trains. On most branch lines the averages will run down to 20 passengers and at times below. Manifestly, then it is uneconomic to operate a locomotive, three cars, full engine and train crew with all the inherent fixed expenses and only use them to one-third capacity; here is the explanation why a single unit motor car handling the same business can make money where the steam train loses.

Among the structural features of the gasoline motor car bodies the success of which is demonstrated by 10 years' practical service is the single steel center sill in place of the well established double center sill construction in wooden cars. A single steel center sill will develop all the strength necessary and therefore its simplicity, economy and desirability, backed by its successful operation in practice, shows the fallacy of using a two sill design where one will answer. The steel center sill in a motor car structure is three times as strong as two standard wooden draft sills. The gasoline motor cars were among the first all-steel passenger cars built, and notwithstanding their comparatively light weight have shown remarkable strength and safety characteristics. These cars are so constructed that the load is almost entirely carried by the sides of the car and not by the sills, and in ten years' experience I have never known one of them to sag; even after years of hard and fast service over the rough track of branch lines, the alignment of the side sills is as near as we can measure the same as when the car originally left the shop.

DISCUSSION

A. W. Jones, General Electric Company, gave some figures for motor car service which included one instance of an operating cost of 2.35 cents per train mile. This was for trains of one motor and one trailer car.

An example was given by another speaker of a 60-mile road which because of the high initial cost of motor cars found it advisable to purchase additional locomotive and passenger cars instead. He advocated a cheaper and lighter type of motor car which would be much easier on tracks than the present types and believed such a car could be built for \$1,800.

The Central New York Southern, which operates two McKeen cars on runs of about 40 miles each way, has found that the cars will run slightly over two miles per gallon of gasoline, while the maintenance costs average 3.1 cents per car mile. Stress was laid on the effect of the operator's training on the results obtained with motor cars; a man trained in steam service should not be expected to make the best job of running a motor car immediately as he is too used to the sounds and other characteristics of the steam locomotive. The Southern Pacific now has in service 42 motor cars and 9 trailers and obtains an average of 2.4 miles per gallon of gasoline.

LABELING EXPRESS AND FREIGHT PACKAGES IN ENGLAND.—The Railway Executive Committee has issued amended instructions, effective September 1, as to the labeling of parcels and goods. In order to meet the fears of traders that their competitors might know from the addresses on packages who their customers were, the companies have, in the case of a number of similar consignments to the same consignee, been content in the past to accept only a few labeled in each lot. With the depleted staff at their command, this has put an increased amount of work on the companies, and from September 1, when there are 10 or fewer packages, each must be labeled; where there are over 10 but less than 100, one in five and for over 100 one in 10.

General News Department

Jay A. Rossiter, office engineer of water pipe extension for the City of Chicago, Ill., has been appointed engineer of track elevation.

During one week recently the department having charge of lost and found articles at the Chicago & North Western passenger terminal, in Chicago, returned to owners 157 articles that had been left in suburban trains. Among the articles were 15 raincoats, 34 umbrellas, 3 traveling bags, 2 boxes of cigars and a purse.

Employees of the Missouri, Kansas & Texas have organized an athletic association, the purpose of which is to develop a closer relationship among the men as well as to promote athletics. The first annual field and track meet of the association will be held at Denison, Tex., on November 6, and employees from all branches of the service and from all districts of the road will participate. C. E. Schaff, president and receiver of the road, has given a cup, to be known as the "C. E. Schaff Trophy," which is to be contested for annually.

The American Association of Engineers is perfecting plans for a national convention to be held at Chicago on December 10 and 11. All engineering societies have been invited to send representatives. A national membership committee has been selected to push the organization of local chapters in various parts of the United States. The association maintains a service clearing house, engaged in putting the engineer in touch with the employer and the employer in touch with the men, without charge. The association has recently taken larger quarters at 29 South LaSalle street, Chicago.

The National Highways Protective Society, E. S. Cornell, secretary, New York City, has records showing that in the first nine months of the present year 142 automobiles killed persons in the streets of New York City, and that the drivers of these cars are today operating their vehicles unmolested and apparently having no fear of any legal action. This and other facts in this connection, printed in the New York Herald, are made the basis of a strong argument for more energetic action on the part of prosecuting officers. In the theatre and shopping districts of New York the street conditions are said to be absolutely intolerable. Of 170 persons killed in the streets by automobiles 68 were victims of trucks.

A southbound passenger train of the Missouri, Kansas & Texas was stopped by ten robbers near Onapa, Okla., on the morning of October 27, about 2 o'clock, and the express car robbed. They tied up the crew with ropes, placed a guard over the passengers and held the train two hours, going about their work with precision. They sent back a detachment which stopped a freight train coming up behind and placed the freight crew under guard to prevent interference. The robbers escaped into the woods and posses followed. Three safes proved impregnable and were abandoned. After five charges of nitroglycerine were exploded the fourth safe was opened. During this time probably a dozen shots were fired by the robbers.

The Boston papers continue each day to have news and discussions of the strike of freight house men in that city; but from the railroad standpoint the strike seems to have been settled. Large numbers of new men have been engaged and put at work, and the reports say that freight is moving nearly in a normal way. The strikers say that they are going to get longshoremen and other workmen to join them in sympathy, and the mayor of Boston writes to the railroads that the situation is threatening; also that the public will support the men in their demand for \$2.50 a day; but the activities of the mayor and of other city officers do not seem to have affected the final outcome.

Approximately 2,500 ft. of double-track snow sheds on the line of the Southern Pacific at Summit, Cal., where the railroad crosses the Sierras at an elevation of 7,018 ft., was burned out

on Sunday, October 17, by a fire which probably started from an explosion of a carboy of acid in a freight train on a siding. Fourteen loaded freight cars of this train, with a value estimated at \$100,000, were destroyed, with their contents. The company soon sent three fire fighting trains loaded with water to the scene of the fire, and the line was open to traffic by 8:30 in the evening. Only the heavy timber supports of the snow sheds were left standing, and snow has already begun to fall at that elevation. Material was immediately rushed to the place and the work of rebuilding was begun at once.

Cost of Running Jersey City Tractor

The results of the use of an electric automobile, running on the pavement, to move freight cars on tracks in the streets of Jersey City, were given in an article, by T. V. Buckwalter, in the *Railway Age Gazette* of October 22, page 737. The expenses for the driver (wages) during the past year have averaged \$71.65 a month, not \$7,165, as erroneously stated on page 739. The same error, the omission of a decimal point, is what is the matter with the other item, \$13,451, which appears in the same paragraph.

The Cost of Valuation

Charles A. Prouty, director of valuation of carriers' property for the Interstate Commerce Commission, is quoted as saying that he expects the task to be completed in four years from next January. "The engineering departments are now proceeding at a rate of 50,000 miles a year," he said. "We have about 1,500 men employed at an annual expense of about \$3,000,000; but the total bill for securing the information necessary to furnish a satisfactory basis upon which to predicate rates will not be more than the cost of one big dreadnought."

The Trial of the New Haven Directors

The trial of the criminal suit against the eleven New Haven directors under the anti-trust law was continued in the Federal Court at New York during the past week. Former President C. S. Mellen was the principal and practically the only witness on the stand during the week and his testimony as developed by letters and other evidence offered by the attorney general's special attorney, Frank M. Swacker, dealt only with the years prior to 1897. During this time the New Haven attempted to eliminate the New York & New England as a competitor.

Mr. Mellen on Thursday told how he became general manager of the New England in April, 1892, but how seven months later he was made second vice-president of the New Haven, because, as C. P. Clark, president of the New Haven, later said, he was "too much of a nuisance on the New England."

Mr. Mellen told how in his new position he helped to eliminate the competition of the New England. The New Haven refused at one time to pay advance charges on freight coming from the New England. The New Haven entered into agreements with a number of roads west of the Hudson River whereby it exclusively was to receive New England traffic from them. One of the New England's means of access to New York City was by the Wilson's Point route. The government in this connection brought up the Sound Lines agreement signed in 1881, which the New Haven accused the New England of breaking in 1891, when the latter attempted to establish a connection with New York via Wilson's Point and the Long Island Road. The New England was jointly interested with the Housatonic Road in this route, and the New England Terminal Company, which supplied an important part of the service. New Haven interests later bought control of the Housatonic line and an attempt was made to abolish the service of the Terminal Company almost entirely. The New England then tried to secure access to New York over the New York & Northern, which was about

this time acquired by the New York Central. Thereupon the New Haven tried to block the New England by the so-called tripartite agreement, which attempted among other things to hinder the New England's access to New York City over the Central. Negotiations were not entirely successful, but in May, 1895, the New Haven bought a controlling interest in the New England, following the latter's receivership.

Monday morning the proceedings were enlivened somewhat by the presence of John T. Johnson, the colored messenger in the president's office at New Haven under Presidents Hall, Clark and Mellen. Mr. Johnson was called upon to identify a large number of press copy letter books from the president's office.

On Tuesday Mr. Mellen was asked about certain friction arising between the New York Central and the New Haven, back in 1894, relative to a proposed readjustment of traffic relations. The New Haven, on Mr. Mellen's advice, tried to secure larger divisions and to effect changes in routing which would give it a longer haul, and it was partly because of this that the New York Central opened its terminals to the New England. The friction aroused the anger of the late J. P. Morgan, who was a director of both roads. Mr. Mellen, on hearing of this, went immediately to Mr. Morgan's office and explained the circumstances, whereupon Mr. Morgan exclaimed: "I never understood it before, Mr. Mellen; I have been misinformed. I have been used as a doormat. Good day!" The disputes were later covered by the so-called Corsair agreement.

Mr. Mellen was also on the stand on Wednesday, and discussed the secret methods followed by the New Haven in buying control of competing roads. The detail into which the government has thus far carried the case has not only been the subject of comment by counsel for the defence, but by Judge Hunt, who is conducting the trial. Mr. Lindabury, of the counsel for the defence, on Tuesday complained of the manner in which "ancient history" was being brought up and expressed the opinion that if things went on as in the first two weeks of the trial he expected to be in court until next July.

Chestnut Hill Electrification

The Pennsylvania Railroad has begun work between the Schuylkill river and North Philadelphia on the foundations for the posts which will be required for this portion of its line when electric propulsion is put in use. It is expected that the electrification work, which includes the branch to Chestnut Hill, 12 miles from the Broad street terminal, will be finished in the latter part of 1916. On the Chestnut Hill branch the elimination of grade crossings at Cheltenham avenue and Highland avenue, which is to be paid for jointly by the city of Philadelphia and the railroad company, will require about 12 months for completion, so that the introduction of electric traction will depend on the time when the grade crossing work is completed.

A Correction

On page 677 of the *Railway Age Gazette* of October 15 there was a map of the railroads in the hands of receivers. On this map the line from New Orleans, La., to Laurel, Miss., was shown as being in the hands of receivers. The New Orleans, Mobile & Chicago formerly had trackage rights over this line but it is owned by the New Orleans & Northeastern and the trackage right contract was canceled before the appointment of receivers for the New Orleans, Mobile & Chicago. The New Orleans & Northeastern is not, of course, in the hands of receivers, although the New Orleans, Mobile & Chicago is. The line from New Orleans to Laurel, therefore, should not have been shown as being in the hands of a receiver.

Highway Crossing Data

"The Partnership Interests of a Municipality and a Railroad, in the Matter of Eliminating Grade Crossings" is the title of a pamphlet which has been issued by Fairfax Harrison, president of the Southern Railway, apparently for circulation among the officers of cities and towns along the lines of that company's railways in the southern states; but it is of interest to students of this subject everywhere, being filled with facts concerning this problem gathered in several northern and central states and in a dozen prominent cities. This matter, showing how this difficult

subject has been dealt with under all sorts of conditions, is in the nature of a preface to a half-dozen pages giving details of the division of cost for improvements of this class in Atlanta, Birmingham, Chattanooga and other places on the Southern Railway's lines.

A New York View of the Mail Pay Question

The Merchants' Association of New York has made an investigation of the mail pay question, thorough and exhaustive, and finds that the railroads are being greatly underpaid; and the board of directors concludes that the plan embodied in the two measures now pending before Congress, the Bourne and Moon bills, would divert large quantities of merchandise from the freight traffic of the carriers.

The investigation was made by a committee of ten members, of which William Fellowes Morgan was chairman. After considering the report the directors adopted resolutions in part as follows:

"Whereas, It is shown by the analyses of the Interstate Commerce Commission

(a) That railroad revenues as a whole are insufficient and should be increased; and

(b) That the deficiency is mainly due to insufficient passenger service earnings; and

"Whereas, It is shown by the analyses of the Bourne committee that the earnings of the mail traffic branch of the passenger service are approximately 22½ per cent below the average earnings of the passenger service, which the Interstate Commerce Commission finds deficient as a whole; and

"Whereas, It is shown by the report of the Association's Committee on Postal Affairs that the average rate of compensation paid by the government to the railroads for mail carriage has been reduced approximately 50 per cent since 1902, and now produces little or no profit and possibly entails a loss; and

"Whereas, The space-rate proposed is equivalent in the case of fully loaded cars to a rate of 1¼ cents per ton-mile for freight carried for the government on passenger trains, while the same high-class freight, if carried for private shippers on freight trains, would pay from two to three times that rate per ton-mile.

"Resolved, That the public welfare requires that the country's transportation facilities be maintained in constantly efficient condition, and that we recommend

(a) Payment for the present, for weight, on the basis of the existing law, but with provision for annual instead of quadrennial weighings;

(b) Payment for apartment-car space, pro rata, upon the basis of payment now in effect for full postal cars;

(c) Payment for side and transfer services, or that the railroads be relieved of the performance of those services.

"Resolved, That no new and untried plan for determining railway mail pay should be adopted unless or until approved by the Interstate Commerce Commission, after thorough investigation, with especial reference to the effect of such plan upon the railroads' existing freight revenues, and the equity of rates proposed for the carriage of postal matter upon passenger trains in comparison with the rates charged for first class merchandise on freight trains; and we recommend that for not less than two years, all weighings and adjustments for determining railway mail pay be supervised by the Interstate Commerce Commission, which Commission shall obtain from the Post Office Department and the railroads reports covering all necessary information as to the service performed, and pending such report and recommendations by the Interstate Commerce Commission the existing law be continued, but with the modifications indicated by the preceding resolution.

"Resolved, That the plan of space-payment is excessively discriminatory in that it makes, for mail-freight carried on passenger trains, a rate only about one-third to one-half the rate paid for high-grade freight carried on freight trains, which condition will promote the diversion to the mails of large quantities of high-grade merchandise, on all of which the railroads will suffer a loss of two-thirds of their present freight revenues; and therefore that The Merchants' Association of New York oppose any and all bills for the readjustment of railway mail pay on the basis mainly of space or substantially as proposed by the Bourne and the Moon bills."

Western Society of Engineers

L. E. Johnson, president of the Norfolk & Western, will address the Western Society of Engineers at its meeting in Chicago on November 2, on "The Relations of the Railroads and the Public," giving a discussion of the railway situation, especially with reference to the policy of regulation, both as it is and as it ought to be.

Passenger Traffic Officers

A special meeting of the American Association of Passenger Traffic Officers was held at French Lick Springs, Ind., on Tuesday of this week, with about a hundred members present. A large docket of important subjects was discussed, including committee reports on a Universal Telegraph Code; Association Ticket Paper; Economical Distribution of Folders and Advertising Matter; An Additional Charge for Checking Baggage; Economy in the Operation of City Ticket Offices and Regulation of the Sale of Prepaid Ticket Orders.

Society of Railway Financial Officers

The annual meeting of the Society of Railway Financial Officers was held at Colorado Springs, Colo., on October 19, 20 and 21. President A. O. Wellman, assistant treasurer of the Atchison, Topeka & Santa Fe, presided. The meeting discussed committee reports on Uniform Form of Vouchers and Agents' Drafts, Semi-Annual Pay-Days, Railroad Collection Bureaus in Large Cities and Railway Clearing House. The subject of a railway clearing house was referred back to the committee for a further conference with a committee of the accounting officers' association during the year, the result of the conference of the joint committee to be referred back to the next annual meeting. Addresses were made by Senator Charles S. Thomas on "Some Features of the Federal Reserve Bank," Dr. William F. Slocum, president of Colorado College, and R. L. Holland, of Colorado Springs.

Officers for the ensuing year were elected as follows: President, T. H. B. McKnight, treasurer, Pennsylvania Lines, Pittsburgh, Pa.; first vice-president, H. E. Suckling, treasurer, Canadian Pacific, Montreal, Que.; second vice-president, D. K. Kellogg, treasurer, Richmond, Fredericksburg & Potomac, Richmond, Va.; secretary and treasurer, Carl Nyquist, assistant secretary, Chicago, Rock Island & Pacific, Chicago.

Railway Development Association

The Railway Development Association will hold its annual convention at the Hotel McAlpin, New York City, November 9, 10 and 11.

The program for Tuesday, November 9, includes an address on "General Railroad Business," by George A. Post, president of the Railway Business Association; on Immigration, by F. C. Howe, United States Commissioner of Immigration; Immigration Field Work, by John F. Fox, Immigration Agent of the Northern Pacific; Exports, by W. S. Kies, vice-president of the National City Bank, New York; Fruit Growing, by J. H. Hale; "What Made the Department Permanent," by W. W. Wood, General Industrial Agent of the Baltimore & Ohio; "Eliminating Competition by Locating Industries on Joint Tracks," by C. C. Dana, Industrial Commissioner of the Atchison, Topeka & Santa Fe.

On the second day there will be papers on Agriculture, by Professor Alva Agee, Dean of the New Jersey State College of Agriculture; Intensive Agriculture, by William H. Olin, Agricultural Commissioner of the Denver & Rio Grande; Co-operation of Railroads and Commercial Organizations, by R. C. O'Keefe, Secretary of the Buffalo Chamber of Commerce; Acquisition of Land for Locating Industries, by John C. Emig, Industrial Agent of the Cleveland, Cincinnati, Chicago & St. Louis; Horticulture and Agriculture in the South, by J. A. Hearne, Fruit and Vegetable Agent of the New Orleans & North-Eastern.

On Wednesday evening there will be a banquet, and the speakers will be Howard Elliott, President of the New York, New Haven & Hartford; Senator J. W. Weeks, of Massachusetts, and Ralph Peters, President of the Long Island Railroad.

On the third day the following addresses will be made: Do-

mestic and Foreign Immigration, by S. A. Hughes, General Immigration Agent of the St. Louis & San Francisco; Markets and Rural Organization, by C. C. White, of the United States Department of Agriculture; Industries, by W. W. Hartman, Industrial Agent of the Grand Rapids & Indiana; Harbor Development and Pier Extension, by Thomas O. McGill, Secretary of the Committee to Investigate Port Conditions in New York City.

The president of the Railway Development Association is J. C. Emig (C., C. & St. L.), Cincinnati, Ohio, and the secretary is H. O. Hartzell (B. & O.), Baltimore, Md.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, Chicago.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

TWO MONTHS OF FISCAL YEAR ENDING JUNE 30, 1916.

Name of Road.	Average mileage operated during period.	Operating revenues			Maintenance of		Operating expenses			Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.	
		Freight.	Passenger.	Total (inc. misc.)	Way and structures.	Equipment.	Traffic.	Transportation.	Miscellaneous.					General.	Total.
Staten Island Rapid Transit Co.	11	\$79,920	\$71,901	\$223,553	\$12,538	\$7,986	\$1,674	\$73,977	.....	\$5,038	\$101,213	\$122,340	\$112,340	\$8,871
San Antonio & Aransas Pass... {Pass. 724 {	724	383,680	191,572	624,699	128,323	118,025	12,902	281,866	.....	23,102	564,124	60,575	31,465	29,110
San Pedro, Los Angeles & Salt Lake....	1,132	994,979	844,786	2,041,655	178,716	252,975	63,701	530,174	61,587	33,875	1,121,028	920,627	102,595	817,947
Seaboard.....	3,123	2,119,702	768,484	3,204,226	406,719	494,860	122,726	1,140,882	15,253	115,607	2,296,047	908,178	184,495	722,452
Southern Pacific.....	7,022	6,614,689	2,995,076	10,523,527	1,401,516	1,733,161	317,406	3,387,061	54,437	318,015	7,354,120	3,169,408	456,560	433,662
Southern Railway & Seattle.....	6,932	11,006,981	7,732,624	20,830,099	2,083,116	2,656,755	396,391	5,908,415	446,327	438,542	11,906,550	8,923,549	831,091	8,098,374
Spokane, Portland & Seattle.....	556	424,659	384,982	829,740	91,293	70,197	18,198	187,169	8,820	23,961	203,715	493,367	106,800	386,519
Tennessee Central.....	294	174,536	72,773	226,089	55,865	31,546	10,768	92,297	.....	13,239	203,715	58,374	9,611	48,401
Terminal R. R. Ass'n of St. Louis....	35	.....	441	441	36,812	30,732	1,737	146,057	.....	7,976	223,335	218,373	54,672	163,558
Texas & New Orleans.....	468	454,860	177,065	687,358	97,745	158,089	15,260	238,596	14,686	20,722	544,876	142,482	36,670	105,176
Texas & Pacific.....	1,944	1,962,332	706,648	2,895,240	362,425	488,706	74,839	1,120,494	23,707	81,146	2,147,265	747,975	148,000	598,962
Toledo & Ohio Central.....	436	650,042	113,534	821,348	130,499	137,401	14,019	281,479	3,630	19,025	586,052	235,296	41,854	193,442
Toledo, Peoria & Western.....	248	110,317	80,894	202,644	36,003	55,732	4,359	80,157	.....	7,689	183,941	18,703	12,200	6,503
Toledo, St. Louis & Western.....	451	706,121	81,195	804,134	93,686	153,158	31,710	276,614	.....	16,254	571,422	269,612	36,942	232,670
Union & Delaware.....	129	90,654	134,010	260,921	27,963	24,445	4,800	92,419	106	5,374	155,107	105,813	7,000	98,815
Union Pacific.....	3,617	6,222,154	2,192,002	9,456,435	1,410,603	1,160,100	242,859	2,227,203	197,895	223,391	5,456,792	3,509,643	390,915	3,606,913
Union R. R. of Baltimore.....	9	204,420	39,979	247,799	33,399	33,399	.....	8,897	.....	4,390	46,686	201,113	11,611	189,502
Union R. R. of Pennsylvania.....	31	1,253,113	419,937	1,908,863	73,293	188,645	46,601	317,137	.....	5,983	585,272	463,164	14,501	448,663
Vandalia.....	910	.....	.....	.....	280,261	341,901	46,601	657,762	19,168	46,141	1,391,834	510,029	72,404	437,433
Vicksburg, Shreveport & Pacific.....	171	136,571	73,774	234,961	41,976	51,346	6,567	82,045	4,308	9,222	195,663	39,297	16,200	23,097
Virginia & Southwestern.....	240	260,119	29,854	298,928	49,720	67,509	4,332	81,182	.....	7,542	210,285	88,643	13,333	75,309
Virginian.....	504	1,040,051	83,286	1,194,054	140,765	195,458	10,432	231,233	25,062	28,763	622,428	571,626	41,500	530,120
Wabash.....	2,519	3,574,238	1,218,352	5,235,739	763,794	815,414	174,892	1,906,078	32,222	132,027	3,822,517	1,413,222	164,618	1,247,825
Washington Southern.....	36	89,805	79,181	221,275	25,953	25,953	2,830	75,773	2,407	6,282	138,516	82,759	7,080	75,672
West Jersey & Seashore.....	356	433,940	1,347,191	1,913,526	223,318	199,022	24,191	555,587	6,966	28,649	1,037,733	875,794	57,442	818,209
Western Maryland.....	664	1,459,197	207,083	1,739,851	210,477	284,572	44,066	551,152	11,766	37,767	1,137,360	601,491	54,000	547,491
Western Pacific.....	941	656,859	651,714	1,425,043	221,708	125,639	47,552	378,028	48,490	36,045	857,460	567,583	61,732	505,566
Western Ry. of Alabama.....	133	97,449	69,791	187,833	34,076	45,389	11,424	56,698	4,368	9,027	160,982	26,851	10,226	16,068
Wheeling & Lake Erie.....	512	1,006,646	129,371	1,229,598	199,973	186,002	18,185	367,880	2,778	26,857	801,674	427,924	67,666	360,250
Wazoo & Mississippi Valley.....	1,382	1,454,107	353,548	1,897,044	349,848	333,533	35,621	636,508	2,717	53,768	1,411,508	485,535	100,000	385,192

Traffic News

Offices are being established by the American Express Company in Manila and Hong Kong, which will also represent the traffic department of the Union Pacific System.

The Rutland Transit Company, operating freight steamers on the Great Lakes and to Ogdensburg, N. Y., has sold its last two vessels, the Rutland and the Ogdensburg. The purchaser is said to be the Pacific Alaska Navigation Company, of Seattle.

Train service was resumed on October 19 between Laredo and Mexico City. Temporarily, the train starts from New Laredo, just across the river from Laredo, Tex., but it is expected that within a short time the service will be extended to this side of the river.

Those railways which formerly maintained passenger or freight agencies in Mexico are considering arrangements for re-opening the offices. H. C. Dinkins, foreign freight agent of the International & Great Northern, is making a tour of Mexico, studying business conditions.

The Canadian Northern will begin running regular trains between Winnipeg and Toronto on November 1. Passenger trains will leave Winnipeg at 5:15 p. m. on Mondays, Wednesdays and Saturdays, arriving at Toronto at 2:45 p. m. on Wednesdays, Fridays and Mondays. Trains will leave Toronto at 10:45 p. m. Mondays, Wednesdays and Fridays.

"Baltimore Agricultural Transportation Club" is the name of an organization recently started in Baltimore for the purpose of promoting co-operation between the railroads and agricultural interests of all kinds, for the promotion of agriculture as related to traffic. Austin Gallagher, industrial commissioner of the Western Maryland, is president of the club.

The Northern Pacific has put in effect a low passenger rate for harvest hands of \$5 per capita for the round trip, from all points in Minnesota and from points in North Dakota east of and including Oakes and Valley City, as well as from Superior, Wis., to any point on its line in North Dakota, except that from St. Paul, Minneapolis, Duluth and Superior this rate will apply only for parties of five or more on one ticket.

The Canadian Express Company is now doing a large business in the transportation of fresh fish from the Pacific ocean to the eastern part of the country. An officer of the express company says that the average monthly receipts of fish at Prince Rupert, the western terminus of the Grand Trunk Pacific, amount to 1,723,000 lb., nearly all halibut. Most of the fish comes from Alaskan waters, nearly 1,000 miles from Prince Rupert. Monthly receipts at Seattle average 2,000,000 lb., and at Vancouver 1,099,000 lb.

A committee representing the Chicago Board of Trade and other shippers' organizations interested in traffic on the Great Lakes, appeared at the hearing before the Interstate Commerce Commission on October 23, on the application of the Lehigh Valley for a reconsideration of the commission's order requiring it to discontinue the operation of its boat lines on the lakes. The committee, which was appointed at a meeting at Chicago last week, appeared and asked the commission to postpone the effective date to give the shippers an opportunity for a further hearing. The petition filed by the Chicago Board of Trade, setting forth the fear of the shippers that the commission's order will practically destroy boat service on the Great Lakes, was reported in last week's issue.

The Department of Agriculture, Washington, has issued a bulletin, No. 315, giving results of a study of the cantaloupe industry. It is found that many receivers encourage the shipment of greater supplies than they can sell promptly. In August, 1914, melons from Texas were being sold in New York City in competition with those from New Jersey. At Chicago in one day melons were on the market from eight different states, including Delaware and California. Differences in the weather in different parts of the country, and the superiority of irrigated fields produce violent changes in the conditions affecting the competition between growers in the east and those

in the far west. In the study made by the department in 1914 statistics were gathered of 16,401 carloads of cantaloupes. In carload shipments California was the greatest producer, shipping 5,146 carloads.

The New England Industries Demurrage Committee held its annual meeting at Boston, October 20, with 31 members present. These representatives of shippers and receivers of freight express themselves well satisfied with the special arrangement in New England under which a demurrage commissioner, with an office at Boston, virtually arbitrates all demurrage disputes between the carriers and the shippers. A proposition to broaden the scope of the committee so as to have it deal with all sorts of traffic questions was voted down. It is estimated that demurrage charges in the six New England states amount to nearly a million dollars a year. The chairman of the executive committee of this body is W. A. Clark, president of the New England Coal Dealers' Association, Northampton, Mass.; vice-chairman, G. L. Graham, American Woolen Company, Boston; secretary, C. J. Hart, Old South Building, Boston; treasurer, C. H. Tiffany, New England Paper & Pulp Traffic Association, Boston. Other cities represented in the executive committee are Lynn, Holyoke, Worcester, Bridgeport, Lawrence, Providence, Bellows Falls, Berlin, N. H.; Plymouth, Mass., and New Britain, Conn.

Decrease in Loss and Damage Payments on the Santa Fe

At the recent semi-annual conference of the Atchison, Topeka & Santa Fe loss and damage committee figures were presented showing a still further reduction in payments for loss and damage to freight, in spite of an increase in the volume of freight as shown by the earnings, the payments for such claims amounting to .96 per cent of freight earnings as compared with 1.05 per cent the year before. The loss and damage payments by the Santa Fe in 1908, the year the campaign for reductions of loss and damage was started, were \$1,565,434, with freight earnings amounting to \$61,848,638, the payments being 2.53 per cent of the earnings. As a result of the campaign there has been a gradual decrease as shown below:

Year	Gross Freight Receipts	Payments for L. & D.	P.c. Fght. Receipts
1909.....	\$64,212,638	\$1,234,564	1.92
1910.....	71,194,055	1,141,014	1.60
1911.....	71,787,200	1,091,435	1.52
1912.....	71,529,574	939,676	1.31
1913.....	78,190,922	942,838	1.21
1914.....	73,638,388	772,300	1.05
1915.....	80,504,000	771,764	.96

Heavy Freight Movement

Serious congestion of freight is reported on all of the trunk lines centering in New York. The movement of export grain, and of many other articles for export, including war material, is very heavy; and, beginning with the delays occasioned early in the month by the strikes of laborers in New York City, the movement of all freight has been growing more and more difficult. The Central of New Jersey announced last week that it had been necessary to refuse all new shipments for a period of two weeks, but it was expected that most of the accumulated freight could be cleared out of the way by the middle of this week. The trunk lines have many miles of side tracks filled with delayed cars. The movement of grain from Lake Erie to the Atlantic Seaboard is the heaviest ever known. A competent observer in New York believes that there is now ready for export at New York harbor five times as much freight as the available vessels can take.

The vessels of the Southern Pacific and other lines have had to leave behind large quantities of freight at Galveston and New Orleans destined for New York and other Atlantic ports, these lines being crowded with freight because of the blockade of the Panama Canal.

The ship lines whose business is stopped or delayed by the closing of the canal are complaining loudly that the rates by the Panama Railroad across the isthmus are excessive. A flat rate of three dollars a ton has been announced by the Panama Railroad, which rate includes wharfage and cartage and the transfer charges on the docks. There were about 375,000 tons of freight in the vessels awaiting transit through the canal before any of them left to go by the longer routes. This is equal

to more than half the largest annual tonnage ever hauled by the Panama Railroad between the seaboard.

Texas Farmers' Attitude

[Statement by Henry N. Pope, President Texas Farmers' Union.]

"The weekly crash of railroad receiverships as they fall upon our courts forebodes the coming of government ownership, but if the people want government ownership, it should come through choice and not be thrust upon them by the financial failures of the railroads. The railroad problem in Texas is perhaps more acute than that of any other state in the Union. We lead all states in total railroad mileage and likewise we lead all states in receivership mileage, as 30 per cent of our mileage and 45 per cent of railroad investments are in the hands of receivers. We are more in need of additional mileage than any other state and construction is at a standstill.

"The public hearings before the Texas Railroad Commission so far indicate that almost every line of industry and almost every shipper who has appeared concede that the railroads are entitled to an increase in rates, but most of them want their own business exempt; yet the railroads cannot pay bills with moral support. Any shipper who wants his goods hauled for less than cost begs from his neighbors and asks of government a special privilege for which he gives nothing in return. Such conduct is feeble, vicious and un-American and unworthy of serious recognition by any tribunal of justice.

"The rate problem is too complicated for the layman to undertake to pass upon it in detail, and I have perhaps given the matter no more study than the average citizen and like all shippers have been opposed to increasing the rate on my own freight and had hoped an increase of any sort could be avoided; but it is time to meet the issue squarely and if an increase in rates is necessary to avoid honest receiverships and to provide sufficient revenue to maintain and improve railroad property wisely and honestly administered, then all shippers and all commodities should be willing to bear an equitable portion of the burden.

"The hearings have pretty well exploded the theory that 'the consumer pays the freight,' or at least that he feels every vibration in rates, for the consumer in some instances has invited an increase in rates and in no case has it been opposed by the consumer; but the dealer has kept a battery of attorneys and rate experts at Austin to battle against every suggestion of an increase. There have, no doubt, during the past quarter of a century, been many decreases made in freight rates that never reached the consumer and such rates ought first to be restored, as they are nothing more than legalized rebates to the shipper, and result in impoverishing the railroads without benefiting the people. The public gains nothing by a rate that confiscates the property of a railroad to increase the dividends of private corporations or that forces a railroad to make an unreasonable contribution toward building up a business, an industry or a city. Such conduct is immoral, for a business that must have its freight hauled for less than cost has no right to exist and a railroad should not be made to subsidize any line of industry. Such a procedure, when voluntarily engaged in by the railroads several years ago, was vigorously condemned by the courts and censured by public opinion, and ought not to be legalized now.

"Every effort should be made to give the railroads necessary relief by the equalization of rates and by making every pound of freight pay its own fare before taxing the products of the soil; and, likewise, all expenses should be reduced to the minimum. The Farmers' Union has always opposed the legislature burdening the railroads with unnecessary expenses and now is a good time to search the statute books for oppressive and extravagant laws which consume the revenues of the railroad and give the public inadequate returns, and for the inauguration of constructive legislation that protects and invites expansion of our transportation facilities."

RAILWAY EXTENSION IN AUSTRALIA.—A big scheme for extending the New South Wales government railways into Victoria and the Victoria government railways into New South Wales is in contemplation. The former government has consented to the appointment of a joint state commission to investigate the subject and formulate schemes, and reports say that the Victoria government is considering the question.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Rates on Fertilizer from New Orleans

Opinion by Commissioner Harlan.

The commission finds that the carriers have justified proposed increased rates on domestic fertilizer and fertilizer materials from New Orleans and other Louisiana points to Ohio river crossings and beyond. (36 I. C. C., 247.)

Complaint Dismissed

Nebraska State Railway Commission v. Chicago, Burlington & Quincy. Opinion by Commissioner Daniels.

The commission finds that the rates on cattle, hogs and sheep from stations in Nebraska on the Holdredge-Cheyenne branch of the Chicago, Burlington & Quincy to St. Joseph, Mo., are not unreasonable nor discriminatory. (36 I. C. C., 219.)

Rates on Soap to Texas Points

Pect Brothers Manufacturing Company v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Daniels.

The commission finds that the rates on soap from Kansas City to Texas points are not unreasonable nor discriminatory as compared with the rates from St. Louis or from Chicago or Cincinnati to the same or other destinations. Action on a fourth section application for authority to continue rates on soap and soap powder from Kansas City, Mo., to Beaumont, Houston and Galveston, Tex., lower than the rates to intermediate points is reserved because this matter is being taken up in connection with another case. (36 I. C. C., 208.)

Soap to Texas points. Opinion by Commissioner Daniels.

A proposed increase in commodity rates on soap from Kansas City, Mo., St. Louis, Mo., and points east of the Mississippi river to Beaumont, Houston, and Galveston, Tex., is found not justified, since a present discrimination against St. Louis from points beyond is increased thereby without the necessary fourth section relief. This denial of the proposed increase is, however, without prejudice to future action by the carriers. (36 I. C. C., 215.)

Rates on Pig Iron from Virginia Furnaces

Low Moor Iron Company et al. v. Chesapeake & Ohio et al. Opinion by Commissioner Daniels.

In the original report in this case, 30 I. C. C., 615, the rates on pig iron from Low Moor, Roanoke and Virginia furnaces on the Chesapeake & Ohio and Norfolk & Western to Baltimore, Philadelphia and New York, and points taking the same rates, were held unreasonable and new rates were prescribed not to exceed \$2.25 per gross ton to Baltimore, \$2.75 to Philadelphia, \$3 to New York and \$3.25 to Boston. The defendant carriers put in effect the rates prescribed as maxima to the cities specified, but not to related points. In a new order they are required to establish rates to these other points which will bear the same relationship to the rates prescribed above that was formerly in effect before the rates were changed. (36 I. C. C., 222.)

Rates on Scrap Iron to Galveston

Phoenix Iron & Steel Company v. Galveston, Houston & Henderson et al. Opinion by Commissioner Daniels.

Prior to September 1, 1911, the defendants absorbed the unloading charges at Galveston on all commodities exported through that port, with the exception of lumber, logs, staves and other articles taking the lumber rates, when from Texas, Louisiana, and California points, provided that the net revenue to them after the absorption was \$1.50 per net ton on traffic from all points except Houston, as to which point there was apparently no minimum net revenue required on carload shipments for export. On that date they refused to continue the absorption

of an unloading charge of 35 cents a net ton on scrap iron for export alleging that their rates on this commodity were too low to permit of absorption. The commission finds that the effective rates in question are reasonable and that the carriers are justified in refusing to absorb the unloading charges. (36 I. C. C., 175.)

Rates to the Teton Basin

Foster Lumber Company v. Clatskanie Transportation Company et al. Opinion by Commissioner Daniels.

In view of carriers' adjustment of rates subsequent to the filing of this complaint, and in view of their proffer of additional through routes with joint rates applicable thereto, rates from points in Oregon, Washington and Idaho to destinations on the Teton Basin branch of the Oregon Short Line are held not unreasonable.

The Teton Basin branch was opened for operation in 1912, and the defendants contend that in accordance with the general practice followed by them in connection with branch lines, the through rates were originally made by full combination upon the junction point, subject to reduction by substituting lower differentials for the locals as the development of traffic on the branch warranted, and that a readjustment of August 20, 1914, was made in pursuance of that practice. It is in evidence that the Teton Basin branch was costly to construct and that its volume of traffic, as also the complainant's lumber shipments thereon, are light. North of Ashton the line to the Yellowstone is operated only during the tourist season. (36 I. C. C., 190.)

Lumber Rates on the Gould Southwestern

E. P. Ladd Company v. Gould Southwestern et al. Opinion by Commissioner Daniels.

The rates on lumber from Furth, Ark., on the Gould Southwestern, 13 miles from Gould, Ark., its junction with the St. Louis, Iron Mountain & Southern, are 2 cents per 100 lb. higher than from Gould. The commission finds that these rates from Furth are unreasonable to the extent that they exceed the rates from Gould. The rate on hardwood from the latter point is blanketed in Arkansas from just north of Little Rock south to the Arkansas-Louisiana state line, and the rate on pine and cypress is similarly applied as a blanket rate from the Arkansas river south to the Gulf of Mexico and east to the Mississippi. Gould and Furth are near the northern boundary of these blanketed territories, and consequently nearer Cairo and other northern markets than most of the other stations within the groups. The complainants contended that the rates from Furth should not be higher than from points on many other short-line connections of the Iron Mountain like the Gould Southwestern in the same general territory as Furth, or higher than from main and branch line points in these groups on the Iron Mountain much farther distant from points of destination than Furth. Reparation awarded. (36 I. C. C., 179.)

Rates on Lumber from Michigan Points

Opinion by Commissioner McChord.

The Ann Arbor, the Grand Rapids & Indiana, the Grand Trunk, the Pere Marquette and the Michigan Central have proposed increases in the rates on lumber in carloads from producing points in Wisconsin and Michigan to points in the lower peninsula of Michigan and along the northern borders of Ohio, Indiana and Illinois. The rates on this traffic were increased following the decision in the *Five Per Cent Case*. On September 29, 1914, the Michigan Railroad Commission allowed the carriers to establish rates on lumber equal to 95 per cent of the sixth class mileage scale. When new rates in accordance with this order were put in effect it was found that the rates to certain intrastate points were higher than the interstate rates to border points in northern Ohio and Indiana. The Michigan Commission later modified its decision so as to permit only a five per cent increase in the intrastate rates, except that in order to eliminate discrimination alleged to exist against points in the western part of the state in favor of points in the eastern part, it provided that the rates to Detroit from all stations within a distance of 125 miles, thereof should be increased 1 cent net per 100 lb.

The interstate commission finds, therefore, that in order to

maintain the proper relationship in lumber rates between Detroit and Toledo the carriers may put in effect increased rates to Toledo but not to the other points in issue. (30 I. C. C., 184.)

Joint Rates from Canadian Points

Philip Carey Manufacturing Company et al. v. Grand Trunk Western et al. Opinion by Commissioner Clark.

Complaint is made that the rates on asbestos sand in carloads from Robertson, Thetford and Sherbrooke, Que., to Lockland and Rockdale are unreasonable.

The commission finds that the rates in question do not conform to the general adjustment of rates between the Canadian territory of origin and the group in which these destinations are located and that the rates on asbestos sand to Rockdale and Lockland are higher than from the same points of origin to Chicago and Milwaukee, while the rates on asbestos fiber from the same points of origin to Rockdale and Lockland are lower than from the same points of origin to Chicago and Milwaukee, the fiber being a lighter loading commodity and much more valuable than the sand. The rates attacked are therefore held to be discriminatory against complainants.

Following *International Paper Co. v. D. & H. Co.*, (33 I. C. C., 270), the commission cannot prescribe joint through rates from points in Canada to points in the United States, but it can control the rates which the lines in the United States charge for services rendered within the United States. Joint rates from and to points in Canada are a convenience to the public and the shippers and should be encouraged. It is therefore expected that the defendants will comply with the finding that the rates to Lockland and Rockdale are discriminatory to the extent that they exceed the rates to Chicago or Milwaukee by proper readjustment of the present joint through rates. If this is not done an order will be entered requiring the defendants that are subject to its jurisdiction to establish in lieu of the present rates joint or local rates from the ports of entry in the United States to Lockland and Rockdale which shall be no higher than those contemporaneously maintained to Chicago or Milwaukee. (36 I. C. C., 203.)

STATE COMMISSIONS

The railroad commissioners of South Dakota have notified the railways of the state that reports of accidents will be accepted on the forms prescribed by the Interstate Commerce Commission; though telegraphic reports must continue to be made of all accidents resulting in personal injury or death, this being required by statute. This adds one to the list of eight states, mentioned in the *Railway Age Gazette*, October 15, page 696, which accept the federal forms for monthly reports of accidents.

The New York State Public Service Commission, Second district, has prescribed a uniform blank for declaration of value by passengers having baggage checked, which form must be put in use by November 1, on all roads in the state where such a declaration is required. Where the value of a passenger's baggage is less than the limit of value for which the carrier makes no charge, the actual sum need not be named; the certificate simply says that it is less than \$100 (or, in the case of an intrastate movement, \$150).

The New York State Public Service Commission, Second district, following a hearing on the application of William B. Gray, of New Rochelle, for authority to operate "jitney buses" on six routes in New Rochelle, has approved four of the routes and has disapproved two. This refusal applies to routes which would run on the same streets with street cars, or closely parallel to them, thus introducing unnecessary competition. The opinion, by Commissioner Emmet, compliments the authorities of the city for imposing salutary regulations in granting the franchise for the operation of these omnibuses. It is required that each carriage shall seat from 10 to 17 persons, that they shall have pneumatic tires, shall be of the pay-as-you-enter type, and that trips must be made at least every 20 minutes from 6:30 a. m. to 1:30 a. m. Three per cent of the gross earnings is to be paid to the city, and the franchise expires in 10 years. A substantial bond will be required.

COURT NEWS

The Superior Court of Thurston county, Washington, has quashed the supersedeas writ previously issued against the order of the public service commission promulgated last August, requiring the railroads to discontinue the practice of requiring two full fare tickets as a requisite to engaging drawing room accommodation in sleeping cars, thus making the order effective immediately. It is understood that the railroads will continue their legal fight under a writ of review.

Judge Trieber, of the United States court at Little Rock, Ark., on October 20, on application of the Arkansas Railroad Commission, granted a continuance until April 1, 1917, on all the cases to enjoin the roads from charging three cents a mile passenger fare. The action was taken because the money appropriated by the legislature for rate litigation has been spent and the next general assembly does not meet until January, 1917. The state has therefore given up its fight for the time being.

Federal Judge Carpenter, at Chicago, on October 22, at the request of four brewing companies, issued a permanent injunction restraining the Chicago, Rock Island & Pacific from refusing to accept and deliver consignments of liquor to points in Iowa to agents of the consignees on the written order of the latter. It is provided in the order that the consignees must designate the drayman or other carrier who is to receive the liquor and that the shipment must be marked "for personal use and private consumption." An attorney representing the state of Iowa opposed the order on the ground that it would force the railroad to violate both the laws of the state and the Federal Webb-Kenyon law.

No Liability for Injuries to Trespassing Employee

The Supreme Court of Michigan holds that, where a railroad company posted a notice warning persons other than employees from using a bridge and trestle, it is not liable for the running down of one of its own section laborers using the bridge instead of a highway to go to work, though the engine which ran him down was not equipped with lights.—*Newell v. Detroit, G. H. & M.* (Mich.) 153 N. W. 1077.

Employer's Liability Act Held Not to Apply to Injuries on Ships Unconnected with Railroads

The New York Court of Appeals has affirmed the decision of the Appellate Division (152 N. Y. Supp. 1120) holding that the federal employer's liability act does not apply to a railroad which operates ships unconnected with the line, and in such case the state laws governing injuries to a servant apply though the ships are engaged in interstate commerce.—*Jensen v. Southern Pacific*, N. Y., 109 N. E. 600.

Rest, Food and Water Act—Connecting Carriers—Separate Penalties

A railroad unloaded a shipment of cattle, but reloaded them 3 hours later, and transported and delivered them to a connecting carrier more than 36 hours from the time of loading at the point of shipment, they not having been unloaded for 5 hours in the meantime. The connecting carrier, without unloading them, transported them to their destination. The federal district court, N. D. New York, holds that the initial and connecting carriers were guilty of separate violations of the act, and liable for separate penalties, though the time of confinement constituting the two violations overlapped.—*United States v. New York Central*, 221 Fed. 1000.

Assessments—Special Franchises

The New York Appellate Division holds that where land used by a railroad company for its tracks was acquired for a street, and the grade of the street was carried over the land and the company's tracks by a bridge, the railroad company, though it thereafter increased its trackage, had no special franchise subject to taxation, for a special franchise involves a grant from competent public authority, while in such case the railroad company retained the right to use the land for any purposes not inconsistent with its use as a street.—*People ex rel. New York Central v. Woodbury*, 153 N. Y. Supp. 537.

Railway Officers

Executive, Financial, Legal and Accounting

J. O. Talbott has been appointed assistant auditor of the Pere Marquette, with office at Detroit, Mich.

Thomas Y. Railey has been appointed assistant attorney for the Missouri Pacific-St. Louis, Iron Mountain & Southern, with headquarters at St. Louis, Mo., vice T. L. Philips, valuation attorney, resigned to engage in private practice.

Edward F. Kearney has been elected president, with office at St. Louis, and Winslow S. Pierce, chairman of the board of directors, with office at New York, of the newly organized Wabash Railway. Mr. Kearney was president and Mr. Pierce chairman of the board of the old company.

Operating

O. E. Smith has been appointed trainmaster of the Oregon Short Line, with headquarters at Salt Lake City, Utah.

N. Shaw, chief dispatcher of the Great Northern at White Fish, Mont., has been promoted to trainmaster, and W. A. Depew has been appointed chief dispatcher.

W. M. Jeffers, superintendent of the Nebraska division of the Union Pacific with headquarters at Omaha, Neb., has been appointed general superintendent with office at the same place. G. O. Brophy, superintendent of the Wyoming division with headquarters at Cheyenne, Wyo., has been appointed to succeed Mr. Jeffers as superintendent at Omaha. S. R. Toucey, assistant superintendent of the Colorado division, has been appointed superintendent of the Wyoming division, vice Mr. Brophy. Effective November 1.

Traffic

E. L. Bevington, secretary of the Transcontinental Passenger Association, with office at Chicago, has been appointed chairman of the association with headquarters at Chicago, succeeding the late James Charlton. Mr.

Bevington was born on February 22, 1866, at New Lenox, Ill. He was educated in high school, business college and under private instruction, and entered railway service in March, 1883, holding various positions in the passenger department of the Chicago & Alton until 1900. From 1900 to 1901 he was general manager of the Denver, Boulder & Northern, with office at Denver, Colo., and in 1901 he was appointed secretary of the Transcontinental Passenger Association at Chicago, which office he had held ever since. Since the death of Mr. Charlton



E. L. Bevington

in November, 1913, he has assumed the duties of both offices.

C. M. Rollings has been appointed district passenger agent of the Union Pacific, with headquarters at St. Louis, Mo.

D. H. Street, traveling freight agent of the Baltimore & Ohio at Baltimore, Md., has been promoted to commercial freight agent, with office at Akron, Ohio.

Elmer H. Wood, freight traffic manager of the Union Pacific with headquarters at Omaha, Neb., has retired and his office has been abolished. He has been placed on a pension.

Engineering and Rolling Stock

Irwin Ashton Seiders, who has been appointed superintendent of motive power and rolling equipment of the Philadelphia &

Reading, with headquarters at Reading, Pa., as has been announced in these columns, was born on October 23, 1864, at Tamaqua, Pa., and was educated in the public schools. He began railway work on January 18, 1882, as a laborer on the Philadelphia & Reading, and the same year became machinist helper. He later served as station hand and then as brakeman until September, 1888, when he was appointed locomotive fireman, and two years later became an engineman. In April, 1907, he was promoted to road foreman of engines, remaining in that position until December, 1914, when he was appointed fuel inspector, and now becomes superintendent of motive power and rolling equipment on the same road, as above noted. Mr. Seiders' entire railway service has been with the Philadelphia & Reading.

Clyde C. Elmes, whose appointment as assistant superintendent of motive power and rolling equipment of the Philadelphia &



C. C. Elmes

Reading with headquarters at Reading, Pa., has already been announced in these columns, began railway work in 1903, at the Olean, N. Y., shops of the Pennsylvania Railroad, and after learning the machinists' trade he attended Purdue University. He subsequently returned to the Pennsylvania Railroad at Olean, as gang foreman, and later was promoted to roundhouse foreman. He then served as superintendent at Auburn, N. Y., of the New York, Auburn & Lansing, now the Central New York Southern, leaving that company to go to the Kansas City Southern

as superintendent of construction of new shops at Shreveport, La., and on the completion of that work was transferred to Pittsburgh, Kan., as roundhouse foreman. He was subsequently promoted to chief inspector of new locomotives being built for that road. He was then consecutively general foreman at Ennis, Texas, of the Houston & Texas Central, acting master mechanic of the general shops of the Southern Pacific at Houston and master mechanic of the same shops with the duties of master car builder until his appointment as assistant division superintendent of the Texas & New Orleans. He then went to the Philadelphia & Reading and served consecutively as motive power inspector, road foreman of engines and as assistant engineer of motive power until his recent appointment as assistant superintendent of motive power and rolling equipment of the same road, as above noted.

R. M. Kincaid, valuation engineer of maintenance of equipment of the Chicago & Eastern Illinois, has been appointed master mechanic of the Illinois and St. Louis divisions, with office at Villa Grove, Ill., vice F. Studer, resigned.

Hugh Sowa, roadmaster of the Marcus division of the Great Northern, has been transferred to the Superior and Messaba divisions, with headquarters at Superior, Wis. Thomas Beighton has been appointed to succeed Mr. Sowa with headquarters at Marcus, Wash.

OBITUARY

Walter E. Downing, general eastern agent of the Illinois Central, at New York, died in that city on October 25, at the age of 53.

Richard Fenby, formerly auditor of the Texas & Pacific, died at Dallas, Tex., on October 18, aged 70 years. Mr. Fenby retired from active service in 1912.

Lynde A. Catlin, who was secretary of the Illinois Central, previous to 1884, died suddenly on October 23, at his home in South Woodstock, Conn., at the age of 82.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE CHESAPEAKE & OHIO has ordered 10 Mallet type locomotives from the American Locomotive Company.

THE MINNEAPOLIS & ST. LOUIS has ordered 5 Mikado type locomotives from the American Locomotive Company.

THE PENNSYLVANIA has ordered 75 Mikado (L-1-s) type locomotives from the Baldwin Locomotive Works.

THE ATCHISON, TOPEKA & SANTA FE has ordered 30 Mikado type locomotives from the Baldwin Locomotive Works.

THE ERIE has authorized the Baldwin Locomotive Works to proceed with the construction of 2 Centipede type locomotives.

THE PHILADELPHIA & READING has ordered 10 Mikado type locomotives from the Baldwin Locomotive Works in addition to the order for 20 Mikado type locomotives reported in the *Railway Age Gazette* of October 1.

THE TOLEDO TERMINAL has ordered one Consolidation type locomotive from the American Locomotive Company. This locomotive will have 22 by 28 in. cylinders, 51-in. driving wheels and a total weight in working order of 199,000 lb.

THE MAINE CENTRAL has ordered 2 six-wheel switching locomotives from the American Locomotive Company. These locomotives will have 21 by 28 in. cylinders, 51-in. driving wheels and a total weight in working order of 166,000 lbs.

THE CINCINNATI, INDIANAPOLIS & WESTERN has ordered 42 locomotives from the Lima Locomotive Corporation. In the item relative to the identity of this company which appeared in last week's issue, page 776, it was incorrectly stated that the Cincinnati, Indianapolis & Western was now being operated independently of the Cincinnati, Hamilton & Dayton. The general manager of the latter company has since advised that the owners of the C., I. & W. have not as yet taken over the operation of that property. It is still being operated by the C., H. & D., but it is expected that the new owners will take over the property in the near future, about December 1.

CAR BUILDING

THE CHESAPEAKE & OHIO is inquiring for 1,000 70-ton coal cars.

THE BINGHAM & GARFIELD is inquiring for prices on 25 gondola cars.

THE CHICAGO, ROCK ISLAND & PACIFIC is inquiring for 500 center constructions.

THE NEW YORK, CHICAGO & ST. LOUIS will repair a large number of freight cars.

THE ANACONDA COPPER MINING COMPANY has ordered 14 dump cars from the Pullman Company.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered 2 dining cars from the Pullman Company.

THE DELAWARE, LACKAWANNA & WESTERN has issued inquiries for 500 50-ton steel hopper cars.

THE MISSOURI, KANSAS & TEXAS has ordered 50 steel underframes from the St. Louis Car Company.

THE ATLANTIC COAST LINE has ordered 200 flat cars from the American Car & Foundry Company.

THE GADSDEN CAR COMPANY is reported to have ordered 1,000 underframes from the American Car & Foundry Company.

THE PHILADELPHIA & READING is said to have ordered an additional 500 hopper cars from the Standard Steel Car Company.

THE LYON CYPRESS LUMBER COMPANY, Garyville, La., has ordered 75 50-ft. logging cars from the Bettendorf Company.

THE ERIE is said to have ordered 200 gondola cars from the Standard Steel Car Company. This item has not been confirmed.

THE CINCINNATI, NEW ORLEANS & TEXAS PACIFIC has ordered 1,000 center constructions from the American Car & Foundry Company.

THE BALTIMORE & OHIO is reported to have ordered 1000 hopper cars from the Cambria Steel Company. This item has not been confirmed.

THE MISSOURI PACIFIC is reported to have ordered 500 box cars from the American Car & Foundry Company. This item has not been confirmed.

THE NORFOLK & WESTERN, reported in the *Railway Age Gazette* of last week as being in the market for 1,000 gondola cars, will build these cars at its own shops.

THE LOUISVILLE & NASHVILLE is reported to have ordered 1000 steel underframe box cars from the Mount Vernon Car Manufacturing Company. This item has not been confirmed.

THE WESTERN MARYLAND was reported in an unconfirmed item in the *Railway Age Gazette* of October 22 as having ordered 2,000 hopper cars from the Pullman Company. This item has since been confirmed.

THE PENNSYLVANIA RAILROAD has authorized its Altoona shops to proceed with the construction of 100 all-steel caboose cars. It is rumored that this company is contemplating the purchase of possibly 25,000 freight cars.

THE CINCINNATI, HAMILTON & DAYTON has ordered 500 steel underframes from the Barney & Smith Car Company. The latter company will use the underframes to rebuild 500 box cars. It also has a contract to rebuild 300 gondolas.

THE RUSSIAN GOVERNMENT.—The Wall Street Journal published the following item in its morning edition of October 27: "Pittsburgh.—The Pressed Steel Car Co., having completed an order for 7,500 steel freight cars for Russia on Monday closed a contract for an additional 8,500."

THE NEW YORK CENTRAL has ordered 1,000 55-ton composite gondola cars from the Standard Steel Car Company for the Pittsburgh & Lake Erie, 2,000 box cars from the Haskell & Barker Car Company, 1,000 automobile cars from the Pullman Company for the Michigan Central and 1,500 steel box cars from the American Car & Foundry Company. It is also reported that 5,500 more cars (in addition to the 1,000 noted above) have been ordered from the Standard Steel Car Company, but this last item has not been confirmed. All these orders are in addition to orders previously reported.

IRON AND STEEL

THE SOUTHERN has ordered 2,300 tons of bridge material from the Virginia Bridge & Iron Works.

THE MAINE CENTRAL has ordered 2,000 tons of bridge material from the American Bridge Company.

THE DELAWARE & HUDSON has ordered 200 tons of bridge material from the American Bridge Company.

THE CENTRAL OF GEORGIA has ordered 5,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

THE ATCHISON, TOPEKA & SANTA FE has ordered 10,000 to 11,000 tons of 90-lb. rails from the Illinois Steel Company.

THE DELAWARE, LACKAWANNA & WESTERN has ordered 4,000 tons of fabricating material from the American Bridge Company.

THE GREAT NORTHERN has ordered 3,000 tons of steel from the American Bridge Company for plate girder spans and viaduct work.

THE NORFOLK & WESTERN has ordered 4,000 tons of rails from the Pennsylvania Steel Company, and 1,000 tons from the Cambria Steel Company.

THE MISSOURI, KANSAS & TEXAS received the approval of the federal district court of Dallas, Tex., on October 22, for the purchase of 15,000 tons of rails for replacement and improvement work in Texas.

THE ILLINOIS CENTRAL has ordered 5,000 tons of rails from the Illinois Steel Company in addition to the 15,000 reported in our issue of last week. It has also ordered 15,000 tons from the Tennessee Coal, Iron & Railroad Company.

Supply Trade News

J. R. McAllister has been elected a director of the Electric Storage Battery Company, Philadelphia, Pa., succeeding Rudolph Ellis, deceased.

The Sprague Electric Works of the General Electric Company has opened a sales office in the Provident Bank building, Cincinnati, Ohio, in charge of Frank H. Hill as manager.

The directors of the United States Steel Corporation at a meeting held in New York on October 26 declared the regular quarterly dividend of $1\frac{3}{4}$ per cent on the preferred stock, but took no action relative to a dividend on the common stock.

Reports are current that the Baldwin Locomotive Works will sell to the Midvale Steel & Ordnance Company the buildings and land at Eddystone, Pa., now under lease to the Remington Arms Company, which was recently acquired by the Midvale interests.

Stanley H. Smith has been appointed district sales manager of the Pennsylvania and Maryland Steel Companies at Chicago, to succeed Robert E. Belknap, transferred to New York City.



S. H. Smith

Mr. Smith was born at Toronto, Ont., on August 4, 1885. He entered the service of the Pennsylvania Steel Company in February, 1904, as a shop apprentice. After spending two and one-half years in various mills of the company, he served as an outside inspector for the frog and switch department. Later he joined the sales force of the company at Steelton, Pa., and from there was transferred to Cleveland, Ohio, where he represented the Pennsylvania and Maryland Steel Companies for two and one-half years. Next he took a position in Chicago, where he became first assistant to

Robert E. Belknap, recently transferred to New York.

The Industrial Works has opened an office in the Widener building, Philadelphia, Pa. Complete data and information can be obtained there regarding the company's line of locomotive, wrecking and freight handling cranes, pile drivers and grab buckets.

The Westinghouse Electric and Manufacturing Company has taken an additional order for shells for the British government. The order will total about \$12,000,000 and the work will consist of machining shells. This order is in connection with the one recently taken by the American Steel Foundries.

The Locomotive Stoker Company, New York, has received orders for Street stokers for the 10 new Mikado type locomotives recently ordered by the Lehigh Valley of the Baldwin Locomotive Works. Street stokers are also being applied to 30 Mikado type locomotives now in service on this road.

The Illinois Central has let contracts to the Railroad Water & Coal Handling Company, Chicago, for a complete water station at Gravel Switch, Ky., including a double-unit oil-engine pumping plant with pipeline one mile long and a 100,000-gal. steel tank. It has also let a contract to the same company for a double-unit oil engine with centrifugal pump and a 100,000-gal. steel tank at Rockford, Ill.

Negotiations for the transfer of a controlling interest in the Pennsylvania Steel Company from the Pennsylvania Railroad interests to the Bethlehem Steel Corporation, which were reported last week as having been practically completed, have since

been checked. Henry C. Frick, who holds an option on the railroad's holdings in Pennsylvania Steel, is understood to have held up the transaction. The situation is complicated further by negotiations which are under way for a possible merger of the Pennsylvania and Cambria Steel companies.

A. E. Ostrander has been appointed mechanical engineer of the American Car & Foundry Company and is succeeded as assistant mechanical engineer by H. C. Lunger, who was formerly chief estimator. W. H. Selden, formerly assistant chief estimator, succeeds Mr. Lunger. Mr. Ostrander, who succeeds John McE. Ames, who recently resigned as mechanical engineer to go into other business, began railway service on the New York, New Haven & Hartford, serving in several different capacities in various departments on that road. Later he was employed in the engineering office of Cornelius Vanderbilt, leaving there to accept a position with the Standard Steel Car Company. He entered the service of the American Car & Foundry Company in 1903 and has been with that company continuously since that time.

Canadian Car & Foundry Company

President Nathaniel Curry of the Canadian Car & Foundry Company has sent the following circular letter to all stockholders in regard to inquiries concerning the company's business in war munitions:

"It is the desire of the board that the stockholders shall have as clear a view of the situation as it is possible to give them, both regarding amount of war orders and the progress which has been taking place in the manufacture of the same, although for obvious reasons it is not considered wise to publish much detail regarding the orders received. The company's railway equipment business is less than in former years. Several of the plants, as well as those of the Canadian Steel Foundries, Ltd., have been equipped for the manufacture of parts of shells, the production of which is well under way. The plants are working 24 hours a day, and production is constantly increasing in a satisfactory manner. A large portion of this work is for the British government, on which substantial deliveries have already been made.

"Several months ago two contracts were made to supply the Russian government with a large number of complete shrapnel and high explosive shells, and recently a third order has been obtained, subject to the negotiation of minor details in connection with same. The transaction of this business has involved the negotiation of large contracts for parts of shells between this company and manufacturers in the United States, as well as Canada, greatly increasing the magnitude of the operations of this company. This work has now progressed to a point where the first shipments are about to be made, and from results obtained the management feels that they can make fairly reliable estimates both as to costs and net earnings.

"Your management knows that there is a reasonable profit in all the company's business, the amount of which business during the current fiscal year to September 30, 1916, should be in excess of \$150,000,000, as compared with about \$27,000,000 in the best previous year in the history of the company. While the directors do not feel at this time that they should make any definite announcement as to the disposition of the surplus earnings which will accrue from this business, they feel that the shareholder may look forward with confidence to an early resumption of dividends."

TRADE PUBLICATIONS

ROOFING MATERIAL.—More Light on Barrett Specification Roofs is the title of an attractive folder which has recently been issued by the Barrett Manufacturing Company, New York. The folder bears an appropriate title, for it contains a number of views of the plant of the National Lamp Works of the General Electric Company at Nela Park, near Cleveland, Ohio. Barrett roofs were used on the roofs of these buildings.

LOCOMOTIVE CRANES.—The Browning Company, Cleveland, Ohio, has recently issued two rather unusual folders relative to the use of the company's cranes in railway service. One is entitled, "How to be reasonable about handling scrap iron and other materials," and the other bears the name "Railroad construction with locomotive cranes." Each folder contains four illustrations showing Browning cranes at work.

Railway Construction

ALABAMA & MISSISSIPPI.—According to press reports, work is now under way on an extension of the Pascagoula-Moss Point Northern, which now operates a 43-mile line from Pascagoula, Miss., north to Evanston. The extension is under construction from Lucedale, north to a connection with the Alabama & Mississippi, and there only remains about seven miles yet to be built to complete the connection between these two roads.

CENTRAL POWER COMPANY, OF CHATTANOOGA.—Incorporated in Tennessee with \$50,000 capital, it is said, to build an interurban railway from Cleveland, Tenn., west to Chattanooga, about 25 miles. The incorporators include G. B. Adams, J. L. Foust and M. N. Whittaker.

CINCINNATI, HAMILTON & DAYTON.—This road will begin at once to lay seven miles of double track from South Dayton, Ohio, to Miamisburg, at a probable cost of \$175,000.

DALLAS NORTHWESTERN TRACTION.—A franchise for interurban trackage rights in Dallas, Tex., has just been granted to the Dallas Northwestern Traction and the Dallas Southwestern Traction, two corporations of the same ownership. Construction work on 20 miles of the proposed lines must be begun within six months and must be completed within 14 months. The Dallas Northwestern Traction plans to build from Dallas to Denton, about 30 miles, and the Dallas Southwestern Traction has arrangements well advanced for building from Dallas southwest via Cleburne and Glen Rosa to Stephenville, about 80 miles. E. P. Turner is president of both companies.

DALLAS SOUTHWESTERN.—See Dallas Northwestern.

DETROIT, PONTIAC & OWOSSO (ELECTRIC).—At a recent election residents of Pontiac, Mich., approved the 30-year franchise asked for by this company. The Michigan Railroad Commission had already authorized an issue of \$3,300,000 of bonds to provide for the construction of the projected electric line between Detroit and Owosso. The company was incorporated in Michigan last year with \$50,000 capital to build from Detroit, Mich., northwest through Pontiac, Drayton Plains, Waterford, Clarkston, Davisburg and Holly to Owosso. The incorporators include George H. Lau, R. G. St. John and G. W. Eyster, all of Detroit.

GRAHAM COUNTY RAILROAD.—According to press reports, Cheoah and Yellow Creek townships of Graham county have voted \$50,000 of bonds in aid of this proposed line. Surveys were started in 1911 for a line from Topton, N. C., north via Robbinsville and along the Cheoah river for 43 miles. E. Philbrick, chief engineer, Andrews, N. C.

LOUISBURG & ROCKY MOUNT.—See North Carolina Roads.

MARYLAND-WEST VIRGINIA ROADS ELECTRIC.—The right-of-way is being secured, it is said, for an electric line to be built from Hancock, Md., south to Berkeley Springs, W. Va., about 10 miles. L. F. Johnson, Baltimore, is said to be interested.

MIDLAND & NORTHWESTERN.—This railroad is projected from Midland, Tex., northwest through Andrews county to Seminole in Gaines county, a distance of about 65 miles. Approximately 5,000 cu. yd. of material will be handled per mile in grading the road. The maximum grade will be 1 per cent and the maximum curve, from one to two degrees. The contract for the grading has been let to J. A. Hunter, Strawn, Tex., and it is hoped that track laying can be begun by May 1, 1916. Fifty-six-pound relay rails will be used, and rolling stock will be obtained from the Texas & Pacific. The new company expects to obtain a charter before November 15. T. J. O'Donnell, president, Midland, Tex.; G. W. Thaxter, chief engineer. (Oct. 8, p. 670.)

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has obtained the necessary number of property owners' consents to legalize Route No. 61, the Sixtieth street, East river route. This line is to be a two-track underground railroad, from Fifty-ninth street west of Fifth avenue, in the borough of Manhattan, thence under Central Park and Fifth avenue into Sixtieth street, and through Sixtieth street

to and under the East river to North Jane street, Long Island City, where it will connect with the new elevated lines in the borough of Queens. On the Manhattan side the new line will connect with the Broadway, Seventh avenue and Fifty-ninth street line. The new route is made necessary by the substitution of the river tunnel for the use of the Queensboro bridge, as at first proposed by the commission.

NORTH CAROLINA ROADS.—Residents of Louisburg, N. C., are said to be interested in a project to build a railroad from Louisburg southeast to a connection with the Atlantic Coast Line, probably at Rocky Mount, about 35 miles. Under the name of the Louisburg & Rocky Mount a company was organized last year to build a line between these two places. J. A. Turner, Louisburg, may be addressed.

OCMULGEE VALLEY.—This company, which is building a line from Lumber City, Ga., southwest to Jacksonville, about 20 miles, it is said, will open for freight service in October the first section of 14 miles from Lumber City in Telfair County. J. C. Work, chief engineer, Lumber City. (April 30, p. 955.)

OGDEN, LOGAN & IDAHO (ELECTRIC).—The Wellsville-Brigham City link of this road has been completed and operation was begun over the whole system on October 14. The road is 95 miles long and connects Huntsville, Ogden, Brigham City, Wellsville and Logan, Utah, and Preston, Idaho. The company was organized in the summer of 1914, when it took over the properties of the Ogden Rapid Transit and the Logan Rapid Transit companies and let a contract to the Utah Construction Company to unite and extend the lines. The Wellsville-Brigham City link was the last and most difficult part of the line to be constructed. The maximum grade is 2 per cent and the maximum curve 10 per cent. Concrete under-grade crossings were built near Merrihills, Utah, where the line passes under the Oregon Short Line, and near Millville, Utah, and Summit, where it passes under highways.

PACIFIC ELECTRIC.—This road has awarded a contract to Robert Sherer & Co., Pacific Electric Building, Los Angeles, Cal., for grading the roadbed for a line between Hawthorne and Ionia avenues, Los Angeles, on the Redondo via Watts line. The cost is estimated at \$20,000. The Los Angeles city council has granted this road a franchise to build a single track railway on portions of Figueroa street, Denver avenue, Hoover street, Menlo avenue and Vermont avenue.

PASCAGOULA-MOSS POINT NORTHERN.—See Alabama & Mississippi.

PEARL & KAMPSVILLE.—J. E. Melick, 333 South Douglas avenue, Springfield, Ill., and associates have completed a survey for a railway between Pearl, Ill., and Kampsville, a distance of 11 miles. Grading has been begun. The road will connect with the Chicago & Alton at Pearl, and may be extended later to Hamburg, Ill.

PHILADELPHIA ROADS.—The McClintic-Marshall Company, Philadelphia, Pa., has been given the contract for the fabrication and erection of the steel superstructure on three sections of the Frankford elevated line in Philadelphia, extending from Girard avenue north to Unity street, Frankford. This company was the lowest bidder and offered to do the work for \$1,455,000. The same company also submitted the lowest bid at \$249,000 and an alternate bid of \$261,400, for the fourth section, from Girard avenue south to Callowhill street.

POTTSVILLE & ST. CLAIR (ELECTRIC).—Incorporated in Pennsylvania with \$13,200 capital, it is said, to build a three-mile electric line from Pottsville, Pa., north to St. Clair. W. B. Rockwell and I. G. Walborn, Pottsville, are incorporators.

SAN FRANCISCO, CAL., ROADS.—The board of public works will receive bids on the construction of a railway from Rosasco into the Hetch Hetchy valley until November 10. The line will be about 60 miles long and will be used in connection with the building of the city's water supply project.

SAN PEDRO, LOS ANGELES & SALT LAKE.—The Delta branch, which leaves the main line 133 miles from Salt Lake City and 650 miles from Los Angeles, and runs 13.3 miles northwesterly from Delta to Sugarville and Lucerne, Millard county, Utah, has been completed. The grading was done by the Delta Land & Water Company, which is developing this section under the Carey act. The maximum curvature is 6 per cent and the maxi-

mum grade is one-half of 1 per cent. Only one bridge of any size was built, an 18-ft. span constructed of piling and supporting the tracks 17 ft. above high water in the Deseret reservoir. Fifty thousand ft. B.M. of timber and 2,800 lb. of wrought and cast iron were used in this structure. The new line was ready for traffic October 1. (June 5, 1914, p. 1257.)

TEXAS ROADS.—At a meeting of farmers of the Pecos Valley region held recently at Buena Vista, Tex., preliminary steps were taken for the construction of a railroad from Girvin, Tex., or some point on the Kansas City, Mexico & Orient northwest to a connection with the Texas & Pacific either at Pecos or Barstow, about 80 miles. Vernon L. Sullivan, Fort Stockton, is chairman of a committee to promote the construction of such a line.

WESTERN MARYLAND.—This company is making surveys from a point on the Baltimore & Ohio near Hutchinson, W. Va., west to Wyatt, about eight miles, for a line to be built to develop coal fields. A charter will be obtained after definite location is made.

WHITE PINE MINING COMPANY.—This company has let a contract to the Smith-Byers-Sparks Company for two miles of spur track from the mine to the Chicago, Milwaukee & St. Paul.

RAILWAY STRUCTURES

BRANTFORD, ONT.—An officer of the Lake Erie & Northern writes that the location selected for the new station to be built by the Lake Erie & Northern in Brantford will probably be changed. The style of building has not yet been definitely decided upon.

BROOKLYN, N. Y.—The date for receiving bids for the construction of station finish work on the New Utrecht avenue elevated line, in the borough of Brooklyn, has been postponed from October 26 to November 5, 1915, by the New York Public Service Commission, First district.

BUFFALO, N. Y.—The Lehigh Valley has given a contract to the Eastern Concrete Steel Company, Buffalo, N. Y., for erecting a Bush type passenger train shed on Scott street, east of Washington street, and a contract to the American Bridge Company for fabricating the steel for the train shed, calling for 1,250 tons. The new structure will be 182½ ft. by 842 ft., and is part of the improvements being carried out in connection with the new terminal now under construction at Buffalo.

CLEVELAND, OHIO.—The city board of control has awarded contracts for grade crossing elimination at Union avenue as follows: To the Robert Grace Contracting Company, Pittsburgh, Pa., for the foundation approaches, at \$103,373; to the King Bridge Company, Cleveland, Ohio, for the steel superstructure at \$34,892.

CRESSON, PA.—An officer of the Pennsylvania Railroad writes regarding the report that a new bridge would be built at Cresson to replace the present structure that this work consisted of renewing the old girders spanning the main line tracks carrying the Cresson division tracks overhead. The new girders are of heavier section to provide for heavier equipment.

EAST ST. LOUIS, ILL.—The Wiggins Ferry Company will soon begin the construction of a modern river coal tippie at the foot of Trendley avenue.

LIMA, OHIO.—The Cincinnati, Hamilton & Dayton has commenced the construction of a power plant which will cost about \$25,000.

MIDDLETOWN, OHIO.—The Cincinnati, Hamilton & Dayton will begin immediately the construction of passenger stations at Middletown, Ohio, and at Miamisburg, to cost approximately \$7,000 each.

NASHVILLE, TENN.—The Nashville, Chattanooga & St. Louis is building a frame shed 50 ft. high and 116 ft. by 400 ft. to cost about \$12,000. The work is being carried out by the railroad company with its own forces.

WASHINGTON C. IL, OHIO.—The Cullen & Vaughn Company, of Hamilton, Ohio, has been awarded a contract for a passenger station by the Baltimore & Ohio.

Railway Financial News

ARTESIAN BELT RAILWAY.—A press despatch from San Antonio, Tex., says that J. O. Terrell has been discharged as receiver of the Artesian Belt by the court of appeals.

DENVER & RIO GRANDE.—Benjamin Nicol and D. H. Taylor have been elected directors, succeeding J. F. Vaile and S. F. Pryor, resigned.

LOUISVILLE, HENDERSON & ST. LOUIS.—This company, controlled by the Louisville & Nashville, has made a mortgage to secure \$5,000,000 first mortgage 5 per cent consolidated bonds, of which \$2,500,000 will be reserved to retire the present issue of first mortgage bonds and \$700,000 will be issued to pay off floating debt.

MAINE CENTRAL.—Stockholders have approved of the retirement of \$10,000,000 outstanding stock of the Maine Central owned by the Maine Central Railways, and the issuance in place thereof of \$7,000,000 5 per cent first mortgage 25-year bonds and \$3,000,000 non-voting 5 per cent preferred stock.

NEW ORLEANS, MOBILE & CHICAGO.—The federal court has confirmed the sale of this property to the bondholders' protective committee. This committee represents all but \$561,300 of the outstanding \$13,613,200 bonds.

NEW YORK, NEW HAVEN & HARTFORD.—H. K. McHarg and Frederick F. Brewster have resigned as directors.

See comments on this company's annual report elsewhere in this issue.

SALT LAKE TERMINAL COMPANY.—The International Trust Company, Denver, Col., is offering \$250,000 first mortgage 6 per cent bonds of June 1, 1915-1935, of the Salt Lake Terminal Company, guaranteed principal and interest by the Salt Lake & Ogden and the Salt Lake & Utah, at 101. The Salt Lake & Ogden is an interurban electric road between Salt Lake City and Ogden and the Salt Lake & Utah operates from Salt Lake City south via Provo to Spanish Forks, 60 miles.

WABASH.—See the election of the president of the new company under Railway Officers.

BRITISH RAILWAY LENGTHENS TRAIN SCHEDULES.—The London & North-Western has recently lengthened the schedules of a number of its fast express trains. The semi-official explanation is that with the present heavy traffic caused by naval and military requirements trains cannot keep time, and the new timings are arranged to secure greater punctuality.

INDIAN RAILWAY EXTENSION.—The opening of the Hardinge Bridge, across the Ganges river, has brought to the front questions of the best means of developing railway communication in the country lying north of the Ganges, which used to be known as Northern Bengal. Proposals put forward for further development include a standard gage line from Santahar to Siliguri; a standard-gage line from Ishurdi, through Rampur Boalia, to join the Katihari and Godagari line near Nachoul (or an alternative line from Nattore, through Rampur Boalia, to Godagari); a line on the metre gage from Malda to Santahar (or an alternative line on the same gage from near Shamsi, on the Katihari and Godagari Railway, to Bonarpara); a standard-gage line from Ishardi to Patna, and on to Bhera; and a line from Bogra to Serajganj. Further extensions which should be taken in hand as soon as funds permit would be a standard gage line from the neighborhood of Rampur Boalia to the neighborhood of Dinagepur; a standard gage line from Ishurdi to Patna and Bhera; the conversion of the Santahar and Bonarpara line to the standard gage; and the conversion of the Godagari and Malda line to the standard gage as soon as traffic justifies it. The portion between Nachoul and Godagari would naturally be converted at the same time as the Nachoul and Ishurdi line is built, so as to concentrate transshipment at Nachoul. The doubling of the Katihar and Parbatipur line might also be proceeded with provided no other east and west line has been built.—*Engineering, London.*

ANNUAL REPORTS

STATEMENT OF THE AFFAIRS OF THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY FOR THE YEAR
ENDING JUNE 30, 1915

INCOME ACCOUNT FOR THE YEAR ENDING JUNE 30, 1915.

	1915.	*Comparison with 1914. Increase or decrease.
Average Miles Operated.....	2,003.17	—43.12
RAILWAY OPERATING REVENUES:		
Freight	\$31,179,318.71	—\$1,297,320.54
Passenger	27,010,798.83	—633,037.26
Excess Baggage	136,345.50	—6,339.67
Mail	717,155.16	—71,154.75
Express	2,709,639.13	—140,013.29
Other Transportation	1,957,670.26	135,002.99
Incidental	2,025,030.59	—54,142.07
Joint Facility	643,305.53	—70,323.71
TOTAL RAILWAY OPERATING REVENUES	\$65,379,263.71	—\$2,073,328.30
Per Mile (Average).....	\$32,637.90	—\$325.46
RAILWAY OPERATING EXPENSES:		
Maintenance of Way and Structures.....	7,729,240.58	—1,101,823.60
Maintenance of Equipment.....	9,780,329.69	—611,948.08
Traffic	473,368.28	—28,651.59
Transportation—Rail Line	23,958,702.46	—3,020,169.46
Miscellaneous Operations	592,053.69	—23,392.99
General	1,611,243.46	—312,876.70
Transportation for Investment—De- duct	18,314.40	—8,523.78
TOTAL RAILWAY OPERATING EXPENSES	\$44,126,623.76	—\$5,106,386.20
Per Mile (Average).....	\$22,028.40	—\$2,031.24
NET REVENUE FROM RAILWAY OPERATIONS	21,252,639.95	3,033,057.90
Per Mile (Average).....	\$10,609.50	\$1,705.78
RAILWAY TAX ACCRUALS.....	2,743,921.47	—834,522.95
Per Mile (Average).....	\$1,369.79	—\$378.96
UNCOLLECTIBLE RAILWAY REVENUES.....	7,830.36	7,830.36
TOTAL TAXES AND UNCOLLECTIBLE RAILWAY REVENUES	\$2,751,751.83	—\$826,692.59
RAILWAY OPERATING INCOME.....	\$18,500,888.12	\$3,859,750.49
MISCELLANEOUS OPERATING INCOME.....	1,193.34	—7,791.50
TOTAL OPERATING INCOME.....	\$18,502,081.46	\$3,851,958.99
Per Mile (Average).....	\$9,236.40	\$2,077.04
NON-OPERATING INCOME:		
Dividend Income	\$1,450,666.90	—\$1,091,338.03
Income from Funded Securities.....	179,118.32	—94,125.26
Income from Unfunded Securities.....	1,387,587.70	—662,289.07
Rent from Locomotives, Passenger Train Cars and Work Equipment.....	232,606.55	—12,804.32
Joint Facility Rent Income.....	139,717.34	57,452.48
Income from Lease of Road.....	1,779,033.11	50,767.01
Miscellaneous Rent Income.....	630,486.47	133,239.96
Miscellaneous	55,835.01	—347,376.31
TOTAL NON-OPERATING INCOME.....	\$5,855,051.40	—\$1,966,473.54
GROSS INCOME	\$24,357,132.86	\$1,885,485.45
Per Mile (Average).....	\$12,159.29	\$1,177.64
DEDUCTIONS FROM GROSS INCOME:		
Rent for Locomotives, Passenger Train Cars, Work Equipment and Balance for Hire of Freight Cars..	598,100.97	598,100.97
Joint Facility Rents.....	2,728,338.26	57,210.25
Rent for Leased Roads.....	6,238,999.11	196,038.84
Miscellaneous Rents	204,648.59	—17,792.13
Miscellaneous Tax Accruals.....	93,474.50	783.55
Separately Operated Properties—Loss:		
Boston R. R. Holding Co. Guar- antee	131,571.70	—7,428.30
N. Y., W. and B. Ry. Co. Guar- antee (Bond Interest).....	864,000.00	—95,324.68
Boston & Albany R. R.		423,018.37
Interest on Funded Debt.....	9,380,046.38	—1,159,750.87
Interest on Unfunded Debt.....	1,800,276.96	—148,679.11
Miscellaneous	19,704.96	
TOTAL DEDUCTIONS FROM GROSS INCOME	\$22,049,161.43	—\$153,823.11
Per Mile (Average).....	\$11,007.13	—\$156.77
NET INCOME	\$2,307,971.43	\$2,030,308.56
Ratio of Operating Expenses to Total Operating Revenues	67.49%	—5.50%
Ratio of Operating Expenses and Taxes to Total Operating Revenues.....	71.69%	—6.60%

* 1914 figures have been revised to conform with classification effective July 1, 1914.

† Includes \$161,761.61 revenue from milk handled on freight trains.

NOTE.—The N. Y., N. H. & H. R. R. Co. Income Account does not include interest due from Subsidiary Companies unless earned by them.

OPERATING RESULTS

Miles Operated.—There was a decrease in average miles of road operated of 43.12 miles.

The average miles of track maintained was 4,315.49 compared with 4,397.75 the previous year, a decrease of 82.26 miles.

These decreases are mainly due to giving up certain trackage rights on the Boston & Albany and Boston & Maine and to the Central New England assuming operation of the line between Danbury, Connecticut, and Hopewell Junction, New York.

REVENUES

Total Operating Revenues decreased \$2,073,328.30, or 3.07%.

Freight.—Freight Revenue decreased \$1,297,320.54, or 3.99%.

There were 23,842,023 tons of revenue freight carried during the year. This was a decrease of 1,154,815 tons. The number of tons of revenue freight carried one mile was 2,185,109,160, a decrease of 109,674,782 ton miles. The average distance haul of one ton of revenue freight this year was 91.65 miles as compared with 91.80 miles last year. The average amount received for each ton of freight was \$1.31453 as compared with \$1.29923 a year ago. The average revenue received per ton per mile was \$.01434 this year, as against \$.01415 last year.

The average number of tons of revenue freight per revenue train mile was 333.17, an increase of 29.21 tons, or 9.61%. The average number of tons of revenue freight per loaded car mile this year was 15.59, as compared with 15.55 tons a year ago. The average number of freight cars (including caboose) per revenue train mile was 31.78 this year, as compared with 28.35 cars a year ago, an increase of 3.43 cars.

Revenue freight train miles decreased 1,001,404 miles. The decrease in freight train mileage was due to better loading of cars, to heavier loading of trains account of rearrangement of locomotives and to decrease in business offered.

Passenger.—Passenger Revenue decreased \$633,037.26, or 2.29%. Excess Baggage Revenue decreased \$6,339.67, or 4.44%. Mail Revenue decreased \$7,154.75, or 0.99%. Express Revenue decreased \$140,013.29, or 4.91%.

There were 78,172,698 revenue passengers carried during the year, a decrease of 9,010,843 passengers. Total number of revenue passengers carried one mile was 1,477,868,934, a decrease of 122,607,802 passenger miles. The average distance each revenue passenger was carried was 18.91 miles as compared with 18.36 miles last year. The average amount received from each passenger was \$.34553, as compared with \$.31708 last year. The average revenue per passenger per mile this year was \$.01828, as compared with \$.01727 a year ago.

The average number of passengers per revenue train mile was 97, an increase of 1 passenger. The average number of passengers per revenue car mile was 25, the same as last year. The average number of passenger train cars per revenue train mile was 5, as compared with 4.88 cars a year ago. Revenue passenger train miles decreased 1,485,622 miles.

The decrease in passenger train mileage was due to rearranging service and taking off some trains that did not pay their operating expenses.

Other Transportation.—Other Transportation Revenue increased \$135,002.99, or 16.41%. This includes Special Train Service, revenue from Pullman service, Switching and Milk Revenue.

Incidental.—Incidental Revenue decreased \$54,142.07, or 2.6%. This account includes: dining car revenue, which decreased \$44,602.72, or 9.28%; revenue from restaurants, which decreased \$1,031.95, or 1.05%; other items such as Station and Train Privileges, Parcel Room Receipts, Storage, Demurrage, etc., which decreased \$144,971.63, or 11.41%; and revenue from electric current and other power sold, which increased \$136,464.23, or 59.35%.

Joint Facility.—Joint Facility Revenue decreased \$70,323.71, or 9.85%. This account includes your Company's proportion of revenue collected for the use of privileges in stations owned by other carriers and used jointly by this Company.

EXPENSES

Total Operating Expenses decreased \$5,106,386.20, or 10.37%.

Maintenance of Way and Structures.—The charge decreased \$1,101,823.60, or 12.48%. This general account took 11.82% of Operating Revenues, as compared with 13.09% a year ago.

A brief description of the character of the improvements made during the year is given below.

Grade crossings eliminated during the year for the greater safety of the public were:

State of Connecticut.....	9
State of Rhode Island.....	7
Total	16

The elimination of five grade crossings at Pawtucket and Central Falls, R. I., has been completed, together with new four-track location through the cities; also a new sixty-car bulk delivery yard, and other work incidental to the elimination scheme. The construction of a new passenger station for joint use of the cities is progressing and will be completed before the end of the year.

New Passenger Stations have been provided during the year at the following points: Brookfield, Conn.; Clinton, Mass. (joint station built by B. & M.); Haddam, Conn.; Pittsfield, Mass. (joint station built by B. & A.); South Worcester, Mass.; West Haven, Conn.; Pawtucket-Central Falls (temporary station).

The rebuilding of the Hartford passenger station is well under way, and the entire station facilities will soon be completed.

New Freight Stations have been built during the year at the following points: Brockton, Mass.; Brookfield, Conn.; New York, Pier 37, East River; Olneyville, R. I.

Improved facilities have been made at 7 other stations.

Improvements to Roadway and Track. There were 31.75 miles relaid with 107-pound rail, 90.22 miles with 100-pound rail, 25.33 miles with 90-pound rail, and 73.31 miles with rail weighing from 68 to 80 pounds per yard. There were placed in main line track 1,588,895 new ties, of which 97,256 were cross-ties. In sidings 408,648 ties were renewed. There were also 23.90 miles of track ballasted. During the year 10.21 miles of sidings and spurs were built.

Owned and leased track operated (excluding sidings), as of June 30, 1915, was laid with rail of the various weights per yard, as follows:

Weight lb.	Miles	% of Total	Comparison of Miles with 1914	
			Increase	Decrease
141 lb.	.86	.03	.....	.13
107	31.75	1.08	31.75	.....
100	980.84	33.24	17.56	.....
90	157.38	5.33	.....	1.93
80	454.92	15.42	50.66	.....
79	111.28	3.77	3.30	.....
78	623.43	21.13	.....	2.66
75	9.63	.32	.....	.07
74	185.66	6.29	.....	54.17
72	23.59	.80	9.74	.....
70	174.12	5.90	.....	7.52
68-67-66-60	157.75	5.35	.....	18.21
56 or under	39.54	1.34	.....	31.35
Total	2,950.75	100%	.....	3.03

NOTE.—All Steel Rail. With exception of sidings (not included in above figures) there is no iron rail in the track.

Signal and Interlocking Improvements and Additions have been made at 32 points on the system.

During the fiscal year 1915 33.67 miles of road and 109.54 miles of track were equipped with automatic block signals.

A new interlocking plant was installed at the junction with the Boston & Albany R. R. at Springfield, Mass.

Bridges.—During the year 50 bridges, railroad and highway, were repaired, strengthened or renewed.

The realignment of the New Haven Company's tracks across Winthrop Cove at New London, Conn., including the construction of a solid embankment and twenty-two foot arch waterway, is progressing satisfactorily, and will, when finished, permit the abandonment of the wooden trestle and provide for a better approach to the proposed bridge over the Thames River. Location for this bridge has been approved by the United States Government and the Connecticut Public Utilities Commission, and plans of the substructure are completed.

Construction of the new concrete bridge carrying the New Haven Company's westbound track over three of the New York Central Company's tracks at Woodlawn, N. Y., has been completed.

Maintenance of Equipment.—The charge decreased \$611,948.08, or 5.89%. Included in Maintenance of Equipment are charges account of Depreciation, as prescribed by the Interstate Commerce Commission, as follows:

Steam Locomotives	\$294,927.38
Other Locomotives	77,268.68
Freight Train Cars	970,055.81
Passenger Train Cars	272,759.20
Floating Equipment	87,555.90
Work Equipment	21,867.56

Total

The equipment retired from service during the year resulted in the following charges to Operating Expenses:

Steam Locomotives	\$32,312.19
Other Locomotives	8,457.89
Freight Train Cars	404,457.80
Passenger Train Cars	68,236.68
Work Equipment	32,540.43

Total

The ratio of this general account to Operating Revenues was 14.96%, as compared with 15.41% a year ago.

Steam Locomotives.—Total number on active list June 30, 1914.... 1,204

From which should be deducted:

Engines retired from service during the year..... 39

Total on active list June 30, 1915..... 1,165

Thirty-six of the engines retired from service during the year were of light capacity, and in addition, their boilers would not meet the requirements of the Federal Boiler Inspection Act. Since the Company had no service that would justify going to the expense of repairing the engines, they were condemned.

The hauling capacity of the steam locomotives is as follows:

Active List	Number	Tractive Power Pounds	Total Weight on Drivers, Tons	Total Weight of Locomotives, Tons (exclusive of tenders)
Assigned June 30, 1914..	1,204	29,074,311	62,608	80,668
Added during fiscal year*		68,736	52	82
Total	1,204	29,143,047	62,660	80,750
Retired from service during year	39	569,447	1,145	2,454
As of June 30, 1915.....	1,165	28,573,600	61,515	78,296

* Increased account of superheaters applied and change from compound to simple cylinder locomotives.

The following statement shows the character and condition of the steam locomotives of the Company on June 30, 1915:

Wheel Arrangement	Owned 6-30-14	With- drawn	Owned 6-30-15	Total	Average Weight Each Locomotive Tons (exclusive of tender)	Average Tractive Power Pounds
< OO	16	6	10	23	23	15,674
< OO o o	3	2	1	47	33	10,066
< OOO	205	2	203	61	61	27,666
< o OOO	349	6	343	69	60	27,427
< o OOOO	35	..	35	76	69	32,546
< o o OOO	390	23	367	53	35	17,115
< o o OOOO	106	..	106	67	51	23,421
< o o OOO o	12	..	12	100	53	24,956
< o o OOOO o	88	..	88	122	75	35,513
Total	1,204	39	1,165	67	53	24,527
Condition						
Good					Number	Per Cent
Fair					989	84.9
In shop for repairs					111	9.5
Stored awaiting repairs, to be repaired when suitable service demands					41	3.5
					24	2.1
					1,165	100.0
No. of locomotives equipped with superheaters					82	7.04

The 24 engines stored awaiting repairs are engines of light capacity assigned to no particular service. Should occasion arise requiring engines of this particular type they will be repaired and placed in active service.

As of June 30, there were 191 engines stored in good condition suitable for immediate service when requirements demand.

Electric Locomotives.—Hauling capacity and condition:

Active List	Number	*Tractive Power, Pounds	Total Weight On Drivers Tons	Total Weight of Locomotives, Tons
Assigned June 30, 1914..	104	1,515,464	8,172	11,152
Retired during fiscal year	2	17,200	30	30
As of June 30, 1915.....	102	1,498,264	8,142	11,122

* 1 hour rating

The electric locomotives are in good condition, and during the year 48 received a general overhauling.

Cars in Passenger Service.—In addition to new equipment shown under Additions and Betterments, on page 42, the following equipment was received during the year under an Equipment Trust:

45 steel coaches
5 steel electric cars
10 steel combination baggage and smoking cars
50 steel baggage cars
10 steel baggage and mail cars

On June 30, 1915, there were 74 all-steel passenger train cars due from the Osgood Bradley Car Co. on the 1915 contract. Of this number there have been received since June 30, 1915:

24 baggage cars
20 coaches
10 smoking cars

Cars in Freight Service.—Of the total number of freight cars owned on June 30, 1915, 3,863, or 11.26%, were in need of repairs. The repairs needed vary from those requiring one hour of labor up to and including rebuilding.

The freight car repair shops are working full time and the force has been considerably increased during the past few months in order to reduce the number of bad order cars.

Traffic Expenses.—The charge decreased \$28,651.59, or 5.71%. The most noticeable decreases were in Superintendence and Advertising, while Outside Agencies and Industrial Bureau show increases.

This general account took 0.72% of Operating Revenues as compared with 0.74% last year.

Transportation Expenses.—The charge decreased \$3,020,169.46, or 11.19%. This general account took 36.65% of Operating Revenues this year, as compared with 40% a year ago, a decrease of 3.35%.

The miles run by revenue trains of all classes were 21,584,882, a decrease of 2,481,774, or 10.31%. The cost per revenue train mile for Transportation Expenses was \$1.11, compared with \$1.12 for last year, a decrease of 1 cent per mile.

Cost of fuel for revenue train and yard locomotives decreased \$826, 875.03 under the previous year, due to better weather conditions, a decrease in train miles and better work by officers and men in obtaining greater efficiency from coal burned.

Injuries to persons required the sum of \$792,795.18, a decrease of \$388,940.41 under the previous year. \$485,424.44 was on account of accidents occurring prior to July 1st, 1914. The estimated amount of unpaid personal injury claims on June 30, 1915, was \$697,608.69, as compared with \$1,042,597.17 on June 30, 1914, a decrease of \$344,988.48, or 33.09%.

The amount spent during the year for loss and damage, for injuries to persons, and for clearing wrecks was \$1,412,804.72, as compared with \$1,966,492.64 in 1914, a decrease of \$553,687.92. The cost of these items per revenue train mile was 6.55, as compared with 8.17 cents in 1914, a decrease of 1.62 cents. The reduction in the amount paid for injuries to persons and for loss and damage reflects the efforts put forth towards efficiency and safety which have brought about a reduction of accidents and damage to property.

Miscellaneous Operations.—(Covers Dining Car and Restaurant Service and Producing Power Sold.) The charge decreased \$22,392.99, or 3.64%. There was a reduction in the cost of operating the dining car service of \$71,554.67 under the previous year. The number of revenue meals served during the year was 378,540, a decrease of 64,212 meals as compared with the previous year.

There was a decrease in cost of operating restaurants of \$523.20 and an increase of \$49,684.97 in the cost of "Producing Power Sold."

This general account took 0.91% of Operating Revenues this year, the same as last year.

General Expenses.—The charge shows a decrease of \$312,876.70, or 16.26%, in spite of an increase in pensions of \$23,468.31 and an increase in valuation expenses of \$66,710.97.

The amount of pensions paid during the year was \$176,276.25, and the cost to the Company account of the federal act requiring valuation of railroads amounted to \$90,887.74.

The salaries and expenses of the general officers were reduced \$45,718.44, and law expenses were reduced \$180,707.06.

This general account took 2.46% of Operating Revenues, as compared with 2.85% a year ago.

Payrolls and Materials.—Total payrolls of the Company for the year for all classes of labor paid for directly were \$25,765,313.80, and the expenditures for materials of all kinds, excepting equipment, amounted to \$14,278,303.39.

Non-Operating Income. (Includes Dividends, Interest on Notes and Deposits, income from Lease of Road, etc.)—This account decreased \$1,966,473.54. No dividend was received from The New England Navigation Company this year and some of the subsidiary companies did not earn their fixed charges. The interest on the securities of those companies held by the New Haven Company was not included in income unless actually earned.

The decrease was offset in part by a larger dividend from the Central New England Railway Co.

Deductions from Gross Income. (Includes Hire of Equipment, Joint Facility Rents, Rent for Leased Roads, properties Operated at a Loss, Interest on Debt, etc.)—The charge decreased \$153,823.11, the principal decreases being in Interest on Debt and Miscellaneous Deductions. There were increases in Hire of Equipment, Joint Facility Rents, and Rent for Leased Roads.

FINANCIAL

Capital Stock.—The Massachusetts Public Service Commission recommended to the Massachusetts General Court that all of the capital stock outstanding in the hands of the public be validated under the laws of Massachusetts, and also recommended that the shares in the Company's treasury be retired and cancelled. The Massachusetts General Court validated the 1,571,179 shares in the hands of the public and the stockholders at a meeting held in New Haven, Connecticut, April 24th, 1915, author-

ized the retirement of the 228,991 shares held in the treasury, which shares were subsequently retired and cancelled.

Maturing Debt.—There will mature between October 1st, 1915, and June 30th, 1916, short-term notes, as follows:

October 26th, 1915.....	\$375,000.00
December 14th, 1915.....	75,000.00
December 28th, 1915.....	550,000.00
January 14th, 1916.....	1,705,000.00
May 1st, 1916.....	27,000,000.00
Total	\$29,705,000.00

CHANGES IN DEBT IN HANDS OF THE PUBLIC

DEBT AS OF JUNE 30, 1914

Mortgage Bonds	\$58,526,000.00
Debentures	155,779,100.00
Loans and Bills Payable.....	23,769,000.00
H. R. & P. C. R. R. One Year 5% Gold Notes, due May 1, 1915 (see note).....	10,000,000.00
	\$248,074,100.00

DEBT AS OF JUNE 30, 1915

Mortgage Bonds	\$58,354,000.00
Debentures	155,892,100.00
Loans and Bills Payable.....	30,139,000.00
	244,385,100.00
Net Decrease	\$3,689,000.00

ACCOUNTED FOR AS FOLLOWS:

MORTGAGE BONDS:	Increase	Decrease
Middletown Horse R. R. Co. 5% 1st Mortgage Bonds, due Dec. 1, 1914, paid off		\$150,000.00
Worcester & Conn. Eastern Ry. Co. 4½% 1st Mortgage Gold Bonds, due Jan. 1, 1943, purchased for Sinking Fund		22,000.00
DEBENTURES:		
Sale of Treasury holdings of 6% Convertible Debenture Certificates, due Jan. 15, 1948.....	\$113,000.00	
LOANS AND BILLS PAYABLE.....	6,370,000.00	
H. R. & P. C. R. R. C*, ONE YEAR 5% GOLD NOTES, DUE MAY 1ST, 1915, PAID OFF		10,000,000.00
	\$6,483,000.00	\$10,172,000.00
Actual decrease in debt.....	3,689,000.00	

NOTE: The Harlem River and Port Chester R. R. Co. One Year 5% Gold Notes amounting to \$10,000,000, which were in the hands of the public as of June 30th, 1914, were paid off during the fiscal year ended June 30th, 1915, from the proceeds of The New York, New Haven and Hartford Railroad Co. note issue of \$27,000,000, dated May 1st, 1915, the New Haven Company being reimbursed by The Harlem River and Port Chester Railroad Co. by an issue of Fifteen Year Prior Lien Debentures dated May 1st, 1915, these debentures now being carried in the Investment Account of the New Haven Company.

GENERAL REMARKS

The last two years have been the most critical in the history of the Company, and there has been difficulty in maintaining its integrity. In the last annual report you were fully informed of the terms of the proposed settlement with the United States Government. This settlement was confirmed by a decree of the United States District Court for the Southern District of New York entered October 17th, 1914, and the securities were transferred to the Trustees appointed thereunder. Since then these Trustees have been in exclusive control of the respective properties, namely, the Boston and Maine Railroad, the Connecticut trolleys and the Rhode Island trolleys.

Since July 1st, 1913, there has been a widespread depression in business, affecting adversely the earning power of your property. For example, the gross operating revenues compare as follows:

For the year ending June 30, 1913, \$70,458,790.09.
For the year ending June 30, 1914, \$67,452,592.01.
For the year ending June 30, 1915, \$65,379,263.71.

This business depression has also affected all of the subordinate properties in which your Company is interested, so that the returns to your Company from these properties for the last year were \$4,759,610.31 less than for the year ending June 30, 1913, and \$1,135,451.39 less than for the year ending June 30, 1914.

This large decrease in earnings and income made it necessary for the Company to retrench in every way.

Efficiency and Economy.—During the year continuous efforts were made to adopt efficient methods and to encourage economical practice.

There was a total saving in operating expenses of \$5,106,386.20 compared with a loss in operating revenues of..... 2,073,328.30

resulting in an increase in net revenue from railway operations of..... \$3,033,057.90

The most important savings were in Conducting Transportation, which decreased \$3,020,169.46, or 11.19%, and in General Expenses, which decreased \$312,876.70, or 16.26%.

The average load for each train was increased from 320.84 tons to 351.25 tons. This is a step in the right direction, but there is much chance for further economies through the purchase of heavier locomotives, the lengthening of sidetracks and the creation of better terminal facilities.

Condition of Property.—Although there was a reduction in expenses for Maintenance of Way and Structures and for Maintenance of Equipment, the property has been well maintained during the past year, and its track and structures are in better condition than for several years.

The amount spent per mile of track maintained was \$1,637.47, which is the largest amount in the history of the Company, except for the previous year, when \$1,853.06 was spent, due to unusually heavy rail renewals.

The same may be said about all classes of equipment, although the Company is somewhat behind in repairs to freight cars and in the varnishing and painting of passenger cars and locomotives.

Debts.—On June 30, 1915, the floating debt of the Company in the hands of the public was \$50,139,000, including \$20,000,000 6% Gold Notes of The New England Navigation Company due May 1, 1917, for which the New Haven Company, as the only stockholder, must be responsible.

The amount paid for interest and discount on short-term paper, including

The New England Navigation Company and The Harlem River and Port Chester Railroad Company for the last two years has been:

For the year ending June 30, 1914.....	\$4,483,366.48
For the year ending June 30, 1915.....	3,662,051.36

The company in the last two years has spent for the protection of its properties the following:

	1915	1914
For Additions and Betterments.....	\$1,358,261.86	\$4,083,669.57
For Grand Central Terminal Buildings, New York City.....	643,432.37	1,575,790.35
Advances to affiliated companies for improvements, betterments and fixed charges	1,272,365.14	1,959,479.09
	\$3,274,059.37	\$7,618,939.01

This total, \$10,892,998.38, has been obtained from earnings, from the sale of property and from cash on hand.

In spite of these large and unavoidable expenditures, by exercising care and postponing all improvements that could be put off with safety, the debt in the hands of the public of the New Haven Company, including The New England Navigation Company, has been reduced since July 1st, 1913, \$324,750.00; an increase in 1914 of \$3,364,250.00, but a decrease in 1915 of \$3,689,000.00.

Some further reductions can probably be made from the proceeds of property sold and from earnings, although the necessity for improvements and betterments is likely to take all surplus earnings until a definite financial plan is effective.

The total debt of the Company, in the hands of the public, excluding contingent liabilities, but including The New England Navigation Co. Gold Notes, for which the New Haven Company is responsible, is \$264,385,100.00, which means that for every \$100 of stock the Company has \$168.28 of debt.

Equipment Trust.—The Company leases 273 all-steel passenger equipment cars under two Lease and Conditional Sale Agreements, one with The Farmers' Loan and Trust Company, dated April 1, 1914, and the other dated November 2, 1914, with The Philadelphia Trust, Safe Deposit and Insurance Company.

The equipment is as follows, constructed at a total cost of \$4,216,889.00.

117 all-steel coaches
50 all-steel baggage cars
15 all-steel postal cars
28 all-steel smoking cars
10 all-steel combination baggage and smoking cars
10 all-steel combination baggage and mail cars
17 all-steel m. u. motor cars
26 all-steel m. u. trailer cars

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The equipment trust certificates issued under the first agreement are known as "Series A," and those issued under the second agreement as "Series AA."

By the terms of the first agreement an initial payment was made of \$512,399.00 and "Series A" certificates were issued in the amount of \$2,490,000.00 par value, bearing interest at 5% per annum, payable semi-annually and redeemable in fifteen annual payments of \$166,000.00.

By the terms of the second agreement an initial payment was made of \$244,490.00, and "Series AA" certificates were issued in the amount of \$970,000.00 par value, bearing interest at 6% per annum, payable semi-annually and redeemable in twenty semi-annual payments of \$48,000.00 and \$49,000.00 respectively.

The Company pays as rental for these cars (annually in the one case, and semi-annually in the other) to the lessor-trustees under the agreements, an amount equal to the maturing certificates and interest on the outstanding certificates, and these rental payments, by the terms of both agreements, apply as purchase money toward the eventual ownership of the cars by the Company, in the event that no default in payment occurs. The initial payments of \$512,399.00 and \$244,490.00 respectively likewise were on account of rental, and also apply as payments on account of the purchase price of the cars.

New Legislation.—To place the Company in a better position legally to finance itself the charter of the Company and the laws of Connecticut, Massachusetts and Rhode Island were, at the request of the Company, so amended that with the authority of the stockholders and the Public Service Commissions, the Company can mortgage its property or issue preferred stock or do both.

A careful study is now being made of this subject, and the directors will make their recommendation to the stockholders at a later date.

Increase in Capital Since 1903.—On December 18, 1913, the Board of Directors appointed a special committee with power to employ accountants to make a thorough examination of the accounts of the Company. The examination was made by a representative of Price, Waterhouse & Company, who spent over a year on the work and made reports covering 392 pages. From these reports the following deductions were made:

From July 1, 1903, to June 30, 1915, the Company increased its capital obligations in the hands of the public as follows:

	Par Value
Capital Stock	\$87,216,800.00
Mortgage Bonds	54,136,000.00
Debentures	145,710,900.00
Short-Term Notes	30,139,000.00

Total N. Y., N. H. & H. R. R.....	\$317,202,700.00
The New England Navigation Co. Colateral Gold Notes.....	20,000,000.00
New York, Westchester & Boston Ry. Co. Mortgage Bonds	19,200,000.00
The New York Connecting Railroad Co. one-half issue of Mortgage Bonds.....	8,000,000.00

Grand Total

\$364,402,700.00

This Company owns all of the shares of The New England Navigation Company and all but a few shares of the New York, Westchester & Boston Railway Company and must protect the outstanding notes and bonds of those companies.

This Company and The Pennsylvania Railroad Company are the only stockholders of The New York Connecting Railroad Company and your Company must protect one-half of the bonds issued for that enterprise.

The New York, Westchester and Boston Railway and New York Connecting Railroad are important parts of the terminal development of your Company and should be retained for the benefit of the increasing volume of business passing to, from and through New York, Brooklyn, and Jersey City.

From sale or exchange of the above obligations there was received, including premiums..... \$388,049,309.88

Increase in Property Since 1903.—During the same period there was acquired additional property with book values as follows:

Additions and Betterments to The New York, New Haven and Hartford and leased lines and investment in securities of certain leased and controlled steam railroad lines....	\$171,669,058.38
New York, Westchester & Boston Ry. Co.....	38,850,150.09
The New York Connecting Railroad Co.....	9,450,000.00
Grand Central Terminal Buildings, New York City.....	6,001,794.12

Total Steam Railroad and Terminal Properties..... \$225,971,002.59

OUTSIDE PROPERTIES

New York, Ontario and Western Railroad Stock.....	\$13,108,397.62
Rutland Railroad Securities.....	2,514,977.15
Gas and Water Power Companies.....	4,151,663.95
Miscellaneous Properties.....	1,475,673.13
Boston and Maine and Leased Line Stocks.....	31,079,668.75
Various Steamship Lines.....	14,242,718.81
Various Trolley Lines and Securities.....	100,527,389.53

Total Outside Investment..... \$167,100,488.94

Grand Total \$393,071,491.53

Losses.—Charges and credits to Profit and Loss have been made during the year, as shown on page 32. For causes that need not here be enumerated there have been decreases in the present value of some of the properties, and some actual losses have been entered on the books.

Unless industrial and general conditions change so as to restore the value and earning power of all transportation agencies, the Company will without doubt suffer considerable losses from the sale of those properties which the United States District Court has ordered sold. Whether these losses will be so great as to impair the capital stock of the Company cannot be determined until the sales of the various pieces of property have been made and until the valuation now being made by the Interstate Commerce Commission is completed. The directors therefore have thought it was not wise to make any general charges to Profit and Loss at this time, but simply to state that there may be large losses which may be offset all or in part by a proper valuation of the property.

Dividends.—The first three months of the current fiscal year show marked improvement in the earnings of the Company, both gross and net, but your directors cannot consider the declaration of any dividend until they are assured of the permanent financing of the Company. The amount of the possible loss in the sale of the properties that must be sold by order of the Federal Court, the existence of the large floating debt, and the need of money for making improvements, all affect the ability of the Company to pay dividends. It is hoped that the valuation of the property of the Company now being conducted by the Interstate Commerce Commission will result in an increased value over that now shown on the books and to that extent will offset any loss in the sale of the properties that must be sold under the decree of the Court.

From July 1, 1902, to June 30, 1915, the property has paid to its owners in dividends \$92,135,064.44. During the same period it has paid in wages on the New Haven and subsidiary companies, the net earnings of which helped to make up the dividend fund (except Boston & Maine and New York, Ontario & Western), \$402,488,811.53.

More Time Under Federal Decree.—Under the decree of the Federal Court some securities must be sold by January 1, 1917, some by July 1, 1917, and the remainder by July 1, 1919. The decree, however, provides that the Court may extend the time for good cause. The European War started after the agreement was made with the Government and has changed financial conditions in the whole world to such an extent that it would seem just for the Company to have more time within which to dispose of the various properties if no sales can be made on a reasonable basis within the period now fixed by the Court. At the proper time, if the properties have not been sold, the management will apply to the Court for an extension of time.

Suits for Restitution.—After earnest and thorough discussion and consideration, with the assistance, and in accordance with the advice of able counsel specially employed in these matters, the directors voted unanimously that any such suits, except the so-called "Billard Case," in which suit is now pending, would be long drawn out, full of complications and very expensive, and would result in nothing but a waste of the stockholders' money.

Sale of Property.—Every effort is now being made to sell at fair prices real estate and other property not needed to protect the Company in its future development, and with the proceeds to make improvements, to pay part of the floating debt or to purchase the Company's own securities in the market and thus reduce interest charges.

Boston and Albany Railroad.—A settlement was made with the New York Central Railroad Company as a result of the termination of the Boston and Albany Operating Agreement and the withdrawal from the Agreement for the acquisition of one-half interest in certain Trust Equipment provided by the New York Central for use on the Boston and Albany Railroad.

After all adjustments were made the net result of the participation in the operations of the Boston and Albany Railroad for the period July 1st, 1911, to January 31st, 1914, was a loss of \$168,601.55, which your Company paid, and the New York Central Railroad Company returned the working fund of \$750,000.00 advanced by your Company. The participation in the Trust Equipment Account was settled by the New York Central returning to your Company all payments made on that account, aggregating \$668,391.28.

Eastern Steamship Corporation.—Your Company, through the Navigation Company, owns securities of a book value of \$4,200,000 of the Eastern Steamship Corporation, which is in the hands of receivers. An effort is now being made to reorganize that corporation, but there will, without doubt, be a loss, and your Company will have to take securities of a different kind and participate in the loss.

New England Investment & Security Company.—Your company, through the Navigation Company, owns \$13,709,000 notes of the New England Investment & Security Company. Negotiations are now pending to put the corporate affairs of that Company on a simpler basis, in the belief that better results may be obtained for the owners of the property and for the public.

Need for Improvements.—It is necessary for your Company to spend considerable money in the next few years for improvements. A few of the larger items that must be considered are:

Rebuilding the Thames River Bridge, about.....	\$2,500,000.00
300 steel passenger cars (contracted for in 1913).....	3,600,000.00
100 steam engines of large capacity.....	2,500,000.00
3,000 freight cars.....	3,000,000.00
Electric equipment and facilities so as to get full benefit of electrification between New York and New Haven.....	1,500,000.00
Better ballast on important main and branch lines so as to increase safety, preserve ties and keep down dust.....	1,000,000.00
Improved and added signals so as to increase safety and capacity of road.....	1,000,000.00

Added trackage, yards, sidings, etc.....	3,000,000.00
Improved terminal facilities at many points so that better care can be taken of motive power, better working conditions created for employees and better service given to the public	4,000,000.00
	\$22,100,000.00

To this must be added an indeterminate amount for grade separations and many items of improvement to shops, bridges, passenger stations, small buildings, grade revisions so as to increase train tonnage, heavier rails, and advances to the New York Connecting and New York, Westchester & Boston Railroads, and to certain subordinate companies to enable them to sustain themselves until they are sold under court decree.

It is not too much to say that at least \$25,000,000 to \$30,000,000 should be spent in the next five years over and above ordinary operating expenses and fixed charges. Part of this money should be taken from earnings and part from the sale of property and securities.

Rates.—During the year the rates for local passengers were increased to 2½ cents a mile and for mileage tickets to 2¼ cents a mile.

On June 8 the New York Court of Appeals approved the decision of the lower court in annulling the order of the Public Service Commission of New York requiring the Company to reduce its increased passenger rates between New York State points.

In December, 1914, the Interstate Commerce Commission authorized an advance of freight rates applied for by the eastern roads. This increased the rates about five per cent on a limited part of this Company's business.

Throughout the year much progress has been made in revising class rates, merchandise and commodity rates, with the idea of removing discrimination.

Some rates have been increased and some have been reduced, but on the whole the rate basis is on a slightly higher plane.

Taxes.—There was a considerable decrease in the taxes paid by the Company for the last fiscal year, due to the decreased market value of the Company's securities, which was the basis for tax assessments in Connecticut and Massachusetts. The Connecticut law was changed at the last session of the Legislature to a gross income basis. On this account the taxes for the coming year will show an increase over the last year.

Valuation.—During the past year the forces of the Interstate Commerce Commission have been engaged actively in the work of valuation of the property of this Company, under the Act of Congress passed March 1, 1913.

The date of valuation of the property of your Company and its leased lines was fixed as of June 30, 1915, and that of the Central New England as of June 30, 1916.

The government roadway parties have made a cross-section survey of the roadbed and an inventory of the track material on about four hundred miles of road, the land parties have completed an investigation of the values of similar and adjoining land on about one hundred and twenty miles, the electrical party has completed its inventory of electrical construction on the Providence, Warren & Bristol and on the Norwich & Worcester and is now at work on the line between Hartford and Rockville, a telephone and telegraph party has just started, the structural parties have commenced the inventory of bridges, and will soon commence the inventory of buildings, the signal and interlocking party will begin during the fall and the equipment parties expect to commence the inspection of machinery and equipment in December.

It is hoped that these inventories will be completed prior to January 1, 1917, by which time the survey being made by the Company should be completed, there now remaining about 500 miles unfinished.

While the Act provides that the inventory of the property shall be made by the Commission, the Company is required to complete the survey of its lands; to furnish a large amount of information and data required of the carriers by the Commission; and to co-operate and aid the Commission in the valuation work.

A valuation department was organized in December, 1913, and \$115,064.51 has been expended to June 30, 1915. About 130 employees are now engaged in the work at a cost of approximately \$150,000.00 per year and it is expected that the entire cost will equal, if not exceed, \$500,000.00.

It is impossible to estimate when the whole work will be finished, but a tentative valuation may be reached some time during the year 1917.

Investigation by Public Service Commission of Massachusetts.—In the Massachusetts Act validating the Company's securities a provision was included directing the Public Service Commission to make an examination of the financial affairs of the Company. That investigation is now going on, and the Company is giving the Commission every assistance.

The relations between the state commissions, the Interstate Commerce Commission, and the Company have been frank and cordial, and the members of the various commissions have been receptive of suggestions and helpful with advice and action. The relations with the public and with the press have also been pleasant throughout the year.

The standing of the Company with the public and with public bodies has helped it to tide over a most serious period.

The road is solvent and its next most important problem is to adopt some comprehensive plan for handling its debts and providing funds for making those improvements which are essential.

The road is owned by the people who live along its lines, and your particular attention is directed to the classified list of stockholders on page 46 showing the large number who own a small amount of the stock. These stockholders can help themselves and the Company by taking an interest in its affairs.

The improved results for the year were obtained by hard, painstaking work, and a spirit of co-operation by the officers and men, for which the directors of the Company and the stockholders are thankful. Acknowledgment must also be made to the patrons of the road, to the press, and to the public authorities for their assistance.

Your attention is called to the statements of account of the New Haven Company and of each one of the subordinate properties.

Respectfully submitted,

By order of the Board of Directors,

HOWARD ELLIOTT,
Chairman.

PROFIT AND LOSS ACCOUNT

CREDIT.

Balance brought forward from June 30, 1914.....	\$1,822,246.14
Net income for the year.....	2,307,971.43
Adjustment with Boston & Albany Railroad of operating and Equipment Trust agreements.....	99,696.22
Difference between par and amount paid for The N. Y. N. H. & H. R. R. Co. 5% Collateral Gold Notes dated May 1, 1914	8,025.93
Profit on sale of securities.....	3,853.75
Overcharges carried in "Other Unadjusted Credits" now found to be unrefundable and transferred to Profit and Loss	18,665.27
Miscellaneous	1,020.01
	\$4,261,478.75

DEBIT.

Amount paid other roads account of unadjusted per diem charges during the period October 1, 1907, to February 28, 1908....	\$160,892.34
Amount paid The Rhode Island Company account cancellation of certain operating agreements	120,000.00
Value of property or facilities abandoned....	108,489.60
Discount on Equipment Trust Certificates Series "AA" dated November 2, 1914.....	19,400.00
Reduction in stock value of interlocking and signal material on hand.....	118,010.31
Miscellaneous charges	1,652.21
	528,444.46
Balance June 30, 1915, as per balance sheet.....	\$3,733,034.29

STATEMENT OF CONTINGENT LIABILITIES.

JUNE 30, 1915.

Under the provisions of Section 4, Chapter 519, of the Acts of the General Court of the Commonwealth of Massachusetts, passed at its 1909 Session, The New York, New Haven and Hartford Railroad Company is authorized to guarantee the principal of, and the dividends and interest upon, the capital stock, bonds, notes and other evidences of indebtedness of Boston Railroad Holding Company. On June 15, 1910, the General Court of the Commonwealth of Massachusetts passed an act authorizing the issue of preferred stock (without voting power) of Boston Railroad Holding Company, in exchange for its four per cent. fifty-year Debentures dated November 1st, 1909; and on January 10th, 1911, the \$20,012,000.00 Debentures owned by The New York, New Haven and Hartford Railroad Company were exchanged for preferred stock. On June 30, 1915, there were held by the public 28,000 shares of preferred stock of Boston Railroad Holding Company, on which the guaranty of four per cent. cumulative dividends per annum and the payment of principal at one hundred per cent. on liquidation had been executed, and on the same date The New York, New Haven and Hartford Railroad Company owned the following stock, which is held by Trustees for the Company under decree of the Federal Court:

31,065 shares of Common Stock of Par Value...\$3,106,500.00
 244,939 shares of Preferred Stock of Par Value...24,493,900.00

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY

Is liable jointly with other roads for any deficiency on foreclosure of bonds of the Boston Terminal Company.

Guarantees the payment of principal and interest of the four per cent. First Mortgage Gold Bonds of the Central New England Railway Company

of the issue of January 1, 1911, to the amount of \$13,427,000.00.

Guarantees four per cent. dividends on preferred stock of the New England Investment and Security Company, \$4,000,000.00, and payment of principal at one hundred five per cent. on liquidation; also guarantees the payment of principal, \$5,000,000.00 and interest of the New England Investment and Security Company fifteen-year Funding Gold Notes dated April 1, 1909.

Guarantees the payment of principal and interest of the Gold Debenture of The New England Navigation Company in case of termination of lease of the Old Colony Railroad Company, \$3,600,000.00.

Guarantees jointly and severally with The Pennsylvania Railroad Company the payment of the principal and interest of The New York Connecting Railroad Company First Mortgage four and one-half per cent. Gold Bonds due August 1, 1953, of the principal amount outstanding of \$16,000,000.00.

Guarantees the payment of principal and interest of the four per cent. fifty-year First and Refunding Mortgage Gold Bonds of the New York and Stamford Railway Company of the issue of November 1, 1908, to the amount of \$247,000.00.

Guarantees the payment of principal and interest of the four and one-half per cent. First Mortgage Gold Bonds of the New York, Westchester and Boston Railway Company of the issue of July 1, 1911, to the amount of \$19,200,000.00.

Guarantees four per cent. dividends on preferred stock of the Springfield Railway Companies, \$3,387,900.00, and payment of principal at one hundred five per cent. on liquidation.

STATEMENT OF FINANCIAL OPERATIONS, YEAR ENDING

JUNE, 30, 1915.

RESOURCES TO ACCOUNT FOR.

Cash on hand and in banks June 30, 1914	\$4,806,237.43
Special deposits for payment of interest, dividends, etc.	1,747,014.33
	\$6,553,251.76
Income for the year:	
Balance after expenses, taxes and fixed charges	2,307,971.43
Increase in Notes Payable.....	6,370,000.00
Decrease in sundry assets:	
Treasury securities sold	
6% Convertible Debenture Certificates	\$113,000.00
Miscellaneous securities	64,747.11
Notes of other companies and individuals paid off	1,062,127.91

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY.

GENERAL BALANCE SHEET, JUNE 30, 1915.

ASSETS.			LIABILITIES.		
	1915.	Comparison with 1914. Increase or decrease.		1915.	Comparison with 1914. Increase or decrease.
INVESTMENTS:			STOCK:		
Road	\$134,024,062.55	—\$56,117.44	Capital Stock (in hands of public)...	\$157,117,900.00	
Equipment	61,481,781.17	—341,564.53	Premium on Capital Stock (since July 1, 1909)	19,282,887.50	
	\$195,505,843.72	—\$397,681.97		\$176,400,787.50	
Improvements on Leased Railway			LONG TERM DEBT:		
Property	3,990,421.40	463,915.36	Mortgage Bonds (See Page 40)	\$58,779,000.00	
Sing Funds	\$144,495.00		Less held in Treasury and Sinking Fund	391,000.00	58,388,000.00
Less Company's own issues	144,000.00	—741,656.60			—\$172,000.00
Miscellaneous Physical Property.....	5,357,414.95	—2,974,264.39	Debentures (See Page 41).....	\$157,964,450.00	
Investment in buildings at Grand Central Terminal, New York City..	6,001,794.12	643,432.37	Less held in Treasury	2,072,350.00	155,892,100.00
Stocks—In hands of					\$113,000.00
Trustees (See Page 36)...	53,369,953.36	53,369,953.36	LOANS AND BILLS PAYABLE.....	30,139,000.00	6,370,000.00
Pledged (" " 37)...	31,444,196.21	—13,195,821.61	NON NEGOTIABLE DEBT TO AFFILIATED COMPANIES	807,536.58	—221,408.54
Unpledged (" " 38)...	77,639,368.72	—39,887,712.16		\$245,226,636.58	\$6,089,591.46
Bonds—Pledged (" " 38)...	14,270,027.50	10,656,404.45	LIABILITY UNDER CONTRACT WITH NEW YORK CENTRAL FOR THIS COMPANY'S HALF INTEREST IN EQUIPMENT OF B. & A. EQUIPMENT TRUST OF 1912		—\$2,436,000.00
Unpledged (" " 38)...	4,515,668.50	—8,554,781.71	CURRENT LIABILITIES:		
Notes—Pledged	38,515,650.14	3,534,403.48	Traffic and Car Service Balances Payable	4,430,008.78	1,152,090.08
Unpledged (See Page 39)...	1,642,671.63	—3,014,708.17	Audited Accounts and Wages Payable	3,741,729.72	—1,072,231.36
Advances Unpledged (" " 39)...	1,642,671.63	—3,014,708.17	Miscellaneous Accounts Payable....	56,000.00	56,000.00
Total Investments	\$432,253,505.25	\$3,823,162.41	Matured Dividends and Interest Unpaid	1,960,753.94	694,924.57
CURRENT ASSETS:			Matured Funded Debt Unpaid.....	6,512.68	—22,000.00
Cash	3,786,642.93	—1,019,594.50	Matured Interest Accrued.....	2,448,502.69	86,610.08
Special Deposits	2,113,400.82	366,386.49	Unmatured Rents Accrued.....	489,070.05	16,230.98
Net Balance due from Agents and Conductors	3,133,065.66	306,657.21	Other Current Liabilities.....	230,233.11	—142,422.34
Traffic and Car Service Balances Receivable	211,876.27	—107,382.84		\$13,362,810.97	\$769,202.01
Miscellaneous Accounts Receivable..	4,056,955.93	—1,444,817.90	DEFERRED LIABILITIES:		
Materials and Supplies.....	5,582,699.18	—59,641.02	Retained Percentages due Contractors	83,160.06	83,160.06
Interest and Dividends Receivable..	448,664.16	—624,359.25	Deposits account of Sidetracks.....	72,153.00	8,889.30
Loans and Bills Receivable.....	4,693.97	2,906.45		\$155,313.06	\$92,049.36
Other Current Assets.....	201,314.16	—350,887.99	UNADJUSTED CREDITS:		
Total Current Assets.....	\$19,539,313.08	—\$2,930,733.35	Accrued Taxes	205,542.57	17,746.46
DEFERRED ASSETS:			Personal Injury Reserve.....	697,608.69	—344,988.48
Working Fund Advances.....	88,694.87	—751,942.35	Other Unadjusted Credits.....	1,968,227.80	—5,656,755.59
UNADJUSTED DEBITS:				\$2,871,379.06	—\$5,983,997.61
Rents and Insurance Premiums Paid in Advance	20,008.71	—4,009.71	RESERVE FOR ACCRUED DEPRECIATION OF EQUIPMENT	3,742,865.27	1,597,131.30
Road and Equipment Suspense Account	599,310.04	592,341.70	SINKING FUND RESERVES.....		—623,188.03
Other Unadjusted Debits.....	2,469,064.01	688,884.01	EQUIPMENT AND PERSONAL PROPERTY LEASED	9,477,069.23	2,126.07
Total Unadjusted Debits.....	\$3,088,382.76	\$1,277,216.00	PROFIT AND LOSS—SURPLUS (See Page 32)	3,733,034.29	1,910,788.15
GRAND TOTAL	\$454,969,895.96	\$1,417,702.71	GRAND TOTAL	\$454,969,895.96	\$1,417,702.71

NOTE.—1914 balance sheet figures have been revised to conform with classification effective July 1, 1914.

Materials and Supplies.....	\$59,641.02	
Miscellaneous Physical Property account termination of Boston & Albany Equip- ment Trust	538,570.97	\$1,838,087.01
Decrease in sundry current assets plus in- crease in sundry liabilities.....		3,400,426.21
		<u>\$20,469,736.41</u>

RESOURCES ACCOUNTED FOR.

Expenditures:		
For additions and betterments.....	\$828,989.53	
For new equipment.....	707,936.67	
	<u>\$1,536,926.20</u>	
Less excess of real estate sold.....	178,664.34	
Abandoned structures	198,438.45	
Equipment retired	958,195.34	
		<u>\$201,628.07</u>
Advances account structures at Grand Cen- tral Terminal, N. Y.	643,432.37	
Improvements on Leased Railway Properties	463,915.36	
Advances to subsidiary companies covered by notes	520,982.06	
Advances to subsidiary companies for bet- terments	16,678.80	
		1,645,008.59
Notes of Harlem River & Port Chester R. Co. paid off.....		10,000,000.00
Securities of other companies acquired....		1,929,251.15
Mortgage debt paid off.....		150,000.00
Bonds purchased for Sinking Fund.....		22,000.00
Increase in Notes Receivable.....		2,906.45
Increase in sundry assets—Park Square Property		306.58
Decrease in Non-Negotiable Debt to Affili- ated Companies		221,408.54
Profit and Loss:		
Balance of sundry accounts.....		397,183.28
Cash on hand and in banks June 30, 1915..	3,786,642.93	
Special deposits for payment of interest, dividends, etc.	2,113,400.82	
		<u>5,900,043.75</u>
		<u>\$20,469,736.41</u>

INVESTMENTS.

STOCKS—IN THE HANDS OF TRUSTEES APPOINTED BY U. S. DISTRICT COURT			
	No. of Shares.	Par Value.	Book Value.
*Boston & Maine R. R. Leased Lines:			
Boston & Lowell R. R. Corp..	412	\$41,200.00	\$88,775.13
Concord & Montreal R. R....	2,469	246,900.00	395,765.70
Concord & Portsmouth R. R. Co.	18	1,800.00	3,285.00
Conn. & Pass. Rivers R. R. Co.	1,464	146,400.00	208,162.44
Connecticut River R. R. Co.	1,015	101,500.00	276,220.04
Hereford Railway Co.....	246	24,600.00	21,928.77
Lowell & Andover R. R. Co.	193	19,300.00	41,919.26
Manchester & Lawrence R. R. Co.	63	6,300.00	14,081.66
Massachusetts Valley R. R. Co..	354	35,400.00	46,020.00
Nashua & Lowell R. R. Corp.	84	8,400.00	20,170.51
Northern R. R. (of New Hampshire)	922	92,200.00	130,750.27
Pemigewasset Valley R. R. Co.	710	71,000.00	99,676.51
Peterborough R. R. Co.....	86	8,600.00	8,390.00
Upper Coos R. R. Co. (of New Hampshire)	73	7,300.00	10,242.75
Vermont & Mass. R. R. Co..	184	18,400.00	30,439.77
Wilton R. R. Co.....	98	9,800.00	21,389.14
Boston R. R. Holding Co., Com- mon and Preferred	276,004	27,600,400.00	27,600,400.00
Rhode Island Co., The.....	96,855	9,685,500.00	24,352,336.41
Total	381,250	\$38,125,000.00	\$53,369,953.36

* Under decree of the Court the investments in Boston and Maine leased lines must be sold on or before January 1, 1917.

STOCKS—PLEDGED AND UNPLEDGED.

UNPLEDGED			
	Shares	Par Value.	Book Value.
Berkshire Street Ry. Co.....	53,981	\$5,398,100.00	\$6,371,395.58
Boston & Providence R. R. Cor- poration	5,246		
Central Terminal Co., The.....	2,000	200,000.00	200,000.00
Central New England Ry. Co., Common and Preferred (Scrip, \$136.78)	85,320	8,532,136.78	1,921,727.96
Harlem River & Port Chester R. R. The.....	10,000	1,000,000.00	1,000,000.00
Hartford & Connecticut Western R. R. Co.....	17,482	1,748,200.00	1,201,063.69
Holyoke & Westfield R. R. Co...	200	20,000.00	20,000.00
Iron Works Aqueduct & Water Co.	1/12	100.00	100.00
Millbrook Company	1,000	100,000.00	100,000.00
New England Navigation Co., The	494,055	49,405,500.00	53,322,899.48
New York Connecting R. R. Co., The	15,000	1,500,000.00	1,527,204.33
New York, Ontario & Western Ry. Co., Common and Preferred..	291,622		
New York & Stamford Ry. Co...	5,000	500,000.00	610,643.40
New York, Westchester & Bos- ton Ry. Co. (Scrip, \$37.50)	49,249	4,924,937.50	6,241,951.76
Norwich & Worcester R. R. Co.	971		
Old Colony Railroad Co.....	98,132		
Pennsylvania R. R. Co., The...	1,168	58,400.00	71,907.64

Pittsfield & North Adams R. R. Corp.	50	\$5,000.00	\$6,965.26
Providence, Warren & Bristol R. R. Co., Common and Preferred	4,868	100.00	220.00
Providence & Worcester R. R. Co.	9,551		
Quincy Quarries Co.....	38	1,900.00	2,110.00
Queensbury Mills, Inc.....	2 1/2		
	Scrip	\$66.27	266.27
Roxbury Central Wharf Co.....	7		17.00
Rutland R. R. Co.....	23,520 1/2	2,352,050.00	2,364,977.15
South Bay Wharf & Terminal Co.	9		19.00
Vermont Co., The.....	6,500	650,000.00	571,164.31
Waterbury Gas Light Co.....	21,472	536,800.00	1,174,027.86
Westchester St. R. R. Co., The..	7,000	700,000.00	905,783.53
Westinghouse Air Brake Co.....	9	450.00	967.00
Wood River Branch R. R. Co...	336	33,600.00	21,477.50
Miscellaneous	25	2,500.00	2,500.00
Total	1,203,813 1/2	\$77,670,040.55	\$77,639,368.72
	Scrip.	\$240.55	

The following are pledged as part of collateral securing \$27,000,000.00 One Year 5% Gold Notes of The N. Y., N. H. & H. R. R. Co. dated May 1, 1915:

Boston & Providence R. R. Corporation, par value \$524,600.00, book value \$1,582,443.18; New York, Ontario & Western Ry. Co., Common and Preferred, par value \$29,162,200.00, book value \$13,108,397.62; Nor-
wich & Worcester R. R. Co., par value \$97,100.00, book value \$219,038.19;
Old Colony R. R. Co., par value \$9,813,200.00, book value \$13,065,341.80;
Providence, Warren & Bristol R. R. Co., Common and Preferred, par
value \$486,700.00, book value \$730,212.67; Providence & Worcester R. R.
Co., par value \$955,100.00, book value \$2,738,762.75; total par value \$41-
038,900.00, book value \$31,444,196.21.

† Nominal Value.

BONDS—PLEDGED AND UNPLEDGED.

	Rate of Interest.	UNPLEDGED Par Value.	Book Value.
Berkshire Street Ry. Co.:			
20 Year Gold Debentures due 1925.	5 %	\$200,000.00	\$200,000.00
Central New England Ry. Co.:			
First Mortgage 50 Year Gold Bonds due 1961	4 %		
Income Bonds (Scrip) due 1949...	5 %	608.50	608.50
Dutchess County R. R. 1st Mtg. Gold Bonds due 1940.....	4 1/2 %	5,000.00	5,230.00
Chicago & Eastern Illinois R. R. Co.: Consolidated & 1st Mtg. 50 Year Bonds due 1937.....	5 %	22,000.00	25,300.00
Chicago, Rock Island & Pacific Ry. Co.: General Mtg. Gold Bonds due 1988.	4 %	38,000.00	38,000.00
Harlem River & Port Chester R. R., The: 15 Year Prior Lien Gold Debs. dated May 1, 1915.....	5 %		
New York & Stamford Ry. Co.: First & Refunding 50 Year Gold Bonds due 1958.....	4 %	678,000.00	599,880.00
New York, Westchester & Boston Ry. Co.: First Mortgage Gold Bonds due 1946	4 1/2 %	2,190,000.00	2,190,000.00
Park Square Theatre, Inc.: Second Mortgage Notes due 1932...	5 %	320,000.00	320,000.00
Pawtuxet Valley Electric St. Ry. Co.: Bonds due 1933.....	5 %	38,000.00	39,900.00
Vermont Co., The: First Mtg. 20 Year Gold Bonds due 1931	5 %	846,000.00	846,500.00
Westchester Street R. R. Co., The: First Mtg. Gold Bonds dated Sept. 1, 1914.....	5 %	222,000.00	222,000.00
Wood River Branch R. R. Co.: First Mortgage Bonds due 1924....	5 1/2 %	56,500.00	28,250.00
Total		\$4,616,108.50	\$4,515,668.50

The following are pledged as part of collateral securing \$27,000,000.00 One Year 5% Gold Notes of The N. Y., N. H. & H. R. R. Co. dated May 1, 1915:

Central New England Ry. Co., first mortgage 50-year gold bonds due 1961, par value \$1,500,000.00, book value \$1,270,027.50; Harlem River & Port Chester R. R., The, 15-year prior lien gold debt, dated May 1, 1915, par value \$13,000,000.00, book value \$13,000,000.00; total par value \$14,500,000.00, book value \$14,270,027.50.

NOTES—UNPLEDGED.

	Rate of Interest	Amount.
Berkshire Street Ry. Co.....	6%	\$3,364,760.45
City Lumber & Coal Co.....	5%	10,000.00
Connecticut Co., The.....	6%	2,025,000.00
Harlem River & Portchester R. R. Co., The.....	4%	15,000,000.00
Hartford & Conn. Western R. R. Co., The.....	5%	819,781.71
Housatonic Power Co.....	6%	1,240,000.00
Larkin, P. Co.....	5%	63,894.05
Millbrook Company.....	5 and 6%	2,278,241.21
New England Navigation Co., The.....	4 1/2, 5 and 6%	3,004,808.04
New York & Stamford Ry. Co.....	6%	189,872.08
New York, Westchester & Boston Ry. Co.....	5 and 6%	5,478,751.00
Providence, Warren & Bristol R. R. Co.....	6%	352,397.30
Rhode Island Co., The.....	6%	3,230,001.00
Rutland R. R. Co.....	6%	150,000.00
Salts Textile Mfg. Co.....	5%	75,000.00
Shearer Realty Trust.....	5%	150,000.00
Trustees of the Mass. Automobile Club Trust.....	5%	90,000.00
Westchester Street R. R. Co., The.....	6%	88,643.30
Wood River Branch R. R. Co.....	5 and 6%	4,500.00
Total		\$38,515,650.14

ADVANCES—UNPLEDGED.

Boston & Providence R. R. Corporation.....	\$101,060.62
New York, Westchester & Boston Ry. Co.....	\$1.00
Norwich & Worcester R. R. Co.....	\$20,729.04
Old Colony R. R. Co.....	720,880.97
Total	<u>\$1,642,671.63</u>

* The advances made to the New York, Westchester & Boston Railway Co. amount to \$2,764,775.00, but as the prospect of their being repaid is very remote, they have been reduced to a nominal value of \$1.00.

DEBENTURES, INCLUDING DEBENTURES OF MERGED ROADS ASSUMED.

	Total Outstanding.	Date of Maturity.	Interest	Payable.
*Convertible 6% Debenture Certificates	\$39,029,000.00	Jan. 15, 1948	Jan. 15	July 15
*Convertible 3½% Debenture Certificates	9,765,450.00	Jan. 1, 1956	Jan. 1	July 1
Non-Convertible 4% Debentures	5,000,000.00	Mch. 1, 1947	Mch. 1	Sept. 1
*Non-Convertible 3½% Debentures	5,000,000.00	Mch. 1, 1947	Mch. 1	Sept. 1
*Non-Convertible 3½% Debentures	10,000,000.00	Apr. 1, 1954	Apr. 1	Oct. 1
Non-Convertible 4% Debentures	15,000,000.00	July 1, 1955	Jan. 1	July 1
Non-Convertible 4% Debentures	15,000,000.00	May 1, 1956	May 1	Nov. 1
European Loan of 1907	27,985,000.00	Apr. 1, 1922	Apr. 1	Oct. 1
Naugatuck R. R. Co. 3½% Debentures	234,000.00	Oct. 1, 1930	Apr. 1	Oct. 1
Hartford Street Railway Co. 4% Debentures	165,000.00	Jan. 1, 1930	Jan. 15	July 15
The Consolidated Railway Co.				
*3%, 3½% and 4% Debentures	972,000.00	Feb. 1, 1930	Feb. 1	Aug. 1
4% Debentures	4,255,000.00	July 1, 1954	Jan. 1	July 1
4% Debentures	2,309,000.00	Jan. 1, 1955	Jan. 1	July 1
4% Debentures	1,340,000.00	Apr. 1, 1955	Apr. 1	Oct. 1
4% Debentures	2,011,000.00	Jan. 1, 1956	Jan. 1	July 1
Providence Securities Co.				
*4% Gold Debentures	19,899,000.00	May 1, 1957	May 1	Nov. 1
Total	\$157,964,450.00			

* Include Treasury Holdings as follows:

Convertible 6% Debenture Certificates	\$487,800.00
Convertible 3½% Debenture Certificates	852,100.00
3½% Non-Convertible Debentures, 1947	9,000.00
3½% Non-Convertible Debentures, 1954	2,100.00
The Consolidated Ry. Co. 3%, 3½% and 4% Debentures	2,350.00
Providence Securities Co. 4% Gold Debentures	719,000.00
Total	\$2,072,350.00

ADDITIONS AND BETTERMENTS.

Owing to financial conditions, the expenditures for Additions and Betterments have been comparatively small and only cover work that was absolutely necessary.

The expenditures for the year ending June 30th, 1915, follow:

New or improved bridges	\$365,938.89
Woodlawn, N. Y.-New Haven, Conn., electrification, control system, power plant, etc.	114,285.19
Pittsfield, platform and tracks	14,362.95
Middletown-Willimantic, Conn., improvements	12,102.36
Stamford-New Haven, Conn., signals	22,097.97
Olneyville, R. I., freight facilities	21,730.91
Ellis, Mass., parallel highway	19,853.61
Springfield, Mass., interlocking plant and track changes	14,408.37
Increased weight of rail laid	90,908.78
Hartford, Conn., yard facilities	10,429.65
Elimination of Grade Crossings	38,416.07
Sundry other additions and betterments	104,454.78
	\$828,989.53

Less:	
Excess of Real Estate sold	\$178,664.34
Buildings and sidings abandoned	198,438.45
	\$377,102.79
	\$451,886.74

New Equipment, consisting of 6 club cars, 26 baggage cars, 50 cabooses, 2 derrick cars and 1 truck car, was received during the year and paid for out of cash.	
Cars were converted as follows: 39 box, 3 flat, 9 coal, 1 derrick car, 1 wrecking and 2 "Other passenger train cars" converted into "Other company service cars," 2 coal, 1 coach and 2 baggage cars into wrecking cars, 1 coal car into a derrick car, 2 postal cars into combination cars	707,936.67
	\$1,159,823.41

Less:	
Equipment put out of service: 25 passenger, 6 freight, 8 switch and 2 electric locomotives, 34 coach and smoking and 21 other passenger train cars, 1,078 coal and 355 other freight train cars, 78 work equipment cars	958,195.34
Total	\$201,628.07

These expenditures were disposed of as under:	
Charged to Road Suspense (account work not yet completed)	\$508,004.18
Charged to Equipment Suspense (account work not yet completed)	91,305.86
	\$599,310.04

Less:	
Credited to Cost of Road	56,117.44
Credited to Equipment	341,564.53
	\$397,681.97
	\$201,628.07

MORTGAGE BONDS, INCLUDING BONDS OF MERGED ROADS ASSUMED.

	Rate and Character of Debt.	Total Outstanding.	Date of Maturity	Interest	Payable.
N. Y., N. H. & H. R. R. Co.—H. R. & P. Co.	4% First Mortgage	\$15,000,000.00	May 1, 1954	May 1	Nov. 1
†New York, Prov. & Boston R. R. Co.	4% General Mortgage	1,000,000.00	April 1, 1942	April 1	Oct. 1
Housatonic R. R. Co.	5% Consolidated Mortgage	2,839,000.00	Nov. 1, 1937	May 1	Nov. 1
Danbury & Norwalk R. R. Co.	6% Consolidated Mortgage	100,000.00	July 1, 1920	Jan. 1	July 1
Danbury & Norwalk R. R. Co.	5% Consolidated Mortgage	400,000.00	July 1, 1920	Jan. 1	July 1
Danbury & Norwalk R. R. Co.	5% General Mortgage	150,000.00	April 1, 1925	April 1	Oct. 1
Danbury & Norwalk R. R. Co.	First Refunding Mtge. Gold	350,000.00	June 1, 1955	June 1	Dec. 1
New Haven & Derby R. R. Co.	5% Consolidated Mortgage	575,000.00	May 1, 1918	May 1	Nov. 1
Providence & Springfield R. R. Co.	5% First Mortgage	750,000.00	July 1, 1922	Jan. 1	July 1
Naugatuck R. R. Co.	4% First Mortgage	2,500,000.00	May 1, 1954	May 1	Nov. 1
Boston & New York Air Line R. R. Co.	4% First Mortgage Gold	3,777,000.00	Aug. 1, 1955	Feb. 1	Aug. 1
Providence Terminal Company	4% First Mortgage Gold	4,000,000.00	Mch. 1, 1956	Mch. 1	Sept. 1
†Worcester & Conn. Eastern Ry. Co.	4½% First Mortgage Gold	1,992,000.00	Jan. 1, 1943	Jan. 1	July 1
New Haven & Centerville St. Ry. Co.	5% First Mortgage	283,000.00	Sept. 1, 1933	Mch. 1	Sept. 1
Meriden Horse R. R. Co.	5% Consolidated Mortgage	415,000.00	Jan. 1, 1924	Jan. 1	July 1
Norwich Street Railway Co.	5% First Mortgage	350,000.00	Oct. 2, 1923	April 1	Oct. 1
Montville Street Railway Co.	5% First Mortgage	250,000.00	May 1, 1920	May 1	Nov. 1
New London Street Railway Co.	5% First Mortgage	150,000.00	Oct. 2, 1923	April 1	Oct. 1
Portland Street Railway Co.	5% First Mortgage	30,000.00	Nov. 1, 1916	May 1	Nov. 1
Hartford, Manchester & Rockville Tram. Co.	5% First Mortgage	200,000.00	Oct. 1, 1924	April 1	Oct. 1
Hartford Street Railway Co.	4% First Mortgage Gold	2,500,000.00	Sept. 1, 1930	Mch. 1	Sept. 1
Greenwich Tramway Co.	5% First Mortgage	320,000.00	July 1, 1931	Jan. 1	July 1
*Branford Electric Co.	5% First Mortgage	63,000.00	Oct. 1, 1937	April 1	Oct. 1
Torrington & Winchester St. Ry. Co.	5% First Mortgage	150,000.00	Dec. 1, 1917	June 1	Dec. 1
Meriden, Southington & Compounce Tramway Co.	5% First Mortgage	175,000.00	July 1, 1928	Jan. 1	July 1
Pawtuxet Valley R. R. Co.	4% First Mortgage	160,000.00	April 1, 1925	April 1	Oct. 1
New England R. R. Co.	4% Consolidated Mortgage	10,000,000.00	July 1, 1945	Jan. 1	July 1
New England R. R. Co.	5% Consolidated Mortgage	7,500,000.00	July 1, 1945	Jan. 1	July 1
Stafford Springs Street Ry. Co.	5% First Mortgage Gold	400,000.00	July 1, 1956	Jan. 1	July 1
New Haven & Northampton Co.	4% Refunding Cons. Mtge. Gold Bonds	2,400,000.00	June 1, 1956	June 1	Dec. 1
Total		\$58,779,000.00			

† In Treasury of the Company.

New York, Providence & Boston R. R. Co., 4% General Mortgage Bonds \$247,000.00

† In Sinking Fund (New York Trust Company, Trustees).

Worcester & Connecticut Eastern Ry. Co. 4½% First Mortgage Gold Bonds 144,000.00

* Principal and interest to maturity deposited with the Union and New Haven Trust Co.

\$391,000.00

NOTE.—Certain property of this Company is subject to a lien under a mortgage of the New York & New England Railroad Company to secure Boston Terminal Bonds of that Company to the amount of \$1,500,000, due April 1, 1939, bearing interest at 4 per cent.

ST. LOUIS SOUTHWESTERN RAILWAY COMPANY—TWENTY-FOURTH ANNUAL REPORT

OFFICE OF
CHAIRMAN OF THE BOARD OF DIRECTORS.

NEW YORK, September 15, 1915.

To the Stockholders of the St. Louis Southwestern Railway Company:

On behalf of the Board of Directors, I present herewith the Twenty-fourth Annual Report of your Company, for the fiscal year ended June 30, 1915.

The comprehensive report of the President, which follows, exhibits in detail the revenues, expenses and other results from operation, as well as the financial and physical condition of your property.

The fiscal year just closed has been fraught with many anxieties and diffi-

culties, as is a matter of common knowledge. The President has, in his report, reviewed, somewhat in detail, the adverse conditions resultant from the European war, explaining that the agricultural and industrial interests of the cotton growing sections of the South, especially, have been subjected to the most trying conditions experienced for many years, because of the difficulties encountered in marketing the largest crop of cotton ever produced and the low prices received for the staple. As cotton is essentially the "money crop" of the South, these conditions greatly restricted the purchasing power of the cotton growers and all branches of trade, and seriously affected the revenues of your Company as they did the revenues of other carriers operating in the same section of the country.

Owing to the unfavorable bond market, brought about by the general un-

settled financial conditions, the unsatisfactory rate situation and other influences, your Company, in common with other carriers, has been unable to market its bonds, issued on account of moneys advanced from its Treasury to cover expenditures for additions and betterments, at anything like fair prices. In order to provide necessary cash for current needs, it was found necessary, during the past year, to negotiate temporary loans, aggregating the sum of \$1,585,000.00 for which there was pledged as collateral free assets in the form of Treasury securities, as follows:

	Par Value
First Terminal and Unifying Mortgage Bonds—	
St. Louis Southwestern Ry. Co., 5%.....	\$2,420,000.00
First and Refunding Mortgage Bonds—	
Paragould Southeastern Ry. Co., 5%.....	250,000.00
First Mortgage Bonds—	
Southern Illinois & Missouri Bridge Co., 4%.....	600,000.00

Total\$3,270,000.00
Reference is here made to exhibit "R," to be found on page 48, containing a summary of property investments and advances unfunded, and unpledged securities not necessary for control, held in the Company's Treasury, as of June 30, 1915. This statement does not include any of the securities owned by the company heretofore pledged as collateral, and it may be stated, as a matter of information, that the Company's Treasury may be reimbursed later on through bond issues or otherwise, for the amounts included in this exhibit on account of property investments and advances unfunded.

Exhibit "S" on page 49 furnishes, in a condensed form, an analysis of all resources, showing also how the same were applied during the fiscal year.

CAPITAL STOCK.

No change has been made in the Capital Stock of your Company during the current fiscal year.

FUNDED DEBT.

As shown by Exhibit "N," page 44, Funded Debt, including amount issued and held by or for company, has been increased \$185,000.00—explained as follows:

First Terminal and Unifying Mortgage Bonds Issued:	
For reimbursement of treasury on account of expenditures for addition and betterments made by the St. Louis Southwestern Ry. Co., and advances made to Proprietary, Affiliated and Controlled Companies, covering similar expenditures made by them to December 31, 1914, viz:	
St. Louis Southwestern Ry. Co.....	\$196,630.68
St. L. S.-W. Ry. Co. of Texas.....	311,369.32
	\$508,000.00

To acquire a like amount of First Refunding and Extension Mortgage Bonds of the Gray's Point Terminal Ry. Co.... 27,000.00

Total, Carried forward.....	\$535,000.00
First Terminal and Unifying Mortgage Bonds Issued:	
Brought forward.....	\$535,000.00

Deduct:	
Equipment Trust Obligations matured and paid during year:	
Series—with Penn. Co. for Ins. on Lives and Granting Annuities.....	\$ 34,000.00
Series "A"—with U. S. Mort. and Trust Co. of N. Y.....	46,000.00
Series—Special Equip. Trust with The Phila. Trust, Safe Deposit and Ins. Co.....	66,000.00
Series "D"—with U. S. Trust Co. of New York.....	34,000.00
Series "E"—with Guaranty Trust Co. of New York.....	170,000.00
	350,000.00

Net increase this year (including bonds issued and held by, or for, Company).....\$185,000.00

Decrease this year, in amount Outstanding in hands of Public, as shown by condensed general balance sheet (caused by payment during year of matured Equipment Trust Obligations, as listed above).....\$350,000.00

The issuance of the securities, as above shown, was authorized, after full bearing, by the Public Service Commission of the State of Missouri.

The crop outlook is very encouraging and it is hoped that business conditions may improve during the ensuing year.

The faithful and efficient services of the Company's officers and employees, during the past year is acknowledged with pleasure.

For the Directors,

EDWIN GOULD,
Chairman.

OFFICE OF THE PRESIDENT.

ST. LOUIS, MO., September 1, 1915.

MR. EDWIN GOULD,
Chairman of the Board of Directors:

DEAR SIR:

The Annual Report of the Company for the fiscal year ended June 30, 1915, showing the results from operation during the year and the financial and physical condition of the property at the close of the year is submitted herewith.

During the year the average main track mileage operated was 1,753.8 miles, an increase of 18.9 miles over the preceding year. The main track mileage operated at the close of the fiscal year, June 30, 1915, was 1,753.8 miles the same as at the close of preceding year.

In the condensed statement, immediately following, will be found the financial results from operation for the fiscal year ended June 30, 1915, compared with the preceding year.

FINANCIAL RESULTS FROM OPERATION—ENTIRE SYSTEM. INCOME STATEMENT FOR FISCAL YEAR.

ITEM.	Year Ended June 30, 1915.	Year Ended June 30, 1914.	+Increase —Decrease This Year.
AVERAGE MILES OPERATED...	1,753.8	1,734.9	+ 18.9
OPERATING INCOME:			
Railway Operating Revenues	\$10,627,861.12	\$12,791,904.44	—\$2,164,043.32
Railway Operating Expenses	8,361,153.66	9,833,800.61	— 1,472,646.95
Net Revenue from Railway Operations.	\$ 2,266,707.46	\$ 2,958,103.83	—\$ 691,396.37
Railway Tax Accruals...	\$ 581,778.28	\$ 601,886.34	—\$ 20,108.06

Uncollectible Railway Revenues	\$ 2,187.84	—	+\$ 2,187.84
Total	\$ 583,966.12	\$ 601,886.34	—\$ 17,920.22
Railway Operating Income	\$ 1,682,741.34	\$ 2,356,217.49	—\$ 673,476.15
NON-OPERATING INCOME	1,226,422.73	1,068,217.93	+ 158,204.80
GROSS INCOME.....	\$ 2,909,164.07	\$ 3,424,435.42	—\$ 515,271.35
DEDUCTIONS FROM GROSS INCOME.....	3,190,157.35	3,088,664.50	+ 101,492.85
INCOME BALANCE TRANSFERRED TO PROFIT AND LOSS	\$ 280,993.28	\$ 335,770.92	—\$ 616,764.20

OPERATING REVENUES

During the fiscal year just closed the agricultural and industrial interests of the South have been subjected to the most trying conditions experienced in many years.

For a long time the South has relied on cotton as their staple money crop and when last year, the largest crop of cotton ever produced failed to find a ready market, as a result of the European war, the growers were compelled to sacrifice their cotton in order to satisfy their obligations.

Viewing these conditions, which are of a temporary nature, from a broad standpoint, they will, undoubtedly, in the long run, prove "a blessing in disguise" to the cotton growing sections of the South, for the reason that the farmers and other business interests have now been forced to a realization of the fact that if the South is to become prosperous, its agriculture must be put upon a permanent basis of diversification, which will provide a living at home and something to sell. Furthermore, the old system under which the credit business of the Southern farmer has so long been conducted is giving way, as a result of these changed conditions, to a more substantial form of rural credits.

From statistics prepared by the New Orleans Cotton Exchange, it is found that the average price for "middling cotton" during the past cotton year was 7.94c per pound as compared with 13.49c during the preceding year, and 12.20c for the year before; and the average commercial value per bale was \$41.04 against \$68.06 during the preceding year, and \$63.59 for the year before.

The difficulties encountered in marketing the cotton crop and the prevailing low prices, as above outlined, resulted in the stagnation of all lines of business throughout the Southwest and seriously affected the Operating Revenues, both freight and passenger, of this company, in common with other carriers operating in the same section of the country.

The total Operating Revenues for the current fiscal year amounted to \$10,627,861.12, a decrease of \$2,164,043.32 or 16.92%, compared with the preceding fiscal year.

OPERATING EXPENSES

During the fiscal year ended June 30, 1915, the total Operating Expenses amounted to the sum of \$8,361,153.66, a decrease of \$1,472,646.95, or 14.98% as compared with preceding year, and was sufficient to offset over 68% of the loss in operating revenues.

The ratio of Operating Expenses to Operating Revenues was 78.67% as against 76.88% during the preceding year, or an increase of 1.79%.

The several general operating expense accounts show increases and decreases as compared with preceding fiscal year as follows:

Maintenance of Way and Structures.....	Decrease	\$351,161.33	or 18.13%
Maintenance of Equipment.....	Decrease	586,712.05	or 22.03%
Traffic Expenses	Decrease	55,574.92	or 10.99%
Transportation Expenses	Decrease	344,127.89	or 8.29%
Miscellaneous Operations Expenses.....	Decrease	12,359.77	or 20.55%
General Expenses	Increase	6,787.28	or 1.32%
Transportation for Investment—Cr.....	Increase	129,498.27	—

The substantial reduction in Maintenance of Way and Structures has been accomplished without impairment of the physical property and is a practical illustration of the benefits derived from the policy, pursued in the past, of fully maintaining and gradually improving the roadway, bridges and buildings, and this policy will be continued.

The saving in expenses under Maintenance of Equipment was largely due to the limitation placed on the amount of appropriations for repairs to "bad-order" freight cars (which were out of service and not urgently needed on account of the limited traffic movement during the past year)—the repairs to this class of equipment being deferred until more favorable traffic conditions warranted the outlay.

The decrease in Transportation Expenses would have been more favorable had it not been for the fact that several very large judgments (growing out of claims for personal injuries, resulting from accidents in prior years), were rendered against the Company, and were settled and charged against Transportation Expenses during the current fiscal year.

The increase in General Expenses was due principally to the increase in the primary account "Valuation Expenses," included under this head.

INCREASED BURDENS

The operating results of these lines, in common with those of other carriers, have been seriously affected during the past few years by reason of the increased burdens imposed through legislative and regulative enactments, causing losses in passenger, freight, mail and express revenues, added expenses and increased interest charges on capital invested in unproductive facilities and permanent improvements at terminals and elsewhere, reluctantly made in compliance with Federal, State and other laws, or to satisfy public demands.

The enforcement of the maximum two cents per mile passenger fares resulted in a shrinkage in the passenger revenues of these lines of approximately \$320,000 during the year under review, and of about \$340,000 during the preceding year. As this loss in revenue did not grow out of any reduction in the service rendered, this shrinkage could not be offset by a corresponding reduction in expenses.

Losses have also been sustained in express and mail revenues through legislative enactments, or orders of regulating bodies, which, while reducing the revenues, could not be met by reductions in expenses. For example, these lines sustained a loss during the fiscal year of about \$70,000 in express revenue, which was due, principally, to the inroads made on express business through the introduction by the Federal Government of the "Parcels Post" and also by the reduction in express rates which was made effective February 1, 1914.

The inadequate compensation allowed by the Government for transporting the mails is an important question now engaging the earnest attention of railway executives who are urging for adoption, as fair and equitable, the existing weight basis amended by annual weighing, payment for apartment cars and payment for, or release from, side or terminal messenger service.

While the revenues have suffered losses due to the causes mentioned, expenses and taxes, on the other hand, have been materially increased—thus, for instance, the so-called "Full Crew Law" enacted by several of the States through which these lines operate, resulted in an added expense during the past year of approximately \$23,000; "Hours of Service Acts"

caused an increase of approximately \$14,000; "Semi-monthly pay day" requirements, and other expenditures of a similar nature, about \$16,000, and payments for "Injuries to Persons" increased about \$82,000.

The "normal income tax" of one per cent, imposed by the Federal Government, on the income derived by holders of the Company's so-called "Tax Free" bonds (which tax the company is compelled to assume under the conditions of such bonds), amounted during the current fiscal year to about \$11,000. On account of the ruling of the Government that this tax is in the nature of a contractual obligation, on the part of carriers, the amounts thus assumed and paid cannot be charged to "Railway Tax Accruals" and has, therefore, been charged against Income through the primary account "Miscellaneous Income Charges" as prescribed in the classifications of the Interstate Commerce Commission.

The burdens of the company are also being continually increased, from year to year, because of the demands of organized labor in the matter of increased pay, shorter hours, etc.

RATE SITUATION

MISSOURI.—In the preceding annual report reference was made to the suits begun by the Attorney General of the State of Missouri against the railroads operating in that state to recover the difference between the Missouri statutory freight rates and the rates charged by the carriers for transporting freight and passengers between points in the State of Missouri during the time the Missouri State-made rates were being contested. On the 29th day of June, 1915, the Supreme Court of Missouri held that these suits could not be maintained. No refunds, have therefore, been made in the State of Missouri.

During the past year applications have been filed with the Public Service Commission of Missouri, by this company and all of the large trunk lines operating in the State, for higher freight rates and passenger fares. Numerous hearings have been held at which the carriers and shippers submitted testimony. Briefs have been filed, and on July 15, 1915, the case was finally submitted and argued. It is hoped that the presentation of these applications will result in the establishment by the Public Service Commission of Missouri of more reasonable freight rates and passenger fares.

ARKANSAS.—Reference was also made in the preceding annual report, to the appointment, by the Federal Court in Arkansas, of a Special Master to receive and pass upon claims for refunds growing out of the collection by the carriers operating in that state, while the Arkansas rates were being contested, of freight rates and passenger fares in excess of the State-made rates. Freight claims aggregating 289,237.47 were presented to the Master against this company, of which \$208,160.13 were allowed. Passenger claims aggregating \$13,500.00 were presented to the Master, and of these, claims aggregating \$7,743.61 were allowed.

Exceptions were filed with the Court to the allowance of all of these claims but subsequently a compromise agreement was entered into, which provided for the settlement of the allowed freight claims at fifty per cent. (50%) of the amount allowed (with the exception of certain claims aggregating \$45,000.00, which are being contested on the ground that they are based upon interstate shipments which are not subject to the state rates), the payment of such claims to be made in scrip issued by this company, redeemable within two years, in payment for Arkansas intrastate freight charges.

The agreement also provided for settlement of the passenger claims at one hundred per cent. (100%) of the amount allowed, in scrip, redeemable within two years, in payment for Arkansas intrastate passenger fares.

On this basis, as of June 30, 1915, \$160,931.78 of the freight claims had been settled by the issuance of freight scrip amounting to \$80,465.89 and passenger claims aggregating \$6,487.49 by the issuance of passenger scrip of an equivalent amount.

Owing to the large amount of these claims and to the fact that the liability on account of the same related to operating revenues and operating expenses of previous fiscal periods, authority was obtained from the Interstate Commerce Commission, to charge the amounts paid in settlement of the claims in question, together with \$22,265.56, representing the cost of printing the scrip, legal and other expenses incident to the settlement of the claims, etc., to Profit and Loss direct, through the primary account "Delayed Income Debits."

The balance of the freight and passenger claims allowed, and uncontested, will no doubt be settled under the terms of the compromise agreement during the ensuing fiscal year.

Since the rendition of the decree of the Supreme Court of the United States in the Arkansas rate case, the Arkansas carriers have filed a joint application with the Arkansas Railroad Commission for increases in freight rates. Several volumes of testimony were submitted by the carriers in support of, and by the shippers, in opposition to, this application. As a result, the Arkansas Railroad Commission has promulgated a new tariff of freight rates, effective May 20, 1915, which will return to this company on its Arkansas intrastate freight business, revenue approximately seven per cent. (7%) greater than the revenue accruing under the old rates.

During the fiscal year under review, the United States District Court for the Eastern District of Arkansas has, upon the petition of this company, and other Arkansas carriers, temporarily enjoined the application of the State-made passenger fare of two (2) cents per mile in the State of Arkansas. Pending a hearing on the application for a permanent injunction (which will be had during the coming Fall), effective June 2nd, 1915, a passenger fare of three (3) cents per mile is being charged, which will favorably affect the revenue from passenger traffic.

TEXAS.—Application has also been filed by all of the carriers operating in the State of Texas for increases in freight rates in that state. Considerable testimony has been heard by the Texas Commission for and against such increases and briefs are now being prepared.

INTERSTATE.—After the decision of the Supreme Court of the United States in the Missouri and Arkansas rate cases this company was forced by competition, and other influences, to reduce its interstate passenger fares in Arkansas and Missouri to two (2) cents per mile. It now has application pending before the Interstate Commerce Commission to increase these fares to three (3) cents per mile.

These lines were parties to the application for increase in freight rates on certain commodities, in what is commonly known as the "Western Rate Advance Case," which was submitted to the Interstate Commerce Commission on June 26, 1915. While the decision in this case does authorize some advances, it was on the whole a distinct disappointment to the Western carriers.

Two important lumber cases have also been presented to, and determined by, the Interstate Commerce Commission during the year, resulting in increases in the interstate rates on hardwood lumber from a considerable producing territory, of from two (2) to five (5) cents per hundred (100) pounds.

AGRICULTURAL AND INDUSTRIAL

During the past year, and for a number of previous years, the Agricultural and Industrial Department of this company, and other carriers, as well as the Agricultural Press and the Government Demonstration forces, have been preaching diversification of crops, and while good seed was sown, it lay dormant in the minds of the people until a crisis overtook the South.

During the present crop season there is being raised, throughout the Cotton States, more corn, wheat, oats, rice, hay, garden-truck and live stock than ever before. The cotton acreage has been considerably reduced, as compared with last year, and while the growing crop is two or three weeks late, and has suffered some damage from the severe storm in the Southwest, which occurred in the latter part of August, 1915, the present prospects indicate a good yield.

It is impossible to predict, at this time, to what extent the recent action of Great Britain, and her war allies, in the placing of cotton on the contraband list, will demoralize the cotton market. However, excepting for this temporary restriction, cotton promises to take its proper place, that of the cash or money crop of the country. Many farmers will grow their living at home and be in position to bank or invest the money received from cotton.

The adverse financial conditions, resultant from the low price of cotton during the past year, has greatly reduced industrial operations throughout the territory contiguous to these lines. Very few individuals or business concerns have had, or could obtain, capital to proceed with new enterprises or with improvements, notwithstanding the fact that labor has been plentiful. Many of the large saw mills have been closed down a portion of the time, or running on part time, and this has thrown a large number of men out of employment; however, the latter part of the fiscal year has shown an improvement in this regard—some of the mills, which had temporarily closed down, have resumed operations on part time, resulting in an increased movement of lumber and raw material in the last few months.

There has been very little increase in the capitalization of banks and similar enterprises, in fact, the entire business interests of the Southwest have been simply "marking time," trusting that conditions would improve. That business conditions are gradually becoming better throughout the Southwest is evidenced by the more cheerful attitude of the people and increasing activity in many lines. Wholesale houses and jobbers, who have allowed their stocks to run extremely low, are restocking and their business is slowly resuming normal conditions.

FEDERAL VALUATION

Pursuant to the Act of Congress approved March 1, 1913, viz., "An Act To amend an Act entitled 'An Act to regulate commerce' approved February fourth, eighteen hundred and eighty-seven, and all Acts amendatory thereof by providing for a valuation of the several classes of property of carriers subject thereto and securing information concerning their stocks, bonds and other securities," this company was notified by the Government on October 6, 1914, that the Division of Valuation expected to begin surveys on this company's lines North of Texas about January 1, 1915, and that the date of valuation of all of this company's lines would be as of June 30, 1915.

No work of any importance has as yet been undertaken on the Texas lines by the Division of Valuation of the Interstate Commerce Commission, but it is expected that work will be commenced on those lines during the coming Fall, and the Engineering Department has been preparing maps and getting information in shape for this purpose.

On the lines North of Texas the Government field forces have been actively engaged on the work of valuation since November 12, 1914. Right-of-way schedules, as called for by the Division of Valuation, have been completed and filed with the Commission. The reproduction of all maps and profiles of the line are well underway and will be filed with the Commission shortly.

The Machinery Department has been busily engaged in making an inventory of all equipment, this work being well advanced.

The Accounting Branch of the Division of Valuation commenced work on the company's books on February 8, 1915, and is still engaged on that work.

The work accomplished by the several departments of the Government's field forces on the lines North of Texas, at the close of the fiscal year ended June 30, 1915, may be summarized as follows:

Roadway and Track—	
4 parties, commenced Nov. 12, 1914, completed March 26, 1915.	
Land—	
2 parties, commenced Jan. 7, 1915, completed May 15, 1915.	
Bridges and Buildings—	
2 parties, commenced Jan. 19, 1915, completed April 12, 1915.	
Telegraph and Signals—	
2 parties, commenced March 8, 1915, completed April 2, 1915.	
Each of the Government field parties was accompanied by representatives of this company, called "Pilots" with the view of pointing out all property of the railway company and calling attention to hidden quantities.	
The amounts expended by the St. Louis Southwestern Railway Lines in this work during the fiscal year ended June 30, 1915, and charged to "General Expenses—Valuation Expenses" are as follows:	
Maps (Field work, office work, etc.).....	\$3,891.86
Preparation of primary lists or inventories.....	2,339.40
Land Schedules, land cost data and information for valuation of lands	1,975.73
Construction Cost data for determining proper units.....	1,504.51
Pilots	3,414.71
Miscellaneous	1,686.60
Total	\$14,812.81

The foregoing statement includes only the pay and office, traveling and other expenses of officers and their assistants, clerks and attendants *specialty employed or assigned to valuation work*, and the cost of stationery and printing, engineering supplies, etc. Much time, thought and effort has been incidentally devoted to this work by the officers and employees of the Executive, Engineering, Legal, Accounting and Operating Departments of these lines, but no portion of the pay of such employees, not specially employed or assigned to such work, has been, or can be, charged against "Valuation Expenses" under the rules prescribed by the Interstate Commerce Commission.

The Act of Congress relating to Federal Valuation requires carriers to co-operate with, and aid the Interstate Commerce Commission in the valuation of their properties. Accordingly, the St. Louis Southwestern Railway Lines have appointed a Valuation Committee consisting of representatives of the Engineering, Legal and Accounting Departments.

The Presidents' Conference Committee, representing all carriers, has also appointed Engineering, Land and Accounting Committees, which committees, since the passage of the Act, have been in constant conference with Director Prouty and the Division of Valuation of the Interstate Commerce Commission as to many of the details involved in the practical work of making the valuation.

It would be difficult to overestimate the importance or magnitude of the task involved in the work of making the valuation.

This company, as well as the Presidents' Conference Committee, are alive to the far-reaching economic effect of the final valuations to be made, and the last named committee has appeared before the Interstate Commerce Commission orally and by printed brief for the purpose of discussing and reaching satisfactory conclusions on many of the important questions involved, and will continue its efforts along these lines.

SOUTHERN PACIFIC COMPANY—THIRTY-FIRST ANNUAL REPORT

REPORT OF THE BOARD OF DIRECTORS

New York, October 8, 1915.

To the Stockholders of the Southern Pacific Company:

Your Board of Directors submits this report of the operations of the Southern Pacific Company and of its Proprietary Companies for the fiscal year ended June 30, 1915.

PROPERTIES AND MILEAGE

The transportation lines constituting the Southern Pacific System, June 30, 1915, were as follows:

Divisions.	First Main Track.	Additional Main Track.	Sidings.	Ferries.	Water Lines.
A.—Mileage of lines belonging to or leased by Companies the capital stocks of which are principally owned by the Southern Pacific Company.					
(1)—Operated by the Southern Pacific Company under leases:					
Central Pacific Ry.....	2,235.68	256.04	870.20	9.90	125
Oregon & California R. R.....	692.48	2.85	167.87	...	...
Southern Pacific R. R.....	3,497.31	211.76	1,478.49	3.00	...
South Pacific Coast Ry.....	106.69	20.46	49.58	3.00	...
(2)—Operated by the owning Companies:					
Morgan's Louisiana & Texas Railroad and Steamship Co.	404.53	58.35	228.35	3.00	...
Louisiana Western R. R.....	207.74	...	70.08	...	...
Galveston, Harrisburg & San Antonio Ry.....	1,351.21	6.59	332.80	...	...
Houston, East & West Texas Ry.....	190.94	...	56.57	...	...
Houston & Shreveport R. R.....	40.72	.69	7.35	...	...
Houston & Texas Central R. R.	894.63	1.27	258.79	...	...
Southern Pacific Terminal Company.....	...	...	23.64	...	...
Arizona Eastern R. R.....	366.80	...	81.67	...	...
Corvallis & Eastern R. R.....	140.58	...	16.98	...	...
Southern Pacific Company.....	...	...	...	...	4,683
B.—Mileage of lines belonging to Companies the capital stocks of which are principally owned by the Morgan's Louisiana & Texas R. R. & S. S. Co., but which are operated by the owning Companies.					
Iberia & Vermilion R. R.....	21.44	...	10.99	...	...
Direct Navigation Co.....	...	...	...	...	65
Total.....	10,618.89	561.47	3,855.85	18.90	4,873
Less operated jointly by Proprietary Cos.....	31.49	9.97	17.80	...	...
Total miles of road operated June 30, 1915.....	10,587.40	551.50	3,838.05	18.90	4,873
Total miles of road operated June 30, 1914.....	10,477.00	506.60	3,788.93	18.90	4,873
Increase.....	110.40	44.90	49.12	...	...

In addition to the mileage above tabulated the Southern Pacific Company solely controls through ownership of capital stock 890.46 miles of electric lines, and 1,458.09 miles of steam lines; and jointly controls (through ownership of capital stock in equal proportions with the Atchison, Topeka & Santa Fe Ry. Co.) 400.99 miles of the Northwestern Pacific Railroad and 62.93 miles of the Sunset Railway, an aggregate of 13,399.87 miles.

Since June 30, 1914, railways have been purchased by Proprietary Companies as follows:

HOUSTON & TEXAS CENTRAL RAILROAD.

Under authority of Chapter 40, Laws of the State of Texas, 1913, the Houston & Texas Central Railroad Company purchased as of July 1, 1914, the railroad and appurtenances of the Hearne & Brazos Valley Railroad Company, extending from Hearne to Stone City, Texas, a distance of 18.61 miles.

TEXAS & NEW ORLEANS RAILROAD.

Under authority of Chapter 54, Laws of the State of Texas, 1913, the Texas & New Orleans Railroad Company purchased as of July 1, 1914, the railroad and appurtenances of the Burr's Ferry, Brownel & Chester Railway Company, extending from Rockland to Turpentine, Texas, a distance of 11.89 miles.

INCOME FOR THE YEAR.

The income for the year ended June 30, 1915, of the Southern Pacific Company and of its Proprietary Companies, combined, excluding offsetting accounts, compared with last year, is as follows:

	This Year.	Last Year.	+ Increase. — Decrease.	Per Cent.
Average miles of road operated:				
Lines East of El Paso	3,534.12	3,459.16 +	74.96	2.17
Lines West of El Paso	7,020.12	6,962.49 +	57.63	.83
	10,554.24	10,421.65 +	132.59	1.27
Operating Income.				
Railway operating revenues.....	\$129,865,675.09	\$138,520,258.56	—\$8,654,583.47	6.25
Railway operating expenses.....	87,753,842.31	93,662,266.93	— 5,908,424.62	6.31
Net revenue from railway operations	\$42,111,832.78	\$44,857,991.63	—\$2,746,158.85	6.12
Railway tax accruals.	\$6,371,272.84	\$7,162,624.57	— \$791,351.73	11.05
Uncollectible railway revenues.....	50,946.14	..... +	50,946.14	....
Total operating income.....	\$35,689,613.80	\$37,695,367.06	—\$2,005,753.26	5.32
Non-Operating Income.				
Rent from locomotives	\$72,612.74	\$239,269.60	— \$166,656.86	69.65

Rent from passenger-train cars.....	282,448.41	212,944.78 +	69,503.63	32.64
Rent from floating equipment.....	80,759.03	2,609.58 +	78,149.45	....
Rent from work equipment.....	69,555.19	188,542.24 —	118,987.05	63.11
Joint facility rent income.....	473,475.01	472,424.65 +	1,050.36	.22
Income from lease of road.....	94,996.46	94,667.66 +	328.80	.35
Miscellaneous rent income.....	444,514.74	366,230.03 +	78,284.71	21.88
Miscellaneous non-operating physical property.....	298,358.19	225,476.78 +	72,881.41	32.32
Dividend income.....	4,478,250.00	3,656,276.04 +	821,973.96	22.48
Income from funded securities — Proprietary Companies.....	3,833,185.82	3,612,450.71 +	220,735.11	6.11
Income from funded securities — Affiliated and other companies.....	3,756,061.84	3,813,144.31 —	57,082.47	1.50
Income from unfunded securities and accounts.....	2,651,463.91	2,334,382.60 +	317,081.31	13.58
Income from sinking and other reserve funds.....	678,550.66	556,873.33 +	121,677.33	21.85
Miscellaneous income.	577,332.14	109,617.42 +	467,714.72	426.68
Total non-operating income.....	\$17,791,564.14	\$15,884,909.73	+\$1,906,654.41	12.00
Gross income.....	\$53,481,177.94	\$53,580,276.79	— \$99,098.85	.18
Deductions from Gross Income.				
Hire of freight cars—Debit balance.....	\$120,850.99	\$177,822.48 —	\$56,971.49	32.04
Rent for locomotives.	24,771.52	30,803.31 —	6,031.79	19.58
Rent for passenger-train cars.....	172,921.37	156,112.16 +	16,809.21	10.77
Rent for floating equipment.....	3,613.92	2,750.00 +	863.92	31.42
Rent for work equipment.....	6,960.69	9,397.65 —	2,436.96	25.93
Joint facility rents.....	358,839.75	297,571.04 +	61,268.71	20.59
Rent for leased roads.	717,904.21	707,437.62 +	10,466.59	1.48
Miscellaneous rents.....	647,940.60	612,209.59 +	35,731.01	5.84
Miscellaneous rent accruals.....	965,387.10	609,457.87 +	355,929.23	58.40
Interest on funded debt.....	28,939,034.71	27,415,733.89 +	1,523,300.82	5.56
Interest on unfunded debt.....	356,574.07	546,242.06 —	189,667.99	34.72
Amortization of discount on funded debt	237,540.56	505,476.92 —	267,936.36	53.00
Maintenance of investment organization...	125,981.31	159,056.90 —	33,075.59	20.79
Miscellaneous income charges.....	232,537.67	1,092,287.48 —	859,749.81	78.71
Total deductions from gross income	\$32,910,858.47	\$32,322,358.97 +	\$588,499.50	1.82
Net income.....	\$20,570,319.47	\$21,257,917.82 —	\$687,598.35	3.23
Disposition of Net Income.				
Income applied to sinking and other reserve funds.....	\$939,724.57	\$805,702.07 +	\$134,022.50	16.63
Income balance transferred to credit of Profit and Loss....	\$19,630,594.90	\$20,452,215.75 —	\$821,620.85	4.02

Per cent. on outstanding capital stock of Southern Pacific Company.....

7.20 7.50 — .30 4.02

In the foregoing table the income has been classified in accordance with the regulations of the Interstate Commerce Commission, effective July 1, 1914. This change in the classification has necessitated a restatement of the figures for last year.

The details of Railway Operating Revenues and Railway Operating Expenses are fully dealt with under Transportation Operations.

The \$50,946.14 reported against Uncollectible Railway Revenues represents the amount of charges against companies and individuals, for transportation services rendered, which have been determined to be uncollectible, and which are debited to said account in accordance with regulations of the Interstate Commerce Commission, effective July 1, 1914. Similar charges in previous years were debited to Railway Operating Revenues.

The income for the year from rent of equipment exceeds the payments to other companies for rent of equipment by \$176,256.88. This is a decrease, as compared with last year, of \$80,223.72.

The principal item of increase in Miscellaneous Rent Income is the rental received from the City of Portland for the use of the Willamette River bridge, a one-half interest in which was acquired during the year.

Of the \$317,081.31 increase in Income from Unfunded Securities and Accounts, \$177,722.09 represents interest on increased investment advances to Affiliated Companies, and the remaining \$139,359.22 represents increased interest received on bank deposits, etc.

The increase of \$467,714.72 in Miscellaneous Income is the result, principally, of taking into the year's income the net receipts from the operations of the steamships Persia and Nile from July 1, 1913, to June 30, 1915; and of crediting to income, in accordance with the regulations of the Interstate Commerce Commission, interest on the Companies' own funds used for construction.

The increase in Miscellaneous Tax Accruals is the result, principally, of including in this account this year, in accordance with the regulations of the Interstate Commerce Commission, effective July 1, 1914, certain taxes which were included in Railway Tax Accruals last year.

The increase in Interest on Funded Debt is the result, principally, of the excess of interest accruing this year on the Five Per Cent. Twenty-

Year Convertible Bonds issued in June of last year over the interest accruing last year on the One-Year Five Per Cent. Secured Gold Notes retired in June of last year.

The decrease in the charge for Amortization of Discount on Funded Debt is the result, principally, of charging against last year's income the remainder of the discount on the \$26,000,000 of Southern Pacific Company One-Year Five Per Cent. Notes retired in June of last year.

The amounts reported against Maintenance of Investment Organization represent expenses of the Southern Pacific Company for other than railway operations, and the expenses of keeping up the corporate organizations of the Proprietary Companies, the properties of which are operated by the Southern Pacific Company under leases.

The decrease in Miscellaneous Income Charges is due to the fact that last year the charge for depreciation on rolling stock owned by the Southern Pacific Company and leased to other companies, was included in this account; while this year the corresponding charge is included in operating expenses, in accordance with the regulations of the Interstate Commerce Commission.

On June 30, 1915, the principal of advances to the Southern Pacific Railroad Company of Mexico amounted to \$38,993,894.69. Interest accruing on these advances has not been taken into the income of the Southern Pacific Company.

CAPITAL STOCK.

The capital stock of the Southern Pacific Company outstanding at the beginning of the year amounted to.....\$272,672,405.64
Issued during the year:

Common stock issued in exchange for a like amount of
Five Per Cent. Twenty-Year Convertible Gold Bonds
surrendered and cancelled.....2,000.00

Amount of Southern Pacific Company stock outstanding
June 30, 1915.....\$272,674,405.64

There was no change during the year in the capital stocks of the Proprietary Companies.

The amount outstanding June 30, 1915, was as follows:

Common stock.....\$315,800,572.00
Preferred stock.....29,400,000.00

\$345,200,572.00

Stocks of Proprietary Companies outstanding June 30, 1915, were held as follows:

Owned by Southern Pacific Company....\$344,767,400.00
Owned by Morgan's Louisiana & Texas
R. R. & S. S. Co.....350,000.00
In the hands of the public.....83,172.00

Total.....\$345,200,572.00

FUNDED DEBT.

In December, 1914, to provide for the purchase of new equipment, an equipment trust known as "Southern Pacific Equipment Trust, Series C," was created, and an issue of \$1,170,000, par value, Four and One-Half Per Cent. Equipment Trust Certificates authorized, all of which were issued during the year, and, in accordance with the terms of the trust, guaranteed by the Southern Pacific Company.

Under an agreement made in December, 1914, between The Galveston, Harrisburg & San Antonio Ry. Co. and the holders of all of the outstanding Galveston, Harrisburg & San Antonio Ry. Co. Mexican and Pacific Extension Second Mortgage Six Per Cent. Income Bonds, \$3,815,000, par value, of the said bonds were retired; the rate of interest on the remaining \$2,539,000, par value, of such bonds still outstanding, was reduced to five per cent. per annum; the endorsement making such interest conditional was cancelled; all obligation, if any, of the Railway Company in respect to sinking fund payments accruing on or prior to January, 1, 1915, was released; and the payment of the principal of and interest on the \$2,539,000, par value, of such bonds still outstanding, was guaranteed by the Southern Pacific Company.

The funded and other fixed interest-bearing debt of the Southern Pacific Company and of its Proprietary Companies outstanding June 30, 1914, was as follows:

Southern Pacific Company.....\$203,226,336.58
Proprietary Companies.....456,106,632.24

Total outstanding June 30, 1914.....\$659,332,968.82

Add:

First Mortgage Six Per Cent. Bonds of the Burr's
Ferry, Brownell & Chester Ry. Co., the property of
which was purchased by the Texas & New Orleans
R. R. Co., July 1, 1914, subject to the mortgage in-
debtedness.....165,000.00

\$659,497,968.82

Issued during the year:

Southern Pacific Company.
Equipment Trust Certi-
ficates, Series C.....\$1,170,000.00
Five Per Cent. Twenty-
Year Convertible Gold
Bonds, balance of sub-
scriptions.....3,006,573.42

\$4,176,573.42

Southern Pacific Railroad Company.
First Refunding Mortgage
Four Per Cent. Bonds:
Against outstanding old
bonds retired.....\$21,000.00
Against expenditures for
additions and better-
ments.....6,585,500.00

6,606,500.00

10,783,073.42

\$670,281,042.24

Retired during the year:

Southern Pacific Company.
San Francisco Terminal
First Mortgage Four
Per Cent. Bonds:
Purchased from pay-
ments to sinking
fund.....\$12,000.00
Five Per Cent. Twenty-
Year Convertible Gold
Bonds:

Retired in exchange
for a like amount
of Common Stock
issued.....2,000.00
Equipment Trust Certi-
ficates, Series A, due
March 1, 1915, paid off.....1,012,000.00
Equipment Trust Certi-
ficates, Series B, due
September 1, 1914, paid
off.....201,000.00

\$1,227,000.00

Central Pacific Railway Company.

Three and One-Half Per
Cent. Mortgage Gold
Bonds:
Purchased from pro-
ceeds of sale of
lands.....\$649,500.00
Purchased from pro-
ceeds of sale of
securities.....916,500.00
Purchased from pay-
ments to sinking
fund.....46,500.00
Bond scrip retired
from general funds.....25.00

\$1,612,525.00

First Refunding Mort-
gage Four Per Cent
Bonds:

Purchased from pay-
ments to sinking
fund.....29,000.00

1,641,525.00

Galveston, Harrisburg & San Antonio Rail-
way Company.

Second Mortgage Mexican and Pacific
Six Per Cent. Income Bonds retired.....3,815,000.00

Houston & Texas Central Railroad Company.

First Mortgage Five Per
Cent. Bonds:
Purchased from pro-
ceeds of sale of
lands.....\$154,000.00
Purchased from pro-
ceeds of sale of
other mortgaged
property.....22,000.00

176,000.00

South Pacific Coast Railway Company.

First Mortgage Four Per Cent. Bonds:
Purchased from payments to sinking
fund.....237,000.00

Southern Pacific Railroad Company.

First Refunding Mortgage Four Per
Cent Gold Bonds:
Purchased from payments to sinking
fund.....14,000.00

Texas & New Orleans Railroad Company.

Payment to State of Texas on account of
School Fund Debt.....5,350.80

7,115,875.80

Amount of funded and other fixed interest-bearing debt
of the Southern Pacific Company and of its Proprietary
Companies, outstanding June 30, 1915.....\$663,165,166.44

Net increase during the year.....\$3,832,197.62

The outstanding funded securities are held as follows:

In the hands of the public.....\$582,154,316.91
Owned by Southern Pacific Company....\$67,831,849.53
Owned by Proprietary Companies.....3,386,000.00
Held in Sinking Funds of Proprietary
Companies.....9,793,000.00

81,010,849.53

Total.....\$663,165,166.44

ASSETS AND LIABILITIES

The value of the granted lands belonging to the Central Pacific Railway Company and to the Oregon and California Railroad Company, remaining unsold at the close of the year, is not included in the statement of the assets of the said companies.

The assets and liabilities of the Southern Pacific Company and of its Proprietary Companies, combined, on June 30, 1915, and the increases and decreases during the year, excluding the offsetting accounts between the Companies, summarized, were as follows:

	Total June 30, 1915.	Increase or Decrease.
Investments.	\$908,712,243.46	\$6,080,284.18
Investment in road and equipment..	11,961,803.55	—264,256.29
Sinking funds	15,997.60	303.36
Deposits in lieu of mortgaged property sold	1,425,925.63	1,069,081.55
Improvements on leased railway prop- erty	17,155,150.60	362,618.80
Miscellaneous physical property....		
Investments in affiliated companies:		
Stocks and bonds.....	*430,739,758.47	14,908,811.86
Notes and advances.....	111,175,191.32	5,650,500.99
Other investments:		
Stocks and bonds.....	7,907,307.30	—452,211.50
Notes, advances, and miscellaneous	6,838,555.05	164,803.79
	\$1,495,931,932.98	\$27,519,936.74
Current and Deferred Assets.		
Cash and demand loans and deposits.	\$16,307,928.64	—\$2,862,656.15
Special deposits	541,169.50	453,883.10
Other cash accounts.....	10,829,629.23	—4,262,466.80
Material and supplies.....	18,859,879.40	177,192.91
Deferred assets	6,211,521.00	200,459.37
	\$52,750,127.77	—\$6,293,587.57

Unadjusted Debits.			
Discount on capital stock.....	\$3,678,600.00		
Discount on funded debt.....	4,223,011.38	—\$445,139.40	
Other unadjusted debits.....	4,550,807.66	654,308.68	
	<u>\$12,452,419.04</u>	<u>\$209,169.28</u>	
Total assets	<u>\$1,561,134,479.79</u>	<u>\$21,435,518.45</u>	
Stock.			
Capital stock of Southern Pacific Company	\$272,674,405.64	\$2,000.00	
Capital stock of Proprietary Companies	*345,200,572.00		
	<u>\$617,874,977.64</u>	<u>\$2,000.00</u>	
Long Term Debt.			
Funded debt of Southern Pacific Company	\$206,175,910.00	\$2,949,573.42	
Funded debt of Proprietary Companies	*456,989,256.44	882,624.20	
	<u>\$663,165,166.44</u>	<u>\$3,832,197.62</u>	
Non-negotiable debt to affiliated companies	\$6,083,949.92	\$4,424,550.89	
	<u>\$669,249,116.36</u>	<u>\$8,256,748.51</u>	
Current and Deferred Liabilities.			
Audited accounts and wages payable..	\$7,692,791.07	—\$566,561.24	
Interest and dividends matured unpaid	8,552,932.24	478,511.44	
Unmatured dividends declared.....	4,090,116.08	30.00	
Unmatured interest accrued.....	5,472,775.07	—69,047.34	
Other cash accounts.....	2,648,010.66	—1,728,248.85	
Deferred liabilities	395,504.97	—248,274.80	
	<u>\$28,852,130.09</u>	<u>\$2,133,590.79</u>	
Unadjusted Credits.			
Accrued depreciation	\$36,144,227.71	\$1,976,065.14	
Other unadjusted credits.....	31,617,828.45	4,827,675.97	
	<u>\$67,762,056.16</u>	<u>\$6,803,741.11</u>	
Total liabilities	<u>\$1,383,738,280.25</u>	<u>\$12,928,898.83</u>	
Corporate Surplus.			
Appropriated surplus	\$30,644,472.20	\$1,607,018.14	
Profit and loss.....	146,751,727.34	6,899,601.48	
	<u>\$177,396,199.54</u>	<u>\$8,506,619.62</u>	
Total	<u>\$1,561,134,479.79</u>	<u>\$21,435,518.45</u>	

* The outstanding capital stock and funded debt include capital stocks and funded debt of Proprietary Companies of the par value of \$345,117,400 and \$81,010,849.53, respectively, a total of \$426,128,249.53, which securities are owned by the Southern Pacific Company or by Proprietary Companies, or are held in sinking funds of Proprietary Companies. The cost of these securities is included in the investments shown above. Of the said amount, stocks of the par value of \$249,653,161, which stand charged on the books at \$232,932,667.41, are pledged against the issue of Southern Pacific Company stock and bonds.

TRANSPORTATION OPERATIONS.

The results of the year's transportation operations compared with those of last year are as follows:

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Average miles of road operated	10,554.24	10,421.65	132.59	1.27
Railway Operating Revenues.				
Freight	\$80,020,751.38	\$85,864,378.75	—\$5,843,627.37	6.81
Passenger	36,864,997.50	40,414,932.05	—3,549,934.55	8.78
Mail and Express.....	5,922,171.25	5,207,092.03	715,079.22	13.73
All other transportation	3,055,134.36	2,743,780.82	311,353.54	11.35
Incidental	3,941,910.42	4,190,613.25	—248,702.83	5.93
Joint facility—Credit...	76,942.58	134,213.84	—57,271.26	42.67
Joint facility—Debit...	*16,232.40	*34,752.18	18,519.78	53.29
Total	<u>\$129,865,675.09</u>	<u>\$138,520,258.56</u>	<u>—\$8,654,583.47</u>	<u>6.25</u>
Railway Operating Expenses.				
Maintenance of way and structures.....	\$15,356,355.77	\$16,515,452.13	—\$1,159,096.36	7.02
Maintenance of equipment	19,815,973.36	21,475,526.20	—1,659,552.84	7.73
Traffic	2,915,009.84	3,114,348.10	—199,338.26	6.40
Transportation	44,006,753.11	46,400,045.47	—2,393,292.36	5.16
Miscellaneous operations	2,031,856.61	2,242,153.36	—260,296.75	11.36
General	3,955,027.24	3,864,741.67	90,285.57	2.34
Transportation for investment—Credit ...	*327,133.62		—327,133.62	
Total	<u>\$87,753,842.31</u>	<u>\$93,662,266.93</u>	<u>—\$5,908,424.62</u>	<u>6.31</u>
Net revenue from railway operations.....	<u>\$42,111,832.78</u>	<u>\$44,857,991.63</u>	<u>—\$2,746,158.85</u>	<u>6.12</u>
Railway tax accruals...	\$6,371,272.84	\$7,162,624.27	—\$791,351.73	11.05
Uncollectible railway revenues	50,946.14		\$50,946.14	
Total operating income (Table No. 23).....	<u>\$35,689,613.80</u>	<u>\$37,695,367.06</u>	<u>—\$2,005,753.26</u>	<u>5.32</u>
Freight Traffic.				
Tons—revenue freight—total	\$31,857,039	\$32,599,138	—\$742,099	2.28
Ton miles revenue freight—total	6,637,345,295	7,108,331,050	—470,985,755	6.63

Average ton miles per train mile—all freight.			
East of El Paso...	390.24	399.43	—9.19 2.30
West of El Paso...	507.84	510.30	—2.46 .48
All lines	463.71	471.21	—7.50 1.59
Average loaded freight car miles per train mile.			
East of El Paso...	18.43	18.95	—.52 2.74
West of El Paso...	24.66	24.10	.56 2.32
All lines.....	22.32	22.28	.04 .18
Average ton miles per loaded freight car mile—all freight.			
East of El Paso...	21.18	21.08	.10 .47
West of El Paso...	20.60	21.18	—58 2.74
All lines	20.78	21.15	—37 1.75
Percentage of loaded freight car miles to total.			
East of El Paso....	69.22	70.91	—1.69 2.38
West of El Paso....	70.13	70.25	—12 .17
All lines	69.84	70.45	—61 .87
Average freight revenue per train miles....(e)			
	\$4.39	\$4.44	—0.05 1.13
Average revenue per ton mile of freight—revenue freight....(e)			
	1.099 cents.	1.104 cents.	—0.005 cents. .45
Average miles handled—revenue freight....(e)			
	208.35 miles.	218.05 miles.	—9.70 miles. 4.45
Passenger Traffic.			
Passengers carried—revenue—including ferry suburban.....			
	41,708,096	42,744,673	—1,036,577 2.43
Passenger miles—revenue—including ferry suburban			
	1,662,556,191	1,748,983,080	—86,426,889 4.94
Average passenger service train revenue per train mile			
	\$1.51	\$1.34	\$0.17 12.69
Average revenue per passenger mile.....			
	2.173 cents.	2.247 cents.	—0.074 cents. 3.29
Average miles carried—revenue passengers—including ferry suburban			
	39.86 miles.	40.92 miles.	—1.06 miles. 2.59

(e) Figures in last year's report were based on commercial freight only.
(f) Similar charges in previous years were debited to Railway Operating Revenues.

Since the opening of the Panama Canal, August 13, 1914, competition has been intensified and the gross revenue of the lines of this Company has been considerably reduced by a large increase in the number, capacity, and sailings of steamships between Atlantic and Pacific ports, which, by a material reduction of rates, have taken a substantial volume of freight that was formerly shipped over transcontinental railroads.

The business depression prevailing throughout the United States was aggravated on our lines by the outbreak of the European War. Some of the copper mines served by them were closed down and others were operated to about half normal capacity, which reduction of activity resulted in a large shrinkage of earnings from products of the mines and from the fuel consumed in their operation. The construction of new buildings was retarded and railroad construction and development almost entirely abandoned, these conditions causing a material decrease in revenue derived from lumber and other construction material. There was, moreover, a widely distributed decrease of earnings upon general merchandise and miscellaneous traffic.

These unfavorable conditions, and consequent general retrenchment in expenditures, have also affected both business and pleasure travel and have brought about a large reduction in passenger and related earnings, the former amounting to 41 per cent of the total reduction of \$8,654,583.47 in operating revenues. This reduction has been increased by serious inroads made upon local railroad travel by automobile competition, which the improvement of highways has encouraged and rapidly developed.

While these losses were offset to some extent by Exposition travel, the increased earnings derived from that source before the close of the year were not sufficient to affect materially the general results. Earnings from express business increased under a new and more favorable contract with the Express Company.

The net decrease in operating revenues of the Company was equivalent to 6.25 per cent., which is less than the average percentage of reduction in earnings of large railroad systems reporting to the Interstate Commerce Commission.

A readjustment of rates is now being made which is expected to check the diversion of traffic to the Canal steamship lines; a normal condition of the mining industry has been restored; and, as has been previously stated, passenger earnings since the beginning of the new fiscal year have been substantially increased by Exposition travel. The prospect of better earnings during the coming fiscal year is encouraging, but the extent and permanence of the improvement will depend upon the return of general confidence in the business world, the destruction of which, without doubt, has been the most potent influence that has held back a revival of business and investment in new enterprises.

Although railway operating revenues decreased \$8,654,583.47, or 6.25 per cent., total operating income decreased only \$2,005,753.26, or 5.32 per cent., owing to a decrease of \$5,908,424.62 in operating expenses, and \$791,351.73 in railway tax accruals. This reduction was effected in face of an increase of \$765,082.34, in price of locomotive fuel; of an increase of \$37,398.00 through higher wage schedules; of an increase of \$75,589.80 in valuation expenses; and of an increase of \$1,240,290.62 in charges to operating expenses for equipment depreciation and retirements, caused by including in this year's expenses \$1,190,432 to comply with Interstate Commerce Commission's classification, by which we were required to charge to operating expenses the depreciation portion of rental paid on equipment, which last year was charged to income account. But for these abnormal and uncontrollable charges total operating income would have shown an increase despite the large decrease in operating revenues.

These favorable results, attained under the most trying conditions as to new and intense competition, higher wages and fuel costs, increases in expenses due to costs of valuation, and increases in other operating expense items caused by compliance with new laws and rules of regulating bodies, in face of a decrease in volume of 6.63 per cent in freight and 4.94 per cent in passenger traffic caused by business depression, reflect great credit on your officers. For instance: Marked improvement was effected during the year in the use of locomotive fuel, each pound of which moved in freight service 6.83 per cent and in passenger service 2.85 per cent more gross ton miles than in the previous year. The saving thereby effected amounted to \$450,388 as compared with last year, and \$1,158,015 as compared with two years ago.

As shown by chart below, continued efforts were made to secure safer operation, as a result of which the number of fatalities and injuries was reduced and the payments on account of casualties and damages of all kinds were \$234,758.74 less than last year.

RAILWAY TAX ACCRUALS

The net operating revenue for the fiscal year ended June 30, 1915, amounted to \$42,111,832.78, whereof \$6,371,272.84, or nearly one-sixth, was paid in taxes. With an increase of 179.40 per cent in the mileage of all tracks operated during the life of the Company, taxes have increased \$5,511,767.78, or 641.27 per cent. The decrease in Railway Tax Accruals of \$791,351.73, or 11.05 per cent, compared with last year, is the result, principally, of charging to Miscellaneous Tax Accruals this year, in accordance with the new classification of the Interstate Commerce Commission, certain taxes which heretofore have been charged to Railway Tax Accruals; and to the decrease in such taxes as are based on gross operating revenue.

SAFETY OF OPERATION

During the past year, no passenger lost his life in a train accident, and, with but one exception, none has been killed in a train accident for SIX YEARS AND ELEVEN MONTHS, during which period 373,233,119 locomotive miles were run and 282,719,444 passengers were carried an average of 42.61 miles, or 12,045,555,744 passengers carried one mile. During the year 6 employees out of 8,664 lost their lives through train accidents in running 51,127,703 locomotive miles. Out of 38,833 employees engaged in pursuits not involving train movements, 15 lost their lives—an average of one fatality to every 810,300 days, or 2,200 years worked.

Number Killed	1908	1909	1910	1911	1912	1913	1914	1915
50								
45								
40								
35								
30								
25								
20								
15								
10								
5								
0								
<i>Employees killed ———</i>								
<i>Passengers killed ———</i>								
TOTAL KILLED	20	12	19	14	42	9	7	6
Employees	2	7	14	14	42	9	7	6
Passengers	18	5	5	0	0	0	0	0
TOTAL KILLED PER MILLION								
LOCOMOTIVE MILES								
Employees	0.362	0.264	0.360	0.259	0.772	0.156	0.123	0.116
Passengers	0.038	0.148	0.038	0.000	0.000	0.000	0.000	0.000
Passengers Carried								
Passengers Carried One M. M.	41,393,734	39,337,735	40,180,200	39,980,950	40,329,911	42,006,740	42,744,573	41,706,006
Passengers Carried One M. M.	1,640,026,373	1,641,212,510	1,605,934,993	1,600,133,803	1,787,540,025	1,834,380,082	1,748,987,000	1,682,556,191
Locomotive Miles	52,292,012	47,202,334	54,457,917	54,227,433	54,427,030	57,553,326	57,054,554	52,127,703
Number Employees on Service	6,481	9,144	9,322	8,665	9,127	9,497	8,410	8,864

GOVERNMENT ATTACK ON RIGHT TO CONTROL CENTRAL PACIFIC RAILWAY

In February, 1914, the United States, acting through the Attorney-General, brought suit in the United States District Court for the District of Utah, against the Southern Pacific Company and the Central Pacific Railway Company, to separate the two companies, on the ground that their union in one system was in violation of the Federal Anti-Trust Act of 1890, known as the Sherman law, and also in violation of the Pacific Railroad Acts, meaning the acts of Congress providing for the construction of the Union Pacific and Central Pacific Railroads. Since the last annual report, in which the nature of this litigation was explained, the testimony on both sides has been taken and the case has been fixed for argument in the lower court on December 1, 1915. It may be assumed that an appeal to the Supreme Court of the United States will be taken by the losing party. As the case will be submitted to the court for decision at an early date, it will serve no useful purpose to attempt now to predict the outcome.

GOVERNMENT ATTACK ON TITLE TO OIL LANDS

The last report contained the following statement:

"It follows, as a result of the decision in the Burke case, that proven fraud alone can avail to defeat our title to our oil lands. We know there was no fraud in obtaining the patents, and we may consider that the danger of losing the lands is now removed. Moreover, except as to a comparatively small quantity of land, in respect to which suits have already been instituted, the six years period of limitation is believed to be a bar even to a suit alleging fraud."

The Attorney-General of the United States, deeming it his duty not to abandon the pursuit of the Company's lands without a judicial investigation to determine whether or not our patents were fraudulently obtained, has renewed the litigation, specially alleging such fraud; and, in order to avoid the six years period of limitation, it has been further alleged that the Government was prevented from suing within the required time, by fraudulent concealment of its acts by the Railroad Company. There has been no final decision in these suits. The fact that they have been instituted does not lessen the confidence expressed in the last annual report as to our ability to sustain our title to the lands in question.

GOVERNMENT ATTACK ON THE TITLE TO THE OREGON AND CALIFORNIA RAILROAD'S LAND GRANT

In 1908 the United States brought suit against the Oregon and California Railroad Company and the Southern Pacific Company, to forfeit to the Government the unsold portion of the lands granted by act of Congress to aid in the construction of the Oregon and California Railroad. The ground of forfeiture mainly relied on was that some of the lands included in the grant had been sold in disregard of the requirements of the granting act, namely, that the lands should be sold to actual settlers only, for not more than \$2.50 per acre, and in quantities not exceeding 160 acres. The quantity of land involved amounted to about 2,300,000 acres.

The lower court decided in favor of the Government, but in June of this year the Supreme Court reversed the decision of the court below, and declared that the title of the railroad company to the unsold lands had not been forfeited and was unimpaired by the alleged grounds of forfeiture. The Supreme Court further decided that the lands were held subject to the original terms of the grant limiting sales to actual settlers, in quantities not exceeding 160 acres to any one purchaser and at prices not exceeding \$2.50 per acre. Recognizing that such restrictive covenants were not appropriate to lands of the character of those remaining unsold, the Court practically referred the matter to Congress, by enjoining any disposition of the unsold lands or of the timber thereon "until Congress shall have a reasonable opportunity to provide by legislation for their

disposition in accordance with such policy as it may deem fitting under the circumstances" and at the same time secure to the defendants all the value the granting acts conferred upon the railroads; with the proviso that, if Congress does not act within six months, the Railroad Company may apply to the lower court for a modification of so much of the injunction as enjoined any disposition of the land or timber. In other words, if Congress does not act within the time named, the lower court should grant relief from the broad injunction against any sales of the lands, and should confine the injunction to sales in violation of the terms of the grant. It will be observed that any legislation which Congress may provide is subject to the condition that it must secure to the railroad all the value the granting acts conferred.

It would not be profitable or expedient at this time to speculate upon the possible action of Congress. The Railroad Company will be prepared to co-operate with Congress in securing appropriate modification of the original restrictions upon the sales of lands, BUT IT WILL INSIST UPON OBSERVANCE OF THE CONDITION THAT THE FULL VALUE CONFERRED BY THE GRANTING ACTS IS SECURED TO IT.

*The italics are ours.

FEDERAL LEGISLATION FORCING PACIFIC MAIL STEAMSHIP COMPANY OUT OF BUSINESS

The Southern Pacific Company owns 55.40 per cent of the capital stock of the Pacific Mail, an American steamship company, that has been operating lines of steamships on the Pacific ocean for the last 67 years.

The Act of Congress, approved March 4, 1915, generally known as the La Follette Act, becomes effective, as to vessels of the United States, November 4, 1915. The Company cannot continue operations under the terms of that Act without incurring heavy losses. Figures prepared by chartered accountants show that the Act would increase the expenses of its transpacific fleet as to wages and feeding crews, alone, by \$640,805 per annum. Other provisions of the Act, relating to lifeboat crews and to the Central America line, would swell this amount. The abnormally large surplus in 1915, due to higher rates following the withdrawal of Canadian Pacific and Japanese steamers in consequence of the European war, would not suffice to meet the increases in wages and feeding expenses only that the Act will demand. The stockholders of the Pacific Mail Steamship Company realized that the Company could not obey this oppressive law and exist, and, therefore, have authorized the sale of their vessels as a necessary condition precedent to the liquidation of the Company.

GENERAL

Dividends on the capital stock of your Company were declared during the year, payable as follows:

1½ per cent payable January 2, 1915.....	\$4,090,116.08
1½ per cent payable April 1, 1915.....	4,090,116.08
1½ per cent payable July 1, 1915.....	4,090,116.08
1½ per cent payable October 1, 1915.....	4,090,116.08

Total\$16,360,464.32

The revolutionary disturbances on the line of the Southern Pacific Railroad Company of Mexico have continued. It is estimated that from the beginning of the Madero Revolution, in 1910, to June 30, 1915, the cost of property destroyed will approximate 3,124,000 pesos, equivalent to \$1,562,000. On account of these losses the Company filed claims with the Madero Government amounting to 287,953 pesos, all of which were approved but have not yet been paid. No further claims for property losses have been filed owing to the lack of a constitutional central government to which they could be presented. In addition to the above the Company has claims for freight and passenger service performed, for rental of road and equipment, and for material furnished to or confiscated by the various military authorities, amounting to 5,088,000 pesos. Bills for this amount (less 434,000 pesos received on account) will be filed with the proper authorities as soon as conditions permit. During the year only such maintenance work has been done as was absolutely necessary to render it possible to operate trains over those portions of the line which are open for traffic. The revenues during the year, including those derived from the transportation of troops and munitions of war, were slightly in excess of the expenditures for maintenance and operation.

In addition to the losses during the year from revolutionary causes, the Company suffered heavily from an unprecedented flood along the line in Sonora.

The continued revolutionary disturbances preclude any thought of completing, at the present time, the 99.47 miles of line from Tepic to La Quemada referred to in last year's report.

In addition to the completed lines of railway reported under Properties and Mileage, and the railway of the Southern Pacific Railroad Company of Mexico, hereinbefore mentioned, construction is progressing on the lines of the following companies, viz.:

CENTRAL PACIFIC RAILWAY:

	Length of Projected Line.	Track Completed.	Grading Completed.	Grading Progressing.
	Miles.	—	Miles.	Miles.
Colfax to Blue Canon, Cal.—				
Second track:				
Length of projected line.....	25.08	.....	.....	.....
Less placed in operation.....	23.05	.....	.....	.....
	2.03	1.99	.04	.....
COLUSA & HAMILTON RAILROAD:				
Hamilton to Harrington, Cal.....	61.15	46.69	11.99	2.47
WILLAMETTE PACIFIC RAILROAD:				
Eugene to Marshfield, Oregon.....	121.50	73.39	43.30	4.81
TEXAS & NEW ORLEANS RAILROAD:				
Turpentine to Brownell, Tex.....	17.63	9.13	.....	8.50

The Board announces with sorrow the death, on May 19, 1915, of General Thomas H. Hubbard, a Director, and, on November 14, 1914, of Mr. H. A. Jones, Assistant Treasurer, of your Company. General Hubbard served as a Director and as Vice-President for many years prior to 1901, and was again elected a member of the Board shortly before his death. Mr. Jones was in the service from 1885 to the time of his death, serving as General Freight Agent, Freight Traffic Manager and Assistant Treasurer.

Under the pension system put into effect on January 1, 1903, seven hundred and forty-six employees are carried on the pension rolls of the rail and water lines. The payments to them for the year amounted to \$326,685.04.

By order of the Board of Directors,

JULIUS KRUTTSCHNITT,

Chairman of the Executive Committee.

Railway Age Gazette

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L. B. SHERMAN, Vice-President. HENRY LEE, Sec'y & Treas.
The address of the company is the address of the offices.

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WE GUARANTEE, that of this issue 8,750 copies were printed; that of these 8,750 copies 7,233 were mailed to regular paid subscribers to the weekly edition, 132 were provided for counter and news companies' sales, 1,046 were mailed to advertisers, exchanges and correspondents, and 339 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 413,950, an average of 9,200 copies a week.

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*Illustrated.

The Lehigh Valley reports that at Catherine, N. Y., the town and the county authorities have joined in a request that the gates at a certain highway crossing be removed and an automatic signal installed instead; one of the audible-visible signals (enclosed disk) which are used extensively by this road, and were described in the *Railway Age Gazette* June 19, 1914. This signal, lighted by acetylene, shows white, night and day, when no train is approaching. The request will be complied with. What varied reasons may have actuated the minds of these public officers we do not know; but their reported opinion, that a signal which is "independent of the human element, and always on the job" is safer than gates, with an attendant, corresponds with that of a

well-known careful and conservative railroad officer who, from a thorough analysis of the grade crossing accidents on a large road, reached this conclusion some years ago. The installation of gates, of watchmen and of automatic signals is often governed so much by immediate expediency that science and logic seem to be of no account whatever. But the subject ought to be explored. The whole grade crossing problem bristles with difficulties, and this is only one of them; but the difference in cost between a watchman or gate attendant and an automatic signal is so great that in every case where the expense of keeping men on duty is not justified, all necessary means should be employed to convince the municipal authorities that such is the fact.

The "Equipment and Supplies" column in the general news department of the *Railway Age Gazette* is once more beginning to look like "good old times." In the issue of October 22 the column reported orders for no less than 90 locomotives, 6,800 freight cars and 74,500 tons of rails, making the third week in October the best thus far this year, with the exception of the third week in May, when the Pennsylvania placed its order for 50 engines and 16,145 cars. But in the issue of October 29 the record of the week before was shaded into insignificance. There were reported orders for 177 locomotives, 12,889 cars (counting only the orders since confirmed) and 40,000 tons of rails, omitting the Pennsylvania's order for 175,000 tons of rails, which came to our attention but a few hours after the paper had gone to press. It is interesting to observe that the orders for new locomotives reported in these two issues of the paper had a total value of approximately \$8,000,000; for passenger cars, \$240,000; for freight cars, nearly \$20,000,000, and for rails (including the Pennsylvania's order), \$8,000,000; a total of \$36,000,000 in contracts for rails and new equipment awarded by the railways of this country in a short space of but two weeks. Records kept by this paper show that the orders for locomotives, for domestic service only, this year to October 29 totalled 1,005, as compared with 848 reported to the end of October, 1914; that the domestic orders for freight cars totalled 71,398, as compared with 67,820 up to October 30, last year, and what is most important, that for the first time in 1915 orders for locomotives and freight cars passed those of 1914 for a like number of weeks. The "Equipment and Supplies" column is beyond all doubt the best barometer of conditions in the railway supply trade field.

The use of the telephone for train despatching is constantly increasing, and bids fair to become universal throughout the country; but if anybody thinks the Morse telegraph is dead and out of date, he is mistaken. A note printed in this issue tells how the Pennsylvania Railroad gave a dinner party at Philadelphia for two of its Morse operators who took prizes at the San Francisco exposition. That, surely, is no sign that telegraphers are to be sent to the rear. Moreover, the increase in business just now is such that the Pennsylvania is hiring additional operators; and its school for station agents, at Bedford, Pa., which gives instruction in telegraphy and in other station-office work is still running, full blast, and looking for new pupils. A dinner may be a matter of sentiment; but hiring operators is cold business. The continued activity of this school is of interest, aside from any consideration of the technical differences between the telegraph and the telephone, in the evidence which it gives that the use of telephones is not to be made the occasion of a lowering of the grade of men (or women) to be employed for station work. It is not likely that the railroad company would be hiring many more telegraphers if satisfactory telephone operators could be hired at a much lower rate of pay. Looking only at the single task of sending and receiving messages or orders over the wire, the telephone makes it possible to use operators possessed of less intellectual ability than the telegraph requires; and in the first

Morse Operators in Demand

days of telephone despatching this was suggested as a possible means of saving money. But, as every railroad man knows, a station agent ought to be a very versatile person; and the simplification of a single one of his many tasks affords no justification for reducing his pay. In a less degree the same is true of one who does nothing but handle messages. Ability as a telegrapher may indicate a better mentality than is necessary for speaking into a telephone; but it is a mentality none too high for the general duties of a station operator.

SEVENTY YEARS YOUNG

IF the average ambitious young business or professional man of, say, 25 or 30 years, could determine what his career would be during the next 40 or 45 years, and what his position in life would be at the end of the time, he would be satisfied to determine that his career should be similar to Edward Payson Ripley's since he was 25 or 30, and that he should stand at 70 where Mr. Ripley stands now. Measured by every rational standard the Santa Fe's president at three score years and ten ranks among the most all-round successful men of his generation. The tribute paid by the dinner given him in Chicago last Saturday night on the occasion of his birthday was one of the most splendid ever received by any man and was as sincere and well-deserved as it was splendid.

Born in 1845, Mr. Ripley's life almost spans the history of railway transportation. Entering railway service 48 years ago, he has had his great difficulties to overcome and his hard battles to fight, but from then to now his progress in influence, in achievement and in reputation has been uninterrupted, so that to-day the prestige of his name and the authority of his wishes and opinions are greater than ever before. After a brief period of doubtful health a few years ago, he is again the very expression of hale robustness. Never did he have so many warm admirers and loving friends; never could he better enjoy a good book or a good game of golf. What more could any man ask for, much less hope for?

Our age and country are supposed to be addicted to commercialism. The American business man is often described as the personification of this spirit. The dinner to Mr. Ripley was attended by most of the leading railway men of this country and by many of the captains of industry and commerce in other lines. Everybody there knew that, measured by modern standards, Mr. Ripley is not a rich man. But nobody spoke or even thought of whether he is or not. He was honored as a business man who has demonstrated administrative efficiency of the highest order united to a disinterestedness which has caused him to think almost solely of how he could promote the interests of the investors who entrusted him with the management of their capital and of the public which his railway served. In other words, he was honored as one of the finest exemplars American industry has produced of that spirit of trusteeship which should dominate in the management of all large corporate enterprises, whether railways or industrial concerns. Mr. Ripley without his great ability would not stand where he does today. But neither would he stand there without the exalted sense of duty to his stockholders and bondholders and to the public, which he has always shown. And his possession and exemplification of the spirit of trusteeship have been as important elements in his career as his business capacity. With less ability and a less exalted sense of duty he might have made himself a much richer man, as many other men with less ability and a lower sense of duty have done. But while he would have been a richer man he would not have been so great a man. True greatness consists of character united to ability. Of the two elements character is very much the more important, and it was chiefly a tribute to character which was paid by those who gathered at the dinner to the head of the Santa Fe.

So long as even the business men of our country think so much more about how a business man serves others than about how he serves himself, it cannot truly be said that we are seriously dominated by commercialism. Probably in no other busi-

ness in this country do those engaged in it honor a man so little for serving himself and so much for serving others as in the railway business. That is the main reason why some railway men who have served themselves first and their stockholders and the public second are not in good repute among their fellows, while all railway men are uniting to do honor to the "Boss of the Santa Fe trail."

Mr. Ripley has achieved great things for those who have entrusted to him the management of their property. He has done far greater things for the public which their property serves. How much more he and the other great railway managers have done for the public than all the politicians, the legislatures and the commissions that have combined, in the name of the public, to impose restrictions and burdens on railway management!

NEW CONDITIONS IN THE PASSENGER DEPARTMENT

IN another part of this issue is given an account of the proceedings of the special meeting of the American Association of Passenger Traffic Officers held at French Lick, Ind., on October 26. This was one of the most satisfactory meetings ever held by the association, from the standpoint of the business transacted and the clear understanding reached on many important questions of common interest, and it is believed that the foundation was laid for a much more efficient consideration at meetings in the future of the matters with which the organization deals.

There has been in the past a tendency in some quarters to regard these meetings of the passenger officers as junkets, devoted largely to speech-making and entertainment, and the fact that the association is not a legislative body, and therefore cannot itself enforce its conclusions, but can only recommend them to the various territorial passenger associations for action, has sometimes made it appear that little progress has been made by it. But the record of the association for important achievements is a long one, and there has been, especially in the past few years, a marked tendency toward a more businesslike handling of the docket at each meeting. Not only was the determination to stick to business until the program was completed made manifest at the French Lick meeting, but plans were adopted which seem to lay the foundation for securing more prompt action on the recommendations of the association, by the appointment of a general conference committee to follow the more important subjects through the territorial associations. Moreover, the reference to the executive committee of a proposal to curtail entertainment and speech-making at future meetings indicated a disposition on the part of the members to do more serious work.

As Vice-President Daly of the New York Central pointed out in his address, there can be no question that the passenger department is assuming a new dignity in many ways, and that passenger earnings are coming to be considered as a more important factor in both gross and net revenues. The passenger department has often been regarded largely as a mere adjunct of the freight business, and this, in addition to the difficulty of ascertaining much about the cost of the service, has led to the conducting of the passenger service on an extravagant basis and has sometimes prevented serious consideration of some of the most important problems connected with its work. The passenger business, as well as the freight business in some respects, is passing through a stage of transition from a condition brought about largely as the result of a period of excessive competition when rates were made by men whose main consideration was the gross revenue and who possessed very little knowledge of the subtrahend in the form of operating expenses.

The recent orders of the Interstate Commerce Commission providing for a separation of the operating expense between freight and passenger service, and the decision of the Supreme Court that each branch of the service must stand on its own legs, seem likely to lead to new conditions in the passenger side of the business, which may help to secure a better return from the passenger service as well as give passenger officers a better opportunity of knowing something about the expenses chargeable to their depart-

ment, and consequently more about the relation of both rates and expenses to the net results. Many passenger officers feel that the fact that a good passenger man usually must be a good mixer has sometimes prevented recognition of their more solid qualities and the more serious features of their work, and are therefore looking forward to the day when the new conditions will prevail, and when the business under their supervision may be lifted from the position of an expense to that of a net revenue producer.

The fact that regulation of rates has passed into the hands of another set of men who know even less about the expense accounts than the railroad men, however much they may pretend to give consideration to the cost of service, has by no means taken their work out of the hands of the passenger officers; and the circumstance that they have been trained to keep in touch with the needs and wants of the public has in many ways adapted them for the very important work of educating the public regarding the conditions in the railroad business.

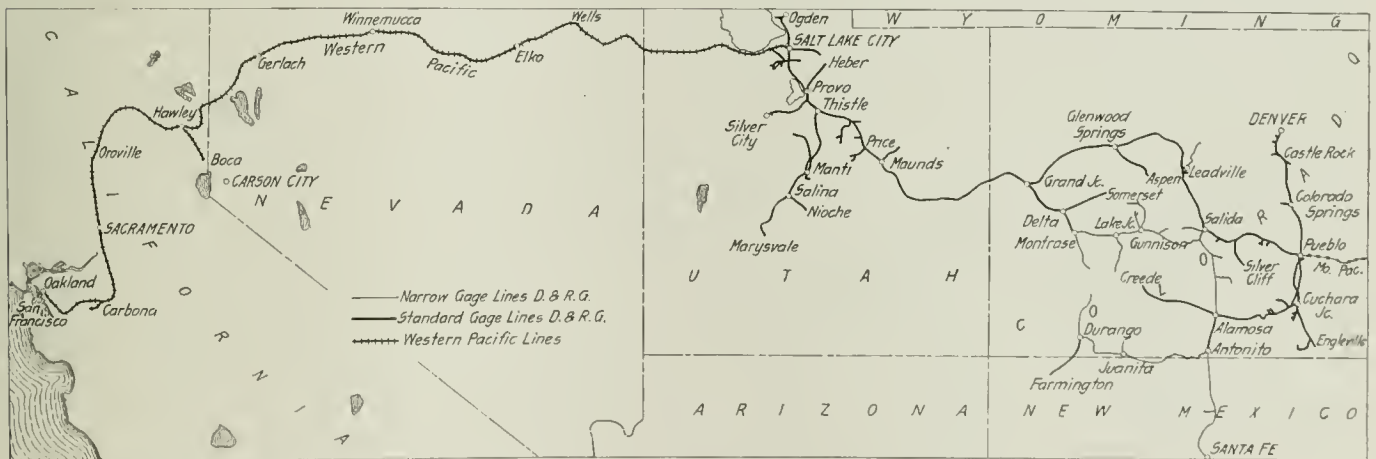
DENVER & RIO GRANDE

B. F. BUSH is president of both the Denver & Rio Grande and the Missouri Pacific, and he is much too good a railroad man to let the physical condition of a property in his charge run down if there is any way of getting the money to spend on needed maintenance. The fact appears to be, however, that the Denver & Rio Grande simply did not have and could not

Total operating revenues for the Denver & Rio Grande in the fiscal year ended June 30, 1915, amounted to \$21,823,000, a decrease as compared with the previous year of \$1,770,000. Total operating expenses amounted to \$14,290,000, a decrease as compared with the previous year of \$2,171,000. After paying fixed charges the company had a surplus of \$935,000, as against \$1,056,000 in the previous year. Cash on hand at the beginning of the year amounted to \$2,607,000, and at the end of the year to \$2,693,000. Leaving aside adjustments through profit and loss account the disposition of the surplus is accounted for by an additional investment in road and equipment of \$559,000, and the retirement of \$501,000 of funded debt and equipment trust certificates.

The Denver & Rio Grande guarantees the interest and sinking fund payments, but not the principal, of the Western Pacific's \$50,000,000 first mortgage 5 per cent bonds. The Western Pacific could not meet the interest charges on these bonds that fell due March 1, nor was the Denver & Rio Grande able to advance the Western Pacific the money. A receiver was appointed for the Western Pacific on March 5, and negotiations are now going on before a committee representing Western Pacific bondholders and the Denver & Rio Grande looking toward some readjustment of the relations between these two companies.

The Denver & Rio Grande operates an average of 2,571 miles of road. At the end of the year 1,791 miles of road operated was standard gage, and 786 miles was narrow gage.



The Denver & Rio Grande and the Western Pacific

get the money which it needed in 1915 for ample maintenance expenses. Maintenance of way expenses per mile of road in the fiscal year ended June 30, 1915, averaged \$988, which was equivalent to a reduction as compared with the previous year's maintenance expenditures of more than 25 per cent. If it had been possible to save sufficient in transportation expenses to meet the loss in operating revenue we may well believe from Mr. Bush's previous record and the showing he is making on the Missouri Pacific that this would have been done. As it was, a saving of 14 per cent was made in transportation expenses, with a decrease of only 7.62 per cent in the total ton mileage carried, and 7.48 per cent in the total passenger mileage carried. The average train load of freight was increased from 390 tons in 1914 to 433 tons in 1915, a remarkably good showing.

Repairs to some classes of buildings were almost suspended, as, for instance, fuel stations, on which \$58,000 was spent for repairs in 1914, and but \$4,000 in 1915, and shops and engine houses, on which \$94,000 was spent in 1914, and but \$26,000 in 1915. There was a very large saving made in track laying and surfacing, on which \$699,000 was spent in 1915, a decrease as compared with the previous year of \$255,000. On the other hand, \$578,000 was spent for ties, a decrease of but \$98,000, and \$128,000 was spent for rails, an increase of about \$9,000.

It will always be an expensive property to operate, so large a part of its mileage being in the Rocky mountains with heavy grades and difficult operating conditions. On the other hand, a large proportion of its traffic is coal and ore, and it received a ton-mile rate—1.186 cents in 1915, and 1.201 cents in 1914. The total tonnage of freight carried in 1915 was 10,103,000, of which 3,307,000 tons, or 32.7 per cent, was bituminous coal, and 3,342,000 tons, or 33.1 per cent, precious ore. Products of agriculture in 1915 furnished 638,000 tons, or 6.3 per cent of the total tonnage. This was 44,000 tons more than in the previous year. The loss in ore tonnage amounted to 955,000 tons, or 22.2 per cent. This reflects the depressed conditions in the copper industry in the first nine months of the year. In the last three months of the fiscal year conditions began to improve, and since the close of the year conditions in the copper markets have very greatly improved. The great natural resources of Colorado have only begun to be tapped as yet. There are vast possibilities for cattle raising, fruit growing and agricultural development in the state, as well as the further development of its gold, silver and copper mines. In time probably also the Western Pacific will be the means of securing a certain amount of through traffic which it will handle in connection with the Denver & Rio Grande, but with the physical characteristics of the country through which it

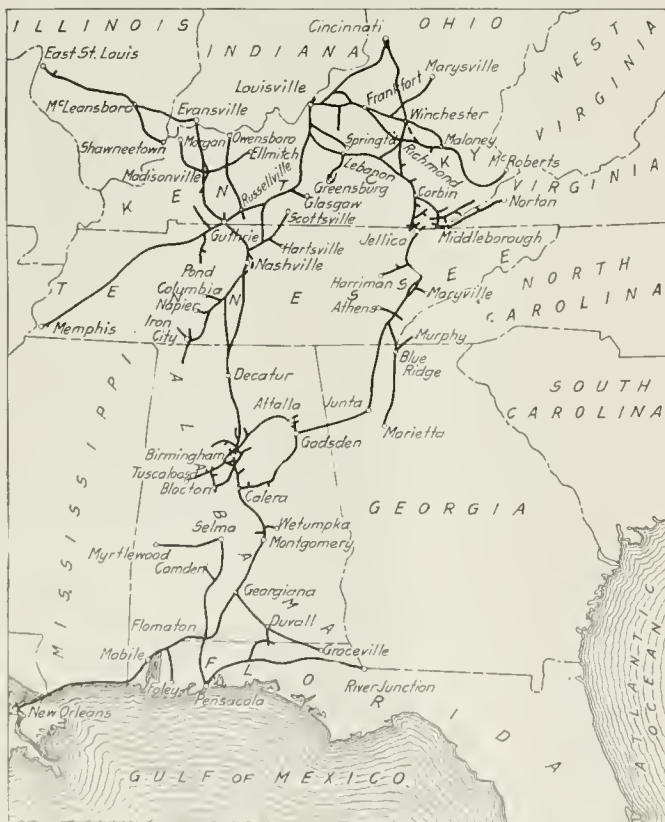
runs such as they are, and with the fact that the through business will have to be handled in competition with the Union Pacific, and therefore at rates which are low compared with what the Denver & Rio Grande can quite properly charge for its local traffic, it will probably be many years before the through business is very profitable.

The following table shows the principal figures for operation in 1915, as compared with 1914:

	1915	1914
Average mileage operated.....	2,571	2,583
Freight revenue	\$15,911,102	\$17,058,445
Passenger revenue	4,449,044	5,077,408
Total operating revenues.....	21,823,236	23,593,641
Maintenance of way and structures.....	2,541,539	3,406,852
Maintenance of equipment.....	3,992,351	4,318,512
Traffic expenses	477,425	497,431
Transportation expenses	6,290,955	7,311,843
Miscellaneous expenses	345,487	401,182
General expenses	651,215	585,069
Transportation for investment—Cr.....	9,302	60,320
Total operating expenses.....	14,289,671	16,460,569
Taxes	1,020,606	1,009,144
Operating income	6,511,607	6,123,564
Gross income	7,752,788	7,386,498
Net income	1,418,731	1,400,375
Appropriations for sinking funds and road and equipment	484,090	344,816
Surplus	934,640	1,055,559

LOUISVILLE & NASHVILLE

IF good business judgment, success in meeting competition, conservative financing, success in opposing or preventing unreasonable regulation, and economical operation had been combined for all the railroads in the United States in the same degree that they are in the Louisville & Nashville, the railroad problem would now be less pressing and dangerous for investors, railroad



The Louisville & Nashville

men and the general public than it is. This is strikingly brought out in a year like the one ended June 30, 1915.

The Louisville & Nashville operates 7,607 miles of road. The revenue from freight forwarded from the principal cities served by the road decreased as compared with the previous year, as follows: Cincinnati, 24 per cent; Louisville, 24 per cent; Owensboro, 17 per cent; Evansville, 25 per cent; Henderson, 19 per cent;

St. Louis and East St. Louis, 30 per cent; New Orleans, 6 per cent; Mobile, 21 per cent; Pensacola, 16 per cent; Selma, 25 per cent; Montgomery, 22 per cent; Birmingham, 25 per cent; Nashville, 11 per cent; Knoxville, 18 per cent. There was a loss of \$8,300,000, or 13.85 per cent, in operating revenues as compared with the previous year, the total operating revenues in 1915 amounting to \$51,606,000, or the smallest revenue since 1909. Operating expenses amounted to \$39,432,000 and net operating revenue to \$12,174,000, the smallest since 1908. After the payment of interest charges and rentals in 1915 the company had \$4,860,000 available for dividends. It paid 5 per cent on its \$72,000,000 stock, calling for \$3,600,000, and had, therefore, even in such a year of depression as 1915, a fair margin of safety. In 1914 there was \$6,645,000 surplus available for dividends and the company paid 7 per cent on its stock calling for \$5,040,000. Thus, in an average year the owners of the property paid the interest on the borrowed money put into it, took a profit of 7 per cent on the face value of their own investment, and invested in the property some additional capital in the form of surplus. In a bad year they cut expenses, took 5 per cent instead of 7 per cent profit, and maintained the policy of putting additional capital into the property in the form of surplus.

Total operating expenses in 1915 amounted to \$39,432,000, a decrease as compared with the previous year of \$5,551,000. Transportation expenses in 1915 amounted to \$17,450,000* and in 1914 to \$20,638,000, a decrease of \$3,188,000. The total number of passengers carried one mile was 499,879,000 in 1915, as compared with 577,421,000 in the previous year, or a decrease of 13.43 per cent. Passenger-train mileage amounted to 10,352,000 in 1915, a decrease of 2.79 per cent, as compared with the previous year. By far the greater part of the \$3,188,000 saving in transportation expenses was made, therefore, in freight service. The total ton mileage carried amounted to 5,144,000,000 in 1915, as against 5,512,000,000 in the previous year, a decrease of 6.67 per cent. The mileage run by revenue freight trains amounted to 14,162,000 in 1915, as against 18,004,000 in 1914, or a decrease of 21.34 per cent. The average trainload was 347 tons in 1915, as against 297 tons in the previous year, an increase of 17.16 per cent. This is a showing that the operating department may well be congratulated on. It is remarkably good.

The Louisville & Nashville divides its expenses between freight and passenger service. On the basis of this division the expenses per revenue train mile in freight service were 191.89 cents, comparing with 179.47 cents in the previous year, an increase of 6.92 per cent, as compared with an increase of 17.16 per cent in tonnage per train mile. In other words, the expense per ton per mile was reduced from 0.605 cents in 1914 to 0.553 cents in 1915, or by 8.60 per cent. The expenses per passenger-train mile were 99.99 cents in 1915, as compared with 101.60 cents in 1914, a decrease of 1.58 per cent.

It is interesting to note that the earnings per passenger-train mile in 1915 were \$1.21, and of freight, \$2.50, while expenses were 100 cents in passenger service and \$1.92 in freight service, leaving a net per train mile of 21 cents in passenger service and of 58 cents in freight service.

The company increased its funded debt outstanding in the hands of the public approximately \$6,000,000, by the sale of \$7,500,000 Lexington & Eastern first mortgage 5 per cent bonds and the retirement of various small amounts of bonds and equipment trust certificates. Approximately \$2,706,000 was spent for additions and betterment to road and \$2,019,000 for additions to equipment. The company had on hand at the end of the year \$9,894,000 cash and \$4,156,000 time drafts and deposits. At the beginning of the year there was \$13,710,000 cash, with no time drafts and deposits. There are no accounts and bills payable.

The Louisville & Nashville has been one of the very few railroad companies to charge depreciation on its road as well as on its equipment. The Interstate Commerce Commission rules for accounting have permitted such a charge ever since 1907 and

* The 1915 figures are in accordance with the new classification and the 1914 figures are not revised, but the totals for general accounts, such as transportation, are comparable.

now specifically provide for such a charge, but do not require it. The Louisville & Nashville had up to June 30, 1915, accrued \$10,718,000 depreciation on its road, which stands on its books at a cost of \$191,498,000, and had accrued \$18,684,000 on equipment, which stands on the books at a cost of \$54,522,000. This is very liberal depreciation. No one would question the soundness of this kind of accounting in a private business, and if a company is strong enough to do so, it would seem the sound method of procedure for a railroad corporation.

In the complaints against rates charged by the Louisville & Nashville brought before the Interstate Commerce Commission the commissioners themselves would probably acknowledge that the company was better able to defend its rates than the majority of other railroad companies, which is a convincing argument that the Louisville & Nashville is not charging excessive rates. Its shippers and the traveling public served by the road are, as a matter of fact, getting better service than would be possible if the company was not as financially strong as it is. The \$7,500,000 bonds were sold at a total discount of \$394,000, so that the railroad company secured new capital on about the same basis as the combined governments of England and France.

The following table shows the principal figures for operation in 1915, as compared with 1914:

	1915	1914
Mileage operated	7,607	7,507
Freight revenue	\$36,953,794	\$42,868,078
Passenger revenue	10,859,047	13,082,509
Total operating revenue	51,606,015	59,682,778
Maint. of way and structures	8,993,389	9,323,206
Maintenance of equipment	10,310,563	12,239,795
Traffic expenses	1,349,705	1,334,264
Transportation expenses	17,449,812	20,638,428
Miscellaneous expenses	212,660	.....
General expenses	1,249,517	1,247,015
Transportation for investment—Cr.	133,857	.....
Total operating expenses	39,431,789	44,782,708
Taxes	2,136,713	2,600,288
Operating income	10,031,448	12,288,155
Gross income	13,461,044	15,176,142
Net income	4,951,764	7,050,139
Appropriations	91,622	405,275
Dividends	3,600,000	5,040,000
Surplus	1,260,142	1,604,864

DETROIT, TOLEDO & IRONTON

A NEW company on March 1, 1914, took over the Detroit, Toledo & Ironton from the reorganization committee which had bought the road under foreclosure sale. The first annual report of the company is for the fiscal year ended June 30, 1915. Under the reorganization \$8,000,000 adjustment mortgage 5 per cent bonds were issued, on which interest charges up to January 1, 1919, are conditional on earnings. A first mortgage was placed on the property to secure an authorized issue of \$1,000,000 5 per cent bonds, of which \$950,000 were sold to raise money for the rehabilitation of the property. In the fiscal year ended June 30, 1915, the company fell short by \$132,000 of earning its operating expenses and the interest on these first mortgage bonds.

A change of policy, however, was adopted in December, which it is thought will greatly increase net earnings. The company cancelled all its tariffs on coal and coke tonnage which provided for hauling this freight at less than three mills per ton per mile. The new management's analysis of the situation was that by accepting coal at rates which yielded from two to three mills per ton per mile the road had to handle traffic that was unremunerative, and through congesting the road in September, October, November and December, when the greatest movement of other freight occurred, it made operation so expensive as to preclude the possibility of a reasonable operating ratio in the months of heaviest traffic. The experiment is a particularly interesting one.

The Detroit, Toledo & Ironton operates 441 miles of road, of which 341 miles is main single track, from Detroit to Ironton. From Ironton to the Kenova bridge across the Ohio river is the main line of the Norfolk & Western. Kenova is on the main line of the Chesapeake & Ohio, a short distance west of the

junction of the Elkhorn branch of the Chesapeake & Ohio with the main line. The Elkhorn branch at its southern extremity connects with the newly built extension of the Carolina, Clinchfield & Ohio. There is a route, therefore, from the Great Lakes to Charleston, S. C., on the southeastern seaboard. From the map which the Detroit, Toledo & Ohio includes with its first annual report it would appear that the company intends to make a bid for traffic over this route. A very early project in railroad planning in this country was for a so-called three C's route from Charleston to Chicago via Cincinnati. The difficulties of getting over the Blue Ridge and Allegheny mountains were so great that this early project was never carried out. The Clinchfield overcame these difficulties and such a route is now open. It would seem as if there were possibilities of developing a traffic in manufactures and merchandise southbound and in fruit and vegetables northbound over the route made by the Clinchfield and the Detroit, Toledo & Ironton.

Heretofore 56 per cent of the total tonnage carried by the Detroit, Toledo & Ironton has been products of mines, and a large proportion of this has been coal, on which the company got but a very meagre ton mile rate. The total tonnage of all classes of commodities carried in 1915 was 2,449,000, and of this, 30 per cent was manufactures as compared with 23 per cent in 1914. The freight density (ton miles per mile of road) in 1915 was 796,000 tons. The average trainload of freight was 477 tons in 1915 and 439 tons in 1914. The total operating revenue per mile of road was \$4,005 in 1915, comparing with \$3,431 in 1914. If the operation of the road is ever to prove profitable to its stockholders it will have to earn very much more than \$4,000 a mile. The present management, however, believes that the way to increase the earnings per mile is not to make a bid for traffic at any price, but to refuse traffic which cannot be handled at some margin of profit and to try to develop, through service and otherwise, other classes of traffic which will yield a margin of profit.

A comparison is made in the annual report of the company for the fiscal year ended June 30, 1915, between the operation in the last four months and the first eight months of that fiscal year. In the last four months the coal and coke tariffs which were considered unprofitable had been canceled. The revenue from coal and coke was \$77,000, or 16 per cent of the total revenue for the four months, whereas in the eight months previous the revenue from coal and coke had been \$522,000, or 41 per cent of the total revenue for that period. Other freight revenue in the four months amounted to \$336,000, or 69 per cent of the total revenue, and in the eight months to \$561,000, or 44 per cent of the total revenue. During the four months operating expenses amounted to \$400,000, or an operating ratio of 82 per cent, while in the eight months operating expenses amounted to \$1,233,000, or an operating ratio of 96 per cent. Thus, in the four months there was \$89,000 net operating revenue, while in the eight months there was but \$47,000 net.

Whether or not the management's diagnosis of the situation is correct cannot be definitely decided until two entire years of operation, one under the old system and one under the new, can be compared. All the indications are, from the twelve months' figures which are given, that the management is right.

The following table shows the principal figures for operation in 1915. No figures for 1914 are given because there are no directly comparable figures which are available:

	1915
Mileage operated	441
Coal and coke revenue	\$599,216
Other freight revenue	897,030
Passenger revenue	161,386
Total operating revenues	1,767,580
Maintenance of way and structures	231,830
Maintenance of equipment	275,478
Traffic expenses	48,401
Transportation expenses	1,009,288
General expenses	69,413
Total operating expenses	1,631,413
Taxes	58,260
Operating income	77,906
Gross income	123,887
Deficit	137,134

Letters to the Editor

SUPERHEATER LOCOMOTIVES AND GRADE REVISION

CHICAGO, ILL.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In your issue of October 8, 1915, page 637, I note a letter by M. E., in which he expresses some doubts as to the ability of a practical man to assimilate some of the statements made in my article on "Superheater Locomotives and Grade Revision" in your issue of September 10, 1915, page 469. I am afraid that the practical man has not applied his practical knowledge to the case in point. The first thing I notice is the diagram on page 637. In this diagram the ordinates are spaced for "Tractive effort—pounds." The A. R. E. A. curves are taken from the tables on pages 469 and 470 of my article above referred to. These two tables show the *drawbar-pull*, the drawbar being at the rear of the tender. This is not tractive power at all, as subtractions have been made for the different kinds of friction usually found in the practical operation of a locomotive.

Another important feature of these figures seems to have been overlooked. These curves are only applicable to the locomotive under the condition of firing given. For the information of those interested in methods of calculation it may be stated that they are based on actual tests, the figures for the saturated steam locomotive being based on the tests made at the St. Louis World's Fair and those for the superheater being based on tests made at the Pennsylvania Railroad's testing plant at Altoona. The only assumption that has been made is that a pound of coal will evaporate a certain number of pounds of water when the grate areas and heating surfaces have a given ratio, this factor being ascertained by the tests cited. It has been found in the Altoona tests that a pound of coal will generate about the same weight of saturated and superheated (200 deg.) steam. However, the weights for a given volume are different. The basis I have used is coal consumption, the same amount of 11,000 b. t. u. coal being used per hour on each locomotive.*

The saturated steam locomotive will have to shorten its cut-off at 5 m. p. h., but the superheated steam will fill the cylinders at 8 m. p. h. At 5 m. p. h. for the saturated steam and 8 m. p. h. for the superheated steam, the two should have the same drawbar-pull. Each curve then follows laws of its own; the superheated steam being more nearly a perfect gas, the drawbar-pull does not decrease as rapidly. As to the difference between the two at 5 m. p. h., I do not know where "M. E." gets his figures. He finds a difference of 3,966 lbs. tractive power. The difference shown by Tables I and II in my article is 966 lbs. drawbar-pull. I am unable to say where the 3,000 lb. came from and must plead not guilty; 966 lb. drawbar-pull is a very small difference, and I very much doubt if any of our eagle-eyed practical men would be able to find it in actual operation. Apparently it is due to the superior "fluidity" of the superheated steam. In the calculation given the difference between the hauling capacity of the two locomotives on a 0.5 per cent grade at 5 m. p. h. is only 62 gross tons.

The A. L. C. curve plotted with these curves is misleading without an explanation. These two curves show the drawbar-pull of a saturated and superheated steam locomotive of the same drawbar horsepower up to 20 m. p. h. This simply means that less coal is fired per hour for the superheater than for the saturated steam locomotive. I have made an entirely different assumption, that is, that they both use the same amount of coal per hour, this amount being about the capacity of a good fireman. There will be a saving per gross ton mile but not per hour. The boiler horsepower of a saturated steam locomotive can be increased say 30 per cent, by adding a superheater, if the

heating surface is not lessened, and the same amount of coal is fired per hour. Operating conditions may be such that the old locomotive was powerful enough. In that case a large saving in fuel will be shown. In other cases the trains will be loaded heavier and faster time made. In this case the saving will be partly in fuel and partly in other operating expenses. A case is conceivable in which a line may be so congested that the extra power will be used entirely for speed and there will be no saving in fuel. However, there will be a saving elsewhere, probably in overtime.

"M. E." uses the following language: "At this speed the A. R. E. A. curve for *tractive effort* for a saturated steam locomotive shows 5,762 lb. From a practical point of view such figures will not substantiate service requirement." I agree with him exactly, but in no place have I used the term "tractive effort." The *drawbar-pull* is 5,672 lb. In the eastern territory with 15,000 B. t. u. coal this would be about 7,700 lb. In the first case $5,672 \div 5.4 = 1,051$ tons behind tender would be the tonnage, and in the second case $7,700 \div 5.4 = 1,425$ tons behind tender would be the tonnage at 35 m. p. h. maintained speed on a level grade and not the 323 tons given by "M. E."

This gets us around to the point of train resistance per gross ton for different average weights of car. "M. E." states that very few support the theory that train resistance does not increase between 4 and 30 m. p. h. I have seen votes taken where it was unanimously decided that it did not increase—also the reverse. As a matter of fact, this depends largely upon the kind of track. With 100 lb. rail the increase will not start until a higher speed is reached than for light rail and track. I have seen dynamometer records that ran as low as 4 lb.; others as high as 8 lb. In this problem I took the highest grade track. If "M. E." will plot a large number of points showing this data taken from dynamometer charts, he will have them spread over an area so large that it would not seem worth while to put a curve through them, although it can be done mathematically. The principal thing to do to get comparable figures is to get similar conditions. "M. E." also inquires, "Also in the case of time freight trains, do such theoretical calculations bear out practical service runs?" Page 469 of my article limited the calculations to slow freight. "Such theoretical calculations" may be made for time freight and may be expected to give correct results if the theory is understood and applied correctly.

In conclusion, I wish to disclaim any intention of asserting that there is any such thing as general economics in cases of this kind. Engine districts vary widely, and figures made for one have no relation to figures made for another. The same method may be used, however, and this is the question of greatest importance. Calculations of the sort which I have gone into only expect to get at a yearly average. Daily runs and similar special cases may be above or below the figures given. Some seem to object to "theoretical" computations in matters of this sort. There can be no other when one line has not been built. When a railroad finds that it cannot do business economically over an engine district it is going to do something about it if it has the money. That any calculations made are not infallible is well known, but it has always seemed to me that the correct point for a start in such matters is the locomotive. The whole district must be considered and not one or two grades.

PAUL M. LABACH.

THE PROGRESS OF THE AUSTRALIAN TRANSCONTINENTAL RAILWAY.—In a recent debate in the Victoria parliament on the Kalgoorlie to Port Augustus Railway Loan Bill, the minister for home affairs remarked that he had been informed that the railway would be opened for traffic by the end of next year. Up to July 17 between 700 and 800 miles of track had been laid out of the total length of 1,053 miles. Rails weighing 80 lb. per yard were being used, and the scheme allowed for a speed of 30 miles per hour, the curves and general characteristics of the railway permitting this speed.

* The curve marked A. L. C., shown by "M. E.," seems to have been made for 5,500 lb. of coal per hour. The B. t. u. apparently is taken at about 14,000.

Dinner to E. P. Ripley on Seventieth Birthday

Three Hundred Railroad Men and Other Associates Honor
Santa Fe President After Twenty Years in Its Service

One of the most remarkable tributes ever paid to a man by his friends, associates and competitors was the dinner to Edward Payson Ripley, president of the Atchison, Topeka & Santa Fe, on the occasion of his seventieth birthday, which also marked for him the completion of 20 years as the head of the Santa Fe system.

The dinner was given by the officers and the directors of the company, at the Blackstone hotel, Chicago, on October 30, and was attended by over 300 personal friends, railroad men and other business associates of Mr. Ripley, including 200 Santa Fe men from all parts of the system, some of whom had been connected with the road throughout its history, and nearly all of the most prominent railway officers of the United States.

The banquet hall was decorated with flowers, foliage and fruits representing the products of the 13 states through which the Santa Fe system runs. An entire refrigerator car was required to transport them to Chicago. One of the most striking features of the decorations was a large Santa Fe emblem in electric lights, the mission cross, bearing the words, "Santa Fe," which vanished and were replaced by "Ripley."

Reverend Bernard Kelly, of Topeka, an old friend of Mr. Ripley, delivered the invocation at the dinner. The speakers were: Charles S. Gleed, president of the Missouri & Kansas Telephone Company; Victor Morawetz, formerly general counsel and chairman of the executive committee of the Santa Fe; George B. Harris, chairman of the Chicago, Burlington & Quincy; Frank Trumbull, chairman of the Missouri, Kansas & Texas, and the Chesapeake & Ohio; Gardiner Lathrop, general solicitor of the Santa Fe, and Mr. Ripley.

Walker D. Hines, general counsel of the Atchison, Topeka & Santa Fe, presided as toastmaster. In introducing the first speaker, he referred to the electric light emblem, saying:

"When we speak of Mr. Ripley, we think of the Santa Fe, and when we speak of the Santa Fe, we think of Mr. Ripley. The two names seem almost interchangeable. The identity is so complete that we are almost disposed to assume that Mr. Ripley was born president of the Santa Fe, but such is not the case.

"Mr. Ripley was born and educated in Dorchester, Massachusetts, and then he worked four years in a wholesale dry goods house in Boston. At the age of 23, he began his railroad service, and for two years he was contracting agent for the fast freight line of the Pennsylvania System. Then he spent 20 years in the

service of the Burlington. He began as a clerk in the general eastern agent's office at Boston, later becoming general eastern agent. Then he became general freight agent, then traffic manager, and then the all-around qualities of his railroad capacity received a very striking recognition, for although all his training had been in the traffic department, he was transferred to the operating department and made general manager. In 1890 he left the Burlington and went to the St. Paul as third vice-president, in charge of traffic, and stayed there until January 1, 1896. Then began the presidency of the Santa Fe. At that time he had lived in Chicago for 18 years and he had been in the railroad business 28 years. He knew the traffic end and the operating end, and he knew the West.

"I want you now to hear what the Santa Fe's experience was before it came with Mr. Ripley. The best qualified man in the country to tell you that is my fellow-director Charles S. Gleed, of Topeka, Kan."

Mr. Gleed spoke on the subject, "The Old Santa Fe and the New," comparing the present situation of the road with the conditions that existed before the receivership.

Mr. Hines then introduced Victor Morawetz, stating he was the most active man in the reorganization of the Santa Fe, and that during the formative period of the new Santa Fe he was Mr. Ripley's most intimate associate in the financial management of the company. Mr. Morawetz spoke on the problems confronting the property when Mr. Ripley took charge of it and on the policies which Mr. Ripley put into effect, saying in part:

VICTOR MORAWETZ ON THE RE-
ORGANIZATION OF THE
SANTA FE

It is difficult at this time to realize the hopeless depression in business and the despondency in financial circles which prevailed at the time of the reorganization of the Santa Fe

system in 1895. It was only through the assistance of Messrs. Baring Brothers & Company, of London, that it became possible to form a syndicate to underwrite the payment.

It is small wonder, therefore, that the reorganization committee failed to foresee the great future of the Santa Fe system and to make adequate provision for its future capital requirements. For a number of years after the reorganization the work of reconstruction was seriously handicapped, because the only securities the company could sell were its general mortgage bonds, and the amount of these that could be issued was wholly insufficient. It was only after the commencement of the period of unparalleled and nation-wide business prosperity about



E. P. Ripley

15 years ago that the company's credit became sufficiently established to enable it thereafter to raise the new capital that was needed by the sale of debentures, convertible bonds and bonds secured by newly constructed lines.

All the railroad reorganizations planned at the time of the Santa Fe reorganization, and nearly all the reorganizations ever planned in the United States, have been faulty because they failed to make adequate provision for future capital requirements. Rarely if ever have railroad reorganizers realized the abounding vitality and the unceasing growth of the country and rarely have they appreciated sufficiently that in the United States a railway system must develop and grow with the country which it serves—that it must ever expand its capacity and improve its service.

Undoubtedly there will recur temporary periods of depression during which railroad earnings will fall off and railroad companies will find it impracticable to raise the new capital which they need. But, even during these periods of depression, population increases, the development of the country proceeds and wealth accumulates, and we know from experience that after each period of depression the prosperity of the country and the demand for additional railway facilities grow by leaps and bounds. Every railroad system, therefore, must be prepared, from time to time, to raise large amounts of new capital to enable it to furnish the additional facilities which the development of the country demands. It is, however, obvious—as obvious as a church by daylight—that in the long run neither the Santa Fe company, nor any other railway company in the United States, will be able to raise the necessary new capital, unless investors in securities feel assured that railroad companies will be permitted by the governmental authorities to charge for their services enough to enable them to pay the increasing costs of labor and of materials, and also to pay a satisfactory return to the holders of their bonds and stocks. Mr. Ripley has built up and perfected a railway system that serves the country well; but whether his work shall endure and in future years the Santa Fe system shall continue to serve the needs of the country will depend on the policy which the people may adopt and enforce through their railroad commissions.

When Mr. Ripley took charge of the Santa Fe system his first task was to improve the physical condition of the road and equipment as fast as the means at his disposal permitted. The Santa Fe soon became one of the leaders in the introduction of the latest improvements of equipment and machinery and generally in scientific railway management.

The results were due not only to Mr. Ripley's exceptional ability and sound judgment as a railway manager, but also to his rigid enforcement of those elementary principles which are essential to enduring success in the management of any business. By rule and by example he enforced the principle that no officer should have any interest that might be antagonistic to the interests of the company and that all should co-operate with singleness of purpose to secure the ultimate welfare of the company, without regard to any outside interest or influence. It was his view also that the finances of a great railway system should be managed with the utmost conservatism and regard for the safety of its security holders.

Mr. Ripley has done more than to build up a strong and prosperous railway system. He has helped to develop and enrich a large section of the country and, by his influence and his example, he has helped to extend sound and business-like methods of railway management throughout the United States.

Mr. Hines then introduced George B. Harris, who had been long associated with Mr. Ripley when both were on the Burlington and who was president of the Burlington during much of the time that Mr. Ripley has been president of the Santa Fe. Mr. Harris spoke on Mr. Ripley's relations with the presidents of other railroads, praising his fairness in his relations to his competitors.

Frank Trumbull was asked to speak particularly with reference to the public aspects of railroad problems and Mr. Ripley's relation thereto. After paying a tribute to Mr. Ripley, he said:

FRANK TRUMBULL ON RAILROAD REGULATION

The railroads of the United States as a whole are regulated by forty-nine interlocking directors—forty-eight states and the federal government. Freight cars go everywhere, shippers determine the routing of their freight; the Interstate Commerce Commission can determine divisions of through rates, and if the railroads of Texas, for example, be crippled, there is impairment and waste not only in Texas, but in every state.

Omitting figures, but stating facts, what is the situation of the railroads of the country, considered as a whole? Their net operating income for the fiscal year ended June 30, 1915, was not as great as in 1910, 1911 or 1912, and the loss in comparison with 1913 was even greater. There are now abundant crops and various signs of returning prosperity, but who shall say whether this is permanent or only hectic?

In the last four years probably not less than fifteen hundred million dollars have been dedicated by private investors to the public service in the form of additional railroad property, but, the net operating income of the railroads has been diminished. Is it any wonder that the investor feels that he may continually be in a dentist's chair, and that there is practically no appetite for fresh railroad development, particularly at a time when investors can get high rates of interest and big profits otherwise? If fifteen hundred million dollars have been required during years of restricted business, why not that much or more in the years that are immediately ahead of us—years of possibly greatly increased traffic? Where is the reserve preparation for it? May not the shippers, while saving in rates, have risked their profits? I do not argue the question of government ownership. Government has owned the wagon roads of this country for three hundred years and they are sufficient answer. It would be interesting, would it not, to have a governmental valuation of the wagon roads showing, as in the case of the railroads, the original cost to date, the cost of reproduction, etc.

Many sincere and honest citizens ask why should not the railroads accept the same vicissitudes as general business. This is a proper question to ask and a proper one to answer. Government puts limitations upon the prices which railroads may charge and requires them to remain in business every day in the year whether or no. These are the two important features which differentiate the railway business from other business of the country. France has long since recognized this by guaranteeing to railroad owners minimum regional dividends. Great Britain has recently recognized it in temporarily taking over the management of its railways, by guaranteeing to their owners returns equal to those prior to the war. Is not security of investment as desirable for the peaceful development of a people as for war? Under present conditions, investors take all the risk of the ordinary fluctuations of business and the risk of contradictory and confusing regulation besides. And that, of course, means pure, unadulterated speculation.

I make no protest against regulation of railroads by public authority. Wise regulation is in the public interest, but if regulation is to be successful it must be responsible; it must be consistent; it must provide some sort of assurance to future investors as to treatment which they will receive. If the treatment is niggardly, even in a few states, railroad investment will be restricted. If the treatment is liberal, railroad investment and enterprise will be stimulated. The fundamental weakness of the present situation is that by reason of the inconsistency, the complexity, and often the contradictions, involved in the present system of regulation, the railroad officer cannot make any promises as to the treatment which investors in his property will receive. That is a difficult position in which to put any conscientious man, seeking additional capital. Again, no matter how well or satisfactorily the Interstate Commerce Commission may do its work, the entire fabric can be disarranged through counteracting influences of state commissions and legislative bodies.

In introducing Gardiner Lathrop, Mr. Hines said:

"The railroads have become a national institution and it is of vital importance to the public that the whole scheme of government regulation should be studied and overhauled.

When the time comes to do this I believe the public will realize the importance of giving careful consideration to the views of men like Mr. Ripley. It is inconceivable that the advice of men with such qualifications will be rejected in any public study of railroad matters. It may be said that the advice of railroad men is impaired by their self-interest, but I deny that any class in our country has a more direct or a more comprehensive interest in the successful rendition of public transportation service than the railroad men themselves. So I believe that one of the greatest functions of Mr. Ripley's career is still before him, and that is to aid in the improvement of governmental regulation.

"But now we come to the relationship which, though last in our arrangement here, is first and fundamental. It is where all of Mr. Ripley's great qualities appear the greatest and all his lovable qualities appear the most lovable, and that is his relationship with his officers and his employees."

An abstract of Mr. Lathrop's address follows:

GARDINER LATHROP ON RELATIONS WITH EMPLOYEES

It is my privilege tonight to speak of Mr. Ripley's relations to his employees, including officers in that good generic term. To his officers he has always given the fullest measure of confidence, the largest power of initiative and the greatest independence of action, at the same time holding them to the strictest accountability for the proper performance of their duties, and subjecting them to just but kindly criticism whenever the occasion demands it. Conferences upon matters of importance are invited and counsel freely furnished from the storehouse of a mind which, after years of study and experience, has become master of every department of railway service.

His dominant characteristics in dealing with his employees are justice and fairness, and like all big men he is plain in manner, easy of approach and always accessible, ready to hear and to heed what any employee, no matter what his position, may have to say. Every man is assured of fair treatment, and, if deserving, he receives promotion in the line of service. Not long ago the chief executive of another system wrote Mr. Ripley to suggest a man for vice-president. Mr. Ripley replied that he found his vice-presidents among his own employees and that his correspondent should do the same, thus rewarding good service and furnishing an incentive to all employees to do their work faithfully, in the knowledge that when their time comes they will be recognized.

It has been his policy, not only to guard the lives and limbs of the men under him by the promulgation of all necessary rules and the adoption of all safety devices of value, and the creation of a separate department to have this matter of safety in special charge, but also to foster a comprehensive hospital system, the support and management of which are participated in by both employees and officers.

In addition to this, the company several years ago, at his instance, established a pension system, being a pioneer in providing for a liberal minimum, whereby faithful employees, grown grey in the service, are enabled to retire at 65 upon a certain percentage of their wages, and to support their families and themselves in reasonable comfort.

But to my mind, the crowning act of his administration, in his relations with his men, was the establishment, at his suggestion and upon his initiative, of the system of reading rooms and club houses, not for the protection of life and limb, but for the mental, moral and social betterment of the men and of their wives and children as well.

At these reading rooms and club houses, which now represent a large investment, are provided by the railway system newspapers, periodicals and good books, baths and beds at a nominal price, and at Needles, on the desert, where the thermometer is always high, a capacious plunge, rational amusements and, from time to time, lectures and concerts. Here, not only the men, but their wives and children, have a place to go and read and get diversion, and become acquainted with each other. As a result, the saloon has been largely eliminated from the life of the men, their standards of living have been raised, and their inter-

course with their fellow-employees rendered more friendly.

But above and beyond all, this substantial manifestation of interest in their welfare has made the Santa Fe men one great family, with Mr. Ripley as the acknowledged head, and with the common object of good service to be striven for by all. As a result, a genuine sentimental attachment for the road has been developed with a loyalty and devotion to the company's interests unsurpassed, and the corporation, no longer soulless, has become instinct with a vitality whose spark was originally struck by our president, and whose development has been zealously fostered by him.

If let alone, the Santa Fe employees are reluctant to strike. When trouble threatened once, some time ago, the superintendent of the reading rooms overheard some men talking. One said, "As long as that man Ripley's heart is at the head of the Santa Fe, there will be no trouble." This tells, in awkward phrase, perhaps, the real secret of Mr. Ripley's success as the chief executive of a great railway system. He has a head capable of conceiving big things, with rare administrative power and an indomitable will to carry them into execution. But beneath the rugged exterior of this manly man beats a big heart, full of the milk of human kindness—safeguarding the lives and limbs of his employees, caring for them when sick and injured, ministering to the higher and better life of themselves and their families, and providing for their reasonable support when old age compels retirement. What wonder that the men admire, revere and love their chief!

MR. RIPLEY'S ADDRESS

As the 70 candles on the birthday cake burned low, Mr. Ripley addressed the gathering as follows:

Such things as have been said of and to me tonight are usually reserved for men's tombstones—perhaps on the theory that a disembodied spirit may read them without emotion; but being still in the flesh and human, they are to me pleasantly overpowering, even if not entirely deserved. Our friend Sancho Panza remarked wisely that, "We are all as God made us, and some of us a great deal worse"—and perhaps the most that any of us can claim is that he has not dissipated the natural gifts with which he started in life and has made good use of his natural talents, or, in Sancho Panza's language, has not made himself "worse."

And before proceeding I desire here to pay tribute of praise to her who joined her life to mine 44 years ago and has since provided the comforts and the rest of a quiet home, who has twice accompanied me through the valley of the shadow of death, who has watched over me mentally, morally and physically, and who is mainly responsible for such success as has been mine in conserving mind and body. I ask you, friends, to join me in drinking the health of my wife.

And, secondly, such success as has been mine has been due to those who have worked with me and than whom no more able and efficient men are in existence. No one man is of any possible consequence; no one man can accomplish anything in a large way without loyal and enthusiastic support. This support I have now and I have always had in unstinted measure—the "esprit de corps" of the Santa Fe has become known and is commented on by everybody everywhere, and I desire here publicly to declare my appreciation of it and to thank not only those present but the great body of employees.

Thanks should be extended to our directors for the cordial support that has always been ours and the liberal backing they have supplied for all schemes looking toward the welfare of employees. Of the original 15 directors but six are still living, but I desire to state that in not any of the 25 or 30 who have at various times served on the board has there ever been any sign of self-seeking or effort to secure personal advantage. Each man has been "Santa Fe all the way"—and his vote cast in what he considered the best interests of the company without reference to his own.

We make no idle boast when we talk of our solidarity and our "team work." We may confidently claim that there is as little friction in our machinery as in any institution of its magnitude.



Dinner Given by Officers and Directors of the Santa Fe in Honor of President E. P. Ripley on his Seventieth Birthday, October 30, 1915

in the world. This condition begins with the directors—all busy men, with large outside interests, but all devoting their time and energies to the Santa Fe alone when in the board room; and it extends through all ranks and is ever noticeably present.

Nor is this loyalty and enthusiasm the result of laxness in discipline or lack of efficient supervision. Not only do the employees regard the company with a loyalty bordering on affection, but they perform their duties cheerfully and well. Not a day passes that travelers and others do not go out of their way to comment on the workmanlike and thorough manner in which things are done. I think the affection that men cherish for the railroad on which they were "raised" is very like that which one feels for his birthplace—the old home in which he played as a boy—it is a part of his earliest and happiest recollections, and no matter how far afield he may stray, or how high be his rise, he looks fondly back to the days of small things and to his old associations. But while we congratulate ourselves on what we have done, let us take heed lest we become conceited. We read that eternal vigilance is the price of liberty. Let us also remember that the higher one climbs the farther and harder will be his fall if he falls, and that we have established a reputation which requires continued effort for its maintenance.

Primarily, the corporation is organized for the benefit of the stockholders, but in safeguarding their interests those of the public must also be cared for. And in the interest of both stockholders and public it is important that the moral and physical welfare of the employee be also looked after. This three-fold duty—to the public, the employees and the owners—is sometimes perplexing, but I think we can claim with confidence that cases of doubt have generally resulted in a solution beneficial both to public and employee, and the stockholder represented by your directors and officers has been willing to subordinate his interest to the other two.

We have aimed at something more than a mere money-getting institution. We have sought to spread education and even culture where little of either previously existed. The Santa Fe has been an educational institution in many ways. It contributes the services of its engineers to counties and municipalities desiring expert advice. It graduates from its apprentice schools yearly something like 155 first-class mechanics; it maintains agricultural experts for the benefit of the farmer; it has set an example in architecture and has made life more attractive all over the southwest. Organized for profit and as a business venture, it has, I believe, fully lived up to its duties to the public as well as to its owners.

This is not the work of one man—it is that of everybody—and I account for it on the supposition that we all realize that the company is fair and just, that it has the welfare of its employees constantly in mind, and that it aims to reward merit. Long may the Santa Fe continue to keep the high position among the railroads of this country that it now occupies.

Nearly 20 years ago we began together what then appeared a somewhat doubtful struggle. We had 6,486 miles of road and not a mile of what to-day we would call good track. We had very little ballast, insufficient terminals, inferior power and mechanical appliances and our credit was not of the best. We earned in the first full fiscal year \$30,000,000. In the last fiscal year we operated nearly 12,000 miles, most of which could be classified as first-class track—about 1,000 miles of second track—and our power, equipment and terminals are second to none in the country; and last year we earned \$117,000,000 gross. In short, our mileage has increased 72 per cent, our capitalization 61 per cent and our earnings 284 per cent in the 20-year period.

Those of us who have been doing this work know that it has been accomplished in the face of many obstacles, and that it has not always been easy, but we also know that it has been an absorbingly interesting work, and that its success has been due to able support from above as well as from below.

Let us not on this occasion forget to acknowledge our debt to those who traveled with us over a portion of this long road, but who for various reasons left us—some of these like Walker, Higginson, Morton, Dun, Nicholson and Hurley, were taken from us to our great sorrow by death; others, like Kenna, Ken-

drick, Mudge, Biddle, Nixon, Gorman, Morawetz, Morse, left us for business reasons, or to fill high positions with other roads, and we are still fond of pointing to them as "Santa Fe exhibits;" their successors were once their pupils. We hope these, our graduates, will not lose their affection for Alma Mater.

Where all parts have been so well played it would be invidious to single out individual names, but I feel that I should call to your attention at this time the remarkable service performed by Victor Morawetz. His was the brain that conceived the plan of reorganization and his the mind that directed the policies of the company for many years. To him, more than to any one, is due the freedom from entangling alliances and the financial independence it is our fortune to enjoy. His high standards and his ability have helped more than any other cause to put the company in its present enviable position. He has a worthy successor in Mr. Hines, but his advent was after the main struggle and when the battle was more nearly won.

For myself, what can I say in appreciation of this occasion and of the feeling from which it grew. When the heart is fullest the speech is most halting. Association with you has been the greatest pleasure of my life. I cannot trust myself to say all that is in my heart. You have all been too good to me. This is the sunset glow. The shadows will soon begin to lengthen and the road grow more dim. But if I have lived to win the approbation of my contemporaries and to be of benefit to those with whom I have been associated, I can look with complacency on the signs of the closing day and go to my rest content.

CONGRATULATIONS BY THE BOARD OF DIRECTORS

Mr. Ripley's tribute to his wife caused the most affecting scene of the entire evening. Mrs. Ripley sat in the balcony and when Mr. Ripley proposed the toast, those present rose and with tears in the eyes of many, responded with cheer after cheer. Mr. Ripley received hundreds of telegrams of congratulations during the day, including many from men in the ranks. Each guest had written a personal tribute and these were all bound together and presented at the dinner. The Santa Fe board of directors met at Chicago during the day and adopted the following resolution:

"Resolved, That the board, on the occasion of its meeting in Chicago on the seventieth birthday of Mr. Ripley, tenders him its hearty congratulations, expresses its continually increasing appreciation of the great value of his services to the company and to the country, and declares its earnest wish for the continuance of his vigorous health and strength through many additional years."

The list of guests at the head table is as follows:

Theodore N. Vail, president, American Telephone & Telegraph Company; A. C. Bartlett, Hibbard, Spencer, Bartlett & Co.; William A. Fuller, J. J. Mitchell, president, Illinois Trust & Savings Bank; J. C. Stubbs, former traffic director, Harri-man Lines; Rev. Bernard Kelly, of Topeka, Kan.; J. M. Dickinson, receiver, Chicago, Rock Island & Pacific; Frank Trumbull, chairman, Missouri, Kansas & Texas and Chesapeake & Ohio; L. E. Johnson, president, Norfolk & Western; A. J. Earling, president, Chicago, Milwaukee & St. Paul; George B. Harris, chairman, Chicago, Burlington & Quincy; Marvin Hughitt, chairman, Chicago & North Western; Walker D. Hines, general counsel, Atchison, Topeka & Santa Fe; Edward P. Ripley, president, Atchison, Topeka & Santa Fe; Victor Morawetz, formerly general counsel and chairman executive committee, Atchison, Topeka & Santa Fe; Edward E. Ayer, Ayer & Lord Tie Company; Milton H. Smith, president, Louisville & Nashville; George M. Reynolds, president, Continental & Commercial National Bank; Gardiner Lathrop, general solicitor, Atchison, Topeka & Santa Fe; John S. Rannels, president, Pullman Company; C. S. Gleed, chairman, Missouri & Kansas Telephone Company; David B. Jones, chairman, National Zinc Company; John F. Harris, Harris, Winthrop & Co.; Frederic A. Delano, Federal Reserve Board; J. J. Glessner, vice-president, International Harvester Company.

American Association of Passenger Traffic Officers

Committee Reports Included Those on Telegraph Cipher Code, Printing Folders and Charges for Checking Baggage

A special meeting of the American Association of Passenger Traffic Officers was held at the French Lick Springs hotel, French Lick, Ind., on October 26. President Alexander Hilton, passenger traffic manager of the St. Louis & San Francisco, presided, and there were about 100 members of the association in attendance. President Hilton in his opening remarks called attention to the fact that while the association is not a legislative body, and thus cannot put its recommendations into effect, it has an important function in originating and discussing subjects to be referred to the various territorial associations.

L. W. Landman, general passenger agent of the Michigan Central, presented a report from the executive committee on a universal telegraph cipher code for handling interline passenger traffic business, for the purpose of not only reducing the expenses of telegraphing for sleeping car reservations and similar matters, but also saving time in ciphering and deciphering and greatly improving the efficiency of the service. Mr. Landman gave an outline of a complete cipher code, invented by J. Edwin Dempsey, of Chicago, a code expert, formerly connected with the traffic department of the Chicago & North Western, who has compiled cipher codes for several large railroads, and is now at work on one for the Chicago, Milwaukee & St. Paul, and who has been engaged by the executive committee to devise a code for universal use. The method employed in ciphering is unique, being in many ways a departure from the styles in general use. The plan includes the code book, which need be placed only in the hands of such officers as desired, the agents requiring only single sheets containing parts of the code used in their regular routine, and by its use the number of words in a telegram ordering reservations, etc., may be very greatly reduced, as single words are used to cover a vast amount of information. The plan was declared to be very simple and easy of manipulation. Illustrations were presented of the translation of ordinary messages into the code, showing in some cases a reduction from 42 words into 3 or 4. The executive committee was very strongly in favor of the plan, believing that it presented possibilities for very large savings in expenses, and proposed to submit copies of the code to the passenger traffic officer of each railroad with a request for a statement as to whether they could adopt the plan. It was explained that the plan would only reach its maximum of efficiency if adopted by all lines. The salient point of the Dempsey cipher code is that it successfully harnesses all detail in such manner as to make necessary the use of only one or two code words in any given message and at the same time it makes such a phenomenal reduction in words, that the saving in tolls on messages sent over commercial wires is very great, while the railroad wires are relieved of a great amount of their burden. The committee was authorized to incur the expense necessary to submit a complete report, with samples of the code, and an estimate of the expense to each railroad.

C. A. Cairns, general passenger agent of the Chicago & North Western, presented a report as chairman of the standing committee on association ticket paper, stating that a patent had been granted on the association's form of multi-route ticket and outlining a plan for a blanket bond to be issued by a surety company for all printers licensed to use association paper. The report was adopted and the secretary authorized to put the plan into effect, with a resolution urging all lines not already doing so to make use of the association paper and standard colors for tickets.

The Committee on Official Digest of Fares and Divisions, O. P. McCarty, passenger traffic manager, Baltimore & Ohio, chairman, presented a report from Agent E. L. Bevington that the digest of fares, a comprehensive collection of the tariffs, arbitraries and passenger divisions of all lines, which has been found to be

of very great assistance to the general officers in passenger accounting matters, is now practically up to date and complete, except as to the fares in western territory, where the tariffs are under suspension by the Interstate Commerce Commission.

The Committee on Adjustment of Disputes Relative to Divisions of Passenger Fares, O. P. McCarty, chairman, reported that peace and harmony apparently prevails, as no disputes had been submitted to the committee since the last meeting.

A report was received from the territorial committees advising of the progress made on subjects referred to the territorial associations at the San Francisco meeting.

The Committee on the Printing of Folders and Other Advertising Matter and Economical Distribution Thereof, H. J. Phelps, general passenger agent, Illinois Central, chairman, reported that its recommendations for the curtailment of distribution of folders in hotels and other public places had been adopted by the Western, Transcontinental and Central passenger associations, but are not yet effective, except in the Central Passenger Association territory, pending the concurrence of other associations. On request the secretary read a report of the action in this respect of the Central Passenger Association, in which the folder committee had reduced the distribution from 1,141 places to about 600, by eliminating most cities of less than 10,000 population, and by a close supervision of the distribution. The Central Passenger Association committee reported that it had gone about as far as it could without the co-operation of other associations. After a discussion the present committee was discharged, as it had requested, and it was decided to appoint a new committee, composed of the chairmen of the territorial associations, to continue the work. In the discussion it was brought out that while the distribution of folders and other advertising matter has been reduced to a considerable extent, the money saved is the result of a closer supervision of the distribution and does not represent the withdrawal of any service to the public.

The Committee on an Additional Charge for the Checking of Baggage, A. B. Smith, general passenger agent, New York, New Haven & Hartford, chairman, presented a recommendation, which was adopted, that the territorial associations give consideration to a plan for establishing a 10-cent terminal charge for the checking of each piece of baggage possibly to be proposed in lieu of requiring a declaration of value on account of the unlimited liability imposed by the Cummins amendment. Several members expressed the opinion that such a plan would be accepted without opposition, if the reasons for such a charge were properly presented, and it was stated that several commercial associations had already indicated their willingness to accept such a plan.

The Committee on Revision of Joint Tariffs, J. P. Anderson, general passenger agent, Pennsylvania Railroad, chairman, was continued and allowed further time for presenting its report, with instructions to endeavor to work out a plan for the simplification of tariffs with a view to economy and to co-operate with the Interstate Commerce Commission.

No report was presented by the Committee on the Expense of Special Train Service for Organized Party Business, but it was decided that the committee should be convened at an early date at the call of the president.

The Committee on Economies in the Operation of City Ticket Offices, S. G. Warner, general passenger agent, Kansas City Southern, chairman, presented a report expressing the opinion that unnecessary expense is incurred in maintaining city ticket offices at excessive rentals caused by competition among the roads for locations, and that offices can be secured which will give equally satisfactory service to the public in sections where

the rents are lower. It was the opinion of the committee that generally the expense of maintaining city ticket offices in cities of less than 50,000 population is not justified; that foreign lines should secure locations on upper floors and that wherever possible it would be advisable for two or more lines to occupy joint offices. The report elicited a general discussion of the plans for consolidated ticket offices which have been adopted in St. Louis, Memphis and Dallas at a very large saving in rentals, but while there seemed to be a general agreement on the advantages of the plan where it has been tried, the opinion was expressed that local conditions in many cities would defeat such a plan, especially where the present leases expire at different times. The report was accepted as information, and the committee was continued to co-operate with local committees that may be appointed to investigate the subject.

The report of the standing joint committee of the American Association of Passenger Traffic Officers and the Association of American Railway Accounting Officers, W. A. Lalor, general passenger agent, Chicago, Burlington & Quincy, chairman, presented a report urging upon all carriers the adoption of a uniform interline ticket at the earliest consistent date which will provide a uniform place on all tickets for the punching of one-half fare, second-class and baggage checked, thereby facilitating the work of selling agents, conductors and the accounting department. This recommendation was adopted and referred to the standing ticket committee. A recommendation was also adopted that the placing of prepaid ticket orders by telegraph or telephone be discontinued on January 1. The question of prepaid ticket orders was generally discussed. Many members were not in favor of discontinuing the placing of prepaid orders by telegraph, but desired to impose a scale of charges to cover the cost of the service. It was stated that the New England lines for several years have made it a practice to require the purchaser to pay the cost of telegraphing, while the Texas lines have confined their practice to the sale of such orders across the counter, leaving it to the purchaser to forward the order. It was pointed out that the practice of telegraphing involved considerable additional service and frequently a large expense for telegraphing, and some members were of the opinion that it was no part of the business of a railroad to deliver cash with such orders, while others were of the opinion that the placing of such orders was a service which the carriers should render for a charge covering the cost.

There was a general discussion of the relations of passenger traffic officers with the Interstate Commerce Commission, state commissions and commercial bodies. The subject was introduced by President Hilton, who in his remarks impressed upon the members the importance of continuing the work begun last year by the passenger men in addressing public meetings on the needs for higher passenger fares in the state. Mr. Hilton said this work should be continued throughout the country wherever possible. C. F. Daly, vice-president of the New York Central, said that this was the most important subject on the docket of the association; that the work done by the passenger men in educating the public along these lines was worth five times the advance in freight rates which the roads received, and that nothing the passenger department can do is so important as educating the public as to the facts about the railroad business, the ignorance of which is responsible for much of the hostility to the railroads. Others spoke in the same strain, urging the importance of continuing the work and pointing to the fact that while no state legislature had restored the passenger fare they had passed little anti-railroad legislation.

Four topics on the docket were deferred for discussion at the next meeting, as follows: "Improved Advertising Methods;" "The Automobile and Its Effect on Passenger Traffic;" "New Plans for the Docket" and "New Contract for Printing Association Ticket Paper."

The subject of the advisability of the curtailment or abandonment of entertainment at meetings of the association, the abolishment of addresses of welcome by state and city officials, and representatives of local bodies at meetings of the associa-

tion, as well as the discontinuance of reports from co-operating associations except in special cases involving subjects of peculiar interest, were referred to the executive committee with the idea of restricting the program of meetings more closely to the business of the association.

The association went on record as being opposed to the use of specimens or imitation passenger tickets for advertising or other similar purposes foreign to the legitimate use of regular tickets. An amendment to the constitution was adopted, providing that in the case of railways having two or more officers with the title of passenger traffic manager, assistant passenger traffic manager, general passenger agent and general ticket agent, all or either of these officers shall be eligible for membership, and each shall be entitled to a vote. This supersedes the plan of taking votes by lines.

There was a long discussion of plans for making the work of the association more effective by the appointment of a general conference committee to consider prior to the meetings important questions submitted by members, or by the territorial associations, and to endeavor to promote action on subjects of inter-territorial interest by the territorial associations in the effort to secure harmony of action at a uniform date. It was decided to request each territorial association to appoint three members of a general conference committee to meet at the call of the president, as a temporary plan pending action to provide a more permanent arrangement by amendment of the constitution at the next meeting.

Following the meeting of the association there was a short meeting of the fraternal society. Secretary-Treasurer W. C. Hope, general passenger agent of the Central of New Jersey, presented a statement exhibiting a very satisfactory condition of its affairs.

Charles F. Daly, vice-president of the New York Central, an honorary member of the association, visited the meeting during the afternoon and by invitation gave an informal talk on the increasing importance of the passenger department, in which he paid a high tribute to the work of passenger men. He said that railroads formerly were inclined to consider the passenger department as the "gold lace" department, and more or less of a necessary evil, but that it is now coming to be regarded more from a standpoint of a revenue producer, because the executive officers are relying on their passenger departments as the most important influence on public sentiment toward the railroads, and because the attitude of the shippers of freight toward a road is largely determined by the impression they receive as passengers. Mr. Daly was formerly passenger traffic manager of the New York Central Lines East, and prior to his election as vice-president in charge of all traffic in 1908, his entire work had been in the passenger department. He said that the experience gained in passenger work had been invaluable to him as an executive officer, and had given him a point of view regarding his work not possessed by most executive officers.

SCOTTISH RAILWAYS HANDICAPPED BY LACK OF MEN.—The Scottish railways have been seriously handicapped by the large number of servants who have joined the colors. The Highland has been very badly hit, and this has had an unfortunate result in the locomotive department owing to a scarcity of fitters to carry out the necessary repairs. Private firms which have in hand some new locomotives for the Highland, and which could carry out some of the requisite repairs, have also been suffering from a scarcity of men, coupled with the fact that they have been engaged on government work. As a result of this shortage of locomotive power, the company's Buckie branch has had to be closed, and other restrictions were threatened. In consequence of representations to the Railway Executive Committee, a sub-committee of locomotive superintendents met at Perth on September 7, which, while protesting that none of the companies had an abundance of men or power, recognized that the Highland Company's position was particularly bad, and recommended that a number of engines and fitters be lent to it.—*The Engineer, London.*

CONCEALED DAMAGE*

By W. H. STREETER

Secretary, United Yard Masters' Association, Duluth, Minn.

One of the first things to be considered in a study of "concealed damage" is the loading of the car. Many car load shipments get away from their point of origin improperly loaded, owing to the fact that too much attention has been given by some over zealous warehouse foreman to reducing the cost of handling and loading freight and not enough to its proper stowing in the car. The results are that a few cents have been shaved from the pay roll of the warehouse and many dollars lost, by the car being rushed out improperly loaded.

To eliminate claims of this nature, or at least to greatly reduce them, an inspector looking after carload shipments and seeing that they were properly crated and stowed would more than earn his salary, for the time and expense attached to tracing claims of this nature that could be saved would more than offset the added expense of maintaining such inspection. A few cents more a ton added to the cost of handling in the warehouse would also greatly tend to reduce losses of this kind, and careful crating of all extra fragile shipments would be another step in the right direction. I do not mean to imply that they are not crated at this time, but some of the material used is not what it should be and what is used is sometimes applied in a very indifferent manner. Better material and better workmanship at a slightly increased cost would give better results all around.

Next in line we have the handling of car load shipments while in the yard. No matter how carefully rough handling of cars is watched there is always the possibility of its occurrence. To eliminate this phase of concealed damage, would not it be a practical part of the scheme to have what might be called a "switching inspector," whose duties would consist of traveling through the different parts of the yard where the work is going on, and educate the crews handling the cars on speed and distance? This is an all important factor in the switching of cars, and is something that takes a thoroughly competent man to judge safely. If the crew handling the cars are experts in this line, there is not apt to be much damage to any of the cars or their contents, but if they are not, the cars and the freight suffer, and to the inexperienced eye there is nothing to denote that such is taking place. This is where a switching inspector would have an opportunity to more than earn his salary. He would in no way have direct control over the crews as far as issuing orders or mapping out their work for them, but his efficiency would consist of working in conjunction with the yard master, traveling around through the yard and educating the men on the finer points of the work, giving advice where needed, and overseeing and coaching the work in general, as pertaining to the handling of the cars.

Taking up the possibility of "concealed damage" occurring while the car is being handled in trains en route from one point to another, it is not absolutely necessary that a car get mixed up in a wreck while en route for its contents to become damaged. In these days of long trains and heavy power, the straining and shaking that a car gets under the most favorable conditions are liable to result in the damage of some part of its contents and especially so when attention and care have not been exercised fully in seeing that the contents were properly stowed and secured before the car was allowed to leave its initial starting point.

Who is responsible for the claims that are constantly arising for "Concealed Damage" on through car load shipments that have come from a great distance, and have been handled by several roads? No one is in a position to say where and how the damage was done and it is for this reason that all of the roads that have anything to do with the handling of an interline car-load shipment are called upon to participate in the majority of the final settlements that are made for "con-

cealed damage." Would it not therefore be a good plan to create an office, to be filled by a thoroughly experienced and competent man, who would have for his special duties the inspecting of the actual conditions of all car load shipments originating off the line, this inspection to be made before the car and its contents are accepted unconditionally? In this manner if there had been any rough handling of the car prior to his inspection, and its contents had been damaged, proper notice could be given to the road making the delivery, a record taken and the fact that the damage was discovered before the car was accepted would be sufficient proof to guarantee the non-liability of the road for which the car was destined. This plan could be worked out as a joint inspection if necessary to reduce any exceptionally high cost, but no matter how handled, either jointly or otherwise, it would go a long way towards reducing the total amounts paid out in the course of a year for claims that would otherwise have been saddled onto the road making the inspection. Inspection of this kind could also be worked out to good advantage in the handling of perishable shipments, particularly fruits and similar commodities that call for careful stowing and watchful attention while en route.

Inspection of this kind, if faithfully carried out, would also be a very forceful incentive for all participating in the handling of a shipment to see that it was delivered to the consignee in first class condition. The time-worn and much-abused stereotyped phrase of "No rough handling while in my charge" would be relegated to ancient history, for the parties at fault would before long become fully cognizant of the fact that the responsibility could and most certainly would be placed where it rightfully belonged, and with this fact continually before them, more care would be exercised in all departments, rough handling of cars both on the road and in the yards would be reduced to a minimum, and the natural results would be that the factor of "concealed damage" would be reduced to one of the minor quantities, and shipments that had heretofore been delivered in anything but an O. K. condition could be surrendered to their consignee in first class order, and, if not, the road making the delivery would be in a position to say who was responsible for the damage, and the ensuing claim could be adjusted in a reasonably short period of time to the mutual satisfaction of all concerned. The fact remains, that, with a rigid inspection in force, more shipments would be delivered free from damage of any description, and more satisfaction derived from this by all concerned, than could possibly be gained from the adjustment of any claim, no matter how quickly adjusted or how liberal the settlement.

RUSSIAN REFRIGERATOR CARS.—In no European country has more attention been paid to refrigerator car problems than in Russia, and the war has not lessened activity in this direction. The Moscow-Kazan Railway has just come out with an ambitious program which provides for the construction of no fewer than 87 eight-wheeled "isothermic wagons," besides a considerable number of ice stores, including freezing rooms and an ice factory at Moscow with a capacity for 5,000 tons of merchandise. The total cost of these schemes is estimated at \$1,845,000. A project is also in hand for new cold storage facilities at Orenburg and plans for special cold stores at Astrakhan and other Caspian ports. Quite recently the first trainload of frozen meat and fish arrived at Petrograd from Astrakhan. All the merchandise bore the journey admirably, arriving in excellent condition. The Russian railways have taken a leaf from the books of the American lines by the provision of an exhibition or demonstration car. This is in the form of a museum refrigerator wagon and has been provided by the Causasian Railway, a line on which a constant refrigerated service is maintained between Moscow and the Northern Caucasus. The object of this particular vehicle is to give a practical demonstration to agriculturists and others within the territory of the Caucasian Railway of the possibilities in the way of refrigerated wagons, and the car is to journey a considerable distance, making stops at important centres en route.—

Railway Gazette, London.

* Abstract of a paper presented before the convention of the United Yard Masters' Association, Seattle, Wash., July 15, 1915.

Completing the Mount Royal Tunnel into Montreal

This Project of the Canadian Northern Involves
a Number of Interesting Details of Construction

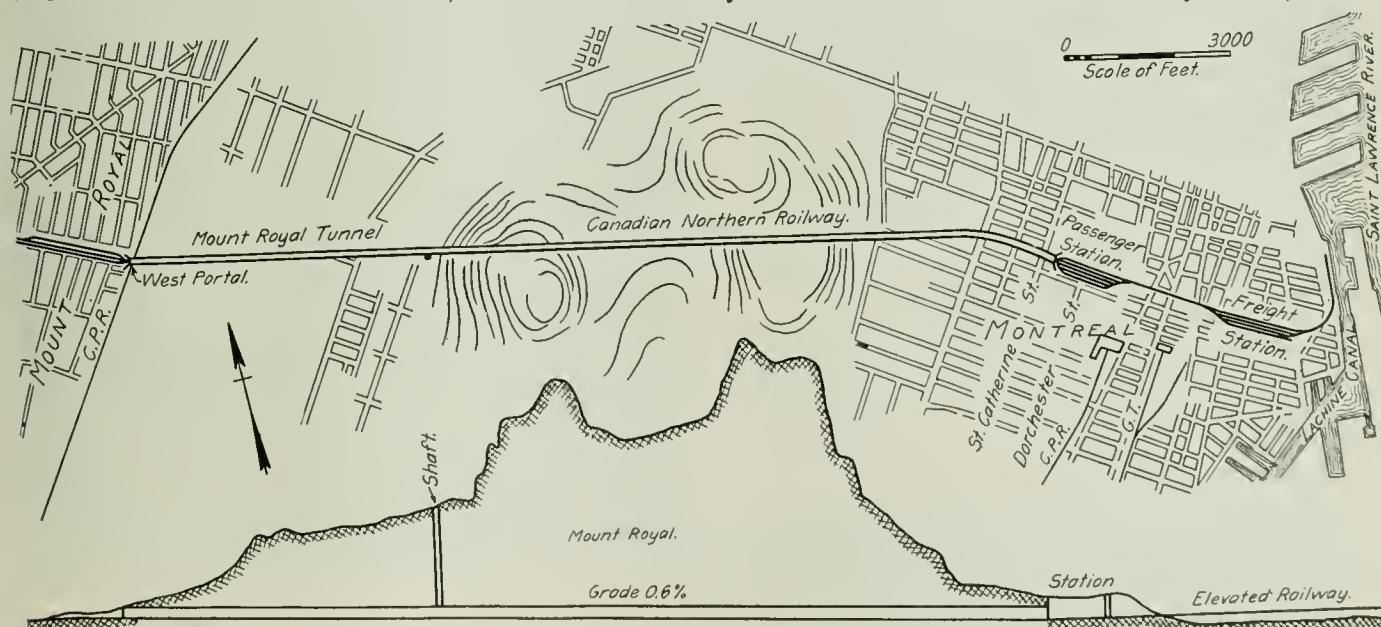
The Mount Royal tunnel, the most important link in the project of the Canadian Northern to secure an entrance into the business center of Montreal, is now nearing completion. The city occupies part of an island in the St. Lawrence river and is situated on a slope between the river and a long ridge 800 ft. high known as Mount Royal, a situation eliminating all approach by railroad except from the southwest and the northeast along the river, which routes are already fully occupied by the Canadian Pacific and the Grand Trunk. The Canadian Northern chose to reach the city by what is apparently the only remaining route, namely, a tunnel through the mountain from the northwest, a scheme which enabled it to select a terminal site of particularly strategic position in the heart of the city. A complete description of the tunnel and the proposed terminal and an account of the construction methods as far as they had been developed, was published in the *Railway Age Gazette* of October 10, 1913.

The Canadian Northern now has a terminal in the northeast portion of Montreal at some distance from the business center. This connects direct with its eastern lines, but the western con-

comotives will be used to haul transcontinental, express and local traffic which extends beyond the proposed electric zone, and multiple unit motor cars will be used for the traffic inside of that district. Eighty-ton locomotives will be used, capable of producing a speed of 50 miles an hour. The multiple unit cars will weigh 50 tons and will have a speed of 45 miles an hour and a seating capacity of 70 passengers. The power will be 2,400 volts direct current. The contact circuit will be of the overhead catenary type, the character of the climate making a third rail inadvisable outside of the tunnel. A substation for power conversion has been built near the west portal of the tunnel and an auxiliary steam plant is contemplated near the Black river as insurance against any interruption of service. A yard is also to be provided near Cartierville for the classification of freight and the transfer from steam to electric traction.

PROGRESS

The tunnel is being built for double track and is 23.5 ft. high by 31 ft. wide. It is located almost entirely in rock, Trenton



Plan and Profile of the Mount Royal Tunnel

nection is very circuitous. The main line west, which is not yet in operation, runs along the north side of the Island of Montreal, behind Mount Royal and follows along the northeast end of that ridge. The tunnel branch leaves the main line a mile or more east of Cartierville and enters the tunnel just west of the Outremont yard of the Canadian Pacific. The tunnel is 3.1 miles long and the proposed passenger terminal will be located immediately adjacent to the east portal between Mansfield and St. Monique streets and Cathcart and Laguachetiere streets, this site being one block southeast from St. Catherine street, the main shopping thoroughfare, and one block northeast of Dominion Square. As the tracks at the station will be 50 ft. below the level of Dorchester street, most of the station proper will be underground, with facilities arranged at various levels. The ground drops off rapidly toward the river and the plans provide for a future elevated railway over the lower part of the city for purposes of an elevated freight terminal and connections with the harbor. West of the west portal provision has been made for the model city—Mount Royal—a suburban project, the development of which is expected to pay a large part of the cost of the tunnel undertaking.

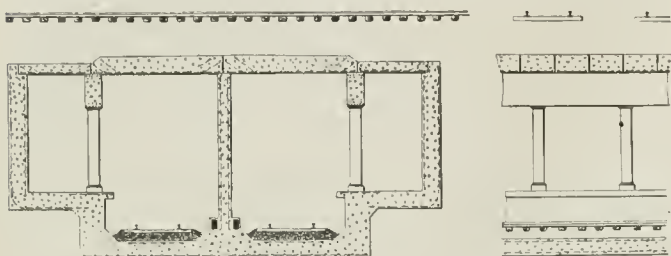
All trains through the tunnel will be operated electrically. Lo-

comotives and Essexite with igneous dikes. The construction work has been characterized by highly developed tunneling methods, resulting in rapid progress, including a record of 810 ft. of heading at one face in 31 working days, the highest rate of progress ever attained in America in rock of a like character up to that time. Center bottom headings were used, followed by breakups to remove the full section overhead, jumbo timbers being framed into the heading at the breakups so that the muck could be dropped directly into cars below. The benches were left until the last. The use of an intermediate shaft afforded a number of headings and thus permitted the use of several types of drill carriages with and without muck handling equipment. This gave a good opportunity for a comparison of the several systems and demonstrated the greater efficiency of the carriage providing for the removal of the muck from the face by means of a belt conveyor.

Practically all of the rock removed has been crushed for road material and concrete stone. All that is not used in tunnel masonry or on the railroad is sold for local consumption about Montreal. At the city end of the tunnel the rock is turned over to an outside company as it comes from the tunnel, but at the west

portal the tunnel company has built a large crushing plant with a capacity of 1,600 cu. yd. daily. At the same point a complete repair shop was also erected, which has been utilized as well for the construction of a large part of the tunneling and transportation equipment.

The meeting of the last two headings took place on December 10, 1913, and was followed rapidly by the completion of the overhead portion of the full section, except for the last half mile in the east end of the tunnel. The removal of the benches was



Sections through Station at Mount Royal Heights

delayed to the last to permit the use of a steam shovel to the best advantage, by carrying on the work progressively from the west end. The benches were shot down a sufficient distance in advance of the shovel to avoid possibility of interference. Bench drill carriages were used, which operated from 8 to 12 drills each. These carriages traveled down the heading, with arrangements at the sides overhanging the benches which carried the drills. The latter were the same as those used in the heading. A 1¼-cu. yd. Marion shovel was used, operating with compressed air. It was served by narrow gage tunnel cars having wooden boxes lined on the bottom and door ends with steel plates and handled by 6, 7 and 10-ton electric locomotives, taking power from an

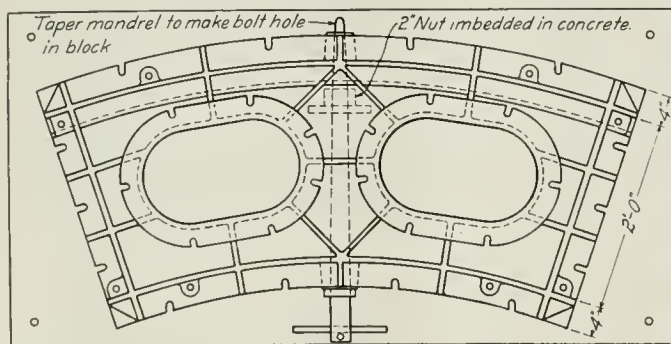
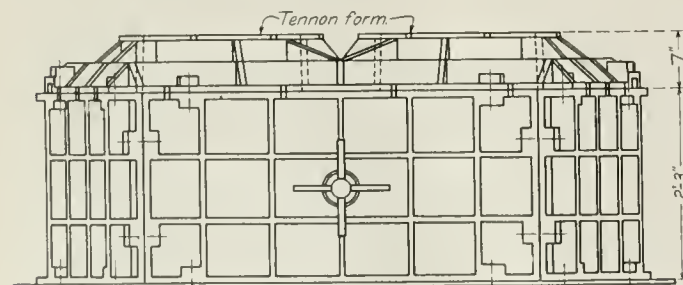


Plate 42"x 4"x 7'-0"
Top Plan



Flanged Cast Iron Sectional Forms for Tunnel Lining Blocks

overhead trolley wire carrying 220 volts direct current. The shovel commenced work at the west portal in August, 1914, and stopped in May, 1915, about one-half mile from the east portal, where the character of the roof necessitated a change in the method of tunneling.

For a distance of about 1,100 ft. east from the end of the shovel work the rock in the roof is of such a character that it is not safe to take out the full section without following immediately with timbering or lining. In the first 200 ft. the section has been

taken out complete, except for the bench and the roof has been timbered; for the remaining 900 ft. a bottom heading 16 ft. high by 12 ft. wide has been driven without lining. It has been decided not to proceed with this part of the tunnel until it is convenient to follow the excavation of the upper part of the section with a permanent concrete arch as fast as the rock is taken out, the benches to be removed later. As the concreting of the lining is progressing continuously from the west portal, this portion of the tunnel will be completed when the lining has been brought up from the west, a distance of 2½ miles.

THE SHIELD SECTION

In the last 1,650 ft. of the tunnel on the city end a boulder clay appears at the top of the tunnel section, replacing the rock which dips down to the east so that at the east end of the tunnel the clay almost entirely replaces the rock. This soft top required a modification of the tunnel section and led to the adoption



Concrete Block Section and Shield, Center Wall on the Right

of the shield method of tunneling and the use of the self-supporting concrete tunnel lining blocks invented by John F. O'Rourke of New York. The tunnel section consists of two separate tubes each with a semi-circular top made of concrete arch voussoirs cast separately, set into position and supported on either side by concrete walls and in the middle by a dividing wall made up of 10¼-in., 65-lb. Bethlehem H-columns spaced 2 ft. 3 in. center to center and spanned by structural steel built-up lintels, all encased in concrete. The blocks are 2 ft. thick radially and 27 in. in the direction of the tunnel axis and were made in lengths of 5 ft. circumferentially. They have plain faces on the intrados and on the radial joints, but are provided on one vertical face with concrete keys or tenons 12 in. by 20 in. in section and 7 in. high, while the opposite face contains depressions of the same shape to engage the projections of the blocks in the adjacent ring of the arch.

A center bottom heading was used for this portion of the tunnel also, being made of sufficient width to permit the passage of muck cars on either side of the center wall columns subsequently erected. The roof was fully timbered and in places where the division between the clay and the rock comes below the top of the heading it was generally found necessary to timber the sides

as well. From this heading transverse drifts run at intervals up into the soft material on either side and from these drifts side headings were then driven longitudinally in the position of the two side walls, providing just sufficient width to permit the construction of forms and the concreting of the side walls from the level of the top of the sound rock to the springing line of the arches. The side drifts were generally at such an elevation relative to the center heading that the muck could be dropped directly into the cars. No rock was removed except for boulders encountered and such loose or unsatisfactory rock as was found overlying the solid rock stratum. The concrete for the branch walls was mixed by hand in the tunnel and passed into the drifts in buckets.

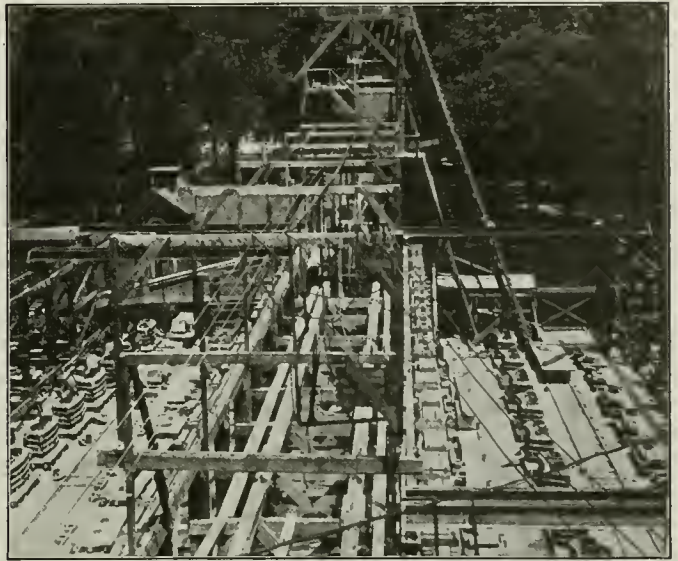
The shield is an application of common shield practice modified to suit the situation at hand, the parts of the two bores being joined at the center line and operated and advanced together. It was supported by and traveled on the previously built center and side walls. The shield consists of two semi-cylinders made

means of a 2-in. bolt which entered a hole in the center of the intrados and screwed into a 2-in. nut case in the center of the block. All operations of erectors and all of the advancing jacks were controlled by valves conveniently located in the operating gallery. The power was derived from water at a pressure of 3,000 to 6,000 lb. per sq. in. delivered in pipes from a duplex pump operated by compressed air and situated at some distance in the rear in a recess cut in the bench. The pump was moved forward from time



Shovel Removing the Bench Rock

of structural plates and stiffened by semi-circular structural steel diaphragms and girders which contain the operating galleries. The cylinders are of sufficient length to extend back over two or three of the rings of the arch last placed and project forward of them to form cutting edges or aprons under which the excavation was carried on. As the excavation was made the shield was advanced by means of 17 hydraulic jacks located on the circumference of the working galleries and bearing against the last completed rings of concrete blocks. An erector, a device for handling the concrete blocks, is pivoted under each working gallery and has four motions: rotation on the pivot by means of a pinion and ram-operated rack, radially by means of a ram within the erector arm, longitudinally in the direction of the axis of the pivot and rotation on the axis of the erector arm. By means of these four motions the concrete blocks were lifted from the cars, projected into the circle of the arch sufficiently in advance to clear the key lugs, rotated to line up with the key recesses of the ring last placed, brought into line vertically and then driven home, the keys entering the recesses. For the last operation the nearest shield jacks were brought into action to overcome frictional resistance between the blocks and were then left in bearing against the blocks to hold them in position with the assistance of the keys until all the blocks of a ring were in place, thus completing the arch. The head of the erector engaged the blocks by



Yard for Concreting Tunnel Lining Blocks

to time as the shield advanced to avoid excessive lengths of the high pressure pipes.

The blocks were built to give slightly open ring joints when in place, which were closed up as the work proceeded by means of a cement gun, while a grouting machine was used at night to close up the 2-in. bolt holes in the center of the blocks and fill all voids outside the rings. The excavation in advance of the shield was carried on in a space just sufficiently wide to permit the men to work, thus affording them a maximum protection against falls. The shield was shoved forward whenever a space of about 27 in.



Tunnel Excavated to Full Section—Before Lining

was available. As the excavation was only carried to a sufficient depth to clear the erectors as they are advanced, it was possible to drop all the material removed directly into cars in the heading below. The H-columns of the center walls were erected one at a time as the excavation advanced, and as they fouled the top timbers of the heading it was necessary to remove the latter at the same time. The bench was removed at some distance in the rear of the shield. Pneumatic hand drills were used and the shots were small to preclude any chance of injury to the blocks or to the

iron work of the center wall. The muck was loaded on to cars by hand.

The progress at the shield depended upon the number of men employed and the number of shifts working. For a considerable part of the time the shield was operated in a single 10-hour shift. The only work done at night was to place the center wall steel work and the grouting. With this program three rings were usually set in each bore each day. With 24-hour operation the progress would be increased to at least six rings a day.

All of the work with the shield method was in a portion of the tunnel with the least thickness of cover (from 30 ft. to 60 ft.), and was directly under a highly improved portion of the city. Because of this and the fact that the material is of a soft character, some trouble was experienced in the start with surface settlement, requiring the shoring and bracing of a few buildings, but with increased experience it was possible to avoid surface troubles almost entirely. At the intersection of McGill College avenue and St. Catherine street there is an intricate network of pipes for various utilities, including some large size water mains. As settlement in such a situation would be likely to have serious consequences, special precautions were taken. The street intersection was excavated to a slight depth below the pipes, and sills and props were placed in position so that the pipes could be jacked up if found necessary from daily observations. Planking was provided to afford a minimum disturbance of the street traffic. Spoil from the tunnel work at the city end which contained too much foreign matter to be passed through the rock crusher was brought up at the Dorchester street shaft and dumped into a bank on vacant property at this point where it was taken over by a contractor for disposal.

Another shaft was provided at Cathcart street and was used to supply the iron work for the center walls, the concrete material for the side walls and the concrete tunnel blocks from a material yard located close by. This yard included a plant for the manufacture of the concrete blocks. As shown in the accompanying photograph, this consists of a trestle through the middle of the layout about 20 ft. high with a yard on either side. At the street end of the trestle is a tower with bins which are supplied with concrete materials by means of a chain bucket hoist from a hopper at the street level. The mixer, carrying a small material storage bin, is supported on a truck which was run out to any desired position on the trestle to spout the concrete to forms in the yards below on either side.

The concrete block forms were made up of flanged cast iron sections bolted together and set on a steel plate supported on skids. The forms were arranged to fill the key lugs last and were fitted with a screw press arrangement designed to finish off the top of the key lugs to exact level and to insure perfect filling of all corners. It was found in practice that this device is unnecessary. The tenons were filled as high as possible, left for about an hour and then struck off to the level of the top of the form. The yards were served by traveling cranes equipped with hand chain hoists, for handling the form sections and the blocks. The latter were set on small flat cars and delivered to the Cathcart street shaft.

OTHER DETAILS

The lining of the tunnel, except in the shield section, is being carried on progressively from the west portal, using the pneumatic mixing and placing system. In the main, one double track arch is used, notched into the rock of the side walls, except when the rock is bad or broken wide and thin walls are required to cover the irregularities of the rock. Only the arch is being concreted at present. The placing of a center wall will be postponed except at such points where it will be required to assist in supporting the top, or to serve as an encasement for the steel columns of the concrete block section. Trimming of the side walls is carried on in advance of the lining.

West of the west portal the line will be in an open cut through the city of Mount Royal. However, west from the portal for a distance of 700 ft. the line will really be under cover, the first 300 ft. being cut and cover subway work and the remaining 400 ft.

comprising the local station of Mount Royal Heights. Part of the latter is under the Canadian Pacific tracks to provide grade separation of the two lines. This portion of the station has been completed and the cross section shown in the accompanying drawing illustrates the character of the station layout. Reinforced concrete was used throughout under the tracks. On account of the increased loading, a row of columns was required next to the edge of each of the platforms, and to avoid interference with traffic on the Canadian Pacific it was necessary to build the cover of unit slabs which were set in place after they had been cured.

It is expected that the tunnel will be ready for use soon and it is intended to commence operation before the Montreal passenger terminal is completed, as the initial traffic can be taken care of with much less extensive accommodations than is contemplated for the complete terminal. The traffic for which the terminal is to be designed will, of course, not be realized until the suburban development is well under way. The entire tunnel project is under the direction of S. P. Brown, chief engineer of the Mount Royal Tunnel and Terminal Company, Limited, the constructing corporation.

STATE LEGISLATION RELATING TO OPERATION

The Special Committee on Relations of Railway Operation to Legislation has issued Bulletin No. 73, including a table similar to that which has been issued in previous years, showing the classification of bills introduced and laws enacted relating to railway operation in the state legislatures which were in session in 1915. The statement shows that while the number of bills of this character introduced continues to be large, the number of laws enacted is considerably less than in 1913, the last year when most of the legislatures were in session. In 1915, 43 legislatures were in session and the number of bills introduced was 1,097, while the number of laws enacted was only 137. A comparison with the four preceding years is shown in the following table:

	1915	1914	1913	1912	1911
Legislatures in session.....	43	*14	42	*19	37
Bills introduced.....	1,097	236	1,395	292	512
Laws enacted	137	27	230	48	**

* Including special sessions.

** This data not compiled in 1911.

Bills relating to railway operation were enacted in 37 states. None were passed in Colorado, Georgia, Idaho, Utah, Washington or Wyoming of the states whose legislatures were in session. In addition to the reduction in the number of bills enacted there was also a marked change in the character of the laws passed, most of them relating to comparatively minor details of operation. The most numerous class of laws passed is grouped under the head "Miscellaneous," of which there were 27, while 154 bills of this character were introduced. The next most numerous class relates to service letters, time and manner of payment, of which 73 bills were introduced and 15 laws passed.

The most numerous class of bills introduced were those relating to employees, of which 348 were introduced and 30 became laws. Fifty-two of these related to size of crews, of which only one was enacted, this being in California; 116 to hours of service, of which 5 were enacted, in Alabama, Arkansas, Michigan, Oklahoma and Texas; and 64 to terms and conditions of employment, of which 9 were passed. Eighteen bills were introduced relating to voluntary arbitration, of which 3 were passed, in Indiana, Massachusetts and Michigan. A total of 83 bills were introduced relating to equipment, of which 12 became laws, including 1 relating to cabooses in Ohio, 4 to headlights in Alabama, Missouri, Nevada and New Mexico; 1 to repair of equipment in Arkansas and 6 to appliances required, in Arkansas, California, Connecticut, Maine, New Hampshire and Ohio. Seventy-nine bills were introduced relating to passenger trains, of which 11 became laws. These include 5 relating to the equipment of passenger trains, in Florida, Illinois, Kansas, New Hampshire and Rhode Island, out of 38 bills introduced, and 2 bills relating to the makeup of passenger trains, in Connecticut

and Vermont, out of 4 introduced. There were 48 bills introduced relating to freight trains, of which only 2 were passed, 1 of these relating to the speed of dead freight and 1 to the handling of explosives.

A total of 23 bills relating to cars were introduced, of which 3 were passed; 17 bills related to the furnishing of cars, of which 2 were passed, in Minnesota and in North Dakota, and 6 relating to demurrage and storage, of which 1 was passed, in Vermont. There were 11 bills relating to block and other signals, of which 1 bill relating to block and interlock was enacted into law in Arkansas, and 1 relating to switch lights in Missouri. There were 9 bills relating to clearances, of which 2 were passed, in Kansas and in Minnesota, 78 bills relating to crossings, of which 12 were passed, 17 bills requiring crossings, of which 5 were passed, in California, Kansas, North Carolina, South Dakota and Wisconsin. Twenty-six bills relating to crossing protection were introduced, of which 2 were passed, in Indiana and in New York, 35 relating to the separation of grades, of which 5 were passed in Indiana, Michigan, New York, South Carolina and Vermont. There were 64 bills introduced relating to maintenance of way, of which 10 were passed; 75 bills relating to stations, of which 11 were passed; 13 relating to hospitals and relief departments, of which 3 were passed; and 10 relating to the payment of claims, of which none were passed. Forty-three bills were introduced relating to trespassers, of which 3 were passed, in North Dakota, Vermont and West Virginia, and 11 relating to the destruction of property by trespassers, of which 5 were passed. There were 5 bills introduced relating to the reporting of accidents, of which 1 was passed.

California heads the list as to number of laws passed in any state, with a total of 14 out of 51 bills introduced. In Texas 8 laws were passed out of 36 bills introduced, and in Kansas 7 laws out of 64 bills introduced. The largest number of bills introduced was in Kansas, with 64. In Minnesota 60 bills were introduced and only 4 passed, and in Missouri 56 were introduced and only 5 passed.

LOSS AND DAMAGE COMMITTEES ON THE LEHIGH VALLEY

Since August 1, last, efforts leading to the reduction of loss and damage claims on the Lehigh Valley have been centered in the safety first committees, now known, instead, as the safety and loss and damage committees. These include a general loss and damage committee with the superintendent of transportation as its chairman, consisting of the assistant to the general manager, the assistant general solicitor, the freight claim agent, the traffic assistant, the chief of police and the general car inspector. There is also a bureau in the office of the superintendent of transportation maintained for the specific purpose of investigating and eliminating causes which lead to claim payments. To this bureau there is attached a corps of special agents assigned to specific territories covering the entire system who may be called upon to investigate an over, short or damage shipment even before a claim is filed.

When the idea was instituted it was necessary to increase

the size of the division and shop safety committees. The division committees, now known as the division safety and loss and damage committees, each consist of the superintendent who is also chairman, the assistant superintendent, the trainmaster, the chief train despatcher, the master mechanic, a road foreman of engines, the division engineer, a supervisor of tracks, a supervisor of signals, a supervisor of bridges and buildings, the claims adjuster, the special agent and a police captain, yardmaster, foreman car inspector, roundhouse foreman, road engineer, yard engineer, foreman, conductor, yard clerk or checker, trainman, switchman, agent, section foreman and freight platform foreman. The supervisors, foremen and yardmasters each serve six months, and the men from the ranks are appointed by the division superintendent and also serve for the same length of time.

Reporting to the division committees are the shop safety and loss and damage committees at Sayre and Packerton, each consisting of one shop superintendent or general foreman of car repairs who acts as chairman, a general foreman, a subforeman or assistant, a foreman of car repairs, a foreman car inspector, a foreman of transfer of lading, a foreman of loaded car repairs, a general machine foreman, a shop adjuster, a piecework instructor and one man from each department. It will be seen that in choosing the committee members every effort is made to get the interest of the man on the job and to give him responsibility.

Each committeeman is expected to be constantly on the alert to prevent loss or damage; to keep the subject of preventing loss and damage constantly before his fellow employees, so as to impress them with its importance; to study the subject from the viewpoint of his own position, and to take proper action whenever the opportunity offers to prevent cause for claims. He is supposed to make suggestions to the chairman of the committee as to ways and means of effecting improvements in the handling of freight, and to take proper action upon suggestions leading to the prevention of loss and damage or regarding conditions to which attention is called by fellow employees.

All employees are asked to take particular care to help in eliminating the following more common causes for claims: Rough handling in starting and stopping trains, in switching at stations, on the road, and particularly in yards; improper stowing of freight in cars and warehouses; loading freight liable to be damaged by water into cars with leaky roofs and doors; rough handling of freight by employees in loading and unloading; failure to see that all package freight is properly marked, in accordance with marks shown on bill of lading and waybills; failure to trim down and brace freight before closing car doors; failure to clean cars before loading; failure to note exceptions in the case of freight damaged when received from shippers; signing bills of lading without positive knowledge that freight has been received, and failure to prevent pilfering of freight from cars or packages.

A great effort is being made to secure the co-operation of every employee who is in a position to help in any way. Every man is asked to be on the watch for things which may possibly be productive of damage claims, and to assure his communicating with the committee members special mailing cards are provided. These are addressed to the chairman of the division committee and may be obtained in the yardmasters' offices or from any committee member. An illustration of the card is given herewith. It is especially provided that cards containing information which may call attention to the action of fellow employees will not be used in the application of discipline, and that such matters are to be handled strictly through the usual channels only. All suggestions are handled by the division committees in so far as they have jurisdiction, and those that are accepted are announced in notices from the office of the superintendent. It is hoped not only to reduce the O. S. & D. claims considerably, but also to secure the good will of shippers and consignees by the prompt attention which is being paid to complaints of any kind.

_____ Date _____
The following practice or condition is liable to cause claims

Suggestion to prevent loss and damage _____

Signed _____

The Suggestion Card Which May Be Mailed to the Chairmen of the Lehigh Valley's Division Loss and Damage Committees

Canadian Pacific Mountain Type Locomotives

The First Two Locomotives of This Type in Canada; the Leading Trucks are Equalized with the Driving Wheels

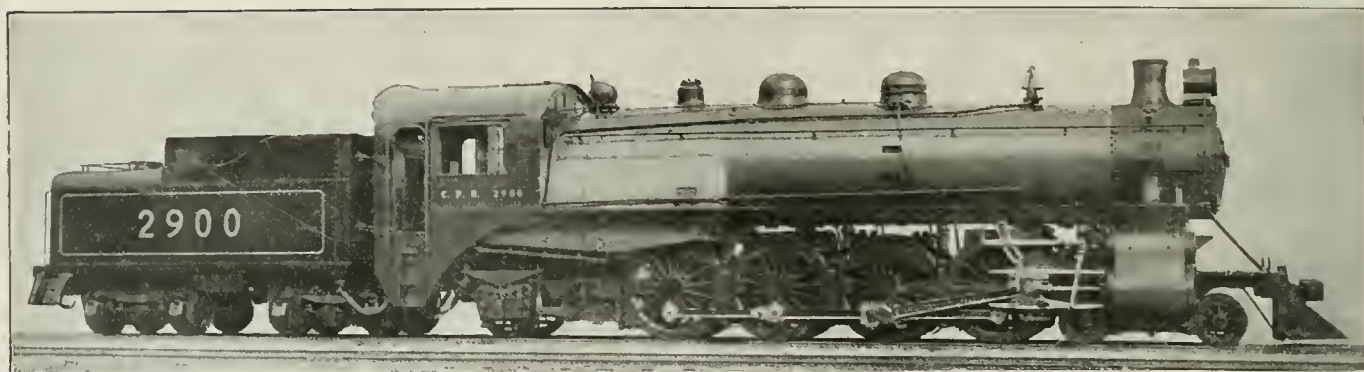
By W. H. WINTERROWD

Assistant Chief Mechanical Engineer, Canadian Pacific, Montreal, Que.

Because of the heavy grades on some divisions of the Canadian Pacific and on account of the desirability of maintaining schedule speeds with heavy trains without double-heading over these divisions, it became necessary to consider a type of locomotive more powerful than the Pacific type which is in use in the heavier passenger service. With this in view the company built and put in service in August, 1914, two Mountain type locomotives, which are the first of their type built in Canada. These locomotives were designed and built at the Angus shops, Montreal, and are identical in practically every respect with the exception of the boilers, one of which is equipped with a Gaines

By the American Locomotive Company's method of calculating boiler capacity, the boiler equipped with the Gaines combustion chamber is rated at approximately 110 per cent and the other boiler approximately 105 per cent. By the same method the boilers of the Pacific type locomotives are rated at approximately 90 per cent.

The firebox equipped with the Gaines combustion chamber is 7 ft. 4½ in. wide and approximately 13 ft. 6 in. long at the mud ring. The grates extend toward the back tube sheet 7 ft. 11 in. and have an area of 59.6 sq. ft. At the front of the grates is placed the vertical brick wall of the combustion cham-



Canadian Pacific Mountain Type Locomotive with Gaines Combustion Chamber Firebox

ber which is 10 in. thick and carries five vertical air passages, each 3 in. in diameter. The distance between the wall and the back tube sheet is 4 ft. 11½ in. The brick arch is carried on four 3½-in. arch tubes.

Two classes of Pacific type locomotives have been in use, one with 22½-in. by 28-in. cylinders and 75-in. driving wheels, and the other with 21-in. by 28-in. cylinders and 69-in. driving wheels. The boilers of both classes carry a pressure of 200 lb. The class with the larger drivers and cylinders has a rated tractive effort of 32,100 lb., the total weight in working order, including the tender, being 361,000 lb. On account of bridge and right of way restrictions, the Mountain type locomotives are not as heavy as a number of locomotives of the same type in service in the United States. They have a rated tractive effort of 42,900 lb. and weigh 443,000 lb., including the tender. With an increase in weight of 22.7 per cent, an increase in tractive effort of 33.6 per cent has been obtained. The accompanying table compares briefly the Canadian Pacific Mountain type locomotives and some of the same type operating in the United States:

The mud ring is forged and slopes downward from both front and back toward the base of the vertical bridge wall. On account of the depth of the firebox the floor of the combustion chamber is raised above the level of the grates in order to clear the rear driving wheels, which extend into the firebox.

The tubes in the boiler of engine 2901, which are 25 ft. 4½ in. long, were beaded into place before the boiler was applied to the frames, with the boiler turned upside down. The center sag of the tubes was then toward the top of the boiler and when it was righted the tubes tended to straighten out. A test showed that they were practically straight and up to the present time they have given no more trouble than the shorter tubes in engine 2900.

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	Can. Pac. 2900*	Can. Pac. 2901	Rock Island	Ches. & Ohio	Great Northern	Missouri Pacific	Seaboard Air Line
Tractive effort, lb.....	42,900	42,900	50,000	58,000	61,900	50,400	47,800
Weight, total, lb.....	286,000	286,000	333,000	330,000	326,000	296,000	316,000
Weight on drivers.....	192,000	192,000	224,000	239,000	218,000	208,000	210,500
Diameter of drivers, in.....	70	70	69	62	62	63	69
Cylinders, diameter and stroke.....	23½x32	23½x32	28x28	29x28	28x32	28x28	27x28
Steam pressure, lb.....	200	200	185	180	180	170	190
Heating surface, tubes and flues.....	3,402	3,929	3,805	3,795	4,200	3,165	3,396
Firebox heating surface.....	265	221	312	337	340	285	319
Superheater heating surface.....	760	943	944	845	1,075	761	865
Total equivalent heating surface.....	4,807	5,564	5,533	5,399	6,153	4,592	5,012
Grate area.....	59.6	59.6	62.7	66.7	78.0	56.5	66.7
Factor of adhesion.....	4.48	4.48	4.48	4.12	3.68	4.14	4.38

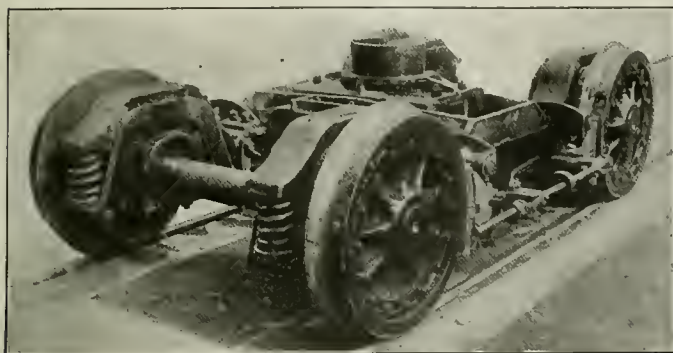
* Boiler equipped with Gaines combustion chamber.

Engine 2900 is equipped with the Gaines combustion chamber firebox. The boiler contains 210 2¼-in. tubes and 30 5¼-in. flues. The length over tube sheets is 20 ft. 8½ in. The boiler of engine 2901 is equipped with an ordinary wide firebox and brick. It contains 43 2¼-in. tubes, 136 2½-in. tubes and 30 5¼-in. flues, the length over tube sheets being 25 ft. 4½ in.

The equalizing system between the engine truck and driving wheels is that patented by H. A. Hoke, assistant engineer, Pennsylvania Railroad, and is in use on a number of Pennsylvania locomotives with four-wheel engine trucks. Its application to the Pennsylvania class E6s Atlantic type was described in the *Railway Age Gazette* for February 20, 1914, page 357. The

weight on the engine truck is equalized with the weight on the first and second pair of driving wheels, while the third and fourth pair of driving wheels are equalized with the trailer truck. The main equalizer fulcrum pin is supported in two steel castings fitted and bolted together directly beneath the cylinders. These castings serve also as a front frame cross tie, engine truck center casting guide and support for the engine truck safety hanger.

The engine truck center casting is made of cast steel. Its



Leading Truck of Canadian Pacific Mountain Type Locomotives

upper portion, which fits into the vertical guide, is made in the form of a hollow cylinder in the back of which is an opening through which the front end of the main equalizer passes. The bearing surface on the end of the equalizer is convex with a radius of $3\frac{1}{2}$ in., and rests upon a concave cast steel equalizer seat supported by the engine truck center casting. This seat is provided with guiding ribs which engage the sides of the equalizer to prevent the seat from turning under the latter. The

of the truck is 6 ft. 10 in., and in working order it weighs 11,250 lb. Actual service has demonstrated that this truck makes a very easy riding engine.

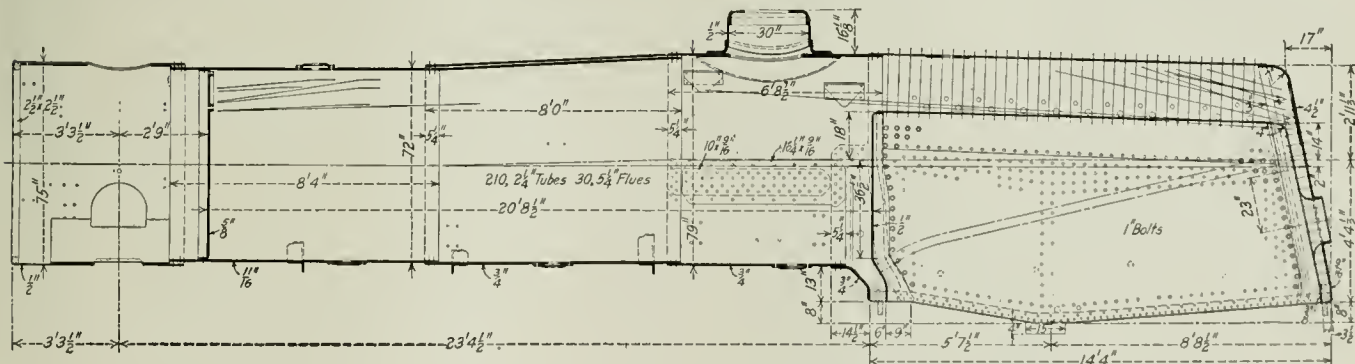
The cylinders are of cast iron and are the same as those used on the Canadian Pacific standard Mikado and ten-wheel type hump switch engines. In designing them particular attention was given to the steam and exhaust passages, which are unusually direct and of liberal cross sectional area. They are fitted with standard 12-in. piston valves.

The main frames of both engines are of vanadium cast steel and are cast integral with the front frames. The rear frames and the pedestal binders are of mild steel. Vanadium steel was also used in the crank pins.

The engines are both equipped with a screw reverse gear, the hand wheel, screw bearings, locking latch and position indicator of which are the same as those of the standard gear used on Pacific and Mikado type locomotives. In order to maintain the standard direction of movement for the top of the hand wheel, which is from left to right toward forward motion and from right to left to reverse, the threads on the screw are made left hand. The motion of the screw block is transmitted to the reach rod through a reverse lever, the motion of the rod thus being in the opposite direction from that of the block. The reach rod, which is very long on both engines, is made in three sections of extra heavy wrought iron pipe. The intermediate section works in a cast iron guide.

Both engines are equipped with Cole driving boxes on the main journals. These journals are 11 in. by 21 in., while the others are all 10 in. by 14 in. Canadian Pacific standard vestibule cabs are provided on both engines.

* The tenders have a coal capacity of 12 tons, and a water capacity of 6,000 imperial gallons and are equipped with air-operated coal pushers. They are Canadian Pacific standard, known as the



Boiler of Engine 2900 with Gaines Firebox

lower part of the casting is rectangular in form and fits between transverse vertical walls on the cast steel frame cross tie, which form the guiding surfaces for the lateral swing of the truck in curving.

The truck is centered by double-faced wedges, the wearing faces of which are inclined 1 in. in $2\frac{1}{2}$ in. The vertical guiding walls of the frame cross tie are joined at the ends to longitudinal vertical walls $4\frac{1}{4}$ in. high, thus forming a rectangular reservoir, open at the top, which is kept partly filled with oil for the lubrication of the centering wedges.

Through a reinforced extension on the front of the cross tie casting is a slot $2\frac{1}{2}$ in. wide and 16 in. long formed on a radius of 2 ft. 8 in. Through this slot is passed the engine truck safety hanger, a wrought iron eye bolt $1\frac{1}{4}$ in. in diameter with a tee head on the bottom end. This is hung from the equalizer fulcrum.

The engine truck side frames are of steel cast integral with the journal box pedestals. They are of channel section and in the center of each is cast a spring seat in which rests a semi-elliptic spring. This is connected at the ends to inverted U-shaped equalizers, which span the journal boxes. Between the outer ends of these equalizers and the frame are placed coil springs, as shown in one of the illustrations. The wheel base

combination type, in which the underframe forms a part of the tank structure.

The principal data and dimensions are given in the following table:

General Data	
2900—Class 11-1-a	2901—Class 11-1-b
Gage.....4 ft. 8 1/2 in.	4 ft. 8 1/2 in.
Service.....Passenger	Passenger
Fuel.....Bituminous	Bituminous
Tractive effort.....42,900 lb.	42,900 lb.
Weight in working order.....286,000 lb.	286,000 lb.
Weight on drivers.....192,000 lb.	192,000 lb.
Weight on leading truck.....53,000 lb.	52,000 lb.
Weight on trailing truck.....41,000 lb.	42,000 lb.
Weight of engine and tender in working order.....443,000 lb.	441,000 lb.
Wheel base, driving.....18 ft. 3 in.	18 ft. 3 in.
Wheel base, total.....39 ft. 6 in.	39 ft. 6 in.
Wheel base, engine and tender.....66 ft. 6 in.	66 ft. 6 in.
Ratios	
Weight on drivers ÷ tractive effort.....4.48	4.48
Total weight ÷ tractive effort.....6.665	6.665
Tractive effort × diam. drivers ÷ equivalent heating surface*.....625	539
Equivalent heating surface* ÷ grate area.....80.7	93.4
Firebox heating surface ÷ equivalent heating surface, per cent.....5	3.92
Weight on drivers ÷ equivalent heating surface*.....39.0	34.5
Total weight ÷ equivalent heating surface*.....59.5	51.4
Volume both cylinders.....16.08 cu. ft.	16.08 cu. ft.
Equivalent heating surface* ÷ vol. cylinders.....290	346
Grate area ÷ vol. cylinders.....3.71	3.71

<i>Cylinders</i>	
2900-Class H-I-a	2901-Class H-I-b
Kind Simple	Kind Simple
Diameter and stroke.....23½ in. by 32 in.	23½ in. by 32 in.
<i>Valves</i>	
Kind Piston valve	Piston valve
Diameter 12 in.	12 in.
<i>Wheels</i>	
Driving, diameter over tires.....70 in.	70 in.
Driving journals, main, diameter and length.....11 in. by 21 in.	11 in. by 21 in.
Driving journals, others, diameter and length.....10 in. by 14 in.	10 in. by 14 in.
Engine truck wheels, diameter.....31 in.	31 in.
Engine truck, journals.....6 in. by 12 in.	6 in. by 12 in.
Trailing truck wheels, diameter.....45 in.	45 in.
Trailing truck, journals.....7 in. by 14 in.	7 in. by 14 in.
<i>Boiler</i>	
Style Extended wagon top	Wagon top
Outside diameter of first ring.....72 in.	72 in.
Working pressure.....200 lb. per sq. in.	200 lb. per sq. in.
Firebox, length and width.....161½ in. by 88½ in.	96¾ in. by 88½ in.
Firebox, water space.....6 in., 4½ in., 3½ in.	5 in., 4½ in., 3½ in.
Tubes, number and outside diameter.....210—2¼ in.	43—2¼ in., 136—2½ in.
Flues, number and outside diameter.....30—5¼ in.	30—5¼ in.
Tubes and flues, length.....20 ft. 7¾ in.	25 ft. 3¾ in.
Heating surface, tubes.....2,552 sq. ft.	2,887 sq. ft.
Heating surface, flues.....850 sq. ft.	1,042 sq. ft.
Heating surface, firebox.....265 sq. ft.	221 sq. ft.
Heating surface, total.....3,667 sq. ft.	4,150 sq. ft.
Superheater heating surface.....760 sq. ft.	943 sq. ft.
Equivalent heating surface*.....4,807 sq. ft.	5,564 sq. ft.
Grate area.....59.6 sq. ft.	59.6 sq. ft.
<i>Tender</i>	
Tank.....Water bottom	Water bottom
Frame.....Combined tank and frame	Combined tank and frame
Weight.....157,000 lb.	157,000 lb.
Wheels, diameter.....36¼ in.	36¼ in.
Journals, diameter and length.....6 in. by 11 in.	6 in. by 11 in.
Water capacity.....6,000 Imp. gals.	6,000 Imp. gals.
Coal capacity.....12 tons	12 tons

* Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

STRIKE OF FREIGHT HANDLERS IN BOSTON

Reference was made in a news item in last week's issue to the strike of freight handlers in Boston, which, from the railroad standpoint, has been settled, although the mayor and other city officials have continued their efforts to settle it along other lines.

At 10:20 on the morning of October 21, a committee representing between 500 and 600 freight handlers employed by the road called on President Hustis, of the Boston & Maine, and informed him that unless these men were granted an increase of 15 per cent. in their wages and pay for holidays, whether they worked or not, they would strike at 12 o'clock, or 1 hour and 40 minutes after the notice was given. The men had had a conference the previous morning with General Manager Pollock, but gave no ultimatum or intention of their purpose to strike. President Hustis pointed out that the rates of pay on the Boston & Maine were the same as those on other roads entering Boston, and that if it were true, as stated, that the other Boston roads were considering a revision of rates, the Boston & Maine would, of course, not ignore any adjustment that might be made. He informed them of the financial condition of the road, that the stockholders had been, and are, getting no return on their investment, and that the men had presented no argument as to why any increase should be granted other than that the men demanded it. The committee was urged to delay action until its statements about the intentions of other roads could be investigated, and their attention was called to the great responsibility it was assuming in ordering a strike in this summary manner, because if the strike was unsuccessful the men would be left in a sorry position.

The committee called a strike of the men, and the management at once took action to fill their places, the employees secured being largely residents of Boston or surrounding towns, who were in need of employment. They were paid \$2.30 for 10 hours' work, the rate of the men who struck, and the standard for steam roads in the territory. These men were secured with the understanding that they would be given regular employment if they were found to be adapted to the work.

James M. Curley, mayor of Boston, called a conference on October 23, with a view to adjusting the dispute, at which the road was represented by Attorney Charles S. Pierce, and the

mayor submitted a proposition that the men return to work at the old rates, pending submission of the entire matter to the State Board of Conciliation and Arbitration for adjudication. The mayor made the same proposition in a letter to Mr. Hustis, who replied, setting forth the facts in the case, and stating that the strikers had failed to recognize the orderly procedure established for dealing with such matters, that the men who took their places had been secured with the understanding that they would be given regular employment and that to discharge them and take back those who summarily left the service would be a breach of faith. A large number of men had been put at work and the conditions at the Boston freight stations on that date, October 25, were generally satisfactory. The mayor then repeated his request that Mr. Hustis attend a conference to be attended by officers of the chamber of commerce, the port directors, representatives of the freight handlers and of the Boston & Albany and New York, New Haven & Hartford, whose men had also gone on strike. Neither of the other two roads sent representatives to the conference, but Mr. Pierce, the attorney for the Boston & Maine, stated that its position was that there was nothing to arbitrate, as the places of the men had been filled and the work was being done satisfactorily. Mr. Hustis declined to attend the conference, saying this would but complicate the situation.

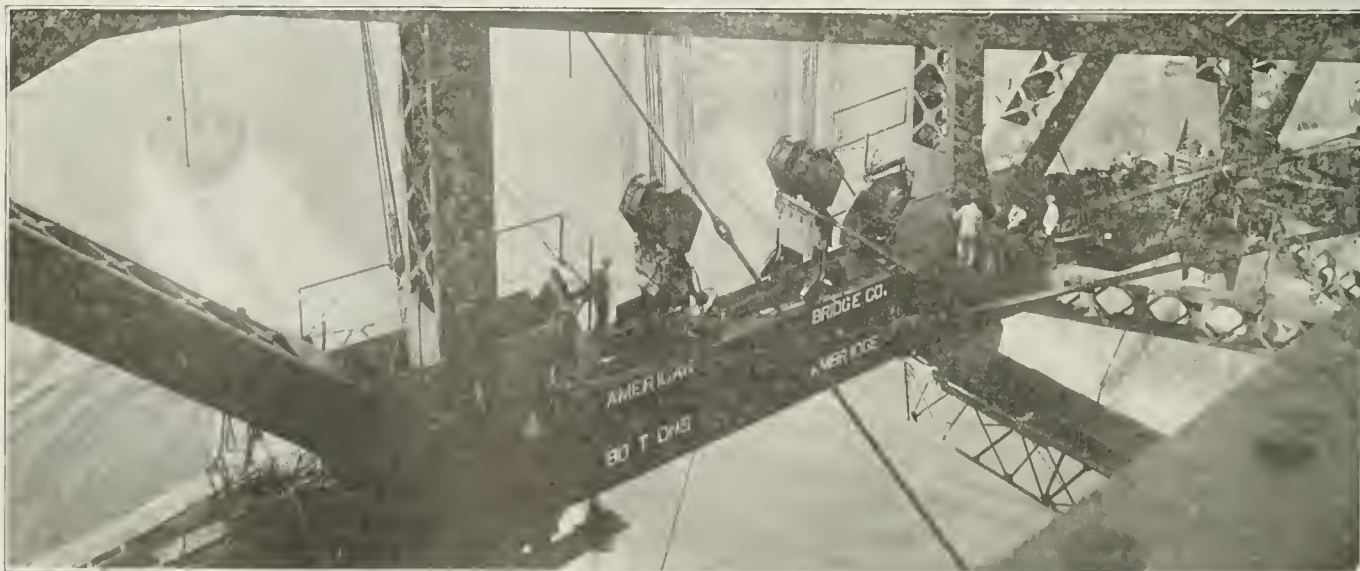
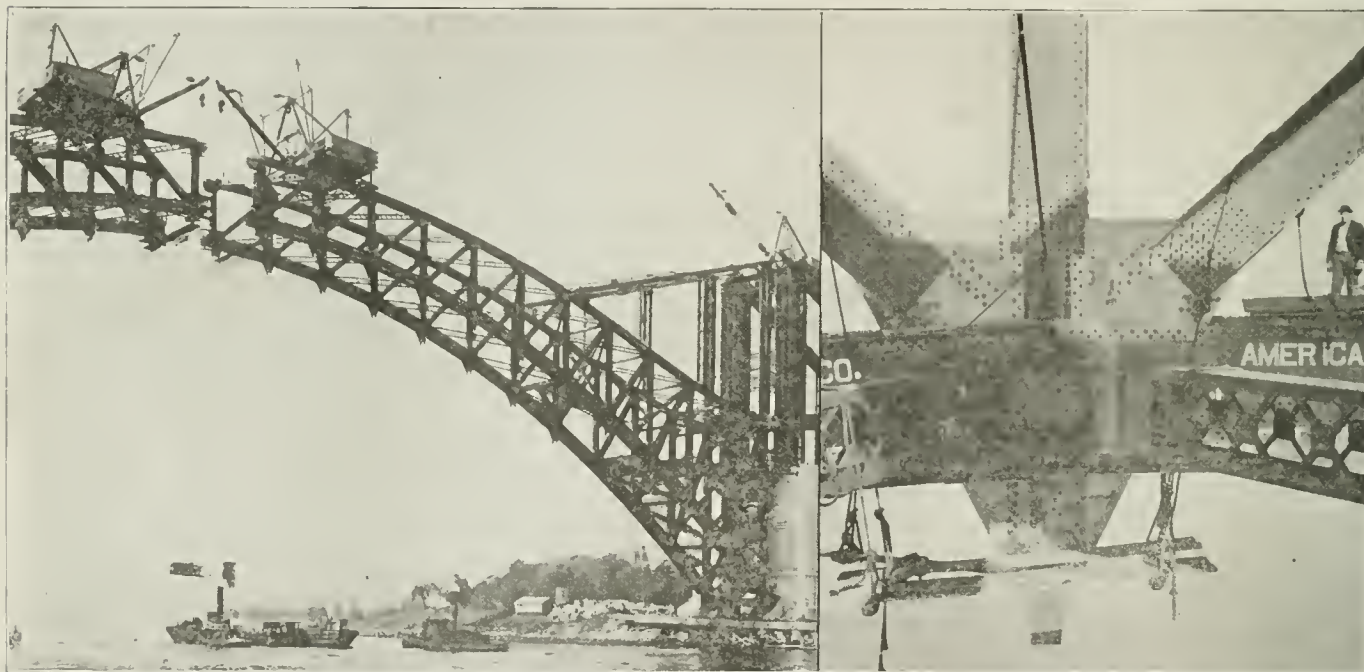
The mayor again repeated his request to Mr. Hustis for a conference, saying, "It is unwise, if not dangerous, to dispose of the question in such a summary manner," and that, in his opinion, "the sentiment of the community would strongly favor the payment of \$2.50 a day for 10 hours' work by able-bodied, intelligent men, skilled and experienced in their duty." Mr. Hustis declined to change his position, saying that the men were warned of the danger which might result from their proposed action and pointed out that the railroad had a public duty to perform, and when the freight handlers left their work the freight houses could not be closed and it could not cease the handling of shipments. It had, therefore, filled their places with other men with whom it could not break faith.

PROGRESS ON THE HELL GATE BRIDGE

On September 29 the closing members were placed in the gap at the crown of the Hell Gate arch, thus marking an important step in the completion of the New York Connecting Railway. The erection of this structure as two separate cantilevers by means of temporary backstays, was described in the *Railway Age Gazette*, September 3, page 422. The projecting arms were supported by ties passing over the saddles at the top of the backstays, where 3,000-ton hydraulic jacks (the largest ever built) were provided to afford the necessary adjustment in the position of the ends of the two halves of the arch. The initial application of the load of the cantilevers to these saddles was made by raising the jacks a total of 15 in., which placed the ends of the cantilevers several inches above the normal closing position.

On September 28, all of the steel was in place except that for the panel at the crown. Measurements across the gap checked the theoretical distance (after correction for temperature and elevation) by 5/16 in., which was the total error in the span of 1,017 ft. On September 30 the center panel sections of the bottom chord were lifted into place by the travelers standing on the two cantilever arms. It having been decided to make the closure at the panel point west from the center line, these bottom chord sections were bolted and drifted for full connection to the east cantilever. Likewise, the diagonals from the east top chords and the lower half of the opposite diagonals were set in place. The top chords and the upper portions of one set of diagonals were omitted.

The two halves of the arch were brought together on Friday, October 1, by lowering the saddle jacks on the backstays. The amount of lowering necessary to bring the bottom chord to contact checked exactly on the Wards' Island side and to 1/32 in. on the Long Island side. The calculated depression necessary



(Top)—Placing Center Top Chord Sections on October 4. (Center Left)—Hoisting Bottom Chord Section from Car Float. (Center Right)—Inside Elevation of Completed Bottom Chord Joint at Crown of Arch. (Bottom)—Placing Closing Member of Bottom Chord

to release the load on the backstays checked equally well. This operation was carried on under careful observation to the jack pressures, results were reported at frequent intervals by telephone. With the placing of the center top chord sections on October 4, the erection of the main members of the arch was completed. These top chord members were fully bolted in place on their east ends only, just sufficient bolts in slotted holes being provided at the other ends to insure alinement. The purpose of this arrangement is to provide for three-hinged action of the arch until all of the steel of the arch span is in place. Action as a two-hinged arch will then be obtained by riveting up the top chord complete.

Work is now proceeding with the removal of the backstays, which it is expected to finish by December 1. With these out of the way, the two travelers will proceed with the erection of the suspenders and the floor beams; and the excavations will be made for the footings of the piers for the approach trestle. The girders of the approach trestles, which have been in use as a part of the backstays, will be distributed along the trestles by a locomotive crane operating over a track to be laid alongside. Derrick cars or cranes working on the tracks above can then readily pick up the girders for erection. A locomotive crane will be used also for erection of the floor stringers of the arch.

In all, about 400,000 rivets will be required for the arch structure. Of these only about 10 per cent have been driven up to the present time, and it is estimated that a year will be required to complete this portion of the work. Thus far, the riveting is limited principally to the top chord. No rivets have been driven in the bottom chord splices.

Work on this structure is under the direction of Gustav Lindenthal, chief engineer of the New York Connecting Railroad. O. H. Ammann is assistant chief engineer, and H. W. Hudson is construction engineer.

ADJUSTABLE HUB PLATE

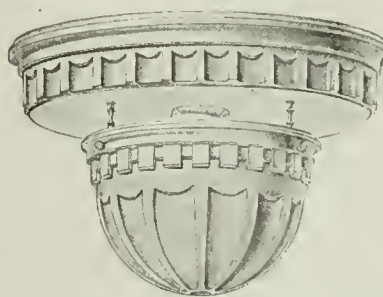
In the article describing the Smith adjustable hub plate, published on page 331 of the August 20 issue of the *Railway Age Gazette*, it was incorrectly stated that the adjustment of the hub plate was made by screwing in the grease plug shown in the outside of the wheel hub. The plug referred to is a retaining plug, and a special grease cup is used for this purpose. This cup, as shown in the illustration, is inserted in place of the retaining plug, and by screwing in the plunger the grease is forced into the hub, forcing the hub plate out the required distance, after which the grease cup is replaced by the retaining plug.

Otherwise the description of the device as given in the issue of August 20 is correct. The right for its use is sold by the Smith Locomotive Adjustable Hub Plate Company, Pittsburgh, Kan.

THE FREIGHT CLERK AT THE TELEPHONE. Answer promptly. Your patrons are business men. Speak with lips close to transmitter. Nothing is more annoying than to have a voice sound faint and unintelligible. Don't be in too great a hurry. Let your patron know that you understand what is wanted and he will not fret while you are securing the desired information. Don't hang up receiver too quickly. Be sure your customer is satisfied before you ring off. Do patrons complain that your phone is often busy? Tell the boss. He will have additional phones installed if they are needed. Remember that people will call your competitor and get in habit of giving him all their business if they cannot get you quickly. When request is made for rate, quote it and tell inquirer about your service and ask him for the business. Secure his address and have solicitor call on him. People appreciate attention shown them. It gets business.—*E. B. Wilkinson, Illinois Central.*

TWO NEW ILLUMINATION FIXTURES

Two interesting illumination fixtures have recently been developed, one for either large or small interiors, the other for exteriors. The interior fixture is known as the Brascolite and is of the semi-direct type. It comprises two definite features. There is a reflector of white enameled steel or vitreous china, which is secured in a horizontal position directly over the lamp and which



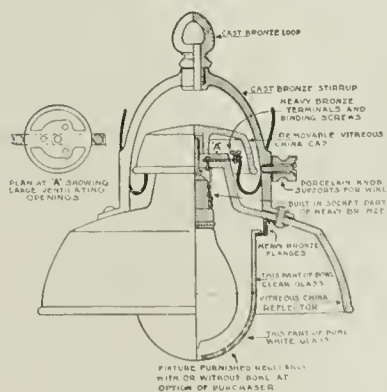
One Style of Brascolite Fixtures

contains the lamp socket in the center. Suspended from this reflector and enclosing the lamp is a white glass diffusing bowl. The fixture emits light in two ways. A considerable portion is diffused through the bowl, while the reflector above serves to reflect direct light from the lamp and reflected light from the inside surface

of the bowl, the surface of the reflector being such that the reflected light is also diffused.

As the bowl is suspended some distance below the reflector, the lamp receives sufficient ventilation. The suspension is by means of three hooks, two of which may be unfastened to lower the bowl to the cleaning position, which permits convenient access to the lamp, the reflector and the interior of the bowl, for thorough cleaning. Aside from the efficiency of the illumination, this type of lamp has the advantage that it is independent of the condition of the ceiling for the effectiveness of the indirect lighting. The Brascolite fixture is made in a number of different styles, thus permitting selection to conform to the architectural treatment of the interior it is to occupy.

The principles embodied in the Brascolite fixture are used in a somewhat modified form in what is known as the Day Way



The Suspended Type Day Way Fixture

with the Brascolite fixture is reproduced in this lamp by the addition of a glass bowl, completely enclosing the lamp, ventilation in this case being supplied by means of two holes through the socket supports. This fixture may be used with either series or multiple circuits with large or small lighting units, thus making it adaptable to almost any form of outdoor service. As the fixture is almost entirely china or glass and the only metal parts are bronze, it offers high resistance to corrosive agencies. The fixtures described above are manufactured by the Luminous Unit Company, St. Louis, Mo.

FINNISH RAILWAYS. At the beginning of 1914 the total mileage of the Finnish State Railways, including 207 miles of line owned by private capital, but operated by the State lines, was 2,537. Finland has 2,765 miles of navigable waterways, of which, with the present facilities, it is estimated that the freight capacity is about 1,600,000 tons a year. The waterways as well as the railways are under the administration of the State.

General News Department

Baltimore & Ohio piers No. 34 and No. 35 at Locust Point, Baltimore, Md., were destroyed by fire on the night of August 27; estimated loss, including the contents of United States bonded warehouses, over \$500,000.

The loaded car movement on the Atchison, Topeka & Santa Fe last week, 35,244 cars, was 15 per cent greater than the loading for the corresponding week of the previous year and represents the highest record for a week in the history of the company. The increase in miscellaneous traffic was over 4,000 cars.

James J. Hill, in honor of whom a number of men have founded a professorship of transportation in the Graduate School of Business Administration, of Harvard University, has given to the university \$125,000, to be added to the like sum which was given by the founders. The letter of the founders was printed in the issue of the *Railway Age Gazette* for July 16, last, page 134.

The number of freight cars moved over the main line of the Pennsylvania Railroad in the month of October was 204,893, or about 1,000 more than in the preceding heaviest month which was March, 1912. The number of loaded cars included in the October number is 123,105. Shipments of coal are now very heavy. The company has more trainmen in its employ at the present time than ever before in its history.

On the Long Island Railroad in the month of October, 23 persons, while operating automobiles and other vehicles, violated the railroad's mandate to stop before starting over grade crossings. Only three people were injured, but this was due in the majority of cases largely to good luck. Twelve automobiles, five motor trucks, five wagons and one motorcycle make up the list. Twelve of these vehicles, mostly automobiles, plunged wildly through lowered gates, breaking eight of them.

The Nashville, Chattanooga & St. Louis has issued an order requiring that every employee who has anything to do with the handling of, or preparation of, food to be offered to the public in the dining cars or restaurants of the company shall first be examined. These examinations are to be held periodically, and no person who has been subjected to or who is suffering from any communicable disease is permitted to aid in the work, either in the diners or restaurants or private cars.

A meeting of representatives of the five principal railroad brotherhoods held in Faneuil Hall, Boston, last Sunday, was attended by about 1,000 men, said to represent brotherhoods in all parts of the United States. It was given out that a concerted movement was to be started to secure agreements with the railroads to limit the workday to eight hours, double pay to be given for all work done outside these hours. Brotherhood leaders in other important cities of the country are giving expression to this same purpose. The Boston meeting was followed by a dinner at the United States Hotel, at which the governor of Massachusetts was present; and he is quoted as saying: "It seems that the railroads are able to pay more than \$800,000 in this State for the expenses of lobbying, but that they are unable to pay some of their employees a living wage." The governor was a candidate for re-election. On Tuesday of this week the election occurred and he was defeated.

Export Coal Terminal at Charleston

The Southern Railway has completed its new export coal terminal at Charleston, S. C., at a cost of approximately \$600,000, and coal can now be loaded into ships at Charleston as rapidly and as cheaply as at any other American port. Freight rates have been so adjusted that coal operators shipping through Charleston will be on a parity with those exporting through Norfolk.

The coal handling machinery consists of a car dumper and a

loading tower, which are operated entirely by electric motors. They stand on a steel and concrete pier 375 ft. long fronting on water 30 ft. deep at low tide. The pier is connected with the mainland by a creosoted trestle 3,800 ft. long. Both the car dumper and the loading tower are movable and can be shifted to serve different hatches, so that when a ship is once tied up at the pier it is unnecessary to move it until a full cargo has been received. The capacity of the plant is from 1,500 to 2,000 tons an hour. In connection with the coal pier there is a storage yard of 400 cars capacity.

Rail Failures in New York

The New York State Public Service Commission, Second district, has written to the principal railroads within its jurisdiction calling attention to the necessity for great care in the inspection of rails in track. There has been a large increase in failures due to internal transverse fissures, the failures reported for the months named during 1914 and 1915, being as follows:

	1914	1915
July	12	12
August	5	16
September	5	32

The letter says that it is extremely essential that employees be cautioned to exert the utmost watchfulness in inspecting the track in order that as many of the rails as possible in which transverse fissures may develop and appear on the surface may be detected before complete failure.

The commission also urges that employees be warned to use great care in passing through automatic block territory after having observed an automatic signal in the stop position. A large number of the failures reported to the commission have been detected by means of the signals.

Protest Against the Moon Bill

The committee on railway mail pay, Ralph Peters, chairman, has issued a pamphlet of 30 pages, containing a strong protest, addressed to Congress and the public, against renewal of the efforts to pass the Moon mail pay bill. The measure was introduced in the last Congress, but failed to pass, although it was made a rider on the post office appropriation bill. The postmaster general has announced that it will be reintroduced when the new Congress opens in December, and will be pushed for speedy passage. This bill would empower the postmaster general, who is interested in the reduction of the postal deficit, to make the rates for carrying the mails, with the sole limitation that he could not exceed certain sums; and the penalty for each refusal to carry at his price might be \$5,000. The committee claims that the bill is really a delegation of legislative power to the postmaster general. The bill is analyzed paragraph by paragraph. It is shown that from end to end the measure does not specify a single definite rate that the railroads are to be paid, but in each instance leaves the determination of the rate to the postmaster general. It is shown also that supplementary grants of power, conferred by some of the closing paragraphs of the bill, would permit the postmaster general of his own motion to establish other systems of mail transportation totally different from the detailed plan which the bill purports to enact into law. The postmaster general could initiate these plans and put them into effect independently of the will of Congress and make them apply to all but the first-class mail.

The Trial of the New Haven Directors

Sessions of the Federal Court in New York before which the criminal suit against the eleven New Haven directors is being tried were held on Thursday and Friday of last week and were continued again this week, Wednesday, after a recess over the

holiday. The sessions on Thursday and Friday were taken up largely by a consideration of the acquisition by the New Haven of a number of trolley lines, the government attempting to show that the New Haven tried to monopolize the trolley transportation of New England. Much of the evidence submitted was in the form of the letter books of John M. Hall, president of the road before Mr. Mellen. Among the letters read were a number telling legislators to oppose or favor legislation, offering passes, and proposing other means of taking care of persons favoring the New Haven. One of the most interesting was that written January 21, 1897, to Charles F. Brooker, one of the defendants, saying in part: "Enclosed is a draft of a carefully drawn bill, which I want you to hand quietly to Representative Tucker of your city to be introduced as quietly as possible. This bill, if passed, will make the electric company widen a bridge and given them something to think about besides paralleling the New Haven. Representative Tucker must father the bill and nurse it. In no event must it be known that the New Haven had anything to do with it. We will make it all right with him and will provide some legislative support."

Mr. Mellen on Friday made a statement concerning these letters as follows:

"There was apparently introduced yesterday, under the heading of testimony of Charles S. Mellen a lot of matter that comes from identification of signatures, particularly letters of Judge Hall, the vice-president. I had no knowledge direct or indirect

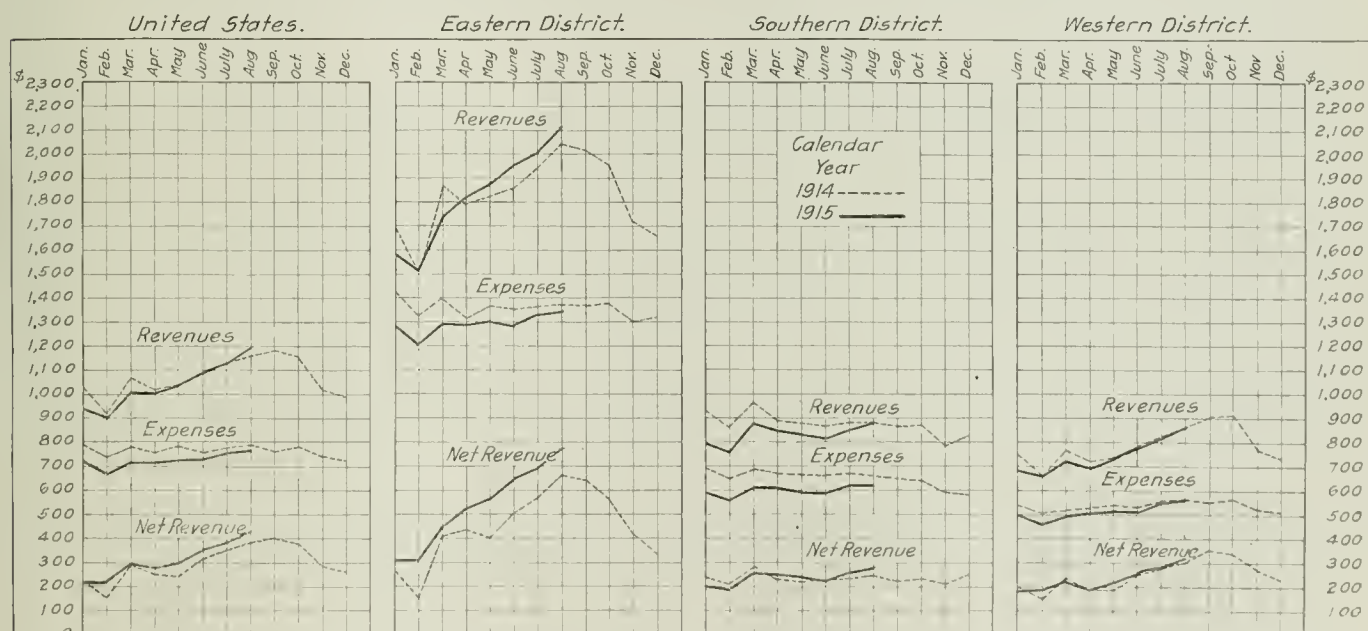
Summary of Revenues and Expenses of Steam Roads

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for August, 1915, are as follows:

Net operating income of the railways of the United States for August increased \$39 per mile, or 11.4 per cent as compared with August, 1914. In August, 1914, net operating income per mile was 0.8 per cent less than in August, 1913.

Total operating revenues amounted to \$272,306,183, an increase from 1914 of \$5,232,376. Operating expenses were \$174,879,773, a decrease of \$4,354,631. Net operating revenue amounted to \$97,426,410, an increase of \$9,587,007. Taxes amounted to \$11,600,099, an increase of \$312,530. This left \$85,738,540 for net operating income, available for rentals, interest on bonds, appropriations for improvements and new construction, and dividends. Operating revenues per mile of line averaged \$1,191, an increase of 1.3 per cent; operating expenses averaged \$765, a decrease of 3.0 per cent; net operating revenue per mile averaged \$426, an increase of 10.2 per cent, while net operating income per mile was \$375, an increase of 11.4 per cent. Taxes per mile increased 2.1 per cent. Railways operating 228,716 miles of line are covered by this summary, or about ninety per cent of the steam railway mileage in the United States.

Operating revenues of the eastern railways per mile show an increase of 3.6 per cent as compared with August, 1914, operating expenses decreased 2.1 per cent, net operating revenue increased



Monthly Revenues and Expenses Per Mile of Line in 1914 and 1915

regarding these matters. They come upon me like a burst of thunder. I cannot rest easy with it appearing even to the uninitiated, that I had any knowledge of such things existing, and I am paralyzed at the thought that for ten years I sat within reaching distance of those books and was not blown up."

In reply to a question by R. V. Lindabury of the counsel for the defense, Mr. Mellen also said: "I never had occasion to refer to them. I know of no director or officer who did refer to them. I had not the remotest knowledge that they were in existence until they were read in evidence."

After this Mr. Mellen left the stand and was not cross examined by the defense. On Friday also Charles C. Goodrich, general manager of the Hartford & New York (Steamboat) Transportation Company of which at one time he was president, told of the business of that company. The New Haven in 1901 entered into an agreement with this company concerning rates and confirming the activities of the boat line both as to ports and amended business done. In 1905, however, the New Haven bought it outright.

On Wednesday Mr. Goodrich was cross-examined by Charles F. Choate of counsel for the defense.

15.5 per cent, taxes increased 1.4 per cent, and operating income increased 17.3 per cent.

Operating revenues of the southern railways per mile decreased 1.2 per cent, operating expenses decreased 7.1 per cent, net operating revenue increased 15.9 per cent, taxes increased 2.5 per cent, and operating income increased 18.3 per cent.

Operating revenues of the western railways per mile show an increase of less than one-tenth of one per cent, operating expenses decreased 2.1 per cent, net operating revenue increased 3.8 per cent, taxes increased 2.9 per cent, and operating income increased 3.9 per cent.

The two months of the current fiscal year show an increase in total operating revenues per mile of line of 0.8 per cent as compared with the corresponding period of the preceding year, a decrease in operating expenses per mile of 3.8 per cent, an increase in net operating revenue per mile of 10.9 per cent, an increase in taxes per mile of 1.7 per cent, and an increase in net operating income per mile of 12.3 per cent.

The net operating income per mile increased 21.3 per cent in the east, increased 14.9 per cent in the south, and increased 3.1 per cent in the west.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF SEPTEMBER, 1915.

Name of Road.	Average mileage operated during period.	Operating revenues				Maintenance of way and structures				Operating expenses				Net railway operating.	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total (inc. misc.)	Way and structures.	Equipment.	Traffic.	Trans- portation.	Miscellaneous.	General.	Total.						
Arizona Eastern	378	\$187,768	\$35,466	\$239,858	\$20,077	\$24,077	\$2,286	\$55,588	\$846	\$9,705	\$122,349	\$11,509	\$103,186	\$103,186	\$82,383	\$82,383	\$82,383
Atchison, Topeka & Santa Fe.	8,619	5,702,566	2,507,999	8,176,666	1,256,197	1,370,265	189,100	2,349,005	1,370,265	162,817	5,303,914	3,672,682	411,645	3,757,523	93,104	93,104	93,104
Atlanta & West Point	93	60,552	37,662	111,686	13,083	23,868	5,137	30,719	1,702	4,102	78,611	33,075	5,525	27,013	15,863	15,863	15,863
Baltimore Coast Line.	4,699	1,674,881	553,420	2,359,744	362,689	447,743	50,374	839,783	6,679	69,942	1,776,141	583,653	142,000	440,492	348,816	348,816	348,816
Baltimore, Chesapeake & Atlantic.	88	59,503	39,161	103,414	7,987	33,511	1,232	35,704	.....	3,860	102,294	1,120	2,300	.....	1,179	28,665	28,665
Bangor & Aroostook.	632	187,331	94,726	271,055	51,092	49,166	2,894	75,346	3,409	11,282	194,039	76,996	12,675	64,319	17,699	17,699	17,699
Bessemer & Lake Erie.	205	1,108,477	40,708	1,168,660	89,088	166,561	9,709	222,377	.....	11,970	490,036	67,423	16,790	657,833	56,305	56,305	56,305
Bingham & Garfield.	27	154,975	3,178	158,669	17,605	3,943	972	17,249	.....	2,103	41,865	116,805	3,985	112,819	76,864	76,864	76,864
Buffalo & Susquehanna R. R. Corporation	253	133,568	6,855	142,320	23,302	33,800	1,077	35,673	.....	5,487	99,430	42,899	2,600	40,299	29,187	29,187	29,187
Buffalo & Susquehanna Railway.	91	15,266	6,795	24,561	6,865	4,931	1,453	11,397	.....	2,209	25,979	1,418	1,600	.....	3,022	3,489	3,489
Buffalo, Rochester & Pittsburgh.	589	875,113	101,779	1,016,388	202,638	198,810	12,464	279,638	1,134	18,837	713,545	302,843	20,000	282,833	63,984	63,984	63,984
Central of Georgia.	1,924	755,102	241,122	1,093,760	135,833	163,185	32,423	330,784	1,451	38,039	700,919	327,850	51,356	359,936	185,500	185,500	185,500
Central of New Jersey.	681	2,009,953	584,732	2,754,381	178,098	473,775	35,302	870,403	13,737	49,147	1,621,960	1,132,421	116,958	1,015,463	12,968	12,968	12,968
Charleston & Western Carolina.	343	117,780	23,809	148,125	26,327	11,825	2,852	50,048	17,178	36,463	1,165,064	537,235	90,515	4,464,489	40,930	40,930	40,930
Chesapeake & Ohio Lines.	2,374	3,265,926	567,883	4,044,775	462,207	790,075	54,046	1,126,399	19,221	72,631	2,523,507	1,521,268	115,120	1,406,016	393,399	393,399	393,399
Chicago & Alton.	1,052	945,216	367,450	1,415,551	176,075	282,686	30,330	444,466	9,520	30,267	959,329	456,222	43,064	412,172	84,625	84,625	84,625
Chicago & Northwestern.	8,108	5,411,592	2,076,861	8,330,301	1,070,425	1,232,864	112,124	2,596,928	54,070	148,000	5,184,766	3,145,305	385,000	2,757,699	359,313	359,313	359,313
Chicago, Burlington & Quincy.	9,366	6,038,198	2,073,016	8,006,988	1,064,210	1,262,413	125,878	2,448,300	73,285	159,683	5,133,770	3,773,218	353,411	3,419,807	364,832	364,832	364,832
Chicago, Great Western.	1,427	839,750	1,264,011	1,866,508	209,404	403,404	4,458	403,404	8,384	32,037	884,019	380,082	45,442	334,231	64,332	64,332	64,332
Chicago, Indianapolis & Louisville.	622	458,396	169,245	678,816	90,178	104,387	19,363	207,907	105	19,654	440,810	238,000	27,341	210,611	70,391	70,391	70,391
Chicago Junction.	13	187,804	18,882	187,804	18,882	18,882	983	90,719	983	5,392	132,638	55,166	2,196	52,970	19,691	19,691	19,691
Chicago, Peoria & St. Louis.	255	125,085	27,822	161,384	22,642	25,437	5,660	59,007	1,134	7,630	118,106	43,279	4,800	38,478	6,240	6,240	6,240
Chicago, Rock Island & Gulf.	477	172,218	57,037	248,465	51,215	29,933	8,841	80,195	2,215	7,630	118,106	43,279	4,800	38,478	6,240	6,240	6,240
Chicago, St. Paul, Minn. & Omaha.	1,753	1,074,505	504,491	1,702,299	297,311	218,182	28,557	596,814	17,178	36,463	1,165,064	537,235	90,515	4,464,489	32,946	32,946	32,946
Chicago, Terre Haute & St. Louis.	374	170,073	16,194	191,990	28,725	39,212	3,654	51,338	736	8,858	132,552	59,478	10,417	49,035	11,075	11,075	11,075
Cincinnati, Hamilton & Dayton.	1,003	792,445	156,591	1,058,632	162,279	193,617	18,266	351,416	3,773	20,624	748,894	309,737	34,576	274,928	72,408	72,408	72,408
Cincinnati Northern.	246	128,914	14,831	155,394	24,236	22,755	2,557	46,812	25,583	74,440	2,132,483	1,280,551	128,000	1,152,297	257,932	257,932	257,932
Cleveland, Cincinnati, Chicago & St. Louis.	2,381	2,471,492	813,193	3,613,034	408,016	630,398	74,319	1,127,208	1,127,208	74,440	2,132,483	1,280,551	128,000	1,152,297	257,932	257,932	257,932
Cumbyland Valley.	164	223,118	63,960	290,679	25,300	218,182	28,557	596,814	17,178	36,463	1,165,064	537,235	90,515	4,464,489	32,946	32,946	32,946
Delaware, Lackawanna & Western.	959	2,892,875	785,585	4,048,748	419,917	556,929	68,080	1,115,870	31,834	74,453	2,260,635	1,788,093	186,600	1,601,386	61,343	61,343	61,343
Detroit & Mackinac.	393	54,047	15,534	86,628	12,870	15,569	3,174	31,674	137	2,878	65,463	21,165	6,508	14,658	6,617	6,617	6,617
Duluth & Iron Range.	273	808,330	25,933	843,459	57,464	82,962	1,128	160,101	327	9,864	311,845	531,614	43,859	487,755	218,693	218,693	218,693
Duluth, Missabe & Northern.	370	1,479,789	24,842	1,567,640	98,489	135,548	1,777	202,572	5,712	10,892	454,990	1,112,650	88,328	1,024,322	568,774	568,774	568,774
Duluth, South Shore & Atlantic.	628	190,126	82,824	303,803	52,332	35,089	7,483	96,198	3,626	9,345	204,703	99,730	17,000	82,730	40,765	40,765	40,765
El Paso & Southwestern Co.	1,027	656,283	116,033	1,176,031	29,156	110,983	17,424	7,098	50,799	51,831	518,391	301,718	34,889	266,829	81,131	81,131	81,131
Elgin, Joliet & Eastern.	776	968,151	4	1,030,971	79,162	155,637	5,865	252,553	512,499	19,301	512,499	18,488	18,501	35,075	104,723	104,723	104,723
Florida East Coast.	745	188,793	91,808	326,658	70,862	58,842	5,967	153,326	2,449	17,648	308,170	18,488	18,501	35,075	104,723	104,723	104,723
Galveston, Wharf.	13	126,658	52,284	201,715	24,506	24,506	3,188	70,966	78,215	389	119,252	3,705	9,218	5,513	45,507	45,507	45,507
Georgia, Southern & Florida.	395	126,658	52,284	201,715	24,506	24,506	3,188	70,966	78,215	389	119,252	3,705	9,218	5,513	45,507	45,507	45,507
Grand Rapids & Indiana.	575	276,141	180,567	500,332	57,386	64,138	9,958	177,797	2,293	10,840	144,419	57,296	10,122	47,028	23,063	23,063	23,063
Gulf & Ship Island.	308	115,569	29,275	153,163	17,476	25,725	2,090	35,192	272	6,253	87,009	66,154	7,777	58,331	23,500	23,500	23,500
Illinois Central.	4,767	4,093,736	1,172,648	5,566,383	874,640	1,295,307	98,932	1,725,251	29,049	144,888	4,156,849	1,557,734	269,700	1,327,333	62,611	62,611	62,611
Indiana Harbor Belt.	110	638,191	154,335	871,897	34,181	103,871	18,476	286,062	3,286	28,412	382,853	33,044	35,000	115,160	13,085	13,085	13,085
International & Great Northern.	1,160	638,191	154,335	871,897	34,181	103,871	18,476	286,062	3,286	28,412	382,853	33,044	35,000	115,160	13,085	13,085	13,085
Kanawha & Michigan.	177	239,428	34,330	303,332	45,091	58,481	2,758	76,738	7	6,188	189,267	114,065	12,485	101,380	16,686	16,686	16,686
Kansas City Southern.	837	667,807	124,240	870,730	94,331	90,357	27,408	270,931	1,111	33,749	508,702	362,028	43,763	318,032	67,269	67,269	67,269
Lehigh Valley.	1,442	3,282,630	418,406	3,943,638	488,230	724,558	83,553	1,268,374	12,362	79,365	2,653,991	1,289,647	139,000	1,150,354	40,317	40,317	40,317
Long Island.	308	324,788	820,034	1,320,142	137,743	110,848	13,32										

Fifty School Boys Killed

President Fairfax Harrison, of the Southern Railway Company reports that during the fiscal year ending with last June, 147 trespassers were killed on the tracks of that road. He urges the development of a public sentiment that will put an end to the hazardous practice of trespassing. He has prepared a map showing the point at which each trespasser was killed and "it looks like a map of the monuments on the Chickamauga battle field." . . . "Fully one-third of those killed were school boys, 'hopping' trains, and a large percentage were valuable wage-earners, walking on the tracks to or from their work. Very few were 'tramps.'"

The Deadly Automobile

The St. Louis Republic says: "St. Louis contains one-sixtieth of the urban population of the United States, and in October a round dozen of our people were killed in the city in automobile accidents; so that the annual automobile death rate in the cities of the United States would be 8,640, if the St. Louis rate in October should be maintained. All the railroads in this country do not kill many more than this in a year, including accidents to trespassers and in the shops. Leaving out trespassers, the St. Louis automobile death rate in October was worse than anything the railroads ever accomplished, yet we have cried aloud unto heaven against the railroads for their carelessness. Right now in this country there is no activity which needs to have the 'safety first' motto rubbed in, with jail sentences, half so badly as automobiling."

Pennsylvania Prize Winners

The latest news bulletin issued by the Pennsylvania Railroad contains portraits of four employees of the road who have lately taken prizes: C. Z. Moore, supervisor, Middletown, Pa., and L. R. Fleming, assistant supervisor, who jointly took the first prize for excellent track work this year, and George W. Smith, Jr., and Richard C. Bartley, telegraphers in the general office at Broad street station, Philadelphia, who took prizes at the International Telegraphic Tournament held at San Francisco in connection with the Panama-Pacific Exposition, August 27 and 28. The roadway prizes have already been noticed in the *Railway Age Gazette*. The two telegraphers named have taken prizes before, notably at Boston in 1908. At San Francisco, Mr. Bartley sent 40 railroad messages, without an error, in 28 minutes and 13 seconds, breaking all previous records. He also won the contest of hand versus machine sending, beating the men who used mechanical appliances by which one stroke of the finger makes any number of dots. Mr. Smith won the receiving contest by taking, without break or error, 40 railroad messages in 31 minutes, 12 seconds. Mr. Bartley has been in the service since 1889 and Mr. Smith since 1896. Both are sons of Pennsylvania Railroad employees. In honor of their success at the exposition, the two operators were given a dinner at Philadelphia, on September 7, by the officers and employees of the telegraph department of the road, J. C. Johnson, superintendent of telegraph, acting as toastmaster.

American Railway Association

The autumn session of the American Railway Association will be held at The Blackstone, Chicago, November 17. Reports will be presented by the committees on Transportation; on Maintenance; on Relations Between Railroads; on Explosives; on Electrical Working; on Legal and Traffic Relations; and on Movement of Empty Cars.

June Mechanical Conventions

Announcement was made in our issue of October 29, page 769, that a joint meeting of the executive committees of the Master Car Builders' Association, the American Railway Master Mechanics' Association and the Railway Supply Manufacturers' Association would be held at Cleveland, Ohio, on Monday, November 15. It has been decided to change the place of meeting to Chicago, as a number of the members of the executive committees of the two railroad associations will wish to attend a meeting of the Special Committee on Relations of Railway Operation to Legislation in Chicago on the following

day. The joint meeting will be held in the office of Secretary J. W. Taylor at 9:30 a. m. As previously noted, the object of the meeting will be to decide upon the dates for the June conventions as well as the place of meetings.

Central Railway Club

At the next meeting of the Central Railway Club, to be held on Friday, November 12, 1915, at the Hotel Statler, Buffalo, N. Y., an illustrated paper will be presented on the subject of "Rubber: From the Raw to the Finished Product." An inspection of the Hewitt Rubber Company's plant has been arranged for the afternoon, and an informal complimentary dinner at the Hotel Statler will precede the evening meeting. The ladies are invited to both the dinner and the club meeting.

MEETINGS AND CONVENTIONS

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

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 2-5, 1916, Atlanta, Ga.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, January, 1916, Atlanta, Ga.
- AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill. Next meeting, June 20-23, 1916, Cincinnati, O.
- AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. K. R. of N. J., 143 Liberty St., New York.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 8 W. 40th St., New York.
- AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION.—H. G. McConaughy, 165 Broadway, New York.
- AMERICAN RAILROAD MASTER TINNERS', COPPERSMITHS' AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, The Blackstone, Chicago.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 17-19, 1916, New Orleans, La.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 21-23, 1916, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June, 1916.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July, 1916.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, Rooms 1116-8, Woodward Bldg., Washington, D. C. Annual meeting, June 28, 1916, Hotel Statler, Detroit, Mich.
- ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Semi-annual meeting with Master Car Builders' Association. Annual convention, October, 1916, Chicago.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—Willis H. Failing, N. Y. C., 3842 Grand Central Terminal, New York. Next meeting, May 19, 1916, Atlantic City, N. J.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 20-22, 1916, St. Paul, Minn.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—T. O. Jacobs, Ill. W. Johns-Manville Co., Chicago. Meetings with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.
- FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Traffic Manager, R. F. & P., Richmond, Va. Annual session, May 17, 1916, Washington, D. C.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May, 1916, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Next meeting, August, 1916, Chicago.

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

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 23-26, 1916, Hotel Hollenden, Cleveland, Ohio.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next annual meeting, September 12-14, 1916, Wilmington, Del.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June, 1916.

NATIONAL RAILWAY APPLIANCE ASSOCIATION.—C. W. Kelly, 349 People's Gas Bldg., Chicago. Next convention, March, 1916, Chicago.

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

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

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

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

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria, Hotel, New York.

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

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

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

RAILWAY REAL ESTATE ASSOCIATION.—Frank C. Irvine, 1125 Pennsylvania Station, Pittsburgh, Pa. Annual meeting, October, 1916, Chicago.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Next annual convention, September, 1916, Grand Hotel, Mackinac Island, Mich.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, N. Y. C. R. R., Box C, Collingwood, Ohio.

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

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

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

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Next annual convention, September 19-22, 1916, New York.

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

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

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

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St., Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, April, 1916.

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

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

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

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

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

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

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.

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

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 21, 1916, Toronto, Ont.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Next meeting, September, 1916, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Konig, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

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

WESTERN SOCIETY OF ENGINEERS.—E. M. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

On October 30, service on the "Pacific Limited" of the Chicago & North Western was amplified by the addition of an all-steel observation buffet lounging car.

The Chicago, Rock Island & Pacific on October 31 discontinued its trains No. 69 and No. 70, running between Kansas City and St. Paul and Minneapolis.

The Union Pacific on October 31 discontinued two of its trains running between Kansas City and the Pacific coast by way of Denver; No. 101 westbound, and 120, eastbound.

The Chicago, Milwaukee & St. Paul has announced that, beginning on November 7, sleeping cars will be run between Chicago and Portland, Ore., on the "Columbian" train in connection with the Oregon-Washington Railroad & Navigation Company from Spokane to Portland. The departing time from Chicago will be changed from 10:10 a. m. to 8:30 a. m., and the train will arrive two hours earlier at Spokane, Seattle and Tacoma.

The receivers of the St. Louis & San Francisco, Wabash, Missouri, Kansas & Texas and Missouri Pacific, all of which are in the hands of the courts, were among the speakers at a dinner given by the Commercial Club of St. Louis on October 27, and in addresses pointed out the reasons for the present condition of the roads. B. F. Bush, receiver of the Missouri Pacific, declared that "in no other way than by an increase of rates can the carriers establish and maintain a credit so essential in the obtaining of new money to provide the required facilities and equipment." Other speakers who spoke along similar lines included J. W. Lusk, receiver of the St. Louis & San Francisco, C. E. Schaff, receiver of the Missouri, Kansas & Texas, E. F. Kearney, receiver of the Wabash, Festus J. Wade and E. C. Simmons.

Passenger officers of the St. Louis-Kansas City lines have decided to discontinue the midnight passenger trains between the two cities, and the new tables became effective on October 31. In January, 1914, the St. Louis-Kansas City lines discontinued their midnight trains and ran the remaining night trains on a 10½ hour schedule. On June 1, 1915, the midnight trains were restored. In a statement issued to the public it is explained that the roads have carefully watched the effect of this additional service and have determined that the volume of business does not justify running two night trains. They have therefore decided to run each one night train on a schedule of about nine hours. On some of the lines the trains leave both terminals at 11 p. m., arriving at 8 a. m. On others they leave both terminals between 9 and 11 o'clock, and arrive between 7 and 8. This meets the criticism directed against the former plan, that passengers only had one choice, because under the new adjustment there will be four different leaving times.

The Empire State Express

This famous train of the New York Central, the first regular long distance train in America to run at over 50 miles an hour, including stops, has begun its twenty-fifth year. It has covered a distance of 6,518,600 miles, equal to 14 round trips to the moon, and has carried approximately 8,000,000 passengers safely to their destinations. The record during these 24 years has been a remarkable one. Not one of its passengers has been fatally injured. One of its engineers for sixteen years was Dennis J. Cassin, who last year was awarded the Harriman bronze medal in recognition of his unblemished record of safety.

When the Empire State Express was first placed in service it weighed only 230 tons; now it weighs 780 tons. It was drawn by engines of the "870" class, and later by the famous "999," the locomotive that took the prize at the Chicago World's Fair. Nowadays that locomotive looks like a toy in comparison with the giant Pacific type, and it could hardly start the train, much less haul it on its fast schedule.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Classification of Chairs

Opinion by the commission:

A proposed increased rating on common chairs in carloads in western classification territory, from fourth class, minimum 12,000 lb., to third class, minimum, 10,000 lb., is found not justified. (36 I. C. C., 243.)

Complaint Dismissed

A. B. Crouch Grain Company et al v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

The commission holds reasonable, the rule in various tariffs of the southwestern lines providing for deductions in the adjustment of claims for loss of grain in transit of certain percentages of loading weights as representing natural shrinkage. (36 I. C. C., 265.)

STATE COMMISSIONS

The Railroad Commission of Texas has granted the application of the St. Louis Southwestern for authority to remove and abandon "Morrill Spur," the order to become effective November 10. Chairman Allison Mayfield and Engineer R. D. Parker, of the commission, made an inspection of the line. Morrill Spur is seven miles in length, of which only 4½ miles is in operation. It was originally built for the accommodation of the Morrill Orchard Company.

The New York Public Service Commission, Second district, has ordered the New York Central to reconstruct a track over the coal pit of the Dundee Electric Lighting Plant, in the village of Dundee, Yates county. The railroad discontinued the track when the trestle over the coal pit was reported unsafe and refused to renew it except under an agreement making the lighting plant responsible for all detriment, damage suits, etc., and calling for \$5 annual rental; and the railroad proposed to reserve the privilege of removing the track on 30 days' notice. The road has now offered a new contract in which the indemnity clause is replaced by one in consonance with a recent decision of the commission in a similar case. The commission rules that the \$5 annual rental is reasonable, inasmuch as the structure is wholly on the railroad's right of way. It refuses, however, to authorize the termination of the contract on 30 days' notice. The commission has power to order the installation of a side-track or its continuance; but it permits a clause allowing discontinuance, "in accordance with law" on 30 days' notice.

COURT NEWS

Attorney General Barker, of Missouri, has announced that he is preparing to file suit in the United States Supreme Court to recover \$24,000,000 in alleged overcharges collected by the railroads of Missouri while the two-cent passenger fare and state freight rate laws were in litigation. A similar suit was dismissed by the Missouri Supreme Court.

The United States District Court at Philadelphia, October 28, filed its decree, in pursuance of the decision handed down last June, to the effect that the Central of New Jersey must divest itself of its ownership of the Lehigh & Wilkes Barre Coal Company. It is reported from Washington that the government will appeal the case to the Supreme Court, on the ground that the decision does not go far enough. The government aims to compel the separation of the Central of New Jersey from the Philadelphia & Reading.

"Engaged in Interstate Commerce"

The Alabama Supreme Court holds that an employee working at a coal chute coaling engines on an interstate railroad and required to serve interstate and intrastate trains is engaged in

"interstate commerce" within the federal employers' liability act.—*Southern v. Peters, Ala.*, 69 So. 611.

Delivery on Forged Bill of Lading

A bill of lading of a car load shipment consigned the freight to the order of Botsford & Barrett, and read "Botsford & Barrett, per F. M. G., Shipper, Lapeer Grain Co., Churchill." Delivery was made by the final carrier on a forged bill of lading. In an action against the initial carrier for the value of the shipment, the Michigan Supreme Court holds that the bill of lading indicated that the Lapeer Grain Company, as well as Botsford & Barrett, were shippers, and, as such shippers, their indorsement was necessary before the carrier was justified in making delivery, and a delivery on a forged bill of lading was no defense.—*Churchill v. Grand Trunk Western (Mich.)*, 154 N. W. 106.

Injuries to Persons on Track—Burden of Proof

A Tennessee statute declares that every railroad company shall keep a lookout, and when any person or any other obstruction appears on the track, take all means to prevent an accident; and that no company that observes such precautions shall be responsible for damage done to persons on its road. The Supreme Court of the state holds that one suing for the death of her intestate, killed on the defendant's road, has the burden of showing that the deceased was on the track or so near it as to be an obstruction before the railroad company is bound to show that it observed the statutory precautions.—*Cincinnati, N. O. & T. P. v. Brock (Tenn.)*, 178 S. W. 1115.

Instructions of Drover—Reasonableness

The Nebraska Supreme Court holds that a railroad is not bound to comply with every arbitrary request made by a shipper of live stock as to the place where the animals shall be unloaded and fed while in transit. It is only obliged to comply with such requests as may be reasonable; reasonableness to be decided by the jury. Cattle were shipped a distance requiring only 21 hours for the journey and no circumstances were present making it necessary that the animals be unloaded short of destination. It was held not to be negligence, as a matter of law, to fail to comply with a request of the shipper, made to the agent at point of shipment, that the cattle be unloaded at an intermediate point for food, water and rest.—*Keat v. C. & N. W. (Neb.)*, 154 N. W. 220.

Franchise Taxes on "Doing Business"—Lease

A railroad corporation incorporated under the New York Stock Corporation Law to take and possess the property and franchises of a domestic railroad company owning and operating a railroad in the state, acquired the property and franchises on a foreclosure sale, and leased the property and franchises, other than the franchise to exist as a corporation, for 999 years. Since the lease, it has held meetings of the stockholders for election of directors, who elected officers, and made annual capital stock reports, kept corporate accounts, and maintained corporate organization and an office in a sister state, while the railroad was operated by the lessee. The New York Appellate Division holds that it did business in the state, within New York Tax Law, section 182, imposing a tax for the privilege of "doing business" in the state.—*People ex rel. Lehigh v. Sohmer*, 154 N. Y. Supp 1054.

Damage by Fire Caused by Water Reaching Unslaked Lime

When a car containing a shipment of goods reached the carrier's yards, the water in a river, by reason of an unusual freshet, was 23½ feet higher than the highest previous record. The water continued to rise until it reached unslaked lime in another car in the yards, causing a fire which destroyed the goods. In an action for damages the New York Appellate Division holds that the carrier's negligence, if it was negligent in placing the goods near the car of lime, was the proximate cause of their destruction. Whether the placing of the car near the car of unslaked lime was negligence was a question for the jury, as the carrier owed plaintiff an active duty to use reasonable care not to expose his property unnecessarily, and it knew or was chargeable with knowledge that, if the water reached the lime, a fire would naturally result, and presumably it knew or should

have known the contents of the car containing the lime.—*Barnet v. New York Central*, 1153 N. Y. Supp. 374.

Alabama Bonner Anti-Shipping Act Held Valid

A liquor dealer in Pensacola, Fla., filed a bill in the Alabama courts against a common carrier to compel it to receive at and transport from Pensacola to Ramer, Ala., a shipment of six quarts of whisky. The complainant, having received an order, accompanied by the requisite cash price, from a resident of Ramer, who was one of the complainant's customers, for the whisky, tendered the shipment to the defendant. The latter refused to receive it, assigning as the only reason for its refusal that the law of Alabama forbade the carrier's transportation and delivery to one consignee at a point in "dry territory" in Alabama of more than one quart of whisky in any four consecutive weeks, even though the shipment is tendered in another state. Ramer is in "dry territory." It was conceded that the shipment was only intended for the personal use of the consignee and his family. The carrier's refusal was based on the Bonner Anti-Shipping Bill, which became effective in Alabama on February 8, 1915. The Alabama Supreme Court holds that the act is a valid exercise of the police power of the state, and does not conflict with either the state or the federal Constitution. The Webb-Kenyon Law, which the court holds to be within the power of Congress to enact, prohibits the entering in interstate commerce of intoxicating liquors where the purpose is unlawful under valid state statutes, and any valid exercise of the police power of the states is not a regulation of interstate commerce. A decree granting relief was therefore reversed and the bill dismissed.—*Southern Express Co. v. Whittle (Ala.)*, 69 So. 652.

Right of Way Granted by Congress Cannot Be Alienated—Adverse Possession

In 1862 the United States granted to the Central Pacific a strip of land 400 feet wide through the public lands of the United States in California for a right of way; also the odd-numbered sections of land lying within 10 miles of the line. It built its road on the strip, enclosing only 100 feet. It sold parts of a section through which the road ran to one Droge, who has remained in possession of that part of the 400-foot strip lying outside of the fences ever since their erection. The railroad never exercised any acts of ownership over these remaining portions. It has now claimed them in an action to recover possession of real property. The chief defenses were adverse possession for 41 years, with payment of taxes for that period, and that the action was barred by limitations and estoppel. The California Supreme Court holds that the action of Congress is a conclusive determination by the United States that the entire strip is necessary for railroad purposes, and the company may not alienate or dispose of any part of it for any other purposes. This was previously decided in *Northern Pacific v. Townsend*, 190 U. S. 267, 23 Sup. Ct. 671. The United States Supreme Court has established the rule that the federal courts will construe the grants of the general government without reference to the rules of construction adopted by the states for their grants. The effect of the grant in question was therefore to be determined in accordance with the decisions of the federal courts. The grant to the railroad was an estate in fee for a special public purpose, subject only to reverter at the instance of the United States if the public use were not properly maintained.

It was claimed that the act of Congress of June 24, 1912, relating to Union Pacific lands in possession of individuals, was effective to perfect this California defendant's title, but the claim was not sustained. The act of 1912 was specially made applicable to the grant to the Union Pacific, and could not be extended by implication to the Central Pacific. Moreover, it has been decided that the act of 1912 is not retroactive. The railroad was not estopped from claiming the land because the defendant had paid a price for it based on the entire acreage of the subdivision, and that he had improved and cultivated the land while it was in his possession. He knew, at the time of the purchase, of the act of Congress. Moreover, estoppel could not operate to discontinue a public use, and divest a title which the company could not alienate or dispose of directly or indirectly. Judgment for the company was affirmed.—*Central Pacific v. Droge (Cal.)*, 151 Pac. 663.

Railway Officers

Executive, Financial, Legal and Accounting

Charles A. Vilas has been appointed valuation attorney of the Chicago & North Western, effective November 1.

The federal court has appointed James A. Seddon special master in the receivership case of the Missouri, Kansas & Texas.

M. H. Smith, president of the Louisville & Nashville at Louisville, Ky., has been elected president also of the Lexington & Eastern, succeeding Arthur Cary. W. L. Mapother, first vice-president of the Louisville & Nashville, has been elected vice-president also of the Lexington & Eastern. J. H. Ellis, secretary of the Louisville & Nashville, and formerly also vice-president of the Lexington & Eastern, is now secretary of both roads, and W. M. Thompson is treasurer of both roads. All with headquarters at Louisville, Ky.

N. D. Maher, heretofore vice-president in charge of operation of the Norfolk & Western, with office at Roanoke, Va., has had his title changed to first vice-president, and in addition to his

duties as head of the operating department will, in case of the temporary absence or incapacity of the president, perform all the duties and exercise all the powers of the president. Mr. Maher was born at Blairsville, Pa., and began railway work in 1871. For two years he was engaged in making surveys on the Pittsburgh, Virginia & Charleston, and then was clerk in the office of the superintendent of transportation at Altoona, Pa., of its successor, the Pennsylvania Railroad. From 1874 to 1883, he was clerk in the general superintendent's office of the same road, and then to August, 1889, was



N. D. Maher

chief clerk to general manager of the Norfolk & Western. He subsequently served for one year as trainmaster of the Flat Top division, and then to June, 1901, was superintendent of the Pocahontas division of the same road. He then went to the Seaboard Air Line as general superintendent at Portsmouth, Va., and in January, 1903, returned to the service of the Norfolk & Western as general superintendent, remaining in that position until the following February, when he was promoted to general manager. From July, 1907, to November, 1912, he was also second vice-president, and since that time was vice-president in charge of operation of the same road, with office at Roanoke, Va.

V. D. Skipworth, assistant general manager of Sulzberger & Sons Company, Chicago, was recently elected a director of the Chicago & Alton. Mr. Skipworth was born on October 21, 1874, at Point Pleasant, Mo., and entered railway service in 1891 with the Kansas City, Osceola & Southern, now part of the St. Louis & San Francisco system. He became a telegraph operator and was successively agent, train dispatcher, superintendent and assistant general freight and passenger agent of this road. From 1899 to 1908 he was manager of the Cold Blast Transportation Company and the Lackawanna Livestock Transportation Company, and since 1908 he has been president and manager of these companies, representing the interests of the packinghouse of Sulzberger & Sons Company.

Operating

A. W. Woodruff, trainmaster of the Union Pacific at Green River, Wyo., has been transferred to Ogden, Utah, where he will

take over the duties of S. R. Toucey, promoted. The office of assistant superintendent at Ogden has been abolished. R. E. Brooks, chief dispatcher at Green River, Wyo., has been promoted to trainmaster, vice Mr. Woodruff. Effective November 1.

James F. Murphy, whose appointment as general manager of the Missouri Pacific-St. Louis, Iron Mountain & Southern has been announced, was born on April 6, 1870, at Peoria, Ill. He



J. F. Murphy

was educated in the common schools and entered railway service in 1887. In 1889 he left his position as yard clerk for the Peoria & Pekin Union to become a brakeman on the Chicago & Alton. In 1890 he became a switchman for the Peoria & Pekin Union, and from 1891 to 1897 served as yard clerk and switchman for the Kansas City, Ft. Scott & Memphis. From 1897 to 1901 he held the positions of assistant yardmaster, general yardmaster and trainmaster of terminals for the Kansas City Southern, at Kansas City, Mo. In 1901, he was appointed general yard-

master of the St. Louis & San Francisco, at Springfield, Mo., and in 1902, became superintendent of terminals for the Kansas City Southern, at Kansas City, Mo. In November, 1905, he entered the service of the Missouri Pacific as trainmaster, with headquarters at Coffeyville, Kans. On January 15, 1907, he was promoted to superintendent of the Memphis division, with headquarters at Wynne, Ark. Later he was transferred to the Central division of the Iron Mountain, and thence to the Arkansas division. On June 19, 1911, he was promoted to general superintendent of the Eastern district of the Missouri Pacific, with headquarters at St. Louis, Mo. He continued in this position until his recent appointment as general manager of the system.

John Cannon, whose appointment as general superintendent of the Eastern district of the Missouri Pacific-St. Louis, Iron Mountain & Southern, has been announced, was born on May 6,



J. Cannon

1872, at Cairo, Ill. He was educated in the public schools and entered railway service in 1886 as a laborer in the mechanical department of the Illinois Central. Until May 1, 1892, he served as messenger in the superintendent's department and held various clerkships in the same department; from May 1, 1892, to 1894, he was chief clerk to the assistant superintendent of the Chicago division. From 1894 to December 1, 1901, he was chief clerk to the superintendent of the Amboy and St. Louis divisions; from December 1, 1901, to the fall of 1903, he was chief clerk

to the general superintendent of transportation; from 1903, to June 1, 1904, assistant trainmaster of the St. Louis division; from June 1, 1904, to January, 1905, chief clerk to the general manager; from January to October, 1905, trainmaster of the Springfield and Chicago divisions. In October, 1905, he entered the service of the Missouri Pacific-St. Louis Iron Mountain &

Southern as superintendent of the Southern Kansas division at Coffeyville, Kan. Since then he has been transferred in the same capacity to Little Rock, Ark., DeSoto, Mo., Poplar Bluff, Mo., and Sedalia, Mo. In October, 1913, his headquarters as superintendent of the Eastern division were changed from Sedalia, Mo., to Springfield. His recent promotion will change his office to St. Louis, Mo.

Andrew P. Titus, who was appointed general manager of the Chicago & Alton on November 1, was born on April 11, 1873, on a farm near Princeton, N. J. He was educated at Princeton pre-



A. P. Titus

paratory school and at Princeton College. He entered railway service on July 1, 1890, in the car department of the Lake Shore & Michigan Southern, at Cleveland, Ohio. From 1893 to 1895, he was employed by a mining company in Mexico, and in June, 1895, returned to the Lake Shore at Cleveland, remaining there until May, 1900. From May, 1900, to November, 1905, he was car distributor and chief clerk to the superintendent of car service of the Wheeling & Lake Erie; from November, 1905, to May, 1907, he was superintendent of car

service of the same road, at Pittsburgh, Pa. From May, 1907, to July 1, 1912, he was assistant superintendent in charge of transportation at Canton, Ohio, and from the latter date to August, 1912, superintendent of the Toledo division of the same road. From August, 1912, to November 1, 1915, he was general superintendent of the Chicago & Alton, with headquarters at Chicago, Ill. The office of general superintendent has been abolished.

Lawrence A. Downs, superintendent of the Kentucky division of the Illinois Central, who has been appointed general superintendent of all lines south of the Ohio river



L. A. Downs

with headquarters at New Orleans, La., was born on May 9, 1872, at Greencastle, Ind., and graduated from Purdue University in 1894. The following February he began railway work with the Vandalia Railroad, and from March, 1896, to 1898, was in an engineering party on the Illinois Central. He then served as roadmaster from 1898 to March, 1907, on the Amboy, the Louisville, the Louisiana, the Springfield and the Chicago divisions. In March, 1907, he was appointed assistant chief engineer maintenance of way, remaining in that position until December 6, 1910, when he was ap-

pointed superintendent of the same road, and now becomes general superintendent of all the lines south of the Ohio river as above noted.

S. H. Barnes, general superintendent of the Missouri, Oklahoma & Gulf at Muskogee, Okla., having resigned, this office has been abolished and H. C. Ferris, one of the receivers, will assume the duties of chief operating officer with W. G. Humphrey, purchasing agent, as assistant chief operating officer. E.

A. Dewey, trainmaster at Muskogee, has been appointed superintendent and C. L. Bushnell has been appointed car accountant.

C. M. Walton has been appointed assistant trainmaster of the First and Second districts of the Grand Trunk, with headquarters at Island Pond, Vt.

L. A. Downs, superintendent of the Kentucky division of the Illinois Central, has been appointed general superintendent of all lines south of the Ohio river, with headquarters at New Orleans, La. He succeeds L. W. Baldwin, who has been appointed general manager of the Central of Georgia, with headquarters at Savannah, Ga. A portrait of Mr. Baldwin and a sketch of his railway career were published in the *Railway Age Gazette* of February 5, 1915, page 248.

T. J. Jones, superintendent of the Wabash at Moberly, Mo., has been appointed superintendent of transportation, with office at St. Louis, Mo., in place of H. Eicke, who has been appointed superintendent of the Chicago Terminal division, with office at Chicago, Ill., in place of H. W. Ballou, who at his own request has been granted leave of absence, on account of ill health, and W. H. Eckard, trainmaster at Stanberry, Mo., has been appointed superintendent of the Moberly division, with office at Moberly, in place of Mr. Jones, and G. S. Ward has been appointed chief special agent, with office at St. Louis, Mo.

William H. Penrith, who was appointed assistant general manager of the Chicago & Alton on November 1, was born on November 4, 1875, at St. Paul, Minn. He was educated in the grammar and high schools at Minneapolis, Minn., and entered railway service on June 1, 1897, with the Minneapolis & St. Louis. From June 1, 1897, to December 31, 1899, he held various clerical positions in the stores department of that railroad. From January 1, 1900, to July 31, 1902, he was chief clerk of the stores department; from August 1, 1902, to October 31, 1912, he was chief clerk of the mechanical department. From November 1, 1912, to February 28, 1914, he was general statistician in the office of the vice-president and general manager. On March 1, 1914, he left the service of the Minneapolis & St. Louis to become special statistician in the office of the president of the Chicago & Alton, at Chicago, Ill. He remained in this position until his recent appointment as assistant general manager. His headquarters will continue to be at Chicago.

Traffic

H. A. Johnson, whose appointment as traffic manager of the Colorado & Southern has been announced, entered railway service as an office boy in the general freight office of the Missouri, Kansas & Texas at Sedalia, Mo. From there he went to St. Louis, Mo., where he was chief clerk to the general freight agent of the Missouri Pacific; on December 4, 1882, he was appointed assistant general freight agent of that railroad, and on August 1, 1884, was appointed commercial agent, with headquarters at Chicago, Ill. On November 1, 1885, he was transferred to Atchison, Kans., and on January 1, 1886, was appointed assistant general freight agent of the Union Pacific. On January 1, 1889, he became general freight agent of the Kansas City, Ft. Scott & Memphis, now a part of the Frisco lines. He remained in this position until January 1, 1890, when he was appointed assistant general freight agent of the Union Pacific at Denver, Colo.; in July of the same year he was appointed general agent of the same road with headquarters at San Francisco, Cal. In August, 1892, he became traveling freight agent of the Great Northern, with office at Spokane, Wash., and in February, 1893,



H. A. Johnson

was promoted to division freight and passenger agent of the Pacific division of that road, with headquarters at Seattle, Wash. On January 1, 1894, he was appointed general agent in the freight department of the Union Pacific at Denver, Colo. On February 1, 1899, became general freight agent of the Colorado & Southern with office at Denver, and on March 1, of the same year, his jurisdiction was extended over the passenger business and his title changed to general freight and passenger agent. He held this position until October 12, 1915, when he was promoted to traffic manager of the same railroad.

H. R. Wilson has been appointed general freight and passenger agent of the Mississippi Central, with office at Hattiesburg, Miss., vice R. D. Moore, resigned.

W. B. McGroarty, agent of the freight department of the Southern Railway and the Piedmont Air Line at Baltimore, Md., has been appointed general agent, with office at Baltimore.

E. A. Peacock has been appointed commercial agent of the Trinity & Brazos Valley, with office at Ft. Worth, Texas. J. E. Meroney has been appointed commercial agent at Corsicana, Texas.

Roy L. Stall, district passenger solicitor of the Pennsylvania Railroad at New York, has been appointed division passenger agent of the Pittsburgh district, with office at Pittsburgh, Pa., succeeding Edgar Yungman, promoted.

Frank A. Hart, general agent of the Chicago, Burlington & Quincy, at Clinton, Iowa, has been appointed division freight and passenger agent, with headquarters at Quincy, Ill., and H. R. Freed has been appointed general agent at Clinton, vice Mr. Hart.

L. D. McCollum, commercial agent of the Atlantic Coast Line at Augusta, Ga., has been appointed commercial agent, with office at Columbia, S. C., vice D. Y. Monteith, resigned to engage in other business, and J. H. Kinard has been appointed commercial agent, with office at Augusta, vice Mr. McCollum.

Engineering and Rolling Stock

J. W. Baum, general foreman of the Lake Erie, Franklin & Clarion, at Clarion, Pa., has been appointed master mechanic, a new position, and the position of general foreman has been abolished.

R. A. Billingham, master mechanic of the Tennessee Central, at Nashville, Tenn., has been appointed mechanical superintendent, and the office of master mechanic has been abolished.

R. G. Jones, assistant engineer on the Northern division of the Grand Rapids & Indiana, at Grand Rapids, Mich., has been promoted to division engineer on the Southern division, at Ft. Wayne, Ind.

C. W. Hixson, signal supervisor of the Vandalia, at Terre Haute, Ind., has been appointed signal supervisor of the Pennsylvania Lines, with headquarters at Chicago, Ill., vice A. J. Seifert, deceased.

James F. McNamara, assistant roadmaster of the Yazoo & Mississippi Valley, at Greenwood, Miss., has been promoted to roadmaster of the Minnesota division of the Illinois Central, with office at Dubuque, Iowa, vice Thomas Quigley, transferred. Effective October 25.

H. H. Sheffer has been appointed signal supervisor of the Western division of the El Paso & Southwestern, with headquarters at Douglas, Ariz., and S. E. Tomlinson has been appointed signal supervisor of the Eastern division, with headquarters at Carrizozo, N. M. Effective November 1.

W. Homuth, formerly signal inspector of the Chicago & North Western, has been appointed assistant signal supervisor of the Chicago terminal, relieving E. E. Schultz, who has been assigned to duties as engineer in the office of the signal engineer. R. B. Arnold, signal inspector, has been appointed assistant engineer in charge of valuation.

J. L. Taylor, Jr., assistant division engineer of the Pennsylvania Lines West at New Castle, Pa., has been appointed assistant division engineer of the Pittsburgh division with office at Pittsburgh. R. D. McKeon, assistant division engineer of the Vandalia Railroad at Logansport, Ind., has been appointed assistant division engineer of the Erie and Ashtabula division of the Pennsylvania Lines West with office at New Castle, and

E. H. May, an assistant of the engineering corps of the Indianapolis division of the Pennsylvania Lines West, has been promoted to assistant division engineer of the Michigan division of the Vandalia Railroad, with office at Logansport, Ind.

R. H. Pinkham, assistant supervisor of the Pennsylvania Railroad, at Derry, Pa., has been promoted to division engineer of the Renovo division, with office at Renovo. H. D. Stowe, supervisor at Dunkirk, N. Y., and G. W. Curtiss, supervisor at Shamokin, Pa., have been appointed pilot engineers in the office of the valuation engineer, both with headquarters at Philadelphia.

W. E. Brown, supervisor of the Middle division of the Pennsylvania Railroad, at Hollidaysburg, Pa., has been appointed supervisor of the Pittsburgh division, with office at Derry, Pa. A. G. Follette, supervisor at Woodbury, N. J., has been appointed supervisor of the Shamokin division, with office at Shamokin, Pa. C. E. Whitlock, formerly supervisor of the Trenton division, and later in the office of the assistant to the general manager at Philadelphia, has been appointed supervisor of the Philadelphia Terminal division, with office at Philadelphia. H. A. John, supervisor at Salamanca, N. Y., has been appointed supervisor of the West Jersey & Seashore, with office at Woodbury, N. J. T. K. Minsker, assistant supervisor of the Pennsylvania Railroad at Bowie, Md., has been promoted to supervisor of the Buffalo division, with office at Dunkirk, N. Y., and F. X. Bradley, assistant supervisor at Derry, has been promoted to supervisor of the Allegheny division, with office at Salamanca, N. Y.

Joseph Weidel, whose appointment as valuation engineer of the Atchison, Topeka & Santa Fe was announced in these columns in August, has recently had his jurisdiction extended over the Gulf, Colorado & Santa Fe. Mr. Weidel started his professional career in 1895 as a draftsman in New York City. In 1899 he was employed as an assayer by the Buck Exploration Company at Durango, Mexico. From 1900 to 1902 he was employed by the Santa Fe in various capacities in Colorado, New Mexico and Kansas. In 1903 he was in the service of the Mexican Central as division engineer in the states of Coahuila and Vera Cruz. From 1904 to 1905 he was assistant engineer on the Santa Fe, and in 1906 construction engineer for the Hally & Swink Railway in Colorado. Returning to the Santa Fe he served one year as engineer on construction of the Raton tunnel at Trinidad, Colo., and two years as office engineer at Topeka, Kan. In 1912 and 1913, he had charge of the construction of the Pecos & Northern Texas, from Lubbock, Tex., to Texico, N. M. In 1914 he returned to the Santa Fe as an assistant engineer.

Purchasing

J. L. Woods, assistant purchasing agent of the Nashville, Chattanooga & St. Louis, at Nashville, Tenn., has been appointed purchasing agent, vice A. C. Taylor, assigned to other duties.

OBITUARY

John Kirk, superintendent of the Gary division of the Elgin, Joliet & Eastern, died at Gary, Ind., on November 2.

Daniel Elliott, division superintendent of the Atchison, Topeka & Santa Fe, at Amarillo, Tex., died on October 19.

Gardner I. Israel, general agent of the Delaware & Hudson, at Chicago, Ill., died on October 25, at the age of 38.

Thomas McGuire, division freight agent of the Pere Marquette at Grand Rapids, Mich., died in that city on October 23. He had been in the service of the railroad since 1891.

C. A. Anderson, trainmaster of the Chicago, Milwaukee & St. Paul at Mason City, Iowa, died on October 31 as the result of being run down by a switching locomotive in the yard.

H. M. McCartney, well known among railroad builders, died at Los Angeles, Cal., on October 16. During the construction of the Western Pacific he held the position of assistant chief engineer and also figured prominently in the construction of the Northern Pacific, the San Pedro, Los Angeles & Salt Lake and the Union Pacific. More recently he was connected with the land department of the Southern Pacific Company.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE GEORGIA, SOUTHERN & FLORIDA is in the market for 2 passenger locomotives.

THE STANDARD OIL COMPANY, Whiting, Ind., is inquiring for prices on one switching locomotive.

THE RARITAN RIVER has ordered one Mikado type locomotive from the Baldwin Locomotive Works.

THE ALLEGHENY STEEL COMPANY has ordered one switching locomotive from the Baldwin Locomotive Works.

THE DETROIT TERMINAL has ordered one Consolidation type locomotive from the Baldwin Locomotive Works.

THE PORT HURON SOUTHERN has ordered one six-wheel switching locomotive from the Baldwin Locomotive Works.

THE PITTSBURGH & LAKE ERIE has ordered 10 Mikado type locomotives from the American Locomotive Company.

THE SUMPTER VALLEY has ordered one ten-wheel and one Mikado type locomotive from the Baldwin Locomotive Works.

THE EAST TENNESSEE & WESTERN NORTH CAROLINA has ordered one ten-wheel type locomotive from the Baldwin Locomotive Works.

THE WALTERBORO LUMBER COMPANY, Thayer, S. C., has ordered one Prairie type locomotive from the Baldwin Locomotive Works.

THE UNITED STEEL COMPANY, Canton, Ohio, has ordered one four-wheel switching locomotive and one six-wheel switching locomotive from the Baldwin Locomotive Works.

THE INTERSTATE RAILROAD, reported in the *Railway Age Gazette* of October 22 as having ordered 2 locomotives from the Baldwin Locomotive Works, has increased that order to 3 Consolidation type locomotives.

THE BETHLEHEM STEEL COMPANY has ordered 2 eight-wheel switching locomotives from the American Locomotive Company. These locomotives will have 22 by 28 in. cylinders, 51-in. driving wheels and a total weight in working order of 196,000 lb.

THE BALTIMORE & OHIO, reported in the *Railway Age Gazette* of October 22 as having ordered one Mallet type locomotive from the Baldwin Locomotive Works, has increased this order to 15 Mallet (2-8-8-2) type locomotives and has also ordered 15 Mallet type engines from the American Locomotive Company.

THE NEW ORLEANS & NORTH EASTERN, reported in the *Railway Age Gazette* of October 22 as having ordered 4 Mikado type locomotives from the Baldwin Locomotive Works, has increased that order to 6 locomotives, two of which will be used on its own lines and four on the Vicksburg, Shreveport & Pacific.

THE PENNSYLVANIA RAILROAD was noted in last week's issue as having ordered 75 Mikado type locomotives from the Baldwin Locomotive Works. These engines are ordered on the 1916 equipment program, and are to be used on the Lines East of Pittsburgh. They are to be of the L-1-s type, and will be similar to the locomotive described in the *Railway Age Gazette* of July 3, 1914, page 12.

THE CENTRAL OF GEORGIA, as stated in a recent issue, has ordered 8 Mikado type locomotives and 4 Pacific type locomotives from the Lima Locomotive Corporation. The Mikado type engines will have the same principal dimensions as those ordered by the Illinois Central. The Pacific type locomotives will have 23 by 28 in. cylinders, 69-in. driving wheels and a total weight of 222,300 lb.

THE ILLINOIS CENTRAL, as stated recently, has ordered 47 Mikado type locomotives from the Lima Locomotive Corporation, all of which will have 27 by 30 in. cylinders, 63-in. driving power of 51,630 lb. and a total weight in working order of 284,400 lb. The 3 Santa Fe type locomotives, ordered from the American Locomotive Company, will have 29 by 32-in. cylinders,

63-in. driving wheels, a weight on driving wheels of 274,000 lb., a tractive effort of 67,173 lb. and a total weight in working order of 346,000 lb.

THE PEKIN-KALGAN RAILWAY has ordered 4 Mikado type and 2 Pacific type locomotives from the American Locomotive Company. The Mikado type locomotives will have 20 by 28 in. cylinders, 50-in. driving wheels and a total weight in working order of 186,000 lb. The Pacific type locomotives will have 20 by 26 in. cylinders, 62-in. driving wheels and a total weight in working order of 183,000 lb.

THE MUSCATINE-IOWA CITY RAILWAY, Muscatine, Iowa, has leased the Montezuma branch of the Chicago, Rock Island & Pacific, running from Muscatine, Ia., to Montezuma, 87 miles, and proposes to operate the line with gas-electric power instead of steam. It has already begun negotiations for the purchase of the necessary freight locomotives and passenger cars. The arrangement for the lease is to become effective on January 1, 1916.

THE CINCINNATI, INDIANAPOLIS & WESTERN was incorrectly reported in last week's issue as having ordered 42 locomotives from the Lima Locomotive Corporation. The company placed orders for but 35 locomotives, the order having been divided as follows: Lima Locomotive Corporation, 8 Mikado type and 7 six-wheel switching locomotives, and the Baldwin Locomotive Works, 10 ten-wheel and 10 Consolidation type locomotives.

CAR BUILDING

THE MISSOURI, KANSAS & TEXAS is inquiring for 2,000 coal cars.

THE BINGHAM & GARFIELD is inquiring for prices on 125 freight cars.

THE NORTHERN PACIFIC is inquiring for prices on 1,000 center constructions.

THE DENVER & RIO GRANDE is inquiring for prices on 10 steel passenger coaches.

THE MUSCATINE-IOWA CITY RAILWAY.—See item under Locomotive Building.

THE MINNEAPOLIS & ST. LOUIS has ordered 500 40-ton box cars from the Bettendorf Company.

THE MICHIGAN CENTRAL has ordered 150 40-ton box cars from the Canadian Car & Foundry Company.

THE ATCHISON, TOPEKA & SANTA FE has ordered 400 steel cars for ties from the Haskell & Barker Car Company.

THE BIRMINGHAM SOUTHERN has issued inquiries for 50 70-ton hopper cars, 25 70-ton flat cars and 15 50-ton box cars.

THE CENTRAL OF NEW JERSEY has ordered 1,000 box, 1,000 hopper and 250 insulated box cars for ice from the Standard Steel Car Company.

THE GEORGIA, SOUTHERN & FLORIDA is in the market for two passenger coaches, 130 steel gondola coal cars and 375 steel underframe box cars.

THE CHESAPEAKE & OHIO, reported in last week's issue as being in the market for 1,000 70-ton coal cars, has ordered these cars from the Standard Steel Car Company.

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for one or two second hand caboose cars. It is also inquiring for 25 flat and 5, 30-ton box cars, for southern delivery.

THE DELAWARE, LACKAWANNA & WESTERN, reported in last week's issue as being in the market for 500 hopper cars, will also purchase 1,000 steel underframe box cars and 500 gondola cars.

THE BALTIMORE & OHIO, reported in an unconfirmed item in last week's issue as having ordered 1,000 hopper cars from the Cambria Steel Company, ordered 2,000 hopper cars from that company and has also ordered 500 box car bodies from the Ralston Steel Car Company.

THE LOUISVILLE & NASHVILLE reported in an unconfirmed item in the *Railway Age Gazette* of last week as having ordered 1,000

steel underframe box cars from the Mount Vernon Car Manufacturing Company, ordered only 1,000 steel underframes from that company and will build the cars in its own shops. This company will also build 400 gondola cars in its own shops.

THE PENNSYLVANIA has issued inquiries for 9,000 freight cars to replace old equipment. Of these 6,000 will be for the Lines East, and 3,000 for the Lines West of Pittsburgh. The company has also issued inquiries for 50 coaches, 50 combination baggage and express cars and 7 horse express cars for the Lines East and 18 coaches, 20 baggage cars, 6 dining cars and 16 combination passenger and baggage and combination baggage and mail cars for the Lines West.

THE NEW YORK CENTRAL was reported in last week's issue as having placed orders for several thousand cars. More recent advices give the division of the order as follows: Standard Steel Car Company, 4,500 55-ton composite gondola cars; Haskell & Barker Car Company, 1,500 automobile cars; Pullman Company, 1,000 automobile cars, and the American Car & Foundry Company, 1,000 automobile cars, a total of 8,000 cars. These orders are in addition to orders placed in September or early in October for 5,500 cars, only 3,500 of which have been previously reported. The orders for 5,500 cars noted included the following: Pressed Steel Car Company, 1,500 gondola cars, of which 500 were for the New York Central proper and 1,000 for the Pittsburgh & Lake Erie; Standard Steel Car Company, 1,500 gondola cars, of which 500 were likewise for the New York Central, and 1,000 for the Pittsburgh & Lake Erie; Haskell & Barker Car Company, 1,000 automobile cars, for the Michigan Central; American Car & Foundry Company, 1,000 box cars, including 500 for the New York Central and 500 for the Cincinnati Northern, and the Barney & Smith Car Company, 500 box cars for the New York Central. The orders placed for the New York Central proper were not previously reported. Of the 4,500 gondola cars ordered from the Standard Steel Car Company on the new order, 3,000 are to be for the New York Central, 500 for the Michigan Central and 1,000 for the Pittsburgh & Lake Erie. The 3,500 automobile cars to be built by the Haskell & Barker Car Company, the American Car & Foundry Company and the Pullman Company are ordered for the Michigan Central.

IRON AND STEEL

THE NEW YORK CENTRAL has ordered 5,000 tons of rails from the Lackawanna Steel Company.

THE CHICAGO GREAT WESTERN has ordered 7,500 tons of 85-lb. rails from the Illinois Steel Company for March delivery.

THE BOSTON & MAINE has ordered 25,000 tons of rails for 1916 delivery, of which 15,000 tons have been ordered from the Lackawanna Steel Company.

THE PENNSYLVANIA RAILROAD has ordered 175,000 tons of rails for 1916 delivery, as follows: 70,000 tons from the Illinois Steel Company, 7,000 tons from the Carnegie Steel Company, 38,500 tons from the Cambria Steel Company, 38,500 tons from the Pennsylvania Steel Company, 10,500 tons from the Lackawanna Steel Company, and 10,500 tons from the Bethlehem Steel Company.

SIGNALING

THE CHICAGO, INDIANAPOLIS & LOUISVILLE will install a 24-lever Saxby & Farmer mechanical interlocking plant at the crossing of its line with the Grand Trunk, at Haskell's, Ind. The material has been ordered from the Union Switch & Signal Company, and the work will be done by the road's forces.

THE ATCHISON, TOPEKA & SANTA FE will install an all-electric interlocking plant at Mission street, Los Angeles, Cal. The material for the installation was furnished by the General Railway Signal Company, and comprises an 80-lever, model 2, unit lever type interlocking machine, with 62 working levers and 18 spare spaces; three-position, upper-quadrant, model 2-A high signals and two-position, lower-quadrant, model 2-A high signals; three-position, upper-quadrant, model 2-A dwarf signals and two-position, lower-quadrant, model 3 dwarf signals, also model 2 switch machines. The work will be done by the road's forces.

Supply Trade News

The American Steel Foundries will soon begin work on a new addition to its plant at Indiana Harbor, Ind. A structure 320 ft. by 200 ft. will be erected.

M. E. Hamilton, northwest railroad representative of the Garlock Packing Company, of Chicago, with headquarters at St. Paul, Minn., has resigned to become general air brake inspector of the St. Louis & San Francisco. Mr. Hamilton was in the service of the Garlock Packing Company for four and one-half years.

The Chicago Railway Signal & Supply Company opened two new branch offices, on October 15, one located at 407 Confederation building, Winnipeg, Man., and the other at 320 Kearns building, Salt Lake City, Utah. W. Reynolds will have charge of the company's Canadian interests, and C. H. Jones will act as representative for the western district, centering at Salt Lake City.

William H. Donner, president of the Cambria Steel Company, has exercised an option for one-half the Pennsylvania company's holdings in the Pennsylvania Steel Company, and has purchased approximately 45,800 shares of 7 per cent non-cumulative preferred and 46,950 shares of common stock. This means that the proposed purchase of the Pennsylvania Steel Company by the Bethlehem Steel interests cannot take place and paves the way for the contemplated merger of the Pennsylvania and Cambria Steel Companies.

TRADE PUBLICATIONS

LOCOMOTIVE APPLIANCES.—The Franklin Railway Supply Company, New York, has recently issued Bulletin No. 166, describing and illustrating the Franklin automatic adjustable driving box wedge.

HORIZONTAL GAS ENGINES.—The National Transit Company, Oil City, Pa., has issued Bulletin No. 403, describing its horizontal gas engines ranging from 30 to 80 h. p. The book is illustrated with photographs and drawings of the various parts.

SCHERZER ROLLING LIFT BRIDGES.—The Scherzer Rolling Lift Bridge Company, Chicago, has issued a booklet describing its type of bridges and the merits of this design. It also contains an extended list of this type of bridges on various railways in the country. The book is well illustrated with examples of typical structures.

KAHN MESH FOR REINFORCING CONCRETE.—The Trussed Concrete Steel Company, Youngstown, Ohio, has issued a 32-page pamphlet describing Kahn mesh expanded metal. The booklet illustrates the various purposes for which this material may be used and gives a number of slab tables. Several standard plans for highway box culverts are also included.

CEMENT AND CONCRETE.—Robert W. Hunt & Co., engineers, Chicago, have issued a booklet containing information and specifications concerning the testing of cement and concrete aggregates, including the standard specifications for Portland cement adopted by the American Society for Testing Materials and approved by the American Society of Civil Engineers.

INSPECTION AND TESTS. The engineering firm of Robert W. Hunt & Co., Chicago, has recently issued a booklet explaining the work of the engineering division of that company's bureau of inspection, tests and consultation. The book goes into some detail concerning the aims of the organization and the duties of its various departmental sub-divisions. The company is prepared to make examinations and reports on public utilities, power plants, industrial plants, etc. It may also be called upon for consultation and designing with reference to power plant design, industrial plants, and railway equipment. Its construction and testing department, in addition, is in a position to supervise the construction of power and other plants and to supervise also tests of electrical and mechanical apparatus at the manufacturer's works or at the plant after installation.

Railway Construction

BELLINGHAM, MT. BAKER & SPOKANE.—The contract for the first 16 miles of this railway—from Bellingham, Wash., to Deming, has been awarded to E. J. Fader, 4175 Arcade Annex, Seattle, Wash. The maximum grade on the first 16 miles is 1 1/10 per cent, but as yet grading has not been begun. Ultimately, it is the purpose of the company to extend from Deming, up the north fork of the Nooksack river, across the mountains to the headwaters of the Methow river, down the Methow to the Columbia river, along the Columbia to the Spokane river, thence to Spokane, and finally to the state boundary line. Steam motive power will be used. President, J. E. Morrison, 1515 Tenth avenue, West Seattle, Wash.; chief engineer, C. E. Wingate, McLeod hotel, Bellingham, Wash.

BOSTON SUBWAYS.—Bids are wanted until November 11, by B. Leighton Beal, secretary of the Boston Transit Commission, for building section G of the Dorchester tunnel. This section is located in Dorchester avenue between West Fourth street and Old Colony avenue, South Boston, Mass. The section is about 1,200 ft. long and will be mainly of reinforced concrete construction.

GULF, TEXAS & WESTERN.—According to press reports arrangements are being made to build extensions of this road, which is now in operation from Mineral Wells, Tex., to Seymour, 108 miles. It is understood that an extension will be built from Salesville east to Fort Worth, about 50 miles, and the original intention to extend the road west from Seymour to Lubbock will also be carried out in the near future.

LINVILLE RIVER.—Construction work is reported under way on the extension of this road from Montezuma, N. C., northeast to Foscoe, 12 miles. A contract was let last July to W. S. Whiting, Elizabethton, Tenn., to carry out this work. The company now operates a 14-mile line from Pineola northwest via Montezuma to Cranberry. (July 9, p. 81.)

RHODE ISLAND ROADS.—Plans are being made for a proposed municipally owned line in Providence, R. I., to be built from the city sea wall at Field's Point to connect with the tracks of the New York, New Haven & Hartford and the Southern New England.

SAN FRANCISCO, CAL., ROADS.—The Board of Public Works of this city will receive bids on November 24 for the construction of a railway from Rosasco, Tuolumne county, to the Hetch-Hetchy dam site. The railroad will be 67.7 miles in length, will have a maximum grade of 4 per cent, and a maximum curve of 30 deg. About 16,000 cu. yd. of material will be handled per mile. One bridge, 220 ft. long will be built over the Tuolumne river, involving the use of 470,000 lb. of steel for the structure itself and 130,000 lb. for girder approaches. The railway will be used to transport material to the site of the Hetch-Hetchy dam and the aqueduct leading from it. Steam motive power will be used, but as yet no definite inquiries for equipment have been made. The plans also contemplate the construction of oil tanks, water tanks and 50 miles of telephone line. M. M. O'Shaughnessy, city engineer, San Francisco, Cal.

VAN HORN VALLEY.—Grading is in progress on this road from Van Horn, Tex., north. Three thousand cu. yd. of material is being handled per mile. Out of some 70 miles of grading to be done, 15 per cent has been completed. R. H. Owen, 816 Reserve Bank building, Kansas City, Mo., is president.

RAILWAY STRUCTURES

ARGENTINE, KAN. Plans are being prepared by the Atchison, Topeka & Santa Fe for a large frame addition to the car repair shed here. The new structure will be 522 ft. by 93, and will cost approximately \$45,000.

BRONXVILLE, N. Y. A contract has been given by the New York Central to the Fort Pitt Bridge Works, Pittsburgh, Pa., for fabricating the steel superstructures of a 63-ft. railroad bridge, also for a highway bridge about 62½ ft. long. These

bridges are to have concrete abutments. This is part of the improvements being carried out in connection with the construction of a new street at Bronxville. Bids were received in September for the excavation, masonry, paving, erection of the steel work, etc., but contracts for this work have not yet been let.

BROOKLYN, N. Y.—The New York Dock Company will carry out improvements on the Brooklyn waterfront between Fulton street and Atlantic avenue at a cost of \$1,250,000. The work calls for the replacement of the existing piers, which are about 400 ft. long, by five new piers, to be from 640 to 750 ft. long.

The New York Municipal Railway Corporation has applied to the New York Public Service Commission, First district, for permission to enter into a contract with the George W. McNulty Company, for the construction of the Coney Island terminal of its elevated lines.

BUFFALO, N. Y.—An officer of the Delaware, Lackawanna & Western writes that the company will reconstruct its lake coal trestle at Buffalo. Some of the work will be done by the railroad with company forces, and the Buffalo Dock & Dredging Company will probably carry out the work at North Pier, Buffalo.

EAST ST. LOUIS, ILL.—A contract has been awarded to the Weller Manufacturing Company, of Chicago, Ill., for the machinery and structural steel to be used in the construction of a coal tippie for the Wiggins Ferry Company. The work of installation will be done by company forces. The coal transfer will be operated by a tram car on a cable way actuated by electric hoists. The hopper trestle and motor house will be constructed of timber; the hopper, tram car and cradle of steel. The new station will have a capacity of 150 tons per hour, and will cost approximately \$11,500, exclusive of the earth approach to the hopper trestle. (October 29, p. 829.)

JAMAICA, N. Y.—Work is now under way on the elevation of about a mile of the Long Island Railroad tracks through Hollis and over the Holban freight yard. About 400,000 cu. yd. of fill will be used. The grade crossings at Farmer avenue and at Hamilton avenue will be eliminated and the grade of the entire Holban freight yard will be changed, so as to permit of the highway going between the network of tracks in the yard. The three-track main line traversing this section will be raised 14 or 15 ft., and the highways will be depressed 3 or 4 feet. The cost of the improvements will be about \$400,000.

PHILADELPHIA, PA.—In connection with the opening of Emerald street under the tracks of the Richmond branch of the Philadelphia & Reading, a three-span deckbridge is to be built by the railroad, to carry 16 tracks, at a cost of \$72,800. The bridge will be supported on concrete masonry abutments at the house lines, and upon steel girders and columns at the curb lines of the street. The bridge floor proper is to be composed of I-beams encased in concrete and will be waterproofed with a layer of asphalt mastic 1½ in. thick. Contracts for the work have been let as follows: For the bridge abutments and removal of core to C. P. Bower, Philadelphia, Pa.; for the superstructure of the bridge, ready for encasement, to the American Bridge Company, Philadelphia, and for waterproofing the bridge, to the Barber Asphalt Paving Company, Philadelphia.

SOUTH BEND, IND.—This municipality has been granted the authority to order grade separation on the New York Central right of way and at present is raising funds to cover its share of the expense. No definite plans of construction have yet been adopted.

ST. LOUIS, MO.—The contract for constructing the Chouteau avenue viaduct over the Missouri Pacific and St. Louis & San Francisco tracks, has been let to F. C. Mueller & Co., of this city. The viaduct will be a reinforced concrete structure, consisting of 30 flat slab spans, 28 to 36 ft. in length, supported on piers extending to rock foundation. The estimated cost of the structure is \$150,000; pavements and surface improvements, \$35,000; real estate, \$35,000; property damages, \$45,000. The railroads and the city will share the cost as follows: Missouri Pacific, \$150,000; St. Louis & San Francisco, \$35,000; street railway, \$10,000; city of St. Louis, the balance.

SUNBURY, PA.—The Philadelphia & Reading has filed plans with the Pennsylvania State Water Supply Commission for permission to reconstruct its bridge across the Susquehanna river at Sunbury. (Sept. 24, p. 586.)

Railway Financial News

BOSTON & MAINE.—The minority stockholders' protective committee has sent out a circular protesting against the proposed reorganization. The circular says, in part:

"Boston & Maine was valued by the commonwealth of Massachusetts as late as 1906 at \$165 per share, and the question arises as to the bearing of this valuation upon present conditions. To what extent have real values suffered legitimate depreciation? Total sales of the stock in the intervening period have been exceedingly small; fluctuations in this limited market cannot properly be used as a barometer of credit in connection with the outstanding obligations of this corporation.

"Boston & Maine as a physical property has substantially appreciated rather than depreciated within the past few years. Recent earnings would seem to refute the claim that a reorganization is immediately necessary and tend to make the suggestion of receivership a more or less empty threat. The position taken by the Interstate Commerce Commission in the Rock Island case may be regarded as a fair warning that merely speculative railroad receiverships will not be tolerated.

"Such reorganization as is projected would permanently fund a large volume of obligations that are declared to be of doubtful validity. It also particularly threatens the integrity of minority interests, for the reason that it would mean an assessment of from \$30 to \$50 per share on all the stock. The result would be the wiping-out of thousands of individual holdings. All stock of the Boston & Maine has been issued under specific guaranty of general law that it should forever remain unassessable."

CHICAGO GREAT WESTERN.—The directors have declared a dividend of 1 per cent on the preferred stock, payable December 1. This is the first dividend declared since the reorganization of 1909. Dividends on the preferred stock have been cumulative at the rate of 4 per cent a year since June 30, 1914.

CHICAGO, ROCK ISLAND & PACIFIC.—The Montezuma branch, running from Muscatine to Montezuma, Iowa, 87 miles, has been leased to the Muscatine-Iowa City Railway, which proposes to operate the line with gas-electric cars for both passenger and freight. The arrangement becomes effective on January 1, 1916.

CHICAGO, ROCK ISLAND & PACIFIC.—As previously announced, the protective committee, Charles A. Peabody, chairman, representing the refunding 4 per cent bonds, has asked for the deposit of these bonds. N. L. Amster, of Boston, has given out a statement criticising the committee for their "attack" on the credit of the company just at this time. It is understood that the Kendrick report on the capital needs of the property to put it in good physical shape is about ready, or has just been submitted, and the committee's action in calling for the deposit of bonds is said to be because of the nature of this report. This cannot, however, be confirmed.

HOUSTON & BRAZOS VALLEY.—On the application of general creditors Judge Burns of the United States district court has appointed G. C. Morris receiver of the Houston & Brazos Valley, which runs from Anchor, Tex., to Freeport, 25 miles.

NATIONAL RAILWAYS OF MEXICO.—The stockholders' meeting was held in Mexico City on October 31. The Mexican and New York boards of directors were elected. The Mexican board consists of Acting Foreign Minister Jesus Acuna, Carlos Basove y del Castillo, Minister of Finance Luis Cabrera, three lawyers, Jose Diego Fernandez, Aquiles Eloduy and Fernando Gonzales; Gabriel Mancera, an engineer; sub-Secretary of Finance Rafael Nieto, Alberto J. Pani, an engineer; Jose Simon, manager of the Banco Nacional Mexicano, and Rafael Zubaran Capmany, ex-minister of the interior. The New York board consists of Juan N. Amader, an attorney; Dr. Alfredo Caturmeli, William Edmund Curtis, Jerome Hanauer, Roberto V. Pesquera, Walter F. Losen, Charles H. Sabin, Richard Schuster and Henry Wehrhane.

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At the recent meeting of the American Association of Passenger Traffic Officers a committee report was adopted recommending that the various territorial passenger

Proposed Charge for Checking Baggage

associations give serious consideration to a plan for imposing a 10-cent terminal charge for the checking of baggage. Such a plan has been suggested before, and, as the *Railway Age Gazette* has pointed out, there are numerous reasons why there should be a difference in the charges paid by those for whom the railroad checks baggage and those for whom it does not. European roads generally charge for handling all baggage in excess of a very small free allowance, and certainly the passenger for whom the railroad checks and handles a 150-lb. trunk receives a greater service than the man who cares for his own hand baggage enroute, but checks it at a

parcel room at either end of his journey for a charge of 10 cents for 24 hours or less. But there is an additional reason now in justification of a charge for baggage that did not formerly exist. The Cummins amendment has increased the liability of the railroads for loss or damage to baggage, and in order to protect themselves the eastern roads are requiring a declaration of value and imposing an insurance charge if the value exceeds \$100. This declaration costs the railroads something for clerical work and has aroused a good deal of complaint as being a nuisance to the passenger. It was the thought of members of the committee of passenger officers that the charge for checking baggage might be proposed as a substitute for the declaration of value and to cover not only a part of the expense of handling baggage but the insurance element. The adoption of a baggage charge would undoubtedly be attended with the difficulty usually experienced in attempting to withdraw a concession that has once been granted, but now that the railroads have something to trade, the plan might appeal to many who object strongly to the declaration of value.

There recently have appeared in the *Railway Age Gazette* several letters and articles complaining about and criticizing the position

A Plan for Improving the Railway Clerk

in which a large majority of general office clerks on railways find themselves. There is ample justification for many of these complaints and criticisms. The work of general office clerks is of no small importance, and the total wages paid to them exceed the salaries paid to the officers. The total salaries paid to all officers of Classes 1 and 2 roads in the year ended June 30, 1913, was \$42,776,142. The total wages paid to general office clerks in the same year amounted to \$69,443,296. The number of general office clerks in that year was no less than 84,267. Considering the number of these employees, the amount of their total compensation and the importance of their work, it is plain that they should be so selected, organized and promoted as to get the very best results from their services. This should be done both out of consideration for the rights and interests of the employees and the welfare of the railways. The clerks are not organized into unions, and this imposes on the managements a special duty to spare no effort to treat them fairly and develop among them the greatest loyalty and efficiency. If there is any railway in the country which has lived up to these principles it has succeeded in keeping the fact a profound secret. Many of the complaints and criticisms we have published, while justified, have been chiefly destructive in their character. We publish in another column this week a letter from a railway officer who has had experience in handling general offices and who suggests a constructive plan for improving the position of the clerk. His plan may possibly not be the best that could be suggested, but it has the merit of having been tried and of having worked successfully. His letter is therefore entitled to wide reading and careful consideration.

THE REVIVAL OF BUSINESS

MOST of the discussion about railroads for a long time has been centered around their troubles. Attention is now being directed to the more favorable aspects of their situation, and many railroad officers whose chief concern for years has been to reduce expenses wherever possible and sometimes where it has seemed impossible, now find their hands filled with the work of handling the business offered them.

Evidence is accumulating that the tide has turned and that general business is rapidly returning to a condition of prosperity, with good consequent effect on the welfare of the railroads and the railroad supply industry. After a long depression, followed by a considerable period of uncertainty, the change has come so suddenly as to leave some doubt for a time as to its permanency. However, while allowance must be

made for the extraordinary activity in certain lines, such as the automobile business, and particularly for the stimulating effect of the large orders for war materials, the upward tendency during the past month or so has been so marked that more confidence is being manifested than at any time since the war began. This confidence is reflected not only in the statements of bankers and other prominent business men regarding the rapid improvement in general business, but in the reports of railroad traffic and earnings and the large orders for rails, locomotives, cars and other supplies that have been placed during the past few weeks by the railroads.

For August the railroads of the country reported an increase in total operating revenues of 1.3 per cent, and in net operating revenues of 10.2 per cent, per mile. This showing was made possible, of course, by the continuance of the program of drastic economy. Preliminary reports from large roads operating 117,734 miles compiled by the Interstate Commerce Commission indicate an increase in total operating revenues per mile from \$1,219 in September, 1914, to \$1,295 in September, 1915, or 6.2 per cent, and in net operating revenues per mile from \$408 to \$484, or 18 per cent. This also represents a gain, in both gross and net, over September, 1913, when a similar compilation by the commission showed that total operating revenues were \$1,235 per mile and net operating revenues were \$397 per mile, and over September, 1912, when total operating revenues were \$1,200 and net operating revenues \$424. The gross earnings reports of 32 roads available for October show increases of 8.63 for the first week, 11.98 for the second and 17.49 for the third over 1914. Any enthusiasm aroused by comparisons with 1914 should be tempered by recollection of the exceedingly poor showing made in that year; but net gains as compared with both 1912 and 1913 are gratifying indeed. In September the gross earnings of the Pennsylvania Railroad were \$20,817,361, the largest in any one month in the company's history, except August and October, 1913, and the net earnings, \$7,282,021, were the largest in any month in its history.

The earnings figures are reinforced by the increasing frequency of reports of scarcity of equipment and congestion of traffic, and by the fact that several of the largest railroads in the country have in the past few days reported record car loading figures. The Santa Fe in the week ending October 30 had the largest loaded car movement in its history, the Burlington on October 17 and 18 set a new record for 48 hours; the Pennsylvania's middle division in October broke its record for a month, and the Missouri Pacific in October had the heaviest freight traffic in its history.

The report on surpluses and shortages of freight cars issued by the American Railway Association for October 1 showed a surplus of 88,061 cars, as compared with 191,309 on September 1, and 133,382 on October 1, 1914. There was also a shortage of 9,762 cars. The statement for November 1, which is just out, shows a large part of this surplus wiped out and a considerable increase in the shortage, which makes the net surplus less than it has been at any time since October, 1913. Reports of increasing freight traffic come from all sections of the country, western roads feeling particularly the effects of the steady growth in the grain movement, which promises to be greater than ever before. The eastern roads are profiting by the heavy shipments of iron and steel, as well as of manufactured goods, which indicate a large gain in general business during the past two or three weeks, which is also being felt by the western roads. There have also been heavy shipments of ore. In the South, while the cotton crop is smaller than usual, its value will be higher than that of last year, and as a result of the more diversified character of that territory's agriculture during the year conditions are showing a marked improvement. The traffic of the transcontinental lines is being considerably stimulated by the closing of the Panama Canal since September 20 by slides, which it is reported may cause a cessation of canal traffic for the rest of the year.

Evidences of a renewed buying activity on the part of the

railroads are numerous. In last week's issue we called attention to the large orders for cars and locomotives placed in the last two months. Even more remarkable has been the rush to place early orders for rails and track material. Since October 1, the *Railway Age Gazette* has reported in its news columns orders for 653,000 tons of rails, which represents an expenditure of over \$19,000,000. Including 107,500 tons reported in our columns in September, this makes a total expenditure of over \$24,000,000 for rails alone. With this rail there were placed orders for at least \$3,000,000 worth of track fastenings. It has been the practice of the railways in previous years to place their rail orders about the first of the year, but this year, on account of the congestion in the steel mills caused by the buying from abroad, they are beginning them much earlier than usual to secure delivery at the time the rails will be needed. The Pennsylvania has just bought 175,000 tons for its 1916 requirements. Its 1915 order was placed as late as June. The Rock Island has just been authorized to buy 40,000 tons of rails.

If the confidence aroused by the improvement within the past few weeks is sustained, railroad men will enter upon the new year with sentiments of relief and satisfaction. But it will take many months of good business for most of the roads to make up for the effects of the depression, and for many of them even a large increase in traffic will not suffice. A railroad's condition is not determined by gross earnings alone and the recent increases in net are largely artificial. They are the result of the very rigid economies that the railroads have been forced to practice and which cannot be continued without detriment to both service and property. The increase in traffic will entail large increases in expenses and the labor organizations are already beginning movements for an eight-hour day and for increases in rates of pay. If successful, these would cause increases in operating expenses, which, in the absence of heavy advances in rates, would soon absorb the enlarged net earnings now being shown. The improvement in conditions in the railway supply field are notable and gratifying; but, nowadays, the problems presented to the managements of the railways in years of good business are hardly less numerous and difficult than those presented in years of bad business.

Some roads are not even in a position to take full advantage of the sudden appearance of prosperity. While the shippers are clamoring for cars, many cars are not available for use, because, in some instances at least, their owners have kept themselves out of bankruptcy only by deferring expenditures for their repair until a more propitious time, and could not afford to repair them until they were sure they would be needed.

WHAT IS AN "EIGHT-HOUR DAY"?

THE large organizations of railway train employees are beginning another concerted nation-wide movement for increases in wages. This time they are going to ask for the adoption of a nominal 8-hour day in train service. The movement is of tremendous importance to both the railways and the public. Its success would cause, directly and indirectly, advances in operating expenses amounting to hundreds of millions of dollars annually, in addition to those which have occurred within recent years. The past increase in expenses have created a need for general advances in rates. The further increases in expenses that would be caused by accession to the demands of the employees would render imperative additional general increases in rates. The question presented is, therefore, not one which concerns only the employees and the railways. It equally concerns the public, which would have to foot most of the bill.

When any class of men or of organizations start a movement of such vast importance the question as to what is really being sought cannot be asked too explicitly or answered too early. The railways and the public are therefore justified in at once interrogating the leaders of the labor unions as to whether when they say they want an 8-hour day they mean exactly what they say. Or do they use the words "eight-hour day" in a different

sense from that in which these words are ordinarily understood.

The 8-hour day already has been established for working men in many branches of commerce and industry. In every line where it now prevails it means that employees work not only a *maximum* of 8 hours, but also a *minimum* of 8 hours, for a day's wage. The conditions of work and bases of wages in railway train service are entirely different from what they are in any other industry. This fact and the reasons for it must be made entirely clear to the public before it will be able to weigh the arguments, pro and con, which doubtless will be presented in the discussion of the so-called "eight-hour day" in train service. The public, until correctly informed, will naturally assume, when it is stated that railway train employees now have a 10-hour day, and want an 8-hour day, that this means that they all now work 10 hours for a day's wage, and want to work only 8 hours for a day's wage. If this assumption were correct there could hardly be presented any argument against an 8-hour day in railway train service that cannot be presented against an 8-hour day in any other line of industry. But the facts are, that in railway train service practically no employees now work more than 10 hours for a day's wage, and that thousands work less than 10 hours, and even less than 8 or than 6, and in some cases less than 4 hours, for a day's wage. The reason for this is that in train service wages are based, not merely on *hours worked*, but also, and mainly, on *miles run*; and that when the requisite *miles* have been made the employee gets a day's wage no matter how few hours he has worked.

In freight service the working day consists of 10 hours work or 100 miles run. If an employee either works more than 10 hours or runs more than 100 miles he receives overtime. If he runs more than 100 miles in less than 10 hours he receives overtime for the *excess mileage*, and if he runs less than 100 miles in more than 10 hours he receives overtime for the *excess hours*. The largest number of train employees is engaged in through freight service. The evidence introduced by the railways in Western territory in the recent arbitration of the controversy between them and their engineers and firemen showed that in the typical month of October, 1910, their engineers and firemen in through freight service worked an average of only 8.3 hours for pay for 100 miles, which is the equivalent of a day's pay. Evidence introduced in the same hearing showed that in the typical month of October, 1913, the engineers and firemen in through freight service worked an average of only 8.2 hours for pay for 100 miles. In way freight service the hours are longer than in through freight service, but on the other hand, in passenger service they are shorter. In passenger service in the West the basis of a day's wage at present is 6 hours and 40 minutes' work or 100 miles run, and in Eastern territory the basis is 5 hours' work or 100 miles run. Railway train employees are not working 10 hours a day, as they are leading the public to believe. Considering the situation as a whole complete data might show that on the average they are not now working an average of more than 8 hours for a day's wage. The spokesmen of the brotherhoods are beginning to fill the newspapers with statements to the effect that some railway train employees work 12, 14 and 16 hours a day. But they do not state the additional related fact that every train employee who works more than 10 hours receives overtime for the entire excess, and that thousands of train employees are regularly receiving a day's wage for working less, and in many cases much less, than 10 hours.

The foregoing facts show why we have headed this editorial with the question, "What is an eight-hour day?" Do the railway brotherhoods, in demanding the 8-hour day, mean not only that employees who are now working a *maximum* of 10 hours for a day's wage shall in future work only a *maximum* of 8 hours, but also that the employees who are now working only 3 or 4, or 5 or 6, or 7 hours for a day's wage shall in future work a *minimum* of 8 hours? In other words, do they desire, as the public is being led to infer, that employment and wages in railway train service shall be put on the same basis as employment and service in other lines of industry where the 8-hour day prevails? Or are they really asking that 8 hours shall merely be made the *maximum* working day in railway train service, and that the thousands of employees

who now work less than this shall be allowed to continue to work less, with the result that on the average the working day in this service will be made only 7 or 6, or 5 hours?

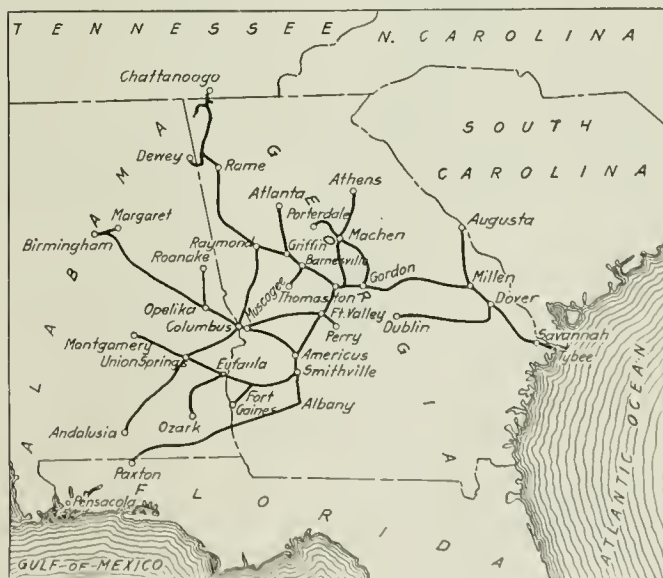
There is no doubt in the mind of any person who is well informed regarding the existing wage schedules in railway service that what the brotherhoods are really seeking is to establish 8 hours as the maximum and to retain the arrangements under which many of them work less than 8 hours. In fairness to the public and the railways the brotherhoods ought to be frank and explicit. Instead of merely saying that they want an "eight-hour day" they ought to state what is their definition of an 8-hour day. So long as they fail to do this they will rest under the suspicion of attempting to mislead the public and to prevent enlightening discussion of their true proposition.

CENTRAL OF GEORGIA

THE Central of Georgia made steady gains in gross revenue from 1909 to 1912, held these gains through 1913, and had the largest gross revenue in its history in 1914. In that year it earned \$14,327,000. The 1914 revenues were 40 per cent greater than in 1905. In 1915 the revenues dropped back more than half way to the 1905 figure, total operating revenues amounting to \$12,108,000, or less than 20 per cent greater than the 1905 revenues.

The Central of Georgia operates 1,924 miles. A majority of its \$20,000,000 stock is owned by the Illinois Central, which was also adversely affected by the business depression in the South and could not well afford to suffer any reduction of income through the passing or cutting down of dividends on the Central of Georgia.

The total loss of \$2,218,000 in revenues of the Central of



The Central of Georgia

Georgia was made up by a reduction in operating expenses of \$1,812,000, and by an extra dividend of \$400,000 declared on the Ocean Steamship Company stock, which stock is held by the Central of Georgia. The net income of the Central of Georgia available for dividends in 1915 was \$1,202,000 as against \$1,091,000 in 1914. In 1914 dividends on the preferred stock only had been declared, calling for \$900,000. In 1915 a 5 per cent dividend on the \$5,000,000 common stock was declared, making the total dividend payments \$1,150,000.

As has been pointed out in comments on the annual reports of other southeastern roads, all forms of industry in the South came almost to a standstill during the early months of the European war and passenger travel was very much smaller. The total tonnage of freight carried by the Central of Georgia in 1915 was 4,903,000, comparing with 5,631,000 carried in 1914.

The tonnage of cotton carried was 260,000 as against 234,000 the year before, and of cotton seed and cotton seed meal, 482,000 tons in 1915 as against 349,000 tons in 1914. It will be seen, therefore, how much more important to the earnings of the Central of Georgia the price of cotton is than the actual tonnage moved. The loss to the planters through low prices is reflected in a movement of but 932,000 tons of manufacturers over the Central of Georgia in 1915 as against 1,443,000 tons in 1914. On the other hand, depression in the lumber trade means both loss of tonnage of that commodity and loss of tonnage of other commodities because of the reduced buying power of those dependent on the lumber industry. The total tonnage of lumber carried by the Central of Georgia in 1915 was 460,000 tons, comparing with 715,000 tons carried in 1914.

To make a saving of \$1,812,000 in operating expenses it was necessary to cut pretty drastically the expenditures of every department. Transportation expenses amounted to \$4,254,000, a saving as compared with the previous year of \$760,000. There was a considerable saving in yard expenses, in the operation of joint terminals, in station agents' pay and in the pay of labor at stations. There was also a large reduction in the payments for injuries to persons, the total payments in 1915 amounting to \$199,000, which is less by \$189,000 than the payments in 1914, and a reduction in the payments for loss and damage to freight, the payments on this account in 1915 amounting to \$95,000, or \$51,000 less than in 1914. A saving was also made in wages of engine-men and trainmen because of a smaller amount of traffic handled. A gain was made in trainloading, the average trainload in 1915 being 360 tons, including company and revenue freight, as against 347 tons in 1914.

Maintenance of way and structures cost \$1,654,000 in 1915, or \$462,000 (21.81 per cent) less than in 1914. Maintenance of equipment cost \$2,247,000, or \$584,000 (20.64 per cent) less than in 1914. Cuts of over 20 per cent in maintenance seem rather drastic. The largest cuts were made in the expenditure for timber for bridges, trestles and culverts, \$140,000 in 1915 as compared with \$285,000 in 1914; and in ordinary repairs of roadbed and track, \$282,000 being spent on these accounts in 1915 as against \$360,000 in 1914; and repairs to buildings, \$100,000 being spent on these accounts in 1915 as against \$172,000 in 1914.

There was a total of \$491,000 spent for additions and betterments. There was a total of \$491,000 spent for additions and betterments, all but a very small part of which was for additions and betterments to road, the largest expenditure being for track material other than rails and ties.

Cash on hand at the end of the year totaled \$881,000, or about \$39,000 less than at the beginning of the year, and loans and bills payable amounted to \$3,665,000, an increase as compared with the previous year of \$345,000.

If the Central of Georgia were an independent road with a large number of small stockholders the management might possibly be criticised for its policy in regard to maintenance retrenchments and adding further to floating debt while paying dividends on both preferred and common stock. The fact that the majority of the stock is held by a single large, rich corporation, which is strong enough to take care of the Central of Georgia's needs when the time for permanent financing of the floating debt comes, puts a somewhat different aspect on the case.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated.....	1,924	1,924
Freight revenue	\$7,859,378	\$9,169,090
Passenger revenue	3,001,184	3,815,474
Total operating revenues.....	12,108,184	14,326,575
Maintenance of way and structures.....	1,654,258	2,115,848
Maintenance of equipment.....	2,246,873	2,831,182
Traffic expenses	407,174	429,583
Transportation expenses	4,254,257	5,014,502
Miscellaneous expenses	18,145	21,473
General expenses	418,398	373,086
Transportation for investment—Cr.....	25,592	.....
Total operating expenses.....	8,973,512	10,785,764
Taxes	576,544	631,596

	1915	1914
Operating income.....	\$2,547,633	\$2,909,214
Gross income	3,903,631	3,808,001
Net income	1,202,005	1,091,042
Dividends	1,150,000	900,000
Surplus	52,005	191,042

ST. LOUIS & SAN FRANCISCO

THE St. Louis & San Francisco reduced its operating ratio in the fiscal year ended June 30, 1915, to 69.45, comparing with 74.06 in the previous fiscal year. Total income amounted to \$11,671,000 in 1915, an increase of \$1,417,000, or 13.8 per cent, as compared with the previous year. This would be at the rate of 7 per cent on a capitalization of about \$31,800 per mile. It is conceivable that through the expenditure of further sums on grade reduction and heavier locomotives the operating ratio of the St. Louis & San Francisco could be brought down to 65 or even to 63 or 64; but even this would not allow operating income sufficient to yield a fair rate of return on anything like the cost of reproduction new of the 5,252 miles of road which is now being operated by the receivers unless the volume of traffic should increase by 20 to 30 per cent.

The good showing made in net was due to cutting down expenses even more than commensurate with smaller business. Total operating revenues in 1915 amounted to \$42,975,000, a decrease as compared with the previous year of \$1,949,000, or 4.3 per cent. Total operating expenses amounted to \$29,839,000, a decrease as compared with the previous year of \$3,432,000, or 10.3 per cent. The amount spent for maintenance in 1914 was abnormally high, the receivers having had to make extensive repairs and renewals to put the property into safe operating condition, and to take up previously deferred maintenance. In 1915 \$6,088,000 was spent on maintenance of way, which was less by \$1,674,000, or 21.6 per cent, than in the previous year. In 1914 there were 3,269,000 ties used on tie renewals. This would be equivalent to approximately 1,250 miles of track. The total miles of track, including second track and side tracks, of the St. Louis & San Francisco, including also 196 miles of trackage rights, was about 6,800 miles. The renewal of ties in all classes of tracks, including branch lines and side tracks, of more than one-sixth of the total number, is, of course, obviously abnormally high. In 1915 tie renewals totaled 1,367,000. The amount charged to expenses for ties in 1915 was \$678,000, a decrease as compared with the previous year of \$1,219,000, or 64.3 per cent. The smaller tie renewal also decreased the amounts spent for track laying and surfacing, the total on that account being \$1,733,000 in 1915, a decrease as compared with the previous year of \$262,000, or 13.1 per cent.

Maintenance of equipment cost \$7,162,000 in 1915, a decrease as compared with the previous year of \$331,000, or 4.4 per cent. There was a decrease of \$837,000, or 22.9 per cent, in the amount spent for repairs, depreciation and retirements (the receivers' report does not separate these three accounts) of freight-train cars, the total in 1915 being \$2,818,000.

The following table shows the percentage of each class of expenses to total operating revenues:

	1915	1914
Maintenance of way and structures.....	14.17	17.28
Maintenance of equipment.....	16.67	16.68
Traffic expenses	1.98	2.07
Transportation expenses	34.13	35.08
General expenses	2.76	2.95
Transportation for investment—Cr.....	0.26	.....
Total	69.45	74.06

Transportation expenses amounted to \$14,668,000 in 1915, a decrease as compared with the previous year of \$1,093,000, or 6.9 per cent. This compares with the decrease in business handled as follows: The total ton miles of all freight, including company, was 3,554,000,000 in 1915, or 16,000,000 (less than half of one per cent) less than in 1914; the total number of passenger miles was 495,600,000 in 1915, a decrease of 39,500,000 (about 7.5 per cent).

The results of the physical betterment of the property and the freight loss and damage preventive campaign show up in fine shape, as does also the saving made in fuel expenses. Loss and damage to freight cost \$316,000 in 1915, a reduction as com-

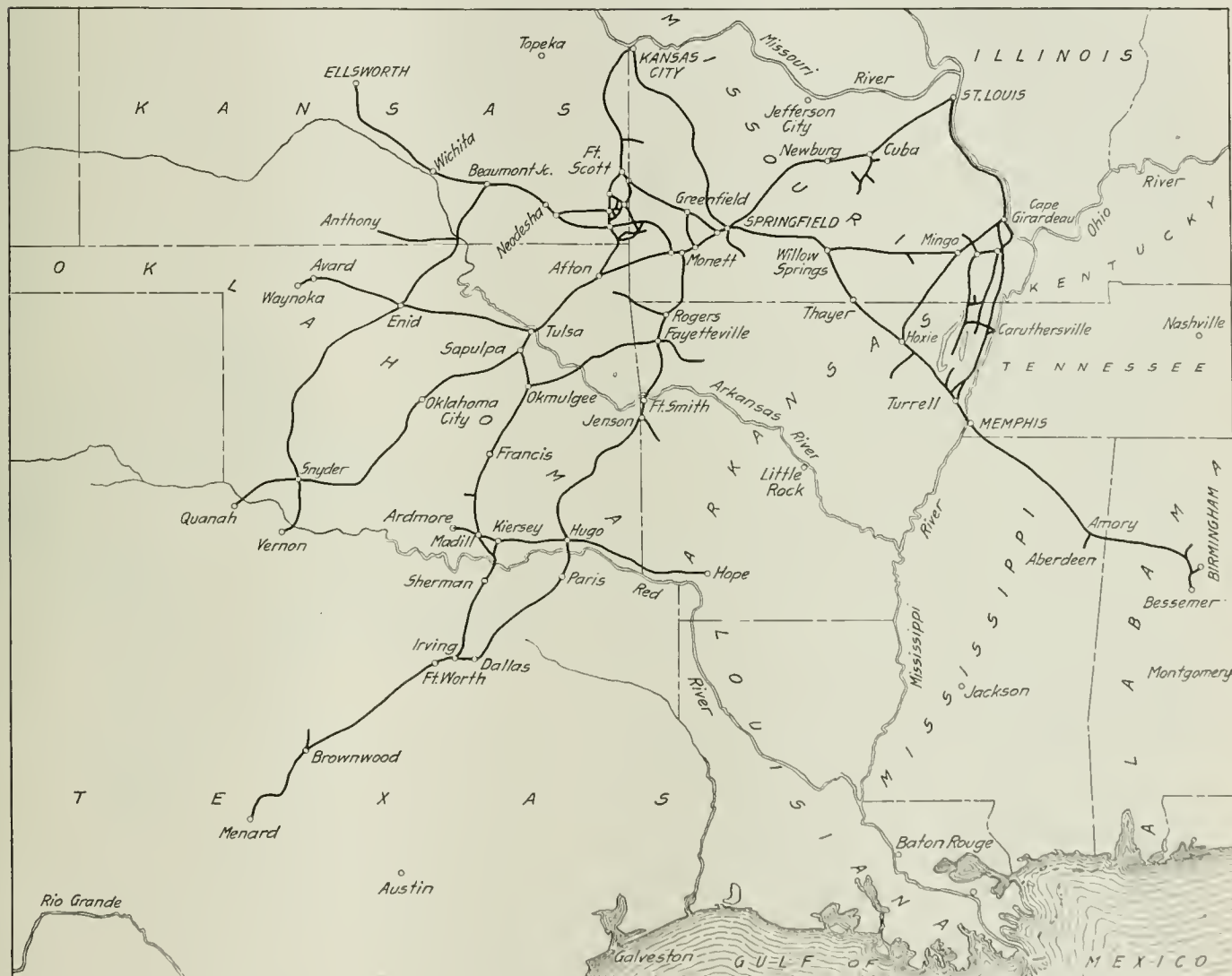
pared with 1914 of \$198,000, or 38.5 per cent. The 1914 loss and damage to freight was 5.8 per cent less than in 1913. Clearing wrecks in 1915 cost \$72,650, a decrease of \$55,307, or 43.2 per cent, as compared with 1914. Fuel for train locomotives cost \$2,515,000 in 1915, or \$253,000 (9.1 per cent) less than in 1914. Total locomotive mileage amounted to 24,257,000 miles, a decrease of 1,907,000 miles, or 7.3 per cent. The average trainload of all freight was 378 tons in 1915, as against 351 tons in 1914, an increase of 27 tons. There were on an average 17.14 loaded cars and 8.14 empty cars to the train in 1915, comparing with 16.71 loaded cars and 7.85 empty cars in 1914. The revenue per ton per mile in 1915 was 9.5 mills, and in 1914, 10 mills.

The total tonnage of revenue freight carried in 1915 was 18,762,000, comparing with 19,906,000 in 1914. The large difference between the reduction in ton mileage (less than half of

nage of lumber and other forest products carried was 3,304,000.

The St. Louis & San Francisco's interest charges, rentals and sinking funds, and the annual proportion of the amortization of discount on funded debt totaled \$13,353,000, so that with total income of \$11,671,000, from the receivers' operations for the year showed a deficit of \$1,285,000. Interest, however, totaling \$6,829,000 was not paid by the receivers, so that the company's cash position at the end of the year was considerably better than at the beginning. Cash on hand amounted to \$3,261,000 on June 30, 1915, as compared with \$979,000 on June 30, 1914. Loans and bills payable amounted to \$1,079,000 in 1915, comparing with \$1,350,000 at the beginning of the year.

In discussing maintenance of equipment expenses it was mentioned that depreciation and repairs are not shown separately. It is evident, however, that the receivers are charging a very



The St. Louis & San Francisco

one per cent) and the reduction in total number of tons carried (5.75 per cent) was due to the considerably longer average haul in 1915 for revenue freight. This figure was 165 miles in 1915, as against 152 miles in 1914. Of the total tonnage of revenue freight carried in 1915 28.37 per cent was bituminous coal and 7.29 per cent stone and like articles. Products of agriculture in 1915 furnished 19.74 per cent of the total tonnage, as against 15.60 per cent furnished by products of agriculture in 1914. Wheat alone in 1915 furnished 1,024,000 tons, comparing with 483,000 tons carried in 1914. The Frisco, like other roads, felt severely the depression in the lumber trade. The total tonnage of lumber and other forest products in 1915 was 2,741,000; in 1914, itself a year of depression in the lumber trade, the total ton-

small amount for depreciation. The total accrued depreciation on equipment since 1907 is but \$774,000. In discussing a possible operating ratio for the Frisco when it is taken out of the hands of receivers it must be borne in mind that charges for depreciation on equipment under the new ruling of the Interstate Commerce Commission will presumably be very much higher than those which have been made by the receiver during the court's administration of the property.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated	5,252	5,250
Freight revenue	\$29,485,596	\$30,202,400
Passenger revenue	10,623,295	11,563,844

	1915	1914
Total operating revenues.....	\$42,974,573	\$44,923,569
Maintenance of way and structures.....	6,088,312	7,762,324
Maintenance of equipment.....	7,162,021	7,492,700
Traffic expenses.....	849,839	929,037
Transportation expenses.....	14,667,524	15,760,663
General expenses.....	1,185,269	1,325,876
Transportation for investment—Cr.....	113,928	
Total operating expenses.....	29,839,038	33,270,600
Taxes.....	2,016,706	2,149,215
Operating income.....	11,098,924	9,503,754
Gross income.....	11,670,767	10,253,665
Deficit*	1,284,672	2,828,142

* In 1915 there was \$6,828,394 interest due but not paid by the receivers, and in 1914 \$4,012,546. These sums were treated as paid in arriving at the deficit shown.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE

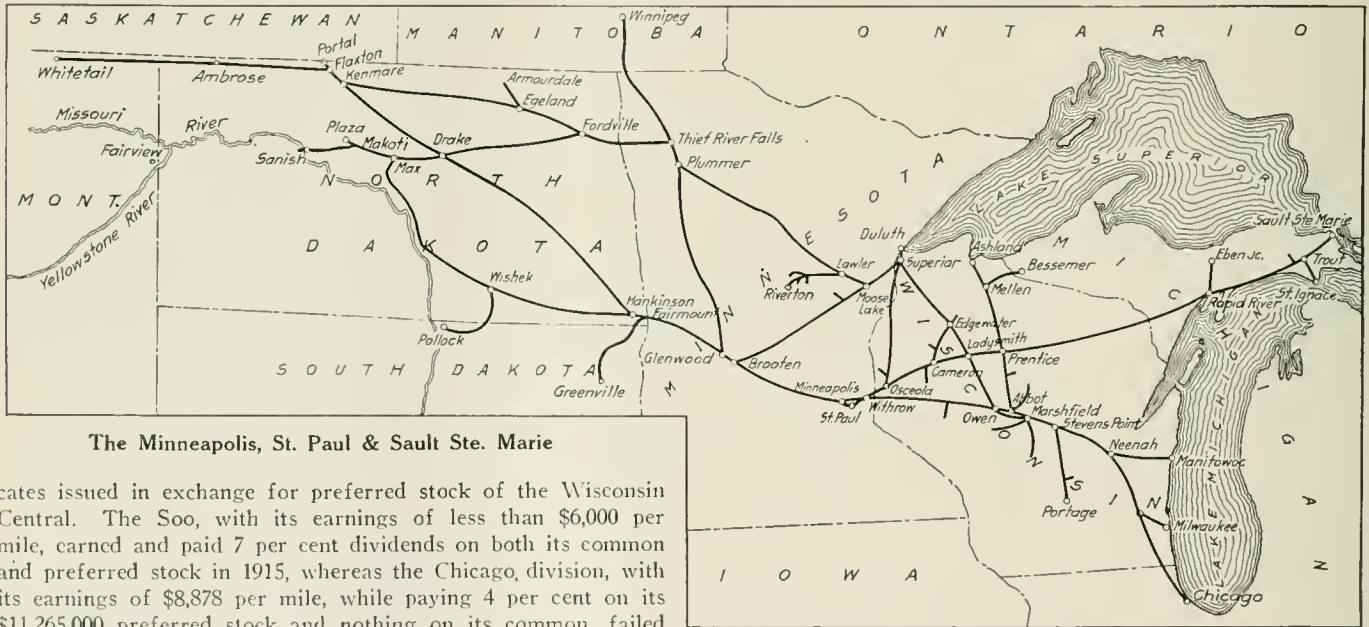
THERE is an interesting contrast between the showing made by the Chicago division of the Minneapolis, St. Paul & Sault Ste. Marie (the Wisconsin Central) and the Soo itself in the fiscal year ended June 30, 1915. In a normal year the Chicago division earns between \$9,000 and \$10,000 per mile of road, and the Minneapolis, St. Paul & Sault Ste. Marie between \$6,000 and \$7,000 per mile of road. In the fiscal year ended June 30, 1915, the Chicago division earned a total of \$9,945,000, or an average of \$8,872 per mile on the 1,120 miles operated; the Soo earned a total of \$17,818,000, or an average on the 3,044 miles operated of \$5,854. The Soo owns \$3,658,000 Wisconsin Central common stock and leases the Wisconsin Central (the Chicago division) by guaranteeing 4 per cent on the leased line certi-

464 tons in 1914. The operating ratio on the Soo in 1915 was 62.1, comparing with 65.2 in 1914, and on the Chicago division 67.9 in 1915 and 67.5 in 1914. The Chicago division lies almost wholly within the state of Wisconsin. The Soo crosses the state with its line from Minneapolis to Sault Ste. Marie, but the greater part of its mileage is in Minnesota and North Dakota.

The Soo carried 7,312,000 tons of revenue freight in 1915 as against 7,203,000 tons in 1914. Of the total in 1915 19 per cent was grain, 19 per cent lumber, 11 per cent other forest products and 14 per cent ores, with but 4 per cent merchandise. The Chicago division carried 6,039,000 tons in 1915 as against 6,442,000 tons in 1914, and of the 1915 total 4 per cent was grain, 14 per cent lumber, 12 per cent other forest products, 15 per cent ores, 5 per cent merchandise, and 9 per cent bituminous coal. The average length of haul on the Soo was 209 miles and on the Chicago division 172 miles. The operating expenses per train-mile for all classes of service were \$1.62 on the Soo and \$1.57 on the Chicago division.

The combined figures for the system show total operating revenues of \$27,763,000 in 1915 as compared with \$29,306,000 in 1914. Operating expenses amounted to \$17,811,000 as against \$19,354,000. There were slightly higher fixed charges and taxes in 1915 than in 1914 and the combined net available for dividends was \$3,111,000 in 1915 as against \$3,371,000 in 1914.

Crops were good last year, but this year's crops, especially of wheat, are much the best that the territory served by the



The Minneapolis, St. Paul & Sault Ste. Marie

ates issued in exchange for preferred stock of the Wisconsin Central. The Soo, with its earnings of less than \$6,000 per mile, earned and paid 7 per cent dividends on both its common and preferred stock in 1915, whereas the Chicago division, with its earnings of \$8,878 per mile, while paying 4 per cent on its \$11,265,000 preferred stock and nothing on its common, failed to earn the preferred dividends by more than \$300,000. Since the Soo and the Chicago division are operated as one system, the difference in profitableness of operation to the stockholders is an illustration of the difference in capitalization of different roads and of the difference of expense of operating roads under different conditions, even when they are in the same general section of the country; still more important is the difference made by different ton-mile and passenger-mile rates.

The Soo has total debt outstanding averaging \$25,464 per mile and the Wisconsin Central \$38,005 per mile. Stock outstanding per mile of the Soo amounts to \$12,421; of the Wisconsin Central to \$24,457. The freight density on the Soo in 1915 was 501,000 tons one mile per mile of road, and on the Chicago division 927,000 tons one mile per mile of road. The average receipts per ton per mile on the Soo were 8.24 mills, and on the Chicago division 6.97 mills. The passenger density on the Soo was 61,736, and on the Chicago division 94,311. The average rate per passenger per mile on the Soo was 2.028 cents, and on the Chicago division 1.888 cents. The average trainload of freight on the Soo was 396 tons in 1915 as against 404 tons in 1914, and on the Chicago division 456 tons in 1915 as against

Minneapolis, St. Paul & Sault Ste. Marie system has ever known. The prospects are therefore that in the present year the system will make a very much better showing than it did in the fiscal year ended June 30, 1915.

The following table shows the principal figures for operation for the Soo and for the Chicago division (the old Wisconsin Central) separately in 1915 as compared with 1914:

	Soo		Chicago Division	
	1915	1914	1915	1914
Average mileage operated.....	3,044	2,982	1,120	1,123
Freight revenue.....	\$12,576,374	\$12,764,423	\$7,237,915	\$7,630,500
Passenger revenue.....	3,810,891	4,436,911	1,994,824	2,227,958
Total operating revenues.....	17,817,855	18,717,689	9,945,370	10,588,533
Maint. of way and struct.....	2,096,307	2,405,187	1,211,190	1,220,082
Maintenance of equipment.....	2,724,036	3,160,909	1,252,718	1,402,758
Traffic expenses.....	337,332	375,815	260,189	285,821
Transportation expenses.....	5,495,980	5,755,346	3,734,415	3,941,125
Miscellaneous expenses.....	92,537	122,386	76,612	95,265
General expenses.....	384,840	389,585	225,586	199,980
Transportation for investment—Cr.....	71,438		8,930	
Total operating expenses.....	11,059,594	12,209,228	6,751,780	7,145,031
Taxes.....	1,135,439	1,182,367	667,614	597,473
Operating income.....	5,622,822	5,326,095	2,525,976	2,846,029
Gross income.....	6,666,787	6,409,338	2,587,257	2,892,739
Net income.....	2,974,004	2,853,502	136,732	517,696
Dividends.....	2,646,714	2,646,714	450,688	450,688
Surplus.....	327,290	206,788	*313,956	67,008

*Deficit.

Letters to the Editor

A PLAN FOR IMPROVING THE POSITION OF RAILWAY CLERKS

NEW YORK

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The letter under the heading "A Clerk's Plea," appearing in your issue of September 10, page 459, quotes the following striking paragraph from an article by George M. Basford, which appeared in your paper of July 23, page 150:

Railroad clerks are a neglected crowd of competent and incompetent men—usually in blind-alley jobs with no training and no outlook.

The remedy suggested in the letter referred to is the writing of books and the founding of schools to train railroad clerks to do their work intelligently. Without expressing any opinion as to the practicability of that suggestion, I wish to offer another, which might be characterized as a first aid, because it is concrete and specific and can be put into effect in any individual organization, large or small, in a very short time and with very little effort. Briefly, it is this:

(1) Beginning at the bottom, where most beginnings are made, abolish the office boy. He is the first fellow in a "blind-alley" job with no training and no prospects. He is generally a youngster who should be in school; paid about \$25.00 per month for doing indifferently work which teaches him little or nothing and affords little opportunity to attain even a minor clerical position. Abolish him and substitute a minor clerkship at \$40.00 or \$50.00 per month. For this sum you can have the pick of high school graduating classes—or, perhaps, if the position is given sufficient dignity, even better. Many young men desirous of entering railroad service would accept such a place if it definitely led somewhere, as hereinafter proposed. Here select the raw material and select it carefully. The work would be of the simplest and the applicant should be told plainly that he is being well paid for the privilege of selection rather than because it is expected his services will really be worth the price paid in the beginning. Accept him on trial. If he proves good material, retain him; otherwise correct the mistake at once and make a change. This will be justice to the man as well as to the company for which he works. It is of great importance to start right.

(2) Grade the office. Establish a regular and recognized progression from the student's position to chief clerk. Beginning with \$50.00 for the student clerk, establish the salaries in rotation, say by \$5.00 steps, to the top—\$55.00, \$60.00, \$65.00, \$70.00, \$75.00, and so on. If necessary to have two or more positions at one salary—say three at \$75.00, three at \$80.00, two at \$85.00, for example—fix the rank of these positions. Make the three \$75.00 positions, for instance, Nos. 1, 2 and 3, so that the clerk reaching the first of these desks from the \$70.00 job shall next pass to No. 2 desk and then to No. 3 desk and then to an \$80.00 position.

(3) When a vacancy occurs somewhere in the line, roll the wheel; shove every man below up one notch and close the gap. Have every one in the force understand that he will not only be permitted to advance, but will be compelled to do so and that, when he can't keep up with the procession, he will be either (see paragraph 4) placed in a rest position temporarily or asked to seek employment elsewhere at something for which he is better fitted.

(4) As the pace may prove too rapid for some, who, nevertheless, will develop if allowed more time, create rest stations along the line—positions in which men who are backward may be held for a time until they catch up and then be put back in the procession. Seventy dollar, \$75.00 and \$80.00 desks, where there is more than one desk paying the same salary, afford opportunities to do this. One of the series may be set to one side to provide a stopping place for those employees who

can go forward and wish to do so, but cannot go so fast.

(5) Results: Every man in the organization, knowing where he goes next, will be looking forward to that position and will be busy observing it and learning about it. Knowing who will follow him, he will be expected also to train that man as his understudy—and this work goes on constantly; it does not await the change; it anticipates it. Hence, when the change is made, the way has already been prepared and the painful process of learning a new desk and teaching a green man the old one at the same time is avoided. Everybody takes an interest. Everybody is "up on the bit"—looking forward, hopeful, enthusiastic, confident. Everybody is being educated in the most practical possible way. An office so organized will soon have several men who can handle several desks. The bugaboo of sickness and vacation time will disappear. The work of the absentee is performed easily—divided between two or three or four, who know how it is done. The student desk is frequently vacated for the next step up, and another recruit is carefully selected; and this choice raw material is trained systematically and absorbed into the organization—a continual infusion of new blood. Weak spots are uncovered, lazy ones and incompetents are eliminated. It may be hard on them, but it is good for the company and for the kind of men the company wants. I saw an example lately, when a change was made on a correspondence desk, of the danger of leaving a man too long in one job. This man had a fine memory, and he depended upon it and neglected to cross index the files, as he was expected to do. When he left there was chaos. It would not have happened under the system here explained, or, at least, it would not have long continued. This man would have either kept up his indices, or an early change would have disclosed his omission to do so in time so it could easily be corrected, and the clerk—in case he remained with the organization—would have been disciplined.

(6) Modifications and objections: No plan, however excellent, is self-executing. Nothing will take the place of office administration, and no practice can be established that will not require exceptions. That is what heads of departments are for. It will occur that certain men, while absolutely unfitted for some kinds of work, may still be useful at other tasks. If wise selection of students is made, these instances will be rare; but, when they do occur, account will have to be taken of them and some temporary modification made, while adhering generally to the plan. Sometimes changes will follow each other so quickly that men will not have become seasoned in the last position taken. In such cases a halt will have to be called and the vacancy filled from outside or from another department; but this does not argue against the plan as a whole. The office can be graded and the regular progression can generally be followed. If necessary to lighten work on some desks and increase it on others to accomplish this, that is easily done. More than one line of progression may be necessary, especially in large offices. If so, use more than one; that is a detail to be worked out by the intelligence of the chiefs, which they are paid for possessing and using. The dead level is deadly. Even the stenographers' desks should be graded and the "new man" (or girl) should take the least important work and the least pay and progress as there are changes above. One objection urged is that a change near the top changes the whole line. It is not an objection. It is a recommendation. The study necessary to prepare men for these changes has been going on constantly. There is little or no confusion when the change occurs. Everybody gets an advance; everybody is happy; every man has his interest aroused anew by new duties, by the knowledge that he is learning, that he is progressing, that he is no longer in a "blind-alley with no training and no outlook." He is being trained. He has an outlook. He is in the procession and he is going somewhere. It is the difference between a stream of living water and a stagnant pool; and,

(7) It has been tried and it works.

A SYMPATHIZER WITH THE CLERKS.

THE COLD STRAIGHTENING OF RAILS

PITTSBURGH, Pa.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Captain Robert W. Hunt's article on the cold straightening of rails in the *Railway Age Gazette* of October 22, page 726, is timely and to the point. Especially is he correct in saying that now is an opportune time to consider this question.

The question as to the advisability of increasing the length of the rails beyond 33 ft. is being given serious consideration and it, as well as the question of cold straightening, involves modification of the hot bed equipment of the mills. It is therefore desirable that the two questions be considered simultaneously in order to avoid unnecessary changes in the hot beds.

More metal in the base of the rail has been advocated in order to minimize the necessity of cold straightening, but until more care is used in cambering and spacing rails on the hot beds the remedy will hardly produce expected results. It seems to be a prevalent opinion that by greater care in the cambering of rails and proper spacing on the hot beds a finished rail can be produced sufficiently straight to require little if any cold straightening. If this should prove to be a fact there would be no justification for delays in conforming to such practice. Cold straightening is, to say the least, extremely undesirable. While it may be too soon to subscribe to the belief that internal transverse fissures are caused entirely by cold straightening, it still is not difficult to believe that a considerable proportion of such fissures result from that cause.

Railroad maintenance of way engineers have a part to play in bringing about a satisfactory solution of this question. It will not be possible to produce an absolutely straight rail without cold straightening; therefore, in order to get rails that have been little or not at all cold straightened, the engineers should be willing to accept rails that are not entirely straight. Such rails will not pile nicely and will perhaps offend the habit of mind of the man on the ground by their appearance and by little annoyances in the handling. The great benefit to be obtained is, however, "Worth the Candle," at least such is the opinion of many careful and constant observers. The maintenance of way engineer, therefore, should "go along" in this movement.

The users of rail will welcome any effort of the manufacturers to produce a no-gag rail and will, I believe, co-operate to the best of their ability for that purpose.

J. T. ATWOOD

Chief Engineer, Pittsburgh & Lake Erie.

GAGGING OF RAILS AND TRANSVERSE FISSURES

BALTIMORE, Md.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to the discussion of the cold straightening of rails by Captain Robert W. Hunt, which appeared in the *Railway Age Gazette* of October 22, page 726, this is very interesting as well as an important subject and is deserving of more thought than is being given at the present time. The cold gagging of rails certainly does not benefit it any, as it must necessarily be strained beyond its elastic limit in order to straighten it. It is difficult to determine the amount of damage sustained by the rail, but rails that could be rolled and be practically straight without the use of gagging would seem to be desirable.

The reason that rails are not perfectly straight in cooling is probably due to their different temperatures when they pass through the cambering machine. Some of it is also possibly due to the irregular way in which they are allowed to cool on the cooling beds. The cambering machine should be made to give the right camber to each rail according to its temperature, and if this were done we would probably get practically straight rails without gagging.

I do not know that it is proven that the gagging causes interior transverse fissures. Our experience is that all the transverse fissures we have found have been in open hearth steel,

with the exception of possibly some low phosphorous, high carbon, Bessemer rail. Therefore, if they were due to gagging alone, it would seem that we would have had more of them in Bessemer steel. We have found large transverse fissures in rails about two inches apart. It is our opinion that the transverse fissures start from a broken fibre somewhere in the head of the rail, due to that particular fibre being overstrained in some way, probably the result of a combination of internal strains, due to cooling, together with the component of the vertical and horizontal forces produced by the heavy wheel loads. After this fibre once breaks, the repeated wave motion through the rails, caused by innumerable wheels passing over them, causes a detailed fracture to spread from this center until we get the silvery spot as noted when the final fracture takes place.

With a tendency to the heavier sections, there might be difficulty in laying such rails without having a straight edge or template to lay the rail to, and the heavier the sections the more difficulty would be experienced in spiking the rail to line. However, with a cambering machine, if the rails were cambered according to the temperature, we might expect to get rails practically straight without gagging, but the indications are that this would not overcome the transverse fissure.

A. W. THOMPSON

Third Vice-President, Baltimore & Ohio.

A PLAN TO REDUCE PILFERAGE

WHITE HORSE, Y. T.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have been reading with great interest some of the late articles in the *Railway Age Gazette* in regard to various methods of reducing freight claims.

In a great number of cases damaged packages result from improper loading and careless handling. However, I believe the largest number of loss and damage claims result from pilferage. With the package requirements of today's classifications it is evident that most packages are strong enough to afford adequate protection to the commodities they contain but it is obvious that no packages have been so constructed as to prevent pilferage.

During my experience I have noted that in a great many cases where packages have been recovered after being bad order in transit no-account rough teamsters watch for a loose nail or board in order to secure a notation of "evidence of recovering, etc." In fact, the contents may be O. K. upon delivery to the teamster but in view of the notation he could lift some of the contents; and naturally the railway company would be liable.

My idea to reduce loss and damage claims would be to cord and seal all packages when they are first found to be in bad order. A small lead seal and inexpensive cord, such as is used on bonded baggage and express, could be used. As they are easily applied this would not take over a minute for each package and would in no way result in congestion.

As all employees, such as agents, yard clerks, freight conductors, etc., are supplied with a sealing iron, it could be used for this purpose as well as for sealing cars with the station seal. By the number of the seal pilferage or improper handling could be easily traced and steps could be taken to prevent such occurrences. As most pilferage is due to petty thieves, sealed packages would retard their efforts in that direction. I believe that if such a plan were put into effect by the carriers on packages after they were first recovered it would prevent further loss and reduce the number of freight claims to a great extent, because a recovered case, when examined at a transfer point and found to be short, will generally be short several more articles on arrival at destination. Also I believe that when shippers came to see the benefit of the protection afforded it would be only a short time before they would adopt a similar plan and seal and cord all their packages. Then in case of damage or pilferage the number of the seal would show where it took place. This plan would also insure more careful attention by employees and bring about their co-operation in reducing freight claims.

R. B. HYETT.

Electrification of the Pennsylvania at Philadelphia

Made Necessary by the Congestion of the Broad Street Station; Chestnut Hill Branch to Be Electrified Also

The electrification of the suburban service of the Pennsylvania between Broad Street station, Philadelphia, and Paoli is the first work of this nature undertaken by that company in the vicinity of Philadelphia. Its primary purpose is to increase the capacity of Broad Street station and relieve congestion at that terminal. This station is of the stub-end type, having 16 station tracks approached by 6 main line and 3 yard tracks on an elevated railroad which crosses the Schuylkill river from West Philadelphia. At this point the routes divide toward the north for New York, toward the south to Washington and toward the west to Pittsburgh.

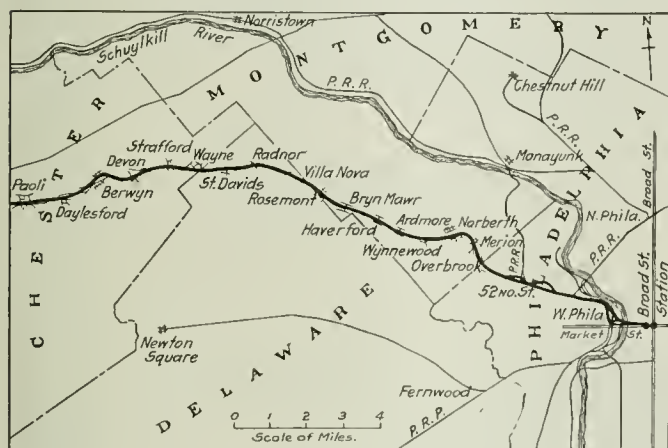
In addition to the through passenger service accommodated at Broad Street station, there is an extensive suburban service extending over six different routes. The growth of all business in recent years has been such that the limit in capacity of the station has been reached and many plans have been formulated

pay interest on the investment, which, in this case, includes the most expensive portion of the work in that the entire Broad Street terminal with an elaborate yard and restricted property lines and approaches thereto form a part of the construction required for a relatively small amount of train service. This is not an unfavorable result under the circumstances, meaning as it does that the increased capacity thus obtained will in part, at least, be self-sustaining, whereas increased capacity by physical enlargement would give no direct return on the heavy investment. In addition there are the other contingent and important advantages of electrification such as the higher speed of trains, more punctual service, especially in bad weather, and more cleanly and attractive conditions for the traveling public.

THE ELECTRIC SYSTEM

An analysis of service conditions and cost estimates covering all available electric systems led to the conclusion that one using a high voltage overhead contact wire and one which eliminated moving machinery in substations for the supply of power was most suitable and also the most economical from the standpoints both of first and operating costs. In arriving at a conclusion as to the system, primary importance was attached to the feature of possible long-distance operation over the entire divisions affected, rather than to the requirements for present short suburban electric service. In this case 11,000-volt, single-phase 25-cycle power is supplied directly to the trains from the overhead catenary trolley system.

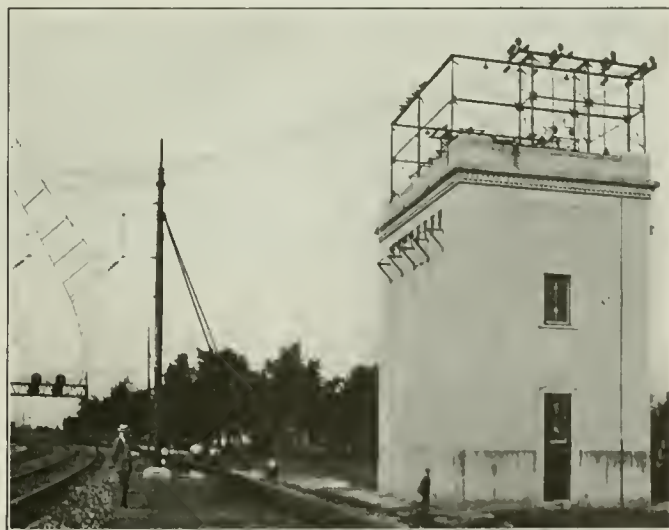
While the studies which preceded this work involved the pos-



Map Showing Electrified Portion of the Pennsylvania Between Philadelphia and Paoli

and discussed for relief by physical enlargement of the station and its approaches, or by rerouting movements. All of these plans involve extensive reconstruction and would require much time for their accomplishment so that some more expeditious method of obtaining relief was desirable. The possibilities of electric traction as a means to this end were studied by committees of operating officials and their analyses and estimates indicated that during rush hours the relief which would be secured by the electrification of the Paoli suburban service alone would be equivalent to increasing the station capacity by an amount equivalent to reducing the total number of trains by about 8 per cent. A similar increase in capacity would result from the electrification of other suburban lines; work in connection with one of these, the Chestnut Hill branch, has already commenced. This increase in capacity is effected by the elimination of the shifting back and forth from one track to another of cars, while the movement of empty power is avoided. There is also some gain in capacity resulting from the quicker acceleration of trains and the shorter length of track occupied by a given train when the steam locomotive is not required. Relief thus afforded by electrification of the Paoli and Chestnut Hill lines is estimated to be sufficient to take care of the normal growth of business for the next seven or eight years and the period of relief can be further extended by the electrification of other suburban lines, should the trial of this initial electric service meet expectations.

It is estimated that under electric operation there will be a sufficient saving in operating costs, as compared with steam, to



Transformer Substation for Reducing Voltage at Paoli, Pa.

sible future electrification of several different railway divisions and classes of service, the present installation covers only the suburban passenger service from Philadelphia westerly to Paoli on the main line of the Philadelphia division and involves about 43 trains each way per day. From Broad Street station the main tracks are electrified for 20 route miles, including also a coach yard at West Philadelphia and a coach and repair yard at the end of the electrified section at Paoli. The present electrification embraces about 93 miles of track.

TRANSMISSION

Power at 25 cycles and 13,200 volts for traction purposes is purchased from the Philadelphia Electric Company and is delivered to the railroad at a substation on the westerly bank of

the Schuylkill river opposite the main generating station, the connection between the power house and the substation consisting of armored submarine cables under the river. On the west bank of the river, the submarine cables are connected to paper-insulated, lead-covered cables, installed in clay ducts. Switchboard meters are provided on each of the incoming 13,200 volt feeders. From this substation, known as the Arsenal Bridge substation, there are four 44,000-volt, single-phase transmission lines to the West Philadelphia substation. These four lines will tee into the West Philadelphia substation. Two of them continue on to the Bryn Mawr and Paoli substations and the other two will go to the Chestnut Hill substation later.

The four transmission lines are carried on brackets on the side of the elevated structure between the Arsenal Bridge substation and the West Philadelphia substation. Beyond this point they are carried on the catenary supporting structures. Along the right-of-way the lines are carried on both sides of the tracks.

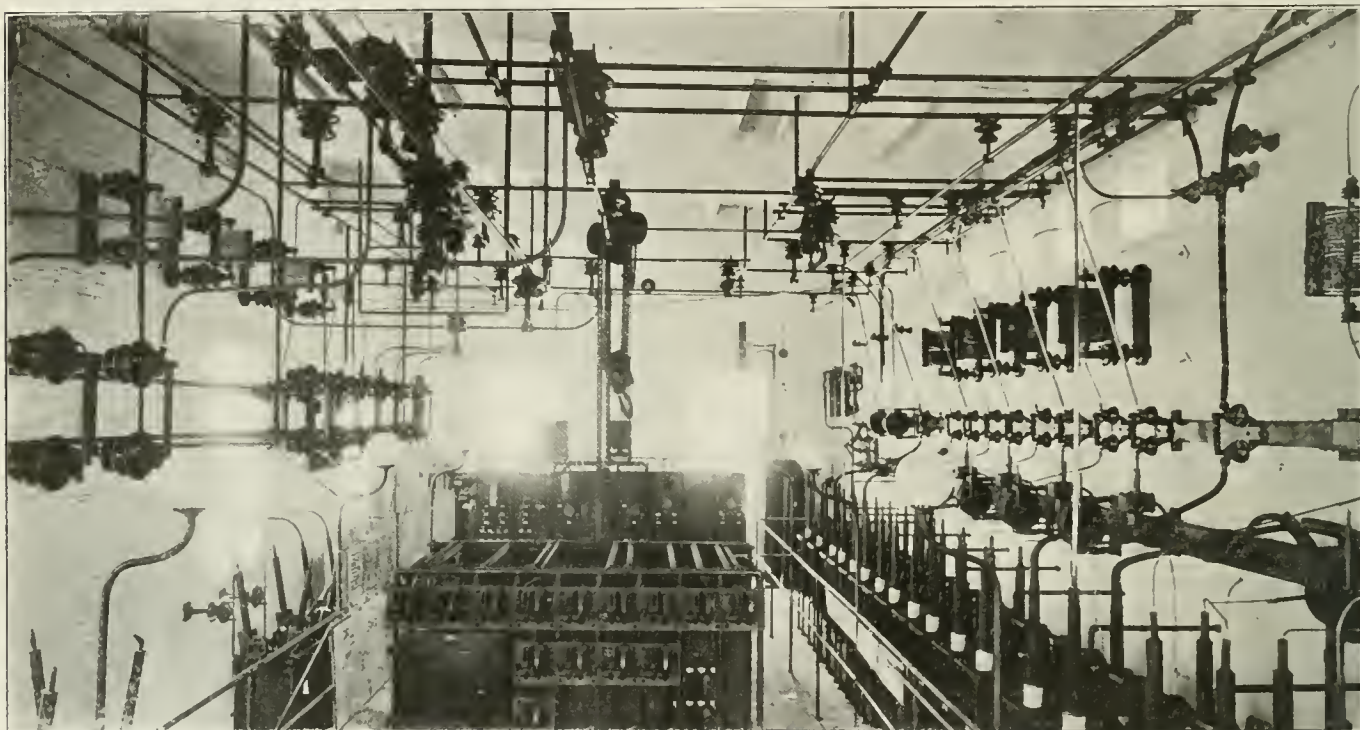
These insulators withstand the following tests: Dry flashover, 165,000 volts; wet flashover, 120,000 volts; puncture, 250,000 volts. After erection, the transmission lines were tested out at a potential of 66,000 volts, or three times the working pressure, to ground.

SUBSTATIONS

The substation equipment is housed in substantial fireproof brick buildings adjacent to the tracks. The lightning arrester equipment and high-tension feeder sectionalizing switches are located on the roof; the bus bars and switching equipment on the second floor, and the transformers on the ground floor. The installed capacity of the substations are as follows:

Arsenal Bridge	3—5,000 K.V.A. step-up	transformers
West Philadelphia	2—2,000 K.V.A. step-down	transformers
Bryn Mawr	2—2,000 K.V.A. step-down	transformers
Paoli	2—2,000 K.V.A. step-down	transformers

Space is provided in all substations for 100 per cent increase



Arrangement of Apparatus in a Typical Substation

Horn gap switches for sectionalizing are installed on the roofs of the West Philadelphia, Bryn Mawr and Paoli substations and lightning arresters on the roofs of all substations.

The transmission lines are 2/0—7 strand, hard-drawn copper wires, spaced 5 ft. apart where the two wires of a single-phase feeder are on the same cross arm. Where there is more than one circuit on a pole the vertical spacing is 3 ft. 6 in. The lines are protected by a 3/8-in. steel ground wire on the top of the poles. Where the transmission lines pass under highway bridges, the ground wire is dead-ended on the bridge structure and the wires are carried on post-type insulators.

At the Arsenal Bridge substation, the lines are protected by relays which operate on overload and on an unbalanced load in either leg caused by a ground. In the other substations the relays operate only differentially, and in case of a ground between substations the circuit on which the trouble occurs will be cut out first in three of the substations and finally at the Arsenal Bridge substation. Overload relays are provided in the 13,200-volt lines at the Philadelphia Electric Company's power station and reverse current relays in these feeders in the Arsenal Bridge substation.

The pin type porcelain insulators used on the transmission lines are 8 7/16 in. high and 12 in. in diameter, made up of 4 parts

in capacity. The transformers in all substations are of the 25-cycle, single-phase, oil-insulated, water-cooled type. The primaries of the step-up transformers in the Arsenal Bridge substation are wound for 13,000 volts and the secondaries for 44,000 volts. The primaries of the step-down transformers in the other substations are wound for 44,000 volts and the secondaries for 11,000 volts. The lightning arresters on all 44,000-volt and 11,000-volt lines are of the electrolytic type and are located on the roofs of substations. The circuit breakers are automatic and remote controlled. In general all power wiring is bare and copper tubing or solid wire is used.

Power for the opening and closing of oil circuit breakers is obtained from the 44,000 or 11,000, 25-cycle buses. Two transformers are provided in each substation, stepping down to 440 and 220 volts.

Except in the West Philadelphia substation where the power director or system operator is located there are no attendants. A switchboard, with the necessary instruments, controllers and indicating lamps, is provided in signal towers near the Arsenal Bridge, Bryn Mawr and Paoli substations. Telephones are provided in all substations and the signal towers controlling them so that the power director is in constant touch with all substations and tower men.

CATENARY SYSTEM

In order to try out the various types of structures and details considered for this work, an experimental four-track section about a mile long was completely equipped in the fall of 1913. An examination and study of this led to the adoption of what



Tubular Cross-Catenary Bridge Before Longitudinal Wires Were Erected

is called the "tubular cross-catenary bridge" for carrying the catenary trolley wires.

One of the photographs shows one of these structures before any longitudinal wires were erected. On either side of the tracks a tubular steel pole is set and grouted into a concrete foundation. Each pole has a double guy anchoring the pole away from the tracks. Spanning the tracks between the poles are the two cross wires forming the cross catenary bridge which carries the longitudinal wires. This type of structure has been used through-



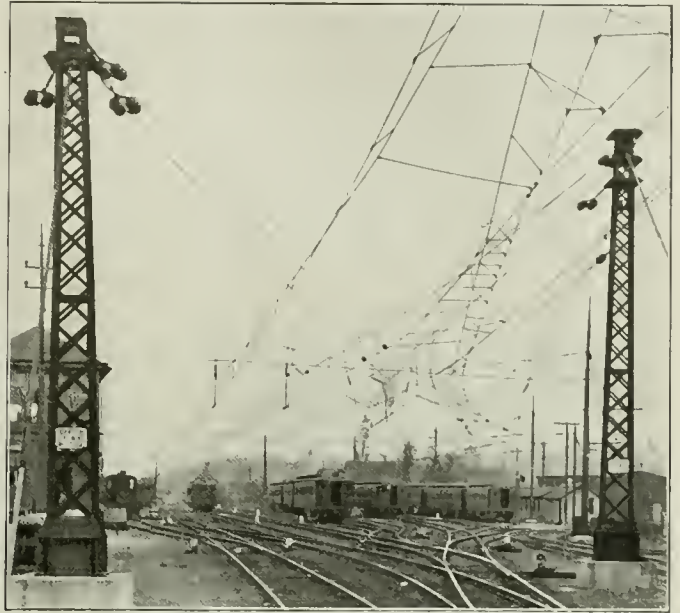
Catenary System Over Curved Track

out wherever the property or arrangement of tracks will permit. Where there is no room for guying, self-supporting structural steel posts have been used.

The tubular poles are built of various lengths, sizes and weights of steel pipe welded together. The guys are solid steel rods with heavy turnbuckles near the ground end to permit of adjustment. Numerous experiments and tests of different forms of guy anchors were made to determine the holding power and economy, and the anchors adopted are of the dead-weight type, consisting of a concrete slab reinforced with old rails held in place by the weight of the soil above. Where the guy rods pass up through the soil they are protected against corrosion by means of a steel pipe, the space between the pipe and rod being

filled with grout. Each catenary structure or bridge is grounded by means of a copper plate buried in coke. The guy rods are attached to the pole by means of heavy steel castings.

The cross wires are of extra high-tension galvanized steel strand, the upper strand usually being $\frac{3}{4}$ in. and the lower one $\frac{1}{2}$ in. in diameter. Both are socketed at each end, and at one side a turnbuckle is installed to permit adjustment. The top and bottom cross wires are joined together by a vertical $\frac{3}{4}$ -in. rod



Catenary Construction at the Paoli Yard

and suitable malleable iron clamps, etc., at the points where the insulators carrying the longitudinal wires are located.

Each insulator consists of three suspension type units, the porcelain being 8 in. in diameter and the flashover value of the three being many times that of the line voltage. The cross wire bridges are located about 300 ft. apart on tangents, but are closer on curves. After the bridges were erected, insulators



Special Car for Erecting Catenary Work; Removable Outriggers Make it Possible to Work Over Track Alongside Without Interruption to Traffic

were suspended over the center of the track on tangents and offset towards the outside of the curve on curved track. After the insulators were erected, the main messenger wire was strung out and suspended from them. This is a $\frac{1}{2}$ -in. extra high tension 7-strand double-galvanized steel cable, having a sag of

5 ft. in a span of 300 ft. Every mile or two this messenger is socketed and dead-ended on one of the heavy structural signal bridges which are spaced about $\frac{1}{2}$ mile apart.

Every 15 ft. on curved track and 30 ft. on tangent track a hanger supports the lower two wires from the messenger wire. The top one of these two wires, called the auxiliary messenger, is of No. 0 round B. & S. copper and its purpose is to give suitable current capacity to the system. The bottom wire is the contact or trolley wire and is a No. 3/0 grooved B. & S. "phono-electric." Both these wires are carried in a vertical plane generally about 22 ft. above the top of the rail except where they drop down to pass under an overhead highway bridge having insufficient clearance to permit this height.

In the Terminal division, which includes the first five miles from Broad Street station, where the steam locomotive traffic is very dense, and there is much smoke and corrosive gas, a non-corrodible tube hanger is used. Some of the tube is Monel metal, while the balance is a bronze mixture containing 90 per cent copper. On the Philadelphia division, where there is relatively less steam traffic, wrought iron strap hangers 1 in. wide

BONDING

The rails are bonded with pin-type expanded terminal bonds. To furnish a circuit for the return of the traction current to the substations, one end of the bond has a terminal solidly welded to the bond while the other end has a soldered terminal. This enables the bond to be installed by being slipped back of the splice bar without the necessity of removing it. Each rail of the main line tracks is double-bonded throughout, each rail joint having two No. 1/0 B. & S. bonds. Through the interlockings only one rail of each track is bonded, but all of the traction rails are connected together.

The track rails are sectionalized at each signal block by means of insulating splices and the traction current flows through impedance bonds connected around these insulated joints. These impedance bonds allow the passage of the traction current, but at the same time sectionalize the track so far as the 60-cycle signal current is concerned.

In order to minimize the inductive effect of the traction currents on adjacent telephone and telegraph wires, a special system of booster transformers has been installed. This consists of



Multiple Unit Train on the Electrified Portion of the Pennsylvania at Philadelphia

by 3/16 in. thick are used. The main messenger cable at the hanger clip is protected from corrosion by a collar of zinc inside of the annealed brass or Monel metal clip, which is bolted to the hanger strap.

On tangents, the casting at the bottom of the hangers holds the auxiliary messenger only and the trolley wire is, in turn, supported from this auxiliary messenger every 15 ft. at points equidistant from the hanger. This insures a flexible or smooth riding trolley wire. On curves the two lower wires do not hang directly beneath the messenger, but the whole system swings into a curved plane until a balance is reached between its weight and the tension in the wires. The tensions in both the auxiliary messenger and trolley wires are selected so that in extreme hot weather there will be enough tension to prevent sagging and yet in extreme cold weather the contraction will not cause stresses beyond the elastic limit. The catenary system over each of the four main tracks is separated electrically from those over the other tracks, and trolley sectionalizing points with switches are provided at all crossovers so that sections of the line may be cut out of service temporarily for repairs.

An interesting detail in the erection of this catenary work was the use of cars, the top platforms of which could be raised or lowered readily by means of chain hoists. The cars were also equipped with removable outriggers so that in the four-track section the work could be erected completely over one of a pair of tracks without in any way interfering with the regular steam traffic on this track.

In order fully to protect the trainmen, general orders have been issued that no men are allowed on top of any car in the electrified zone.

series or booster transformers mounted on the signal bridges and located about a mile apart.

CAR EQUIPMENT

Standard suburban steel coaches of the type used in the regular steam service are being used for the electric service. This was made possible by the fact that the requirements for mounting electric apparatus on the cars had been thoroughly considered at the time when the steel car was first introduced.

The rolling stock consists of 93 standard all-steel cars, 82 of which are passenger, 9 combined passenger and baggage and 2 combined baggage and mail cars. All cars are motor cars, as no trailers will be operated in this service.

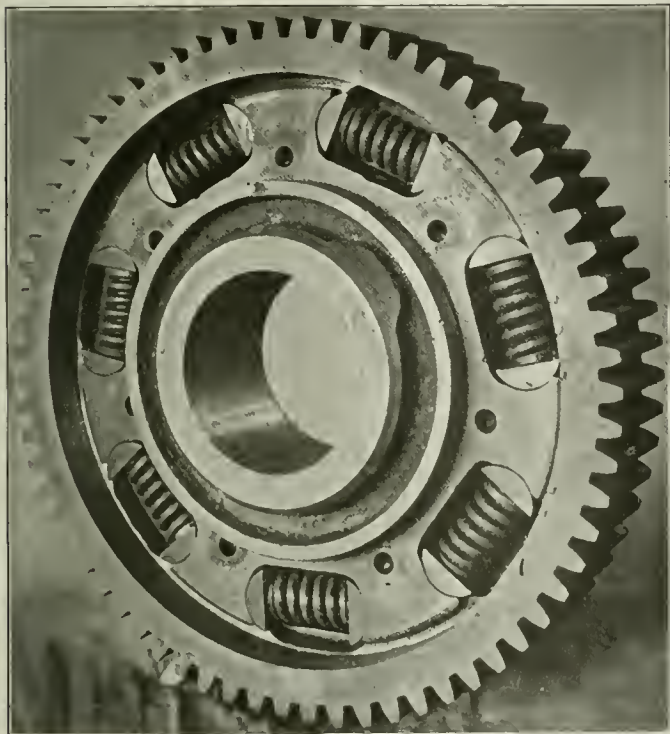
The equipment of each car consists of two 225-h.p., single-phase, air blast-cooled, doubly-fed motors, mounted on one truck, with automatic acceleration, battery control equipment, and automatic multiple unit electric air-brake equipment. The cars are designed for double end operation. Current is collected from the overhead wire by the pantograph trolley and is conducted to the main transformer through the line switch (oil circuit breaker).

The motors, which are connected in series, are started and operated up to approximately 15 m.p.h. as repulsion motors, with the auxiliary or compensating field, the armature, and the main field in series. With these series connections, the armature is short-circuited through resistance. Resistance is also inserted in series with the motors on the first step and is cut out on the second step. The third step changes the connections to energize the auxiliary field from one portion of the transformer and the armature and main field, connected

in series, from another portion of the transformer, thus affording doubly fed connections. The armature short-circuit is removed when operating as doubly fed motors. Subsequent steps are obtained by increasing the motor voltages.

The master controller drum is energized from the motor generator set, in parallel with the battery, through a control plug, and moving the master controller handle to the right or to the left energizes the proper control circuit for forward or for reverse movement of the train. The closing of the unit switches is governed by a current limit switch. Ten control wires between cars are necessary to operate cars in trains with one of these wires performing the dual function of the third operating wire, and the "trolley unlock" wire.

Each motor has an hourly rating of 225 h.p. and a continuous rating of 200 h.p. when ventilated with 1,200 cubic feet of air



Flexible Gear with Cover Plate Removed

per minute. The flexible gear is made up of a rim, on which the teeth are cut, a center, a cover plate and spring details. The rim is spring mounted on the center, the periphery of the center and the cover plate acting as the bearing surfaces for the rim.

The pantograph is of especially light construction. The springs which raise it are designed to give flexibility to the framework, so that in operation a slight dragging of the trolley takes place, resulting in its following the wire much closer than with a rigid framework. The trolley is lowered and unlocked by air at 70-lb. pressure. A small hand pump is provided for unlocking the trolley when no air pressure is available.

The "safety first" principle has been carried out in the provision of a grounding device of novel design. Steps for mounting to the roof are provided at one corner of the car only and a lever is placed on the roof at this corner. When one climbs to the top of the car, this lever is thrown up, thus locking the trolley in the down position and grounding the entire framework.

The line switch is air operated and is closed by energizing a control circuit from the master controller plug. The transformer is of the 2-circuit air-blast type and is suspended from the center sill of the car as close to the motor truck as possible. Ventilating air is taken in at the low-tension end and is

discharged at the high-tension end through especially constructed hoods which cover the air outlets to prevent the entrance of rain and wheel wash.

Nine electro-pneumatic operated switches of standard construction are mounted in one group. The master controllers are of the single-handle type. Nine controller positions are provided; an emergency or "dead man's" position in the center, and an "off," first, second and third running positions, for both forward and reverse movements. The controller drum is spring returned, and, if released, will return to the middle or emergency position. In this position, the control is cut off and a valve magnet is energized which releases air from and operates a brake pipe relay, thus applying the emergency brake. Each controller also has two push button switches for unlocking or lowering the trolley. Control energy is obtained from a motor generator operating in parallel with a battery.

A line or voltage relay is provided for cutting the direct current control generator from battery, and also to operate two small emergency lights, and headlights in case the traction power should fail.

The fan for ventilating the transformer and motor is a 21-in. single inlet Sirocco wheel, and is mounted on the shaft of the motor which drives the compressor. The motor drives the fan continuously. Air for the ventilation of the transformer and motors is taken in at the side of the cars through a louver. The air intake box is designed with a baffle and screen to prevent the entrance of moisture or foreign material to the fan.

The air-brake equipment is designed so that it may be used either in steam or electric service, and differs from the ordinary pneumatic brake in that the brake pipe reduction is made on each car by means of electric control instead of being made entirely with the engineer's brake valve. The addition of electric control to the pneumatic brake does not change its function in any way but shortens the time required to get the brakes applied on all cars.

The motorman's brake valve contains both electric contacts and pneumatic parts, the electric portions being mounted above the pneumatic portions. There are six positions: (1) the release and running, (2) the electric holding, (3) the handle off, (4) lap, (5) service and (6) emergency. The first named position is to the left and in this position all train brakes are released and the system charged. The "electric holding" position, as the name implies, holds the train brakes through the electric control system but recharges the system. Pneumatically, this position is identical with the release and running position. All ports are closed in the "handle off" position, and the handle may be removed; in the "lap" position, the ports are also closed. The "service" and "emergency" positions are for applying the brakes for service or emergency application. In making a service application, a limiting valve in conjunction with the brake valve allows a maximum reduction of 20 lb. in the brake pipe. A small cut-out plug is provided for cutting out the electric operation when desirable.

The main reservoir pressure carried is 100 lb. and the brake pipe pressure is 70 lb. To permit the operation of these equipments in steam service, where the brake pipe pressure is 110 lb., without making adjustment, a main reservoir bypass and limiting valve is employed. By its use the same cylinder pressure is secured in making an emergency application in either steam or electric service, although the operation of the universal valve is the same for either. In steam operation, the pipe line, which is used as a main reservoir line in electric service, is used as a signal line.

Trains of from two to seven cars are operated in regular service, the average acceleration on a straight level track being approximately 1 mile per hour per second up to 30 m.p.h. with a balancing speed of 60 m.p.h.

CAR INSPECTION BUILDING

A substantial and completely equipped car inspection building has been constructed at the Paoli yard. This is planned to serve not only the cars required for the present electrification but

also for the cars required by certain other divisions when electrified. Adjacent to the inspection building proper is a small service building which contains boilers for heating, locker and wash rooms, air compressors and motor generators for supplying power for the tools and signals.

SIGNALS

Throughout the electrified zone, it was necessary to change the existing direct current track circuits to alternating current track circuits and to provide impedance bonds which permit the return of the 25-cycle traction current, but sectionalize the various track circuits so far as the 60-cycle current is concerned.

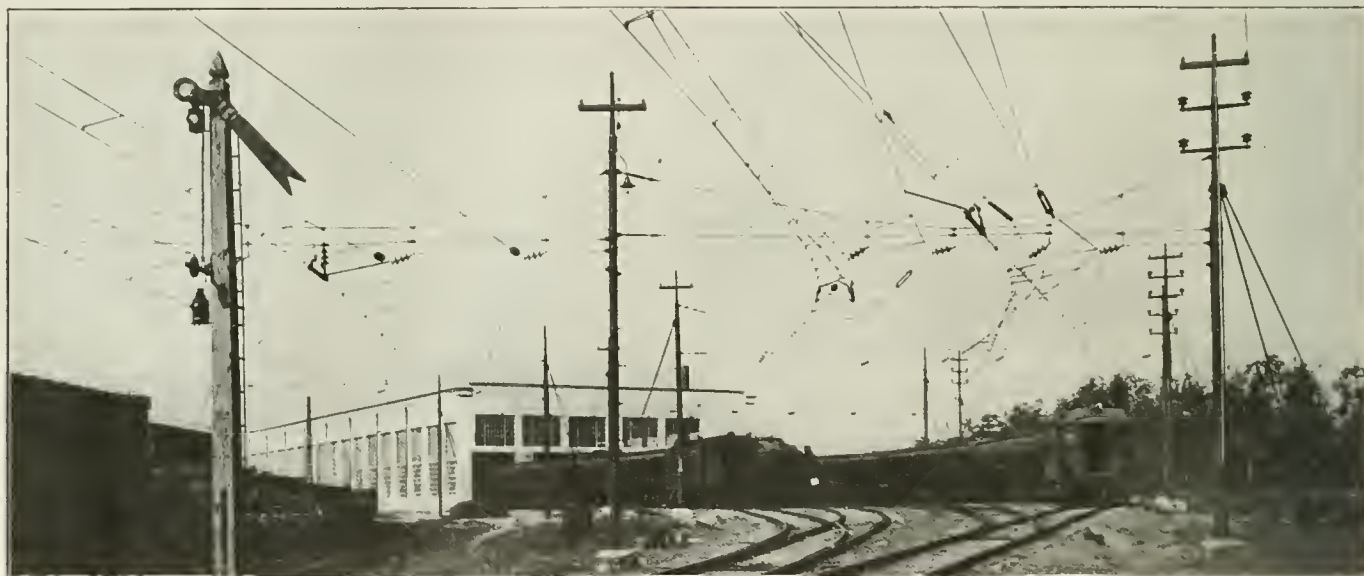
In the electrified portion of the Philadelphia division, the old form of semaphore signals have been replaced by those of the electric-light type in which different rows of five lights each with suitable lenses indicate the various positions of clear, caution and danger.

To provide proper vertical clearance for the catenary wires, as well as to provide points for anchoring them, practically all the old signal bridges in the electrified zone were replaced with ones of considerably heavier design. In order to nullify the

liable intercommunication by telephone is possible between any parts of the whole system.

The design and construction of the electric installation was carried out by Gibbs & Hill, consulting electrical engineers for the company, in co-operation with the engineering department and the officials of the road. All construction except that of substation buildings and inspection building, which were covered by outside contracts, was carried out by a specially organized force. The mounting of the multiple unit car equipment on the cars was carried out by the railroad forces at the Altoona shops under the direction of the motive power department. The signal equipment and changes in telegraph and telephone lines were designed and installed under the direction of the signal and telegraph departments, respectively.

The following is a partial list of the manufacturing concerns which furnished the principal items of plant and equipment: Motor car equipments, transformers, etc., Westinghouse Electric & Manufacturing Company; structural poles and bridges, McClintic Marshall Company; tubular poles, National Tube Company; steel messenger, cross span and ground wire, J. A. Roebling's Sons Company; copper transmission and secondary messenger wire, Waelarke Wire Company; special bronze trolley wire,



Car Inspection Building at Paoli

induction effect of the traction current in the signal circuits of adjacent tracks, resonant shunts have been installed which permit the local induced currents to be shunted around the track relays and thus avoid disturbing the signal circuits.

Following the heavy sleet storm of March, 1914, which caused so much damage to the overhead wires in the eastern states, the railroad decided to put certain portions of its telephone and telegraph wires underground and this has now been done throughout the electrified zone. Along the main line this underground conduit consists of a 6 single ducts of 3-in. bore, part of which are clay conduit and part bituminized fiber. The conduit bank is protected with concrete on all sides. There are concrete manholes every 400 ft. or less. In order to minimize inductive disturbances from the traction circuits, the conduit is located as near the edge of the right-of-way and as far from the tracks as practicable, though in some places it is just beyond the end of the ties on the outside track.

On top of this bank of conduits, the main signal power feeder carrying 60-cycle, 3,400-volt current is carried, the lead-sheathed cable being run in a pump-log duct which is afterwards filled with pitch. In addition to the usual telephone facilities between substations and between the electric power director and the train dispatchers, permanent telephone boxes are located at every signal bridge throughout the electrified zone and prompt, re-

Bridgeport Brass Company; bonds, American Steel & Wire Company, Electric Service Supplies Company, Ohio Brass Company; insulators, Locke Insulator Manufacturing Company; catenary hangers, Adams & Westlake; block and automatic signal equipment, Union Switch & Signal Company; signal wire, Kerite Company; underground conduits, Edwin H. Vare, and electro-pneumatic air brake, Westinghouse Air Brake Company.

PROPOSED IRISH RATE INCREASE.—Owing to increased cost of operation, notice has been given by the Midland Great Western Railway (Ireland) Company of its intention to increase (subject to the statutory maxima) the rate for merchandise traffic between all stations on its system for all classes. The altered rates are made effective October 1, 1915. The increases range from 2d. (4 cents) on rates exceeding 1s. (25 cents) and not exceeding 2s. per ton, to 7s. 5d. (\$1.85) on rates exceeding 72s. 6d. (\$18.12) and not exceeding 75s. (\$18.75) per ton, while rates of 75s. per ton and upwards are to be increased 7s. 8d. (\$1.90) per ton. The proposed scale of increase is very much higher than that introduced on English railways in July, 1913, which ranged from a ½d. increase on 1s. rates, to 3s. 1d. (77 cents) increase on 78s. 1d. (\$19.50) rates, and 4s. increase on rates exceeding 98s. 11d. (\$24.72).

The Relations of the Railways and the Public*

A Discussion of the Policy of Government Transportation Regulation, Both as It Is and as It Ought to Be

By L. E. JOHNSON

President, Norfolk & Western

I have accepted your invitation to address you in the belief that it indicates your interest in the railway problem. That there is such a problem all agree, however much they may differ as to its true nature and proper solution; and it is a problem in which it is very desirable that the more intelligent and public-spirited of our citizens, such as those composing this society, shall actively interest themselves. Not only is it desirable that they should do this, but it is their positive duty. On the way the railway question is finally settled will greatly depend the welfare of the nation. Public opinion will determine whether it will be settled right. In order that public opinion may cause it to be settled right the public must have good leadership; and that leadership should be furnished by men such as you.

It is generally recognized that to solve the problem presented there should be changes made in the relations existing between the people and the governments of the states and the nation, on the one hand, and the managements and owners of the railways on the other hand. Some people believe these changes should be effected by the adoption of government ownership and management of the railways. Others believe the needed changes should be accomplished by modifications in the present policy of regulation, in which latter class I place myself.

OBJECTIONS TO GOVERNMENT OWNERSHIP

I believe a majority of the people think at present that the adoption of government ownership would not promote the public welfare, but would have the opposite result. There are a very few countries, Prussia affording the best example, where state railways have been managed with a considerable degree of success, but in most countries both the economic and political results of government management have been bad. Forty years ago an Italian commission which had thoroughly studied the subject expressed the opinion that under government ownership politics would corrupt the railroads and the railroads would corrupt politics. This view has been supported by the experience of Italy itself and by that of France, of Australia, of Canada, and of every other country where the conditions have been such as to make it possible for politics to affect government management. Nowhere else, perhaps, has the deplorable influence which politics is almost certain in a democratic country to exert on government railway management been more strikingly illustrated than in our next-door neighbor, Canada.

Since 1867 the Dominion has owned and operated the Intercolonial Railway, and since 1873, the Prince Edward Island Railway. These lines now have a mileage of 1,734 miles. Never in a single year since the government acquired it has the Prince Edward Island earned even its operating expenses, to say nothing of interest on the investment in it. The Intercolonial in the 47 years it has been under government management has failed by \$8,500,000 to earn its operating expenses, to say nothing of interest on the large investment which the people of Canada have made in it. Other railways in eastern Canada owned by private companies have charged practically the same rates as these government railways and have been operated at a profit.

In 1904 the government began the construction of the National Transcontinental Railway from Moncton to Winnipeg. The official estimate of its cost was \$61,415,000, or \$31,083 a mile. At the end of 1914 the line had not been provided with equipment or adequate terminals, and yet up to that time there had been spent on it \$173,000,000, or about \$99,000 per mile. A government commission appointed to investigate its construction

denounced it as enormously wasteful, and the Grand Trunk Pacific, to which it had been intended to lease the line for operation, refused to take it over because it could not afford to pay three per cent interest on the excessive expenditure which had been made.

The explanation of the wasteful construction of the National Transcontinental is the same as the explanation of the wasteful operation of the Intercolonial. The work was done on political rather than business lines. The principle of the "pork barrel" had dominated the management and construction of government railways in Canada as it has the development of waterways, the erection of public buildings and a good many other matters in this country.

The experience of other countries and the conditions in our own warn us that we cannot afford to try the experiment of government ownership of railways here; at least, not until our government management would not be rendered impossible by politics of the "pork barrel" variety.

THE ALTERNATIVE

There is only one alternative to government ownership. This is a system of wise and fair regulation. Railway managers are often accused of not recognizing this fact. They are often charged with being opposed not merely to effective regulation, but to any regulation. I deny this. I know the consensus of opinion of our railway managers, and I assert emphatically that they are not opposed to any regulation or to effective regulation, but that they appreciate the need of it and are as strongly and sincerely in favor of it as any other class of our citizens, because they know that this is the only alternative to government ownership, and as patriotic citizens they are opposed to government ownership. They would be in favor of it even in the absence of the danger of government ownership, because they recognize the fact that effective regulation, if it be also wise and fair, will promote the interests and protect the rights not only of the general public, but also of the owners, the officers and the employees of the railways themselves.

All intelligent railway men recognize the fact that there have been in the past shortcomings and abuses in the management of some, if not all, of our railways and that government regulation has helped to correct some of these. They concede that there are still such shortcomings and abuses and that government regulation can, and ought to, help to correct them. But they also believe that there are some very serious shortcomings and abuses in the present system of regulation; that in consequence it is doing harm as well as good; and that unless it is radically changed and raised to a higher plane of efficiency and fairness, it will fail in the long run to do much of the good that the public desires and will do much harm, which the public does not intend.

MAIN PURPOSES OF REGULATION

The three main purposes of government regulation should be to further the economy, efficiency and safety of railway operation; to cause rates to be reasonable and non-discriminatory; and to make investment in railway securities safe and attractive.

It is generally recognized that regulation should seek to improve railway service and to make rates fair and reasonable. It is not so generally recognized that it should aim to improve railway securities as investments, but there are some very good reasons why it should do this. In the first place, if either railway management or government regulation is such as to make investors in general afraid to buy railway bonds and stocks, the companies will be unable to get enough capital to make their serv-

*An address before the Western Society of Engineers at Chicago on November 2, 1915.

ice good and adequate. In the second place, not only is the railway business a very large industry, but it is also one which can be put on such a basis as to make it both feasible and desirable for large numbers of people of small means to invest in it. The degree to which they will be thrifty is likely to depend largely on the opportunities open to them for the safe and profitable investment of any amounts, however small, which they may save. But the trend of our economic and industrial affairs for some years has been such as to reduce rather than to increase the number of the kinds of openings which formerly existed for the class of small investors. Corporate organizations have been growing in size and number and driving out the small concerns in which the small investor used to put his capital. The best substitute we can offer for the opportunity to invest in small properties is the opportunity to acquire with reasonable safety small interests in large concerns, such as our railways and industrial corporations. This opportunity can be afforded only by having these concerns both managed and regulated honestly and wisely and in the interest of those who invest in their securities as well as in the interest of those who buy their goods and services or who are employed by them. There is just as much reason, from the standpoint of the general welfare, why our government should seek to make small investments in our industrial and railway corporations profitable and safe as why they should try to make small investments in our farms attractive and safe. The more widely the ownership of property in a country is diffused the more stable will be its institutions and the more certain its prosperity.

METHODS OF REGULATION

If regulation is to be wise it must be done by bodies having some expert knowledge of railway matters. A commission may have such knowledge, but a legislative body cannot have it. If regulation is to be fair, it must be free from political and other influences that will tend to divert it from its proper purposes. A commission may be comparatively free from political influence, but a legislative body cannot be. For these and other reasons the function of regulation should be delegated chiefly to commissions.

A commission whose members are appointed for long terms is less likely to be influenced by political and other influences tending to impair its fairness and efficiency than one whose members are elected for short terms. Therefore, members of commissions should be appointed and their terms of office should be long. Indeed, I am inclined to believe that it would be conducive to their greatest fairness and efficiency if their members, like our federal judges, were appointed for life.

In most important respects, from the standpoint of the public, our railways constitute a single transportation system extending into every part of the country. Regulation should, therefore, be directed toward promoting the interests of the nation as a whole. But clearly, regulation should not be allowed to further the interests of some classes of the people at the expense of the people as a whole, or to promote the interests of some localities and sections at the expense of the country as a whole. Therefore, regulation should be made as consistent and uniform as is practicable, and regulation by communities and states should be subordinated to that of the nation.

Regulation should not be such as to make railways unprofitable, because this would hamper their development and thereby hamper the development and impair the prosperity of the entire nation.

These principles all seem obvious and fundamental. Are they observed as well as they should be?

INCONSISTENCIES OF PRESENT REGULATION

There is not one of them which is not violated. The nation has created the Interstate Commerce Commission and 45 states have created railroad or public service commissions. Nominally, these are all expert bodies, and theoretically, the legislatures and Congress have delegated to them the function of regulation. In practice the legislatures and Congress at almost every session, without investigation, impose on the railways burdens and re-

quirements affecting operation and rates, the desirability and reasonableness of which ought to be left to be determined by the commissions after investigation. Within the last four years there have been 3,016 bills introduced in the state legislatures for the regulation of operation alone, of which 436 have been passed. The members of many state railroad commissions are elected and, of course, in their election political considerations and not their special fitness for their duties govern. Even when they are appointed they often are selected, not because of their special fitness, but for political reasons. It is inevitable that bodies thus constituted should not be expert and impartial to the degree that they ought to be. The want of impartiality of some of them is illustrated by the facts that seven state commissions appeared as parties against the railways in the five per cent rate case and that 16 state commissions have appeared as parties against the railways in the cases involving advances in freight and passenger rates in western territory.

Furthermore, state regulation is usually controlled largely by local considerations and directed to the furtherance of the supposed interests of the people of the state at the expense of the interests of the people of the nation. Finally, almost all of our regulation is directed toward restricting the net earnings of the railways within the narrowest limits that the courts will permit.

As much of the legislation passed is enacted without sufficiently thorough previous investigation, it is necessarily arbitrary. As there is almost no co-operation between the various state commissions, or between them and the Interstate Commerce Commission, and almost no co-ordination of their activities, it naturally results that the requirements imposed on the railways are often inconsistent and even conflicting. As the legislation passed, and even the orders sometimes issued by the commissions, often are secured almost entirely at the instance of and under pressure from certain well-organized classes of persons, it is not surprising that their intent and effect often is to promote the interests of these classes at the expense of the railways and the rest of the public.

The inconsistencies between the regulation of the states themselves and between that of the states and the national government are illustrated by the fact that while numerous states have adopted legislation regarding train crews or headlights, the federal government has not done so, and that there are wide variations between the provisions of the laws of the states and of the nation regarding the hours of service of railway employees.

DISCRIMINATIONS PRODUCED BY PRESENT REGULATION

The regulation of rates by the various states and by the federal government originally was intended largely, and in the case of the federal government, mainly, to correct unfair discrimination. It has produced a good effect by correcting many such discriminations; but it is now producing bad effects by actually creating other and equally unfair discriminations. For example, at a time when the interstate passenger rates of the railways in most parts of the country were three cents a mile, numerous states passed laws reducing state rates to two cents a mile. In some states railways got these laws set aside as confiscatory. In others, in order to avoid discrimination between state and interstate rates, they reduced the interstate rates also to two cents. In the five per cent rate case the Interstate Commission indicated that it believed that these low passenger rates were not yielding enough revenue to cover the part of railway expenses properly chargeable to passenger service and that the railways should raise them. The railways in eastern territory did raise the interstate passenger fares to 2½ cents a mile and tried to get the state legislatures to increase the state rates. This the legislatures did not do, and, in consequence, there has resulted an unjust discrimination between state and interstate travel brought about by the inconsistent policies of the regulating authorities representing the public itself.

There are likewise unfair discriminations in freight rates due to the same causes. In the Shreveport case the Interstate Commerce Commission called attention to the fact that an unfair

discrimination had been effected between certain state rates between certain points in Texas and certain interstate rates between Shreveport, La., and the same points in Texas, by the rate-making policy of the Texas railroad commission. Again, in the western freight rate case, it refused to allow certain advances in rates on live stock because certain of the interstate rates involved were already higher than corresponding rates fixed by legislative enactments or by the orders of state commissions.

If you turn to the field of regulation of the financial management of the railways you will find somewhat similar conditions. Practically all of our railway corporations have been chartered by the states which have created them. Some states have been lax in creating and regulating railway corporations. This laxity has left the door wide open for corporations created by these states to go forth into other states and handle their financial affairs in ways perhaps condemned by the public opinion of the country. On the other hand, other states, such as Texas, have imposed such stringent regulations on the financial management of railways within their borders as seriously to hamper their development and even to make them heavy burdens on the parts of the same railway systems in other states.

INCREASED COSTS OF OPERATION AND DECREASED EARNINGS

The period during which the present system of regulation has been applied dates from about 10 years ago. This period has been, as you know, one of steadily and rapidly increasing costs of operation. This has been partly due to our policy of regulation, but mainly to the higher standards of service which the public has expected, to increases in taxes and to advances in wages which railway labor has demanded and which boards of arbitration organized under federal law have granted.

The 8 or 10 years prior to 1906 and 1907 were years of steadily and even rapidly increasing railway net earnings. Those since have been years of just as steadily and rapidly declining net earnings. This is not true of every individual road. There are a number of individual railways which, because of exceptionally good management or unusually fortunate situations, have continued to prosper, and some of them are even more prosperous than they were 10 years ago. But these roads are no more typical than are certain roads at the other extreme which, because of bad management or unfortunate situations, have declined into the depths of adversity. It is the situation of the railways as a whole, not that of individual lines, which it is important for us to consider.

According to the latest available statistics there are now 82 railways in the hands of receivers, having a mileage of 41,988 miles and a capitalization of \$2,264,000,000. This is the greatest mileage ever in the hands of receivers in this country. It is a significant fact that the mileage of bankrupt roads is larger in proportion in the Southwest, where the policy of regulation has been the most repressive, than in any other section. Furthermore, the construction of new mileage and the improvement of the facilities of that already existing have been seriously curtailed. The new mileage built has shown a downward tendency since 1906 and was smaller in 1914 than in any year since 1895. There have been heavy reductions in the purchases of equipment and supplies; and, in consequence, many thousands of men have been thrown out of work in both the railway and the railway supply businesses and every line of commerce and industry has been adversely affected.

Now, I would not be understood as attributing the unsatisfactory conditions entirely to regulation. There would no doubt have been large increases in the operating expenses and taxes of the railways if the policy of regulation had never been begun. The great faults of regulation have been that, first, in many ways it has unwisely and unnecessarily enhanced the increases in expenses, and that, second, it has at the same time prevented most of the increases in rates which these increases in expenses made desirable, and, indeed, in the face of these increases in expenses, has actually compelled many reductions in rates. The average annual wage of railway employees was 43 per cent higher in 1914 than in 1898 and average taxes per mile were 140 per cent

greater; yet the average passenger rate and the average freight rate were actually lower after these increases in wages and taxes had occurred than before. Under an entirely intelligent and fair policy of regulation the public authorities would have co-operated with the managements of the railways in their efforts to solve the problems presented by the great and rapid increases in their expenses and taxes. Under the policy actually followed regulation has made their problem more difficult and complicated, with the results just mentioned.

Now it may be said that the railways have brought upon themselves much of the trouble from which they are suffering. I admit that. On the whole, the managements of our railways have been as able, as honest and as efficient as those of any other railways or other large corporate business in the world. But, as I have already conceded, many mistakes have been made and many offenses have been committed by them. It is because of these things that, as railway men now admit, regulation became desirable for the protection and benefit of the public and even of the railways themselves. But is the fact that the managements of the railways have not always been wise and fair any reason for adopting and persisting in a policy of unwise and unfair regulation? Clearly not. Is it not evident that the policy of regulation which has been followed has not established, and is not adapted to establish, satisfactory relations between the railways and the public? Is it not evident that it has not been promoting, and is not adapted to promote, the purposes which regulation ought to promote? It is not making the operation of railways more economical and efficient. It is substituting new forms or unfair discrimination in rates for those which have been abolished. It is preventing rates from being so adjusted as to meet the increasing demands on railway revenues. It is helping to make railway securities unattractive rather than attractive both to the large investor and the small investor, and is forcing the railways to sell bonds to raise capital when they ought to be selling stock and to sell short time notes when they ought to be selling bonds, thereby rendering them financially top-heavy and incapable of weathering the financial storms which are sure to break over us in the future as in the past. In order to establish satisfactory and beneficent relations between the railways and the public, our regulation of railways, as well as our management of them, must be put on a sound basis.

REGULATION SHOULD BE IN HANDS OF EXPERTS

The remedy for the defects in our policy of regulation seems to me obvious. It should not be destroyed, but it should be made less rigid and more flexible, less restrictive and more constructive, less the work of amateurs and more the work of experts. The legislatures should cease passing without investigation arbitrary laws for the regulation of features of the railway business with which their members, from lack of time and want of special knowledge, cannot possibly become competent to deal, and leave the performance of the function of regulation almost entirely to commissions. The commissions should be made in fact as well as in theory impartial bodies of experts. The state commissions should be restricted to the regulation of purely local and state matters and the Interstate Commerce Commission should be expressly authorized and required by law to overrule the state authorities when they adopt regulations the effect of which is to interfere with and burden the commerce of other states and the commerce of the nation as a whole. There may be reasons for applying some different rules in states in which the conditions differ as widely as they do in Massachusetts and Arizona; but there cannot be any good reason for applying widely different and wholly inconsistent requirements in states adjacent to each other, such as Nebraska and Kansas, or Massachusetts and Connecticut; and there certainly cannot be any good reason why a state government should apply one rule in a state and the federal government should apply an entirely different rule in the same state. Both these things are done now. There can be no good reason why a state passenger should be allowed to travel for two cents a mile in a state when the Interstate Commerce Commission has held that 2½ cents is a reasonable rate for interstate

travel in that same state, which is what is being done at the present time.

There can be no good reason why a state law in Texas, for example, should prescribe certain hours of work for railway employees engaged in state commerce when a federal law prescribes different hours for all railway employees engaged in interstate commerce, which is what is being done now. There can be no good reason why the Interstate Commerce Commission should hold that the earnings of the railways in eastern territory are not as large as they should be in the interest of the public, and that at the same time the states should be allowed to prevent the increases in earnings which the Interstate Commerce Commission holds should be permitted in the interests of the public. Yet this is being done now.

At the same time that state regulation is being improved and brought into a proper relationship of subordination to and coordination with federal regulation, there ought to be changes made in the organization of the Interstate Commerce Commission which will better fit it for the performance of its added duties. I personally would favor increasing the salaries of its members and having them appointed for life. Their duties are as important as those of any other officers of the government, and their positions should be made such that they will be attractive to the ablest men in the country and that the incumbents will be immune from political and all other improper influences. When these and other changes have been made which will strengthen the commission and increase its independence, I believe it would be both safe and desirable to increase its powers in several directions. If there is to be regulation of operation this should be done by the Interstate Commerce Commission. If there is to be regulation of the issuance of railway securities, as there already is in some of the states, the necessary authority, with proper restrictions, should be delegated to the Interstate Commerce Commission.

I. C. C. SHOULD HAVE POWER TO RAISE AS WELL AS TO LOWER RATES

At the same time the commission should be empowered to raise rates which it regards as too low, as well as to reduce rates which it thinks are too high; and this power should apply to state rates when the commission regards them either as unremunerative or as working an unfair discrimination against interstate commerce. The commission is now greatly hampered in its regulation of rates by the fact that the law authorizes it to fix maximum rates, but gives it no power to fix minimum rates. The law requires it to make rates reasonable, but gives it no power to make them reasonable if the defect in them happens to be that they are unreasonably low.

Our policy of regulation has thus far been one-sided. It has been tacitly predicated upon the assumption that its sole purpose should be to protect the rights and promote the interests of those who use the service of railways and who work for them. It has too often ignored the fact that those who invest in railway securities are also a class of our citizens possessing exactly an equal claim to have their rights protected and their interests promoted by the government. What is even more serious and important, those who have been responsible for our policy of regulation too often have not recognized the fact that the interests of the patrons of the railways and their employees will suffer if the rights and interests of the investors in them are not protected and promoted. It is only by the investment of adequate additional capital in railways that their facilities may be sufficiently improved and expanded. Furthermore, it is only by the investment of additional capital in the railways that there will be created an increased demand for labor on them; and the increase in the employment they afford will be in proportion to the increase in the investment in them. Therefore the only policy of regulation of railways which will confer the maximum benefits practicable on each class that is directly interested and on the public as a whole will be one which will equally consider the rights and interests of the traveler, the shipper, the employee and the investor.

STEEL GONDOLAS FOR THE RUSSIAN GOVERNMENT

Included in the car equipment, orders for which have recently been placed in this country by the Russian Imperial Government, are 5,000 steel gondola cars for general service, which are now being built at the McKees Rocks (Pa.) plant of the Pressed Steel Car Company. The design of these cars was prepared by the builders, and aside from the couplers and buffers, which are of the type generally used in Europe, and are the Russian standard, it follows very closely a similar design built for service on American railways. The car is 8 ft. 11 in. high from top of rail to top of sides, and has a length of 44 ft. 4½ in. over the buffers. The rated carrying capacity is 50 metric tons, about 110,000 lb., and the light weight about 46,000 lb. One of the requirements is that the car must stand a test load of 75 metric tons uniformly distributed without permanent set, a requirement which the completed car has satisfactorily met.

The bodies are 40 ft. long by 9 ft. 6¾ in. wide by 4 ft. 4 in. high inside. Drop doors are provided in the floor on both sides throughout the length, making the car about 99 per cent self-clearing when loaded with coal or similar material. The doors are operated by the Pressed Steel Car Company's creeping shaft device, and rest directly on the shafts when in the closed position. The chains, which wind on drums, are only employed for lifting the doors and to hold the shaft in place under them when in the closed position, stops being provided to engage both sides of each door when they are dropped. The ends are made of 2¼-in. planks, reinforced all around with 2½-in. by 2½-in. by ¼-in. angles bolted to them. They are secured with links at the end sill in such a manner that they may be dropped into the car when not required, thus facilitating the transportation of long materials.

The center sill construction is continuous from end sill to end sill, and consists of two 5/16-in. bent plates riveted to a 4-in. rolled tee at the top and each reinforced at the bottom with a 3½-in. by 3½-in. angle. Malleable iron center braces are provided at the bolsters and pressed steel braces at the cross ties. The end sills are ¾-in. pressed steel, reinforced with pressed channels extending between the side sills and center sills. They are braced at the rear of the buffers with pressed channels, which transmit the major portion of the buffing shock to the center sills. The bolsters and cross ties are pressed diaphragms reinforced with plates and angles.

The sides are ¼-in. steel plates in three sections, supported by seven pressed steel side stakes located at the bolsters and cross ties. They are reinforced at the top with 4-in. rolled steel bulb angles extending the full length of the car. Near the bottom the side sheets are sloped in at an angle of about 60 deg.; the lower edges are flanged outward, and rest on the end sills, bolsters and cross ties, to which they are riveted. The bottom of the flanges are flush with the lower side of the cover plates on the bolsters and cross ties, thus permitting the doors to be tightly closed all around.

The drop doors, of which there are eight on each side, are made of ¼-in. steel flanged on all sides, and supported on three forged hinge straps which are pin connected to malleable iron hinge butts riveted to the center sills. Besides the hinge straps, there are two 2½-in. by 2½-in. by 3/16-in. angle stiffeners extending crosswise of the car and one 3-in. rolled Z-bar extending lengthwise of the car, near the outside, on each door. The door stops are placed to secure a discharge opening about two feet deep between the trucks, but due to the large diameter of the wheels, the openings over the trucks are somewhat less.

The Russian Westinghouse air brake equipment with 10-in. cylinders is being applied. Although it is generally similar, it differs somewhat in detail from the freight car equipment used in this country. The foundation brake rigging closely follows the standard practice in this country, but involves the use of a tension spring to insure proper release of the brake shoes. The couplings are the hook and link type, each made up of nine drop forgings of special heat-treated steel. The finished coup-

ling is required to withstand a test load of 30 tons without permanent set. The side buffers are Russian standard, except that coil springs have been used in place of volute.

The trucks are of the arch bar type, having a 6-ft. 3-in. wheel base, and follow the lines of the M. C. B. standard construction, though somewhat larger, due to the use of 41 5/16-in. wheels and 5-ft. gage. They have bolsters of the pressed steel bath tub type with cast steel center plates of M. C. B. contour and adjustable malleable iron side bearings. The journal boxes are malleable iron of M. C. B. type, with drop forged wedges. The arch bars are 6-in. by 1 1/4-in. open hearth steel, and the tie bars are 5-in. by 5/8-in. They are secured to cast steel column posts with 1 3/4-in. bolts, and to the journal boxes with 1 1/4-in. bolts. The wheels are rolled steel with flange and tread of the Russian standard, which differs only slightly from the M. C. B. standard contour. They are being manufactured by the Carnegie Steel Company, and weigh nearly 1,200 lb. each. The axles are of steel with journals, collars and dust-guard fits the same as the standard M. C. B. axle for 100,000-lb. capacity

The settlement in June was thought to be final, but because of a certain amount of unrest negotiations were again begun with the result that, effective October 23, the bonus paid under the February and June agreements has been revised as follows:

	Present bonus	Revised bonus
	per week	
Employees 18 years of age and upwards whose standard rate of wage is 30s. per week or more.....	2s.	5s.
Employees 18 years of age and upwards whose standard rate of wage is under 30s. per week.....	3s.	5s.
Employees under 18 years of age, except boys engaged since January 1, 1915, at rates of wages which exceed by 2s. 6d. or more the rates usually paid to boys occupying positions similar to those in which such newly-engaged boys are working.....	1s. 6d.	2s. 6d.

The arrangement is on the flat rate basis and differs in that respect from the previous settlements, which provided for larger bonuses to the lower rated men.

The revised arrangement is to remain in force until notice shall have been received by the railways from the government discontinuing the present control agreement whereby the rail-



Russian Government Steel Gondola of 110,000-lb. Capacity

cars. Except for the increase in length because of the wider gage, the principle difference is in the wheel fit. Instead of the collar, which forms a shoulder back of the wheel hub, the axle is reduced in diameter at this point below the diameter of the wheel fit.

After being built, the cars are knocked down, packed and shipped to New York, going by water from that port to Vladivostok, via the Panama canal. At Vladivostok they will be assembled and placed in service.

ENGLISH RAILWAY MEN'S WAR BONUS

The general managers of the English railways have recently come to an agreement—the third—with their employees “engaged in the manipulation of traffic,” whereby there will be a further increase in the war bonus amounting to \$15,000,000 or \$20,000,000 yearly for the remainder of the war. It will be remembered that last February (*Railway Age Gazette*, March 12, 1915, page 447) the English railways made an adjustment with the National Union of Railway Men and the Associated Societies of Locomotive Engineers and Firemen calling for an increase in wages or a bonus to compensate for the increased expenses arising from the war. The amount was fixed at 3s. (75 cents) a week to employees 18 years of age and older embraced in the “conciliation scheme” whose regular rate of wages was under 30s. (\$7.50) per week and 2s. (50 cents) to employees who received 30s. or more. This arrangement was effective February 15, but there was a clause providing that the adjustment might be reviewed at the end of three months. In June, accordingly, the matter was again taken up and the continuance of the bonus on the same basis was agreed to, subject to the extension to boys of an allowance of 1s. 6d. a week.

ways are being operated for the nation by a committee of general managers. It shall thereafter be subject to discontinuance by one month's notice on either side, it being provided that thereupon the “conciliation scheme” will again be put in operation. It is hoped that this adjustment will be final, the two unions having undertaken “that during the pendency of this agreement they will not present to the railway companies any fresh demands for increased bonus or wages or general alterations in conditions of service, and that they will not give countenance or support either to a demand on the part of any of their members to reopen the settlement now made or to any strike that might be entered upon in furtherance of such demands.”

As in the former case the railways will probably extend the bonus to employees not in the “conciliation scheme.” The estimated cost of the bonus hitherto paid to the entire staff was about \$20,000,000 yearly. The increased bonus will bring this up to from \$35,000,000 to \$40,000,000 yearly.

ENGLISH RAILWAY MEN AS MUNITIONS EXPERTS.—Three of the principal officers of the North-Eastern Railway of England are now engaged at the ministry of munitions. E. C. Geddes, deputy general manager, and lieutenant-colonel in the railway and engineer staff corps, is one of Lloyd George's principal assistants; temporary lieutenant-colonel R. L. Wedgewood, chief goods and traffic manager, lately acting as deputy director of railway transport in France, has been recalled to an appointment in the munitions department; and Vincent L. Raven, chief mechanical engineer, has been appointed acting chief superintendent of ordnance factories at Woolwich. Mr. Geddes served in the operating department of the Baltimore & Ohio from 1890 to 1895 and later served for a number of years in India. Mr. Raven has been chief mechanical superintendent since 1910.

HENRY U. MUDGE

Henry U. Mudge, president and chief executive officer of the Chicago, Rock Island & Pacific, resigned on November 5, and is to be elected president of the Denver & Rio Grande, with office in Denver, Colo., succeeding Arthur Coppell, of New York, who was elected president temporarily on November 4, in place of B. F. Bush. Mr. Mudge was expected to be elected at the meeting last week, but it was found to be necessary first to elect him a director.

Mr. Mudge has been connected with the Rock Island since May 1, 1905, when he became second vice-president in charge of operation. He was elected president on December 1, 1909. He was appointed co-receiver of the property on April 19, but resigned that position on September 28, and was immediately appointed chief executive officer at the request of Receiver Dickinson that he remain in charge of the operation of the road.

As explained in a statement issued by Mr. Copell after the meeting last week the directors of the Denver & Rio Grande have decided that the best interests of the property will be served by having a president who can be located in Colorado and who has no connection with other roads. Recently the president of the Denver & Rio Grande has held the same office on the Missouri Pacific, the Iron Mountain and the Western Pacific. It is understood that a compromise has been arranged with the holders of the Western Pacific bonds, the interest of which was guaranteed by the Denver & Rio Grande, which will relieve that road of a part of its liability and make possible a reorganization of the Western Pacific.

Before going to the Rock Island most of Mr. Mudge's railroad experience had been with the Atchison, Topeka & Santa Fe, on which he started at the age of 16 as section hand and water boy on construction work, and which he left in 1905 as general manager.

In taking charge of the operation of the Denver & Rio Grande, Mr. Mudge, therefore, will be returning to a territory with which he has been familiar throughout his career, and in which he was particularly engaged for many years as superintendent of the Rio Grande and Western division and later as general superintendent of the Western grand division of the Santa Fe.

While working in the construction gang he learned telegraphy and soon became an operator. By hard, conscientious work and painstaking mastery of details successive promotions came rapidly, but naturally, and without any spectacular jumps, so that when Mr. Mudge became a general officer he had had a thorough experience in every branch of the operating department, in the telegraph office, in the train service, at the dispatcher's desk, and as roadmaster, trainmaster, assistant superintendent and superintendent.

Mr. Mudge to an unusual degree has always been popular with and possessed the confidence and respect of his subordinates, and as a president his democratic manners, his fairness and practical common sense, and his open and above-board methods of doing business have made him especially popular with his subordinates and associates in the railroad field and with the patrons of the road. Newspaper men have always liked Mr. Mudge because there has never been any difficulty in obtaining from him a candid and fair statement of any situation that figured in the news of the road, and because he has usually been willing to give the news when it is news and without waiting for the disentangling of official red tape.

Whatever may be said in criticism of the Rock Island's financial transactions can by no means be applied to its retiring

president. It is rather on the Rock Island's record for operation, under the conditions it has had to face, that he is to be judged. As Receiver Dickinson pointed out in a statement to the public following Mr. Mudge's resignation as receiver, "it should be understood that there was a marked differentiation between him and most of the other directors, in that the transaction for which he voted as a director was presented and acted upon at a meeting at which he was elected a director, and immediately upon his election, and also in that he was not a stockholder either of the Rock Island Company of New Jersey or the Chicago, Rock Island & Pacific Railroad Company of Iowa." The syndicate purchase of the Rock Island, the reorganization of its board and the organization of the two holding companies took place in 1901 and 1902, and the purchase of the Frisco and Alton stock in 1903, all while Mr. Mudge was general manager of the Santa Fe, and in no way connected with the Rock Island while the other financial transactions criticized by the Interstate Commerce Commission were either accomplished before he went to the road, or before he became a director, with the exception of the sale of the



Henry U. Mudge

Frisco stock, to which Receiver Dickinson referred in the statement.

Mr. Mudge was born on June 9, 1856, at Minden, Mich., and was educated in the common schools. He entered railway service in 1872 as a section hand and water boy with the Atchison, Topeka & Santa Fe, and soon became telegraph operator. He later held various positions in the operating department until July, 1889, when he was appointed superintendent, and in May, 1893, became general superintendent of the Western grand division and then of the Eastern grand division of the same road. From February 1, 1890, to January 1, 1900, he was general superintendent of the reorganized property. On January 1, 1900, he was appointed general manager of the same road, and on May 1, 1905, left to become second vice-president of the Chicago, Rock Island & Pacific. During the past year he has been president of the American Railway Association.

Selling Railway Supplies to European Countries

Our Manufacturers Must Germanize Their Foreign Sales
Methods and Observe a Broad Spirit of Square Dealing

By WALTER S. HIATT

Our Special European Correspondent

The United States has at last become the creditor of Europe. A precedence in international business has been thrust upon us and at last we have our great chance. How shall we use it?

Europe must obtain from us not only war munitions and supplies, food and clothes, but also the necessities of reconstruction, for it is not too much to say that the reconstruction period has already begun. Despite the secrecy maintained about such matters now, it is known that at least \$10,000,000 worth of railway supply contracts has already been awarded in France alone, and it is certain that during the next two years the manufacturers of American railway materials of every description will find in Europe an ever-extending market for their products. Owing to the wear and destruction of railway material resulting from the war, American manufacturers will be called upon to do a large part in rebuilding the European railways and in re-equipping them with freight and passenger cars and locomotives.

rich at once, or to do a billion-dollar business. They must not take the attitude that Europe will trade willy-nilly, for thereby they will curtail their orders and will kill off the future business that may come long after the war is over, since Europe will even have to rebuild her machine shops, buy new tools and new machinery for the making of the ultimate product.

The American must understand that Europe would rather not buy from us, and we can't blame the Europeans. The American must understand that we are looked upon as neutrals who are enriching themselves at the expense of the misfortunes of others. This feeling is just as strong in Germany as it is among the allied nations. In Italy, when you tell people you are an American, they turn up their noses, so to speak, and ask why we don't come over and help whip the terrible Austro-Germans. In Germany they say to you: "We've always been friends, we've traded together for many years, we are almost blood allies, and yet you



Photo by Henri Manuel

Women Turning Out Shells in Short-Handed Factories in France Where Machinery of Peace Was Once Made

While every factory in Europe is occupied in turning out war munitions, and every man is either at the front or busy behind the lines in the factories making cartridges, bombs, shells, cannon, there is little energy available for the work of peace. This does not apply to France alone, although in that country for nearly a year railway supply factories and even the railroad shops have been occupied with war work, and now every factory possible is turning out aeroplanes, shells, ammunition or cannon. This condition applies also to Germany, where for at least a year every factory in the empire has been busy along the same lines and in a greater degree. It applies to Russia, where the factories and shops have always been comparatively few. It applies to Austria, and to a large degree in England, where 500 factories of all kinds are working overtime to turn out war material.

But while Europe *must* buy machine products from the United States, our manufacturers will not profit to the full from this opportunity if they do not observe a few sane rules. They must learn to do business in Europe's way. They must study tariffs and ocean freights. They must not use the opportunity to turn out poor and imperfect material. They must overcome the prejudices that naturally arise between people who are not accustomed to do business together. They must not expect to get

Americans in order to make some money desert us and go over to the Allies."

In France people are more polite about it. They don't say anything at all. Recently I was walking through a hospital train with Herbert Corey, the newspaper correspondent and humorist. All the soldier hospital men were quite courteous and smiling, despite their private griefs. "You don't have to guess twice to know what these fellows *think* of us," said Mr. Corey. "They think we should have a gun in our hands pointed at the Germans. And the worst of it is, that's what every German *said* when I was over the frontier."

To get down to business details, the American firm that wants to sell in Europe has a lot of other prejudices to overcome. First of all, it must learn how to write a business letter in the European way. Then it must learn that an agent right on the spot is the only medium of getting business, that one country is enough for the agent to conquer at a time, and this agent should speak the language of the country, that he should learn the country's ways, and should learn to do business without intermediaries, crooked or otherwise. Of course, this agent should be an American who thoroughly knows his own firm, its products, and those of its competitors. Further, this agent should be fully

accredited, should have European bank references to inspire confidence in him and in his firm's ability to keep a contract honestly.

DEALING WITH GO-BETWEENS

A book might be written on the question of intermediaries alone. So far we have looked too much on the amusing side of this question. Much of the harassing part of war sales has come through experiences with these intermediaries. Not representing anything or anybody, their main object in life is to get some quick money. The quickest way they know of is to find what concern is about to be awarded a contract, to get this information a week or so ahead of anybody else, and then inform the concern's representative on the ground that he will get the contract if he will agree to pay a commission to the intermediary, who generally claims he must divide it with the firm, railroad company or government awarding the contract. If there is no agent on the ground the intermediary cables the firm direct.

What is the firm or agent to do? A lot of honest time and money has been spent trying to get that contract. Generally the intermediary is given the benefit of the doubt and gets the commission. I will not say that he does not sometimes or often divide it with the agent of the purchaser. It is a common practice all over Europe, for instance, to make presents at Christmas or New Year's, or on other occasions, to buyers. But in the case of railroad purchases, which are made by the chief of a department, as sanctioned by the president of the road, it is hard to believe that these men would accept this sort of money. The first purpose of these men must be to make purchases that will be a credit to the road, that will stand up under long wear, and if the material is faulty both the buying engineer and the selling firm are injured in reputation.

The experience of the American agents I have talked to varies. One man selling artificial limbs on large orders made up his mind when he came not to promise a cent of commission to anybody, and he has gathered all the business he can handle. Another man, representing a group of New England firms, after six months of feeling his way has come to the conclusion that it is best to smooth the way by presents to the smaller fellows and commissions to the more important ones. He claims that otherwise the selling agent is merely listened to politely, given a hearing but not the order, that the buyers do not look on such commissions as plain graft but as payment for a service rendered the seller in getting a contract.

There is another side to the question of doing business through an intermediary, particularly when the latter is not an employee of the government or company making the purchase, but rather merely a person with friends at court. He may lose a good contract for a selling agent. He is generally a native of the country where the business is being done and he is pretty well known. If he openly introduces an agent to the buying engineer, for instance, that engineer may at once be prejudiced against the agent. Further, the buyer realizes that this hanger-on is known to others and that if the contract is closed he, as buyer, will get the credit of having been involved in a shady transaction.

WHEN GO-BETWEENS INJURE A SELLER

It was because of these under-the-table deals, manoeuvred by dishonest and unscrupulous natives of European nations at war, that each of these governments has finally been forced to jail some of its buying agents, that in England the native manufacturers are now only allowed a profit of 10 per cent on their output of government supplies, that in Russia, the home of honest graft, some of them have been shot, and that France, which originally sent a commission to New York to do its buying, finally placed all its contracts in the hands of J. P. Morgan & Co.

I know of one very fine American, honest as the day is long, who has been trying since last spring to sell a certain badly needed product in Europe and on very advantageous terms of credit to the buyer. Not speaking any foreign language, in the beginning he took into his confidence a certain group of intermediaries who had established offices in one of the big European cities where they were trying to sell war and other materials

of all kinds. This good American located his offices with this group, and to date he has done very little business and will probably never do much. He is in bad company, and in so deep he cannot get out. The little business he has done has been so shared that his profit will be next to nothing. He will probably go home at last believing that all European business men are dishonest and that he failed to do a reasonable business because he did not offer their price.

Every American consul, every one of Uncle Sam's commercial agents from the Department of Commerce and every American business man one meets in Europe has a stock of incidents to tell about these intermediaries. A member of one Chicago firm spent three months in Europe trying to sell his product. When he was about to give up in disgust his home office cabled him that a large order had just been placed through another agent. This other agent proved to be a pharmacist who, learning of the contract, had taken the firm's name at random out of a directory, cabled for its prices, and on the basis of it submitted a bid.

Another American agent wanted to sell a certain line to the Belgian army. As he had a German name, his bid was rejected. However, a French grocer, having put in a bid, was awarded the contract, which he turned over to the man with the German name. Incidentally, he got a higher price.

SELLING OF RAILWAY MATERIAL

Of course, many of these incidents relate to army supplies, the selling of which can hardly be called business. In selling machinery and railway supplies a different class of men is met. The buyer knows exactly what he wants, though he is not so sure about the price, since the new elements of high ocean freights and inflated war prices have entered into the sales. For instance, an American agent for car axles heard that a certain Italian railway was in a hurry to place a large order, but desired advance samples. As he had no samples with him, he picked up one of French manufacture that corresponded to that made by his firm, packed it and labelled it as a transoceanic shipment from Havre, and sent it on to Italy. He received a polite reply from the Italian company stating that when he was ready to submit an American sample his bid would be considered. The Italian buyer had at once recognized the axle's make.

This American agent was acting in good faith, and would have delivered an axle up to specifications, but such methods are discrediting. Indeed, the American agent is at present in a difficult position. His only competitors worth considering are the English, and the English have had scores of years of Continental selling experience, while the American is only learning. Then, the American is an unknown factor to the European buyer. The latter probably has never been in America, he doesn't know our reliable firms, and he doesn't understand American terms, except in such simple materials as car wheels or axles. The very rapidity with which the American agent is willing to do business; his push, bordering on bluff; his evident intention to do business in spite of every obstacle, tends to bewilder the European when it does not arouse his suspicion.

If the American hastily concludes that because one Italian or one Frenchman is willing to take money, all the high officers of a railway are dishonest, it is not unreasonable to suppose that these same high officials entertain their doubts of the American. Neither knows the ways of the other, but he establishes in his own mind an opinion as to the kind of a person with whom he is doing business. Neither has yet learned that, as a general rule, the high officials of a factory or of a railroad on either side of the water are probably men of sterling character and of absolute integrity. I personally have found that there is nowhere on earth a better type of business man than the high-grade Spaniard, Englishman, Frenchman or German. It may take some time to discover this man, just as it would for a foreigner to discover such men among us, but once you find him you can depend on him.

While this article is being written the French railways are concluding arrangements to make large purchases of material in

the United States. Notwithstanding that there are a few American railway supply men in France, the buying agents of these roads are bewildered. They do not know where to go to place their bids and do not know what American firms can be relied on to keep their contracts. In one case, the officers of a road, knowing the *Railway Age Gazette* as a standard publication, took a list of names from among its advertisers and asked these firms to submit bids. Then they asked all the American railway men with which they were acquainted to give them impartial advice on the reliability of the firms, and yet these were firms that are supposed to have an international reputation.

Of course, the contracts are being made on a cash delivery basis, with each party putting up five per cent of the value of the contract in money as a guarantee; but what the Frenchmen wanted they wanted in a hurry. They wanted to be sure of having deliveries on time and in good order. This difficulty of getting together on the same plane is one of the chief things American agents must overcome, and only time and fair dealing will do it. These conditions are a combination of inertia, lack of information, and a grain of suspicion. Take the case of sales of American coal abroad this winter. France, Italy, Spain, perhaps Switzerland, must wind up by buying our coal. Yet they are putting it off as long as possible, meanwhile using up their old stocks. Some are securing small quantities from England in the meantime, simply because they know how to do business with England and know English coal in English terms. Aside from the question of price, into this coal selling enters an equation that arises in the sale of any material or product. The French have become used to briquette coal; that is, coal delivered to the consumer, not loose, but in small blocks, and it is natural that this coal is preferred to loose coal, although the latter is cheaper.

OVERCOMING FOREIGN PREJUDICES

The business of selling seems to be merely a matter of price agreements, with one party able to pay and the other able to deliver. Yet as many elements enter into this business as in the manufacture of a highly specialized article. I went into the subject of American sales with the director of one of the French railways, a man whose position corresponds to that of a general manager with plenary powers in the United States. He pointed out many reasons why the French, at least, should be able to trade with Americans, one of which is the similarity of national temperament. The average American and the average Frenchman, he said, were cordial in manner, rather talkative, frequently permitting sentiment to enter into a business transaction, as opposed to the strict aloofness of the Englishman and the heaviness of the German.

So at once it is seen that personality enters into a business agreement. Analyze personality and you will find its relationship to politeness and the manner of presenting a proposition. The personality of the Frenchman forms one of the chief difficulties of selling to him. His personality prevents him from buying an article that everybody else has or that pleases all others. If he has never fully acquired a liking for moving pictures, chewing gum, or the telephone to the same extent as other nations, the explanation is found in his personality. Possibly this is why he would rather repair an old locomotive than buy a new one. If he buys an automobile, he wants it built to suit his individual taste, and the same factor enters into his purchase of a steel rail or a crane or a car. Given this matter of personality, consider also that French machine models are different in detail from American makes, and some of the difficulties of selling are understood.

Of course, the war and the need of immediate deliveries have modified the conditions and standards of normal times. The war brings in new conditions. For instance, one large order for freight cars made this August was contracted for delivery at some French port. In a second and larger order from an American firm it was stipulated that the cars not only be delivered at some French port, but that labor be furnished to put the parts together and set up the cars ready for use on the tracks.

This condition was made partly because of the scarcity of French labor and partly because Frenchmen, being unused to the cars, might find difficulty in setting them up.

Of the large contracts already awarded in France for railway material some went to English firms despite the evident desire of the French to buy in America and their need of using advantageously their part of the recent Anglo-French loan. The American firms that went without the business failed partly because of their lack of information as to how to get it. Of course, with ocean freights four times as high as in peace times, and with the United States criminally lacking in her own ships, a big difficulty at once confronted every American firm after this business. Some of the firms lost the business because they sought it by mail, because they did not have the right kind of agents on the ground, or because they did not co-operate with their agents. If Europe knows little of us, we do not know much more about her ways. Some firms, for instance, submitted bids in English and sent their letters under a two-cent or a four-cent stamp, neglectful of the fact that foreign letters carry foreign postage. This last may be due to the ignorance of a stenographer, but it is a detail that no European firm would overlook. I saw some dozens of such letters thrown into the waste-basket.

GIVE YOUR AGENT A HELPING HAND

Occasionally agents sent over to get business are not given proper bank references, and frequently are not furnished with funds to keep them for the months they must be on the job. I have heard many stories from both Europeans and from Americans long established in Europe about the failure of American firms to get business.

I think one reason is that the American does not mix enough with the people of the country, he does not attempt to make serious acquaintances and friendships among them so he can learn their habits of thought. Instead, like the English, he sticks too much to other Americans and hence goes around in a worn little circle that is not in contact with the ways of the country.

Sometimes the failure to get business is the fault of the agent who succumbs for a few weeks after his arrival to the night life of the big cities. He suffers a relapse after this period of fast living, becomes homesick, lonesome, neglects his opportunities, and then goes home declaring it is impossible to do business with foreigners.

Sometimes the failure comes because the firm at home does not hold up its end. Now that the war is on, letters and cables are apt to go astray, and a lost message may be very important to the man on the ground, though it may seem of little consequence to the man in the office at home. Business people in Europe, in peace time as well as war time, make a practice of duplicating their letters and often of repeating their cables so that one or the other will be sure to arrive at its destination. They number each letter, they also confirm any previous letter received or sent so that their correspondent will know in just what state the correspondence stands. The larger houses number their cables as well. A neglect of these details discourages and disgusts the agent and results in confusion, misunderstanding and failure to get business.

Firms that wish to do a permanent European business would do well to study the methods of the International Harvester Company, which has done a handsome business here for a number of years in agricultural implements. It has an American as a head sales agent, who in turn employs traveling men native to the country who deal directly with the buyer. Another good example of such successful methods is found in the case of the American typewriter manufacturers, who have been established in Europe for the past dozen years, and have competed with French machines despite the maximum tariff on American manufactures.

The manufacturer who is told that there is no business in Europe for him might consider the success of an American laundry machine man. This man came to Europe for pleasure some years ago and discovered that at his hotel he could not get

his laundry back overnight, as in an American hotel. He traveled about for a time, talking to hotel men, studying European laundry methods, and finally set his agents to work and established a line for which there was apparently no demand and against which there were many prejudices. I recently saw some of his machinery doing the laundry work for the passenger and sleeping cars of one of France's railroads.

I have noted but one important American railway supply company properly established on the continent. While it has offices in London, as have several other such companies, its officers understand that London is as far away from the continent for business purposes as is Chicago from New York. Nearly a year ago it foresaw the war and the reconstruction business and sent over a trusted American representative to open offices and begin to lay the groundwork for contracts. This firm backs up its agent in every detail. This agent takes small orders, waits for the big ones, and the result is that he is getting more business than he expected and in the long run will have a near-monopoly of American contracts in his line. Will his competitors wonder why?

It is the failing of Americans to wish to give good advice, to tell the other fellow how best to run his business. Recently a writer in a financial publication, after some European observation, advanced the opinion that America would be called upon to reconstruct the peace machinery of Belgium and France, but that the sales would end after a few years because of the after-the-war competition and the low wages that would prevail because of the poverty, and the consequent low cost of production. This writer neglected the very patent reconstruction needs of Germany, of Russia and of other countries. His reasoning seems hardly in keeping with many facts. But accepting it, these few years of business will mount into hundreds of millions of sales.

If the manufacturers and the business men of the United States would profit fully from their situation as representatives of the most fortunate of peoples, if they would distance the growing war-fed prosperity of England, and if they would now lay the foundation for the after-the-war prosperity and activity of Europe, they must really build their own ships, they must further educate themselves internationally and they must lay aside loose talk about Europe going flat broke after the war, for it won't, not even Germany. In short, they must Germanize their foreign sales methods. And with all this, they must retain their fine spirit of charity and helpfulness, of square dealing, of giving the other fellow a chance to make an honest penny, which the Germans would not.

While too many Americans, like too many Frenchmen, Russians, Englishmen, Hollanders, Norwegians, Swiss have sought to squeeze every cent of profit out of war sales, to get rich through the sorrows and burdens of distracted Europe, some Americans have sold as honestly as they could. One American automobile firm has all through the war given automobiles on request to transport the wounded, and this fact is now widely known. Is this not a fine business asset?

MOVING MEXICAN TROOPS BY RAILROAD

A movement which was unique in the history of American railroading took place on October 28 and 30 when the Texas lines of the Southern Pacific and the El Paso & Southwestern were called upon to handle a body of federal Mexican troops from the boundary line at Eagle Pass, Texas, through the United States to Douglas, Arizona, where the troops were needed by the Carranza forces to oppose an expected attack by the army under General Villa on the border city of Agua Prieta.

The troops were moved in eight trains, two freight and six passenger. There were 5,199 Mexicans, with an escort of 259 United States troops.

The equipment required consisted of 8 baggage, 79 coaches, 8 tourist, 29 box, 2 flat, 26 stock cars and 1 armored car.

While notice of the movement was rather short, and came at a time when there was a heavy excursion business, as well as

movements of United States troops in the same territory, the entire equipment was furnished and assembled by the Southern Pacific without delay, many of the coaches being handled a distance of 738 miles to the loading point. Eagle Pass, the border point at which the movement originated, is located on a branch line 378 miles from Houston, where the general headquarters of the Southern Pacific (Sunset-Central lines) are maintained, and 169 miles from the headquarters of the division. The distance did not, however, hamper the railroad officials in the prompt and efficient handling of this movement, the eight trains being made up, loaded and moved out between 6:30 p. m., October 28, and 2:05 p. m., October 30. The last train reached Douglas at 3:30 a. m., November 1.

An interesting phase of the movement is the location of the lines of these roads, which for several hundred miles border on Mexican territory under the control of General Villa. While it was the intention of the government and the railroad officials that the prospective movement be given no publicity, a newspaper despatch from Eagle Pass gave advance notice, and it was rumored that attempts would be made by Villa sympathizers to cross the border and interrupt the movement by dynamiting bridges or wrecking the trains. This contingency was provided against by thorough patrolling of the tracks by United States troops, and the entire eight trains went through without interruption.

BUELL'S CAB SIGNAL AND AUTOMATIC TRAIN STOP

The cab signal and automatic stop system of J. W. Buell, which has undergone tests on a passenger locomotive of the Cincinnati, New Orleans & Texas Pacific for many months, has proved so satisfactory in its operation that the proprietor has offered it to the Interstate Commerce Commission for test by the engineers of the commission. He reports that in some hundreds of tests of the distinctive features of the system, there has been no failure except on the side of safety. These tests have not included application of the brakes, but in every case the brake-applying valve has been opened and air exhausted, the same as would be the case in regular service, the exhaust being from the main reservoir instead of from the equalizing reservoir as in actual operation. Neither have the tests included track relays, the aim being to get a large number of operations, which, under ordinary conditions would not be possible, the road being clear, usually, for the express trains on which the tests were made.

This system operates by means of an electric circuit from a battery in the cab, through the wheels of the locomotive and the rails of the track, the front truck of the locomotive being insulated from the main frame. With this arrangement this circuit is normally closed through that part of the track which for the time being lies between the rear truck wheel and the front driving wheel; and the electro-magnet in the circuit holds the air valve closed. Application of the brakes is effected by opening (or weakening) the electric circuit, which can be done at any pair of rail joints (opposite each other) by the use of the ordinary insulation.

The latest tests have been made on locomotive No. 804, which runs between Ludlow, Ky., and Danville, on trains 11 and 12. At a half dozen distant signals, track joints have been arranged to cause the operation of the engine mechanism; the roadside apparatus being set against the train whenever tests are to be made.

The insulation between the engine and its truck consists of vulcanized fiber, $\frac{1}{8}$ in. thick. The piece of fiber is made cup shape and is fitted into the lower center casting. Above this is a steel cup of the same shape, and the edges of the fiber project 3 in. above the metal rim, this to prevent foreign metallic substances from making a short circuit. The centerpin is surrounded for its whole length by a hard fiber thimble.

The circuits are illustrated in Fig. 2. The battery, 6, ener-

gizes four parallel circuits, *A*, *B*, *C*, and *D*. Circuit *A*, energizing coil 7, is called the control circuit. From the positive side of the battery 6+ it runs through wire *A*+ to the front truck of the locomotive, thence to the rails of the track and to the driving wheels and by wire *A*3, as shown by the broken line, to coil 7.

Circuit *B* energizing coil 8, is carried through the normally closed push button *B*+. This circuit also goes around the push button by wires *C*3 and *C*4 to a circuit breaker, 92, controlled by air pressure. To restore the apparatus after the brakes have been applied, the engineman must open the circuit through coil 8 by depressing the push button; and the circuit breaker, 92, prevents the operation of the button from having any effect until after the air has actually been exhausted.

Circuit *C*, called the working circuit, passes through contacts

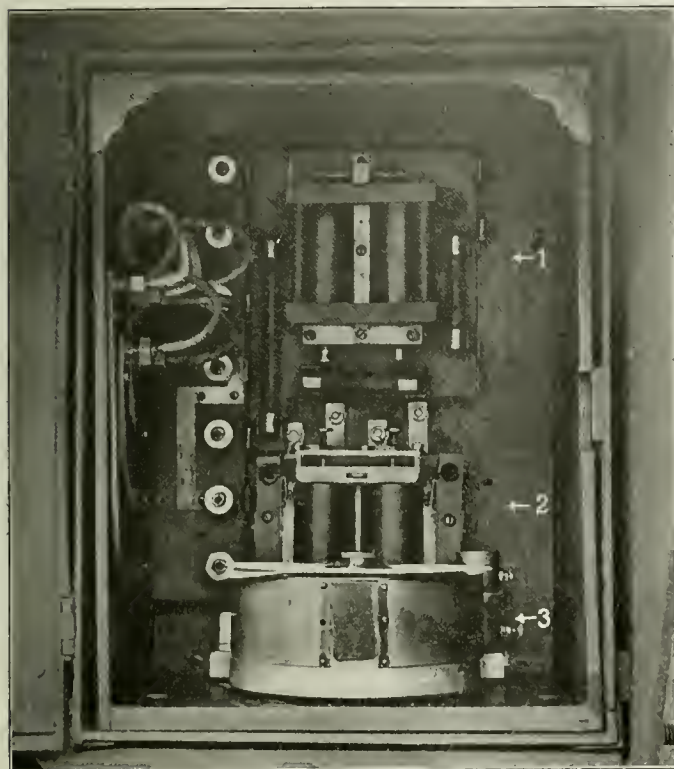


Fig. 1—Buell Cab Signal and Automatic Stop

Note—1, Governing Magnets; 2, Valve-Holding Magnet; 3, Recorder.

9 and 10 of armature 12 and controls the valve holding magnet *VHM*.

Circuit *D* energizes four electric lamps, *L*, arranged in parallel.

As shown in the illustration, the engine is entering the block section which controls track relay *TR*. This relay is energized by the track battery at the far end of the section, so long as the section is clear; and its armature, by closing the contact *k*, prevents the operation of the cab signal and train stop by making a path for the current from the front wheels to the driving wheels past the insulated joints *j* and *j'*. If the section which the train is entering is occupied by a preceding train, track relay *TR* will be de-energized, contact *k* will be opened and the passage of the locomotive over the insulated joint in the track will interrupt the current in circuit *A*. For a distant indication relay *TR* would be so connected as to be controlled by the condition of the track circuit next farther in advance.

In the experimental installations the track relay is so wound that its response to the passage of an engine is slow; so that if the road ahead is clear, the engine will not have caused the opening of point *k* before the leading driving wheels have passed the insulated joints.

Each of the two coils, 7 and 8, is wound to the same resistance.

When by reason of encountering the insulated joints the current through coil 7 is weakened, that through coil 8 is strengthened by means of the bridge wire *a b*; this causes 8 to attract the armature 12, breaking contacts 9, 10, which opens circuit *C* and de-energizes the valve-holding magnet, which causes the application of the brakes. By the opening of contacts 9, 10, a stronger current is made to flow through circuit *D*, causing the lamps to burn with increased intensity. The resistance of *R'* and of the magnet *VHM* and the lamps is so adjusted that normally the lamps burn at low incandescence. This gives constant

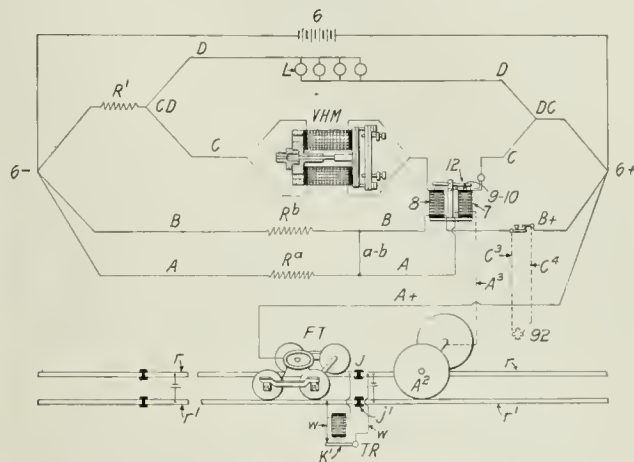


Fig. 2—Circuits of Buell's Cab Signal and Automatic Stop

evidence of the integrity of the circuit. The release of air caused by the operation of *VHM* continues until the engineman opens the circuit at the push button, which de-energizes coil 8 and allows armature 12 to again be attracted by coil 7.

The release of air, applying the brakes, also actuates the recorder which makes a punch mark in a paper disk every time the brakes are applied. The disk is revolved by clockwork, so as to make a record of the time and also, if adjusted for the purpose, a record of the location.

It will be seen that the engine carries only two instruments, the governing magnet, 7, 8, and the valve-holding magnet.

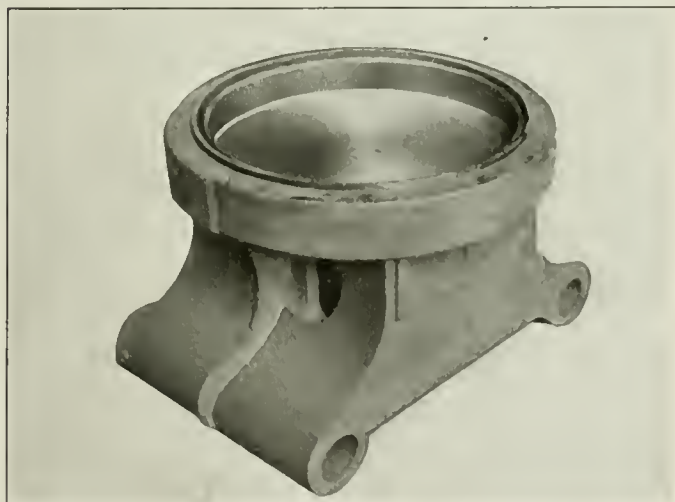


Fig.3—Insulated Center Plate, Front Truck of Locomotive

These are mounted in a box 18 in. x 24 in. x 12 in. (Fig. 1), fixed beneath the cab on the engineman's side.

This apparatus is made by the Buell Signal & Train Control Company, Washington, D. C. It is a development of several years of experiments, and the effects of jar and vibration are said to have been wholly overcome. The cost of equipping a locomotive is given as \$200. Where automatic block signals are in service the roadside equipment will cost but \$10 a block.

FEDERAL LOCOMOTIVE INSPECTION

At the conference between the representatives of the railroads and of the Federal Bureau of Locomotive Boiler Inspection, held in Washington the latter part of last August, the rules for locomotive and tender inspection submitted by the railroads and those submitted by the bureau were discussed and an agreement was reached on all rules except Rules 18, 29, and 31, regarding automatic bell ringers and locomotive headlights, as noted in the *Railway Age Gazette* of September 3, page 426. As a substitute for these rules the committee representing the railroads submitted the following:

"Bells and Bell Ringers.—Each locomotive shall be provided with a bell so arranged and equipped that it may be operated from the engineer's cab."

"Locomotive Headlight.—In order that the engineman shall have sufficient illumination ahead of the engine to allow him to readily perform his duties while operating in and out of passenger terminals and industrial sidings, while switching in yard, and to readily locate whistle posts, yard limit and crossing signs and such other land marks en route, a headlight on a road locomotive shall not at any time during service have apparent beam candlepower less than the following; the readings to be made in a vertical plane 25 ft. ahead of the focal center and referred to points at various stations in the reference plane:

READINGS AT CENTER OF REFERENCE PLANE

Reading point ahead of focal center	Apparent beam candlepower
500 ft.	Not less than 450 cp.
600 ft.	Not less than 400 cp.
700 ft.	Not less than 500 cp.
800 ft.	Not less than 500 cp.
900 ft.	Not less than 500 cp.
1,000 ft.	Not less than 500 cp.

AVERAGE SIDE READINGS (AVERAGE OF READINGS TAKEN AT EACH STATION 20 FT. EACH SIDE OF THE CENTER)

Reading points ahead of focal center	Apparent beam candlepower
50 ft.	Not less than 30 cp.
100 ft.	Not less than 110 cp.
200 ft.	Not less than 225 cp.
300 ft.	Not less than 315 cp.
400 ft.	Not less than 350 cp.

"The above readings are to be considered independent of the location of the headlight, the source and intensity of light, the design of the reflector, etc."

The locomotive headlight rule was based on the report of the committee on Locomotive Headlights of the Master Mechanics' Association, which was abstracted in the *Daily Railway Age Gazette* of June 17, 1914, page 1457.

A hearing was held before the Interstate Commerce Commission on September 28 and 29, concerning the contested rules and in the latter part of October the Special Committee on Relations of Railway Operation to Legislation representing the railroads, filed with the Commission a brief of the arguments against these three contested rules. The brief contained an abstract of the testimony presented at the above-mentioned hearing, bringing out the important features tending to show the inadequacy of these rules. The argument submitted in the brief consists of the following three points: "First, the rule for the inspection of locomotive headlights, filed by the carriers and recommended by the Master Mechanics' Association, is a definite, safe and practical rule, and scientifically adequate for all the purposes and uses of a locomotive headlight. Second, the proposed rule is unsafe and improper. Third, the Boiler Inspection Act of 1911, as amended by the Act of March 1, 1915, imposed no duty and confers no authority upon the Interstate Commerce Commission, other than to approve or to modify rules for the inspection of locomotives and their appurtenance."

Under the first point it is contended by the railway that the conclusion of the committee of the Master Mechanics' Association, which experimented with locomotive headlights, were based on the practical results of exhaustive test and that the recommendation were a scientific statement of the conclusion. It was believed practicable to leave the headlight matter to the judgment of the officers of the different road, but it is a general

rule is to be adopted it should, it was contended, be such as will meet the condition of the roads which have completely signaled their lines and which have a dense traffic and multiple tracks, so that the danger claimed to be inherent in the operation of a high-power headlight upon railroads operating under such conditions will not be present.

The greatest objection to the rule proposed by the Bureau of Locomotive Boiler Inspection, it was argued, is that it is indefinite and incapable of being reduced to a specification from which headlights could be made or reproduced. This rule, as it is presented, uses the terms "normal vision," "normal weather conditions." It was pointed out that there is practically no definition of "normal vision" and that "normal weather conditions" would be a variable quantity in different sections of the country, as well as at different altitudes in the same section of the country.

Testimony was presented by Mr. Crittenden, of the Bureau of Standards, to the effect that under the Bureau's rule, in case of a dispute as to whether or not a given headlight complies with the rule, it would be impossible for anybody to settle that dispute, because the rule is not sufficiently definite and does not provide a measurement possible to absolutely determine whether or not a headlight conforms to the rule. When asked in what respect this rule is indefinite, he stated: "It provides that a person with normal vision shall see an object the size of a man at a distance of 1,000 ft. I believe no person could undertake to determine that with certainty, because the distance at which you can see an object depends not merely upon whether it is dark or not, but upon the background against which you see it and upon the general amount of light and the surroundings, and upon the condition of the atmosphere. Moreover, what you mean by normal vision is not definitely established. That is, if we go to an oculist, he tells us we are of normal vision if we can see type of a certain size at a certain distance, but he makes no test whatever of the amount of light which we need in order to see that print. . . . I would naturally expect, therefore, aside from the other uncertain conditions, that different observers would be presumably able to see an object at different distances with the same light, and therefore without more definite specifications I would not want to attempt to say that any particular light was or was not strong enough to enable one to see an object at a certain distance."

The testimony also showed that there is no such thing as normal weather conditions, unless the term is strictly applied to very narrow limits of territory and to particular seasons of the year. The brief goes on to show the results of tests on various roads, and enumerates a number of accidents claimed to have resulted from the use of high-power headlights.

The third point brought out in the argument of the special committee was presented for the purpose of showing that nowhere in the Act of 1911 or in the Act of 1915 is there a requirement or even a permission, direct or indirect, to the Bureau of Locomotive Boiler Inspection, or to any other body or person, to require a particular kind of construction, or a particular type of equipment, the requirements being fully and solely as to inspection. This is intended to show that the Bureau of Locomotive Boiler Inspection has no authority to specify what should be placed on the locomotive, this applying to the automatic bell ringers as well as the locomotive headlights.

The Bureau of Locomotive Boiler Inspection has 15 days in which to file a brief giving its side of argument, and then the railroads will have 10 days more to file a return brief before the matter will be decided by the Interstate Commerce Commission.

RUSSIAN RAILWAYS AND PRIVATE ENTERPRISE.—The Russian Government is examining the project of a new railway to connect with ports on the Black and Azoff Seas. It is proposed to let the construction of this new line to "private enterprise."

THE BAGDAD RAILWAY.—The portion of the Bagdad Railway, 24 miles in length, from Teyen to Rasul, has been inspected by a technical committee and was open for traffic on August 23.

EDUCATION FOR RAILWAY WORK*

By SAMUEL O. DUNN

Education for railway and other business work is now passing through the stage of doubt, discussion and development that education for professional work passed through a half century or more ago. The courses of study and methods of instruction are as yet incomplete and imperfect, and there are many "practical" men who are still skeptical whether a man will stand a better chance of success in business if he takes a course in business administration or if he omits it and gets into business younger. A recent event has significance as indicating that many of our most prominent business leaders are convinced that college training for railway work is desirable. I refer to the foundation of the James J. Hill Professorship of Transportation at Harvard University. The contributors to the endowment of this chair included many of the leading financiers and railway managers of the country. Mr. Hill would not have permitted a chair of transportation to be established in his name, and these other eminent men would not have endowed it, if they had not believed in college training for railway work. Therefore, if any of the young men and women who have enrolled in the transportation courses at Northwestern have doubts as to the wisdom of their action aroused by the comments of "practical" men they can comfort themselves with the reflection that "practical" men of real eminence have signified their belief in college courses in the most unmistakable manner.

Pursuing studies in college is, of course, not the only way in which one can acquire the broad knowledge and the understanding of fundamental principles which are the best fruits of a liberal education. They may be acquired by study without any guidance except one's own. But one thing may be said on this subject without hesitation or reservation. This is, that broad knowledge and an understanding of the fundamental principles of one's business or profession are essential to great success; and that no one can get these without becoming and throughout his life remaining a good student.

The question arises, then, in what way is one most likely to become a good student? I myself am not a college graduate. I never went to college at all. I have, however, been a pretty diligent student all my life. Possibly, therefore, you might expect from me the opinion that a man is as likely to become a good student, and may become as good a student, by his own unaided and unguided efforts as under the stimulus and direction received in college. I hold no such view. You had as well expect a man to learn to play golf as well without instruction as with it, or to become as accomplished a violinist without instruction as with it, as to expect a man to become as good a student without a college training as with it. There are men who play golf well, there are even men who perform creditably on the violin, who never had any instruction. But most of the good golf players and good violinists have taken lessons; and the better they play the more confidently may it be assumed that at some stage of their careers they had instruction from competent teachers.

Likewise, most good students are college men; and the better students they are the safer you are in assuming that they are college men. There are a few men of such energy and natural ability that they will achieve a moderate, or perhaps even a great success in their chosen line of work without a college training, without other advantages, and even in spite of great disadvantages. But college training, whether along business or professional lines, would not make these men of power less powerful; and to men of less natural parts it is almost essential to enable them to make the most of themselves.

So I say to the young man who expects to enter railway work, and to the man who already is in railway work and wants to advance, devote all the time and energy you can to the acquisition of a broad knowledge and an understanding of the funda-

mental principles of the railway business, because with these you can hope to achieve a satisfactory success and without them you cannot. Do your studying in college if you can. If you can't go to college, at least study systematically and constantly the literature of your business—the books, the magazine articles and the periodicals devoted to it—and all the literature which even indirectly bears upon it.

Some railway men are likely to raise the question whether the colleges really do impart knowledge and help to an understanding of fundamental principles in their courses on transportation. It is a regrettable fact that their skepticism is not entirely causeless. There is much teaching regarding railway matters in our universities which is not satisfactory. No one has any right to criticize a professor of economics or of transportation or of any other subject for drawing his own conclusions from well authenticated facts, no matter how irrational the conclusions may seem. But the public, the railways, and most of all, the students in our schools have a right to demand that those who assume the responsibility of giving instruction concerning railway matters shall make sure they know the facts about them before they try to teach others. Unfortunately, there are some professors in our universities who seem more anxious to impress their own social and economic theories on their students than to impart to them real knowledge, and who do not take the trouble to ascertain the data on which their social and economic theories ought to be grounded. Unfortunately, some of them know a great deal more about so-called "social justice" than they do about transportation. I have read books and articles and heard addresses on railway subjects by professors in our universities engaged in giving courses in railway economics in which there were advanced pretentious theories, and, at the same time, disclosed a startling ignorance concerning the real history, organization, operation, management, wages, rates and financial results of our railways. Too many of our professors are content to study railway matters mainly through the reports of investigating committees, commissions and courts. These reports deal chiefly with what Professor Ripley of Harvard has aptly called the pathology of the business, and a man had as well try to learn the state of health of the human race by studying the sick brought into a hospital, or to get information concerning the domestic life of a people by attending the proceedings of its divorce courts, as to try to get a broad and correct knowledge of the railway business of this country by studying the reports of investigating committees and railroad commissions. The point of view of some teachers was illustrated recently when a professor of economics in one of our large universities, in an address before an important economic society, asked why it is that every time a railway is investigated there is something rotten found. The obvious answer is that only railways which have given strong reason for the suspicion that there is something rotten in them are investigated. Before college courses in transportation and railway economics generally will command the respect and confidence it is desirable they should, the teaching of these studies must be raised to a higher plane, and this will not be accomplished until the teaching is done by men who devote themselves to the acquisition of a thorough and intimate knowledge of the actual facts regarding the railway business before they begin to formulate theories about it. In order that a professor or an editor or anybody else outside the business may acquire this thorough and intimate knowledge of it he must not only master the literature pertaining to it, but he must also get and keep in close touch with the industry itself and with the men who are managing it as well as with those who are regulating it. One of the main reasons for the shortcomings of the teaching regarding railway matters in this country is that many of the professors do not get and keep in this close touch with the transportation industry.

It is not my purpose, however, to imply that all the teaching of railway matters in our universities is open to criticism. There are numerous professors who have devoted years to the industrious, intelligent and painstaking study of railway operating,

* An address at the annual opening of the Commerce School of Northwestern University, Chicago, September 24.

traffic and financial matters, and who, if their teaching is as good as their writing, are competent to serve as guides in investigating and reasoning about these matters.

I am frequently asked by railway men to furnish a list of books on railway subjects which it may be advantageous for them to read or that will be suitable to place in reading rooms or libraries. I have prepared a list of 39 books dealing with railway operation, organization, traffic, finance, etc., which I usually furnish in response to such requests; and I found in looking over the list this morning that 19 of the books in it were written by men who at the time they were written were teaching or lecturing in universities, while two others were written by men who were at the time graduate students in transportation. The books in this list are all accepted as authoritative in their respective fields, and the fact that a clear majority of them was produced in our universities is a high tribute to the class of work in this field which is being done in a number of our schools.

But there are some railway men who regard themselves as highly "practical" who question whether college courses in transportation can be made of much value even when the teachers are learned and able and the pupils are industrious and studious.

There are two arguments which can be made in support of the value of the scientific investigation and study of transportation which seem to be conclusive. One is based on theoretical grounds. The other is based on the careers of railway men themselves.

What, essentially, is it that we learn when we intelligently study the subject of transportation in statistics, books, lectures and so on? First, we learn what has been the experience of those who have actually done practical work in this field. Now, the experience of others has most valuable lessons for us. It is true that one's own experience is, in a sense and an important sense, his best teacher. But, after all, any one person's experience is necessarily very limited, and therefore he who never learns except by his own experience never learns much. Secondly, by the study of transportation subjects we learn how those who have given time and thought to these matters have reasoned about them, the conclusions which they have reached, and the fundamental principles which they have established. Now, any man, in order to do good work, must act on rational grounds. And does it not go without saying that one is more likely to act on rational grounds if he knows how others have reasoned when they have been confronted with the same problems that he meets, and what conclusions they have reached and what principles they have established, then if he is ignorant of these things?

The experience of railway men themselves on which I base the argument for the scientific investigation and study of transportation matters as an essential to real success in railway service is the experience of those who have made the greatest successes in that service. A large majority of the higher officers of our railways have not had college educations and have risen from the lowest ranks of employees. This might be superficially assumed to indicate that college training and "book learning" are hindrances rather than helps to advancement in this field. No assumption could be more incorrect. The main reason why there is only a minority of college men among the higher officers of our railways is that the number of college men who enter any business is small compared with the total number who enter it; that this is as true of the railway as of any other business, and that therefore the number of college men who rise to the top is bound to be small compared with the total number who thus rise. The number of college men holding high positions on our railways is, however, very large in proportion to the number of college men who enter the business. The railways of the United States in 1913 had 1,815,239 employees. Of these, 4,400 were classified by the Interstate Commerce Commission as general officers; and of the general officers no less than 1,076, or 25 per cent, are shown by the Biographical Directory of Railway

Officials to have received a college training. These were divided as follows:

Chairmen of executive boards and presidents.....	67
Vice-presidents	85
General managers, general superintendents and division superintendents	160
General solicitors, general counsel, general attorneys and commerce counsel	113
Traffic managers, general and assistant general freight agents.....	65
Secretaries, treasurers, auditors or controllers.....	76
Mechanical superintendents, mechanical and electrical engineers.....	91
Chief engineers, consulting engineers and engineers of roadway or maintenance	265
Miscellaneous, including purchasing agents, general passenger agents, general baggage agents, etc.....	154

Considering how small a part of those who enter railway service are college men, the fact that from this small part have been recruited one-fourth of all the general officers is as high a tribute as could be paid to the value of a college training. A large majority of these men took engineering courses in which they applied themselves directly to the study of railway civil and mechanical engineering, these being the first specifically railway subjects taught. Now that our educational institutions are giving an increasing amount of attention to railway work in all of its branches, the proportion of officers recruited from among college-trained men may be expected to increase.

The value in railway work of a broad education is further illustrated by the fact that a large majority of the higher officers who are not college men are students in the best sense of that word. I have had opportunity during a rather active life to come in contact with men in many walks of life, and I venture the opinion that there is not in this country another class of business or professional men which excels the higher officers of our railways as a body, in that many-sided intelligence which can be acquired only by a combination of wide reading and study and intense practical experience. And those higher officers of the railways who have not had college training owe almost, if not quite, as much of their success to the broad knowledge and the understanding of fundamental principles which they have derived from study as do those who are college men. A striking illustration is afforded by the head of one of our largest railway systems—a man whose name is recognized all over the world as that of an operating executive of long practical experience, of boundless energy and of great ability. This man, who began active railway work in one of the lowest ranks of the service, states that he reached the turning point in his career when he stumbled on a copy of Wellington's book on "Economics of Railroad Location." From that time he became a student railway man as well as a practical one, and he has ever since been as intense and energetic in his study of railway literature as in the performance of his daily work. He knows the literature of his business thoroughly, and you seldom meet him that he does not start a discussion of some new book or article on transportation he has just read. He is, besides, a good amateur connoisseur in painting, he plays the violin and he has very recently begun the study of French! And that man, among other things, has spent \$110,000,000 in improvements on his railway within the last five years. Of such material are our great railway managers made.

Even though broad knowledge and an understanding of fundamental principles would have been of less value in the railway business in the past than they have been, they would be indispensable to the highest success in this business in the future. In the past there was nobody that it was especially important to the railway manager that he should please but the owners of the property, and it was not especially important that his subordinates should please anybody but him. Now the management must not only run the property successfully from the stockholders' point of view, but it must justify to the public and to regulating bodies representing the public everything that it does, act on sound principles. If they must act on sound principles, But if people must be prepared to justify all they do, they must act on sound principles. If they must act on sound principles, they must know what principles are sound. But an understanding of sound principles and of the conditions and reasons on

which they are based is never attained except by hard study and careful thinking. Therefore, the changes which have occurred within recent years in the conditions under which railways are managed have made a liberal education more necessary to great success in the railway business than ever before. I do not mean that it has made a college education more necessary, but that it has made a liberal education more necessary, whether acquired in college or out of college. The increasing demands and power of labor organizations, the large advances in wages, the insistence of the public on better service, the regulation of railway rates and all phases of operation—these and other conditions are rendering essential greater engineering skill, more ability in handling men, more knowledge of economics, greater aptness for diplomacy, more knowledge of and a broader outlook on public affairs, than were formerly required. The railway having become fully recognized as a quasi-public concern, its officers are becoming recognized as quasi-public officers. Therefore, they need the best qualities of the business man united to the best qualities of the statesman.

Theirs is a high calling. It is also a very difficult calling. Whether private ownership and management of railways will be continued in this country will depend largely on how the managers of the railways measure up to the demands of their calling; and how they will measure up to them will depend largely on whether the men now in the business and those who enter in future give as much attention in proportion to the theoretical, the scientific and the ethical side of their business as to its practical side.

RAILWAY DEVELOPMENT ASSOCIATION

The semi-annual meeting of the Railway Development Association was held at the Hotel McAlpin, New York, this week, beginning Tuesday, November 9, John C. Emig (C., C., C. & St. L.), presiding. The association was welcomed to the city by Chamberlain Bruere for Mayor Mitchel.

The first paper presented was by John F. Fox, immigration agent of the Northern Pacific, on the subject of "Immigration Field Work." Mr. Fox said that settlers who become good, thrifty, prosperous and productive citizens and the expanding industrial enterprises they create and foster are the two chief factors upon which the future success and well-being of a railway are founded. Immigrants may be secured by advertising, by personal solicitation, or by exhibits at country fairs or other places, but every effort should be made to secure only that sort of immigration which will result in material benefit to the settler as well as to the railroad.

In the discussion of Mr. Fox's paper considerable attention was paid to the land locator or real estate shark and to the frauds frequently worked on settlers by unscrupulous land agents. Several speakers believed that the matter should be more carefully looked after by the national or state governments, some proposing that these men be licensed or bonded. The matter was left with a special committee which proposed a resolution adopted by the convention urging Congress to license such locators as a protection to homeseekers.

ADDRESS BY GEORGE A. POST

George A. Post, president of the Railway Business Association, was expected to speak on the subject of "General Railroad Business." Finding that title slightly too broad, however, he spoke on "Corkscrews and Other Openers." An abstract of Mr. Post's address follows:

The men who constitute this association are "openers" of a high degree of efficiency. You are close students of the opportunities afforded by your respective lines. You are more fortunate than are some other departments of railway operation, in that you are constantly brought in contact with the public, and are made aware of their necessities and their diverse viewpoints. You know that your railroads must have ever increasing volume of traffic; you know that this means that productivity of everything that requires transportation must be aug-

mented by every available resource that human ingenuity and persistence can devise. You must make plans, and strive to execute them, that will attract favorable consideration of what you have to offer. You must dream dreams, and seek to have them materialize into profitable realities.

It is for you to match your wits against those of the parties with whom you deal, and see to it that they get what they actually need for their purposes, which will at the same time be profitable to the railway. They must not get away with anything they are not entitled to, and which, if they did, would be injurious to your company. You gentlemen know that nothing can happen to your railway that could be more serious than for you to overreach and put some scheme across that would leave a sore feeling in the hearts of those with whom you deal. A grievance, however small, that is left to rankle, grows and spreads like a prairie fire, and in the end the railway gets by far the worst of it.

Whatever may be the faults of our regulatory system, now in vogue in our states and the nation—and there are many serious ones—it cannot be denied that much good for the public and the railways has been evolved thereby. That there has come about during the past few years a better feeling toward the railroads than existed at one time, there can be no doubt. A reason for this is that the public now knows a great deal about the problems that harass the railroads, and the difficulties under which they are operating. They have had their eyes opened. Railway officers, once reticent from habit, or unaccustomed to public speaking, have found that reticence will not satisfy the public demand for information, and that hesitant speech conveys the idea of ignorance, or unwillingness to answer, when they are haled before public bodies for interrogation as to railway affairs. In other words, they have had to "open up."

I have been an eye-witness of many ordeals through which railway officials have passed during the past seven years. I have seen men of high station thoroughly discomfited by their lack of equipment for forensic fray. It was not because they were not able administrators, fitted by experience and wisdom to preside over the destinies of invested capital, but because they could not concisely, incisively and persuasively tell the things they knew. But they have been apt pupils, and to-day there is a large number who, with easy pose and fluent tongue, win applause as they appear upon the rostrum, and inspire confidence at the bar of inquiry.

It is largely because of this attitude of the railways toward the public, and their acquired ability to make cogent statements, whereby a better comprehension of railway facts is vouchsafed, that the attitude of the public has become so much more favorable toward the railways. Instead of turning deaf ears to railway officials when they tell of their situation and financial perils, thoughtful people now listen and take heed. After all, there are but few folks who bait the railways as a business, and these make a living by doing so. The more people know about the railways, the more meagre will become the menu of the professional baiter. The general public realize that anything that really and seriously cripples our railroads, hurts the public as much as, if not more than, the railroads.

As the incalculable importance of our railroads is opened up to the view of the public, the greater is the public appreciation of the wisdom of fair treatment of them by the public. Some things fortunately have been opened up regarding past railway manipulations that have been discreditable, and that have filled the air with the stench of iniquity. Their exposure has been a splendid job too. They cannot and must not ever occur again. Secrets give birth to suspicions. This is a day for everybody to get out into the open. Things done in the open are quite sure to be circumspect. Railroad operations are now open and above board. The public knows, or it may know if it so desires.

"General Railroad Business" is, I recall, what your program says I am to talk about. Well, the general business of railroads is to act as "openers." Do they do it? Are there vast areas

of land awaiting the tiller? They are opened to settlement by a railroad. Would we open the mountains and make them disgorge their buried treasures of gold, silver, copper, iron or coal? Bring us a railroad, is the demand. Would you open a factory, and hope to be prosperous, without a railroad? How do we open up markets? With railroads, of course! Do cities wax great and are they peopled by busy artisans, whose fabrications reach to all parts of the globe? They have been opened to nation-wide and world-wide commerce by railroads. When railroad business is *general*, things are wide-open. When it isn't, they are closed. When we think of business in general, we inquire: What are the railroads doing?

INTENSIVE AGRICULTURE

W. H. Olin, agricultural commissioner of the Denver & Rio Grande, gave a brief address on intensive agriculture. Mr. Olin's road does a large business in potatoes, the quantity shipped yearly from that territory to distant points amounting to 7,500 carloads. He gave an interesting sketch of his investigations and studies to learn the best kinds of potatoes to be raised on different soils and the best kinds to satisfy different classes of buyers. Furnishing officers of other roads with information about traffic conditions on his line, he received in return useful lists of jobbers on those other roads to whom he could recommend the shipment of potatoes.

In the discussion on this address, J. C. Clair (Ill. Cent.), told of the activities of his department in promoting the sale of Southern fruit and vegetables in northern cities. Information as to marketing was circulated among the farmers in the South by means of photographs. Truck farmers in Tennessee have been induced to form an organization for the dissemination of information, and the road proposes to send men there to give specific instruction as to the best methods of packing for northern markets. In Louisiana, whence the Illinois Central has a large movement of strawberries, the road has employed the best talent to go among the farmers and show them how to get rid of a serious pest that reduced the strawberry crop last year. The information which was developed on this subject has been given to the Agricultural Department at Washington. This year the road has taken out of Tangipahoa parish, Louisiana, about 1,250 cars of strawberries and the American Express Company about the same number.

EXPORT TRAFFIC

This was the subject of a paper by W. S. Kies, vice-president of the National City Bank, New York City. Merchants and manufacturers all over the country still need much advice and instruction concerning the best methods of learning the wants and the wishes of buyers in South America and other comparatively new markets, and Mr. Kies pointed out to the railroad men how they, both in the public interest and in their own, could disseminate this information fully as well as any other class. Our foodstuff exports have become secondary to those of manufactured products, and the present opportunity to extend on a permanent basis our trade in factory products in the markets which our European rivals are temporarily forced to neglect should be more properly cultivated.

The sooner the American people come to recognize the fact that the permanent extension of our American trade in manufactured goods is absolutely essential to our continued domestic prosperity and rightful position in international trade, Mr. Kies declared, the more rapidly and efficiently shall we be able to develop foreign markets. Our national life is becoming more and more dependent on our manufacturing industries and new markets are necessary through which to maintain a capacity output on the most economical basis.

HIGHEST FUNCTION OF THE INDUSTRIAL DEPARTMENT

W. W. Wood (B. & O.) delivered a carefully prepared address on "What Makes the Department Permanent." Discussing the constant changes in railroad customs and ideals, he gave

interesting details of the early history of the Baltimore & Ohio, which had no vice-president until 1866 and no officer with the title of general manager until 1884. Railroad managers of the earlier days made mistakes, of course, and a common fault was arrogance toward the public. This culminated in what has been called the "public-be-damned spirit"; and about that time arose the industrial department. This department, more than any other, is truly a servant of the public. Of all departments, except this, it may be said that at least a part of its functions are not public; but there should be at least one railroad department that is always wide open to the public; and the industrial department is that one.

The railroad officer dealing with the public should give the real reasons for his decisions. Telling people simply that you do not see your way clear to do so and so does not go in these days. It is good to compel yourself to formulate reasons that will be acceptable; possibly in the formulation you will see more clearly, will reverse yourself, and give your customer a more favorable answer.

We are in many cases the mediator between the traffic or the operating department and a shipping. This is an important function. The speaker cited cases where it took 45 days to get approval of a new side track. Half that time may defeat the plans of a prospective industry. It is our duty to prevent such unreasonable slowness.

Every industrial agent should keep himself very fully and minutely informed as to the character of his freight territory; all of it. It is his business to gather and record this information better than any one else can do it. And he must remember that his studies ought to be largely for the future. If a certain district, large or small, finds its source of raw materials has failed or is becoming more costly, why can you not jump in and see that an economical substitute is furnished from the mines or forests on your line? To keep fully abreast of the times is our duty not only to ourselves and our employers, but also to the public. If we do not keep up to date we are liable to find the government stepping in and supplanting the carriers. If the railroads do not do their very best, we shall wake up some morning and find ourselves reporting to the Department of Commerce!

Following this paper, C. C. Dana (A. T. & S. F.) spoke of on "Eliminating Competition by Locating Industries on Joint Tracks." He emphasized the necessity of complete frankness with the public. Excessive fear of competitors, or excessive zeal in circumventing them, will fail. It is quite possible to induce a city to encourage a new industry which cannot possibly succeed in that location; but to do so is a grave mistake. Railroads ought to combine and deal with cities jointly. Acting in this way, and having made a thorough industrial survey of a city, it is to the interest of the railroads to act together. To eliminate unnecessary strife the railroads, going to a city which desires new industries, should ask to have appointed a citizens' committee to select locations for industries. This frankness and impartiality will make friends; and no road is harmed, for no one can get all the traffic of a given factory, anyway.

Mr. Wood's and Mr. Dana's papers were discussed together. J. C. Emig (C. C. C. & St. L.) said that it was the policy of his company to encourage joint locations on the tracks of two or more roads.

D. E. King (Mo. Pac.) spoke of the duty of the industrial commissioner to mold public opinion. The industrial commissioner often is better able to do this than any other department of the railway; and a commissioner, doing this well, will find the other departments coming to him for aid in matters of this kind. It is practicable even to shape the views of people on political subjects. Where two or three roads enter the same city, the railroad men, by acting in unison, disarm prejudice and can enlighten the people on transportation matters to mutual profit.

F. A. Spink, traffic manager of the Belt Railway of Chicago, agreed with Mr. Dana that the day of exclusive terminal privileges is fast passing. In most cities reciprocal switching arrangements are now in effect. In Chicago a manufacturer finds little or no advantage in an exclusive location, neither does the road

enjoying that exclusive arrangement. Frankness with competing roads does away with much friction. If a prospective new industry is worth going after everybody knows it. The industrial commissioner needs constantly to work for efficiency within the railroad organization. To be six weeks in answering a request from a prospective new customer when the matter might be settled in six days—or perhaps six hours—by going direct to the officer who has authority, is absurd and wasteful. It is the industrial commissioner's duty to get such obstacles removed.

J. C. Clair (I. C.).—At competitive points the railroads should not only act in unison, they should take the initiative in securing action by municipal officers looking to economical construction and operation. The railroads may well do what they can to promote the establishment of a manufacturing district in growing cities. Interurban roads should be encouraged; by the facilities which they give to the people they will promote travel on steam railroads. The wide-awake industrial commissioner does not confine himself to industries situated on his own line. You may now and then do a fine thing for your own road by cultivating business in a city many miles away from the line.

R. W. Hockaday (M. K. & T.) agreeing with previous speakers in regard to co-operation among rival railroads and also in the matter of getting growing towns to set aside a manufacturing district, gave examples of what he had done in this respect in Oklahoma. His road is at all times ready to take its chances with competitors at any joint location.

CO-OPERATION WITH COMMERCIAL BODIES

This was the subject of an address by Richard C. O'Keefe, general secretary of the Buffalo Chamber of Commerce. Mr. O'Keefe outlined the early history of railroads in America, showing that co-operation between the public and the owners of the railroads was natural. The federal government, the individual states and cities by the hundreds encouraged the building of railroads and gave their money; and in every way showed that transportation was a vital part of the life and progress of any community. The pioneer railroad builders did not get their money in Wall street, they got it from men actively interested in local commercial enterprises. The federal government aided railroads to a considerable extent, and under slightly different circumstances would, no doubt, have gone much farther. Indeed, freedom from regulation was, in the early railroad era, a form of aid. The speaker enumerated a dozen states which gave aid to railroads. The state of New York aided them to the extent of \$8,300,000, of which sum only \$750,000 was ever paid back. The city of Buffalo took a substantial interest in the Buffalo, New York & Philadelphia and the Buffalo & Jamestown.

Mr. O'Keefe finds that the railroads do not seem to desire to co-operate with commercial bodies. Why should not the carriers co-operate with business men in the cities in the same way that they do with the farmers? Commercial men are annoyed by the fact that railroad representatives lack the authority to settle matters until after tedious correspondence with headquarters. The merchants are the real friends of the railroads, as witness the recent action of the Merchants' Association of New York City in making a thorough investigation of the question of mail pay and publishing a report favorable to the railroads.

AGRICULTURE

This was the title of an extemporaneous talk by Professor Alva Agee, director of the New Jersey State College of Agriculture, New Brunswick, N. J. Professor Agee gave an illuminating mass of facts concerning what is needed to improve agriculture and the interest which the railroads have in this subject. Railroads could be named, he said, the stock of which would increase 50 per cent in value if all of the land tributary to their lines were brought up to its full productivity. The railroads and the agricultural colleges are natural friends, as the colleges were created for the very purpose of making the country more fruitful.

Do not aim solely at the production of heavy and bulky freight. Diversity is what makes the people of a given territory

prosperous, and it is to your advantage to encourage such agriculture as is profitable to the people, whether it does or does not make heavy tonnage directly.

Railroads can well afford to carry lime for the farmers at cost. Nine-tenths of all the land between the Mississippi river and the Atlantic ocean could be made more fertile by the addition of lime; at least a ton on every acre every four or five years. Carry this lime at cost and you will make yourselves rich thereby. The speaker congratulated the railroads on their agricultural demonstration trains. Moreover, the country railroad station is one of the best places in which to display charts and other instructive matter for the benefit of farmers. The problem of soil fertility is unbounded in its possibilities and every encouragement should be given to our research institutions which are enlightening the public on this matter.

FRUIT GROWING

This was the subject of a talk by J. H. Hale, the well-known peach grower of Connecticut, who is also a member of the Public Utilities Commission of that state. Mr. Hale gave an interesting sketch of the progress of civilization from the time when fruit was cultivated primarily to get something to drink—cider or wine—down to the middle of the nineteenth century, when the fruit traffic began to have commercial importance. The consumption of fruit must continue to grow, as the people learn its virtues. Fruit is the only important food that is perfectly fit for use without the cooking, the killing and the machine work necessary with other substances. In 1885 there was no long-distance traffic in cantaloupes and none whatever in carload lots. Now, 25,000 cars of this fruit are moved yearly. In 1890 Mr. Hale, reporting for the census, predicted that in 1900 southern California would ship 10,000 cars of oranges and lemons and was called wildly extravagant; the event proved that his guess was only half large enough. Now, the movement is 45,000 cars yearly. Of all kinds of fruit he estimated that the railroad movement in this country is 200,000 cars annually, producing a revenue of fifty or sixty millions.

Do not overdo the promotion of fruit traffic. Georgia became prominent as a peach state 25 years ago; by 1905 it had 18,000,000 peach trees; then thousands of small farmers got the fever and there was much waste by poor management; and today the state has perhaps only 8,000,000 trees, but these are under intelligent care. The railroads—the Central of Georgia, the Southern, the Atlantic Coast Line—have given the peach growers excellent service. Mr. Hale, commending what Professor Agee had said about lime, told of how, by persistent efforts with the carriers and with the producers of lime, he had been able to get a large reduction on the former prohibitive price of \$8 a ton for lime for his lands in Connecticut, and now was improving them rapidly by the use of this fertilizer.

The railroads could greatly expand the fruit business by promoting the shipment of carload lots to smaller places. Towns of from 5,000 to 12,000 inhabitants now go to larger cities when, with suitable encouragement, and a lower minimum carload weight, they would get fruit direct from the orchards and thus there would follow an increased consumption.

Wednesday afternoon was devoted to a steamboat trip around New York harbor.

THE BANQUET

The toastmaster at the dinner on Wednesday evening was S. C. Mead, secretary of the Merchants' Association of New York, and the speakers were Howard Elliott, president of the New Haven; John W. Weeks, Senator from Massachusetts, and Ralph Peters, president of the Long Island.

Mr. Elliott confined his attention largely to the work of the association considering its activities from the three standpoints of immigration, agricultural development and the encouraging of a friendly feeling towards the railways on the part of the public. Mr. Elliott also made a strong plea in his address for a proper regard for the needs of the country's transportation system.

"The load upon the transportation business has been very

heavy, and railroad owners and managers have tried hard to carry it. They are in the position of trying to serve 100,000,000 people, to treat fairly nearly 2,000,000 employees, to respond to the conflicting rules, regulations and demands of 48 sovereign states and to pay close attention and obedience to the nation, acting through Congress and the Interstate Commerce Commission. Meantime, the country has been growing, and the result has been a diversion of the energy of the owners and managers into channels that were not productive for the country as a whole, and the railroads have not been able to do the best they could to prepare for an increasing volume of business. So, to-day the country is face to face with inadequate facilities, and there should be good temper and co-operation by all to do the work needed to bring the transportation plants up to the present demands and to have a safe margin for future demands."

Senator Weeks made a strong plea for private or corporate enterprise as against government enterprise, taking issue with those who sought to maintain that the people of the country did not want to curtail the activities of the government, but wanted rather to enlarge them. Politics, in his opinion, prevents the government either from conducting business wisely or from interfering wisely in the management of business by others. He then went on to point out wherein the government was not a good business agency and to show further wherein it also hindered private development. The nation, for example, is suffering from too much legislation. "If we had one-tenth of the legislation that we have," he said, "the country would be indefinitely better off. If congress and the state legislatures were to meet this winter, pass the appropriation bills necessary for five years and then adjourn for that time the country would benefit thereby." It is the opinion of many that a great deal of money could be saved in the operation of the post office as, for example, through changes in the manner of rural delivery; so much does politics enter, however, that this is impossible. There is always a tendency on the part of officers and bureaus of the government to take unto themselves powers which laws are not meant to give them. Mr. Weeks here instanced the ruling, soon after rescinded, whereby the comptroller of the currency sought to check the banks from delivering or receiving money in automobiles.

The Sherman anti-trust act came in for a degree of censure. It has frequently acted as a deterrent on business, but rather because of the manner of its enforcement than of its form. Mr. Weeks also maintained that commission regulation sometimes was a deterrent to private initiative and witnessed the Interstate Commerce Commission's order in the express case, whereby even after scientific investigation rates were established that were so low that the express companies were made to operate at a deficit.

Mr. Peters told of the problem the Long Island has worked out in its territory, emphasizing the importance of truck farming as a revenue producer for his road. He also spoke of demonstration farms making the claim that the Long Island had the first of that kind in the country.

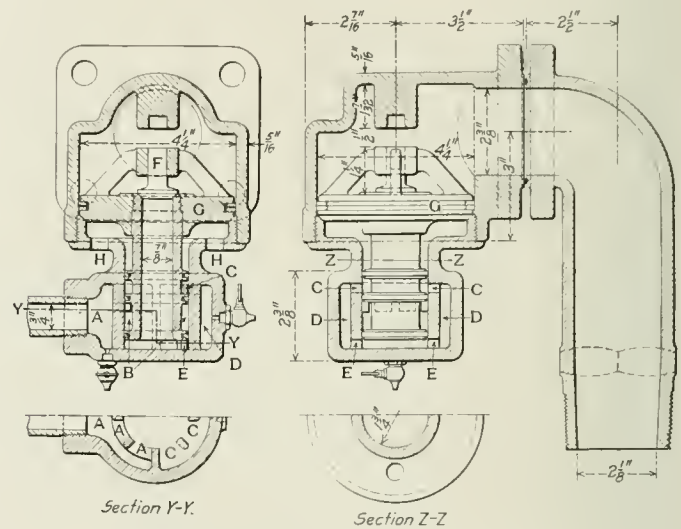
The proceedings of the third day, Thursday, will be reported in a later issue.

GERMAN LOCOMOTIVES AND THE COPPER SHORTAGE.—The Nakskov Tidende, of Copenhagen, says that the railway company owning the local Kragenroe (Norway) line has just taken delivery of some locomotives from Germany under circumstances which indicate Germany's lack of copper. The German contractors first demanded that the locomotives should be exchanged for copper, which the company declined, pointing out the existing prohibition of copper exports. The contractors then suggested that an equal quantity of copper to that used in the locomotives should be returned, which the company also declined. Finally, the manufacturers proposed that the whole amount of the purchase should be paid in copper coin, but the company again refused, whereupon the locomotives were reluctantly delivered against ordinary payment.

AUTOMATIC DRIFTING VALVE

A drifting valve designed for use with superheater locomotives, by means of which live steam is automatically admitted to the cylinders in small quantities when the locomotive is drifting, has been developed on the Minneapolis, St. Paul & Sault Ste. Marie. It has been used with considerable success on the Soo Line's large superheater locomotives and patents have now been secured.

As shown in the drawing, the valve is designed to replace the ordinary steam chest relief valve which it somewhat resembles in appearance. It consists of a two-part casing within which operates a piston valve with a hollow ring-packed stem. A $\frac{3}{4}$ -in. extra heavy pipe from the steam turret in the cab is connected to the casing and admits steam to chamber *A*. A valve is provided in the cab to shut off the supply of steam to this pipe if desired, but in practice the valve is open when the engine leaves the roundhouse and closed when the engine reaches the cinder pit. Through ports in the inner well of chamber *A*



Drifting Valve for Superheater Locomotives

steam is admitted to the annular space *B* surrounding the hollow stem of the piston valve *G*. So long as there is pressure in the cylinder and steam chest the piston valve remains seated in the position shown in the drawing. When the throttle is closed and the engine is drifting, as soon as a vacuum forms atmospheric pressure acting upward against the piston valve through the ports *H* in the casing raises the piston $\frac{1}{2}$ in., which is the limit of its travel. This movement places the annular space *B* in communication with ports *C*, through which steam from chamber *A* passes into chamber *D* and thence, through ports *E*, to the hollow stem of the piston. The check valve *F* is raised from its seat and steam passes directly into the steam chest and cylinders.

As soon as the engine stops or for any reason a slight pressure accumulates in the cylinder the piston valve is forced downward to its seat, thus cutting off communication between the annular space around the hollow stem and chamber *D*. This device has been found to greatly assist in the proper lubrication of cylinders where superheated steam is used.

SPECIFICATIONS FOR EUROPEAN RAILWAY EQUIPMENT.—With the object of placing in convenient and accessible form before persons in this country who are interested in railway materials, the United States Bureau of Standards, in connection with its investigation of failures of such material, has obtained, through the courtesy of the state department, copies of specifications for railway material—rails, axles, wheels, and tires—used in several European countries. These specifications are given in full, together with a digest and discussion, in a forthcoming circular of information from the bureau. Available data concerning the types and weights of foreign railway equipment are also given.

General News Department

The Chicago & North Western has made an advance of five per cent in the wages of station agents, telegraphers and levermen.

The shops and roundhouse of the Chicago & Illinois Midland at Taylorville, Ill., were destroyed by fire November 4; loss \$65,000.

Telegraph operators and agents on the Chicago & Alton have presented a demand for a 15 per cent increase in pay and changes in working conditions.

At a public hearing in Boston, November 5, officers of the New York, New Haven & Hartford presented testimony to the effect that the current of the stream in the Cap Cod canal is so strong that the foundations of the railroad company's bridges across the canal—two of them—are threatened. Testimony of marine men was introduced to the effect that to prevent damage to the banks of the canal by the tidal currents, it will be necessary to build a lock or locks.

A chrysanthemum plant with a spread of 15 feet constituted a freight shipment carried by the New York Central recently from Dobbs Ferry, N. Y., to Cleveland, Ohio. The plant is covered with 1,200 blossoms making it literally a gigantic bouquet. It was conveyed on an open car which had been made specially to carry heavy ordinance, and was packed on edge with the lower edge resting only about 6 inches above the rails. The plant is to be exhibited in a flower show at Cleveland, November 10-15.

The Interstate Commerce Commission has just issued an order requiring every common carrier whose property is to be valued to prepare and file with the commission at Washington within six months a statement showing the name and date of the incorporation and the date of organization. It also requires a description of the railroad or portion of the railroad constructed by each separate corporation, with complete data as to mileage and termini, the length of time which such railroad was operated by each corporation and the proceedings by which any corporations were dissolved. This order also requires the filing of a diagrammatic chart showing graphically the development of the present corporate ownership of the property, to be made like a sample chart of the Cincinnati, Hamilton & Dayton, prepared by the commission.

Lackawanna Cut-Off Opened

The new line of the Delaware, Lackawanna & Western, between Clark's Summit, Pa., and Hallstead, 40 miles long, was put in use on Saturday, November 6. Brief dedicatory exercises were held at Nicholson, on Saturday afternoon, the governor of Pennsylvania making a short address.

An account of the work on this improvement, including views of the Tunkhannock viaduct, the largest concrete bridge in the world, was printed in the *Railway Age Gazette* last week, page 809. Elimination of curves and grades by this cut-off will enable through trains to make their runs in considerably less time; but schedules will not be materially shortened at present.

American Honored in China

A cablegram from Peking announces that the Chinese government has awarded to George Bronson Rea the grand prize, including among other things several thousand dollars for a national system of railways. Mr. Rea is an American engineer and journalist and the editor of the *Far Eastern Review*. His scheme of railways comprises a system of 20 trunk lines aggregating some 11,000 miles of line and attains a special importance because it attempts to get away from the present manner of building railways in China whereby financing and construction have been fitted to the policies of foreign governments.

Mr. Rea was at one time deputy director general of the Chinese National Railway Corporation, serving as such under Dr. Sun Yat-sen, who, after he had resigned the presidency, was

empowered to build all the future railways in China. While holding this position he negotiated a contract for 1,000 miles of railway to cost \$60,000,000 with Pauling & Co., of London, which with contracts for 4,000 miles was never carried out because Dr. Sun became implicated in the revolution against President Yuan Shih-Kai. Mr. Rea, however, later became adviser or technical secretary to the ministry of communications and was requested to design another national plan more in accord with the strategical needs of the government. It was about this time, December, 1913, that the competition was decided upon and engineers were invited to submit their plans with full statistics as to population, trade, cost and revenues and full data on the commercial and strategic importance of the proposed lines. Mr. Rea was on the way to completing negotiations with railway constructors of England, France, Germany and the United States for the financing and construction of 10,000 miles to cost \$500,000,000 on the basis of Chinese participation in an international company when Dr. Chen Chin-tao, the financial expert of China, intervened. Before matters could be straightened out the present war broke out and negotiations were broken off.

Trial of the New Haven Directors

The government attorneys who are attempting before Judge Hunt, of the Federal Court, in New York, to show how the New Haven throttled competition in New England spent Thursday and Friday of last week in bringing out the relations of the company with the Joy Steamship Company. The New Haven made successful efforts to prevent the boat line from leasing boats and at times had to establish special rates for water transportation. Mr. Dunbaugh, at one time president of the Joy Line and also its head for two years after the New Haven had bought out the line in 1905, was on the stand on Friday. He was cross-examined by Charles F. Choate for the defense, Mr. Choate aiming to show that the Joy Line before 1905 cut the regular rates, sometimes made special rates to shippers and absorbed some pier delivery charges, whereupon the New Haven had to take steps to protect itself. The witness expressed the opinion that the arrangement made in 1905 resulted in better service.

Chester W. Chapin, former owner of the Central New England, testified on Monday relative to that roads attempt to secure access to Springfield, Mass., in which it was successful despite the hostility of the New Haven. In 1904 Mr. Chapin sold his interest in the Central New England to the New Haven.

Mr. Chapin was followed by Mr. Mellen, who again took the stand to testify concerning the New Haven's activities while he was president. At this time the government introduced the following letter written to President Hall, November 21, 1895, Mr. Mellen being at that time president of the Northern Pacific:

"My idea of the Central New England has been never to handle it as a through line as it is run today. My idea is to operate it from Hartford to Poughkeepsie as a local road, merely giving service sufficient to take care of local traffic. It is an acquisition necessary to the New Haven as a second step to the acquisition of the New England, as otherwise it would develop into a formidable competitor."

Mr. Mellen on Wednesday told how as president of the New Haven in 1901 he acquired control of the Central New England for only \$5,000,000, whereupon William Rockefeller congratulated him for the acquisition at that low price.

Mr. Mellen wrote to J. P. Morgan in March, 1901, regarding the Poughkeepsie Eastern, which was in receivership, and was not making operating expenses, but owned valuable terminals, saying: "The Poughkeepsie Eastern has a nuisance and real estate value on account of terminals in Poughkeepsie which we could use. I have not the authority to purchase the Poughkeepsie Eastern, which is worth \$150,000, but I think we could depend upon the indulgence of the directors if we overstep our authority and ask approval afterwards."

At the request of one of the government attorneys, Mr. Mellen explained what he meant "nuisance value" by saying: "I

objected very seriously to seeing any property I could use belonging to anybody but the New Haven."

Mr. Mellen on Wednesday testified regarding the New Haven's attempts to hinder water competition and concerning its purchase of a number of competing water lines.

Progress of Federal Valuation

The President's Conference Committee for the federal valuation of the railroads in the United States has issued the following statement, showing the progress of the federal field parties to September 30, 1915:

Road	Date Division Valuation Forces Began Work	Miles of Road	Road and Track	Total miles inspected and inventoried to date			Telegraph and Telephone	Total miles "Adjacent Similar Land" inspected
				Bridges	Buildings	Signals		
EASTERN GROUP.								
Boston & Maine.....	4-29-14	2434	2246	798	798	835	2326	1235
C. & E. I.	5- 2-14	1140	1104	1102	1102	989	1123	989
C., C. & St. L.	8-24-14	2381	1960	1441	820	1952	2218	....
Pennsylvania.....	1- 1-15	5919	1248	1039	1039	890	1058	210
N. Y., N. H. & H.	3-31-15	2046	553	....	....	....	....	108
Boston & Albany.....	4-21-15	392	159	106	....	....	....	....
C. I. & L.	5-25-15	610	424	610	....	....	386	....
Ann Arbor.....	6- 1-15	292	* 292	292	292	292	292	....
Maine Central.....	8-14-15	1057	102	....	....	....	63	....
Bangor & Aroostook.....	8-16-15	626	106	....	....	....	....	....
Total.....		16897	8194	5388	4051	4958	7466	2542
WESTERN GROUP								
Texas Midland.....		111	* 111	111	111	111	111	111
N. O., T. & M.		173	* 173	173	173	173	173	173
Kansas City Southern.....		878	* 878	878	878	878	878	878
S. P., L. A. & S. L.		994	* 994	994	994	994	994	994
E. J. & E.		211	* 211	211	211	211	211	211
Western Pacific.....		981	* 981	981	981	981	981	981
Quincy Western.....		6	* 6	....	....	....	....	....
Missouri Southern.....		54	* 54	54	54	54	54	54
Miss. Riv. & B. Terre.....		54	* 54	54	54	54	54	54
Arizona & Swansea.....		21	* 21	....	....	....	....	....
United Verde & Pac.		26	* 26	....	....	....	....	....
Cape Girardeau Nor.		106	* 106	106	106	106	106	....
M., St. P. & S. S. M.	5- 1-14	4125	2109	404	404	404	....	500
Great Northern.....	5- 3-14	7321	4597	1927	1927	3504	6495	592
Rock Island.....	8- 1-14	7680	5711	1667	1667	720	7210	....
Chicago & Northwestern.....	0- 2-14	8346	91	91	91	91	91	91
St. Louis Southwestern.....	11-12-14	1568	747	747	747	....	747	747
Ill. Cent. (Y. & M. V.) ..	11-18-14	5960	1673	1726	1726	1166	4077	1506
Santa Fe System.....	12- 4-14	11117	1109	1109	1109	....	2107	....
Sou. Pac. (Pacific District).....	1- 3-15	6906	248	....	....	561	705	....
Chi., Mil. & St. Paul.....	5-22-15	9611	1271	....	....	....	....	498
Total.....		66249	21171	11233	11233	10008	24994	7390
SOUTHERN GROUP.								
Norfolk Southern.....	2-27-14	903	903	903	903	903	903	....
Atlanta, Birm. & Atl.	2-10-14	658	658	658	658	658	658	650
Central of Georgia.....	7- 8-14	1972	1972	1959	1902	1972	1972	1972
Savannah & N. W.	2-18-15	109	109	109	....	....	109	....
Charleston & W. Car.	5-29-15	341	341	None	None	None	297	....
Georgia, South. & Florida.....	1- 2-15	605	605	605	605	605	605	....
Mobile & Ohio.....	6-15-15	1114	600	None	None	None	None	....
Southern.....	7-14-15	7000	275	None	None	None	None	....
Total.....		12702	5463	4234	4177	4138	4544	2622
Grand Total.....		95848	34828	20885	19461	19104	37004	12554

*Field work of Roadway and Track parties, completed.

Chicago Switchmen Ask Advance in Pay

A committee representing the switchmen employed in the Chicago switching district who are members of the Brotherhood of Railroad Trainmen has presented to the 18 railroads entering Chicago on which their members are employed a request for an advance in pay of five cents an hour over the rates provided for in the agreement of April 17, 1913; and the railroads have appointed a Conference Committee of Managers, of which George Hannauer, general manager of the Indiana Harbor Belt, is chairman, to negotiate with representatives of the switchmen.

There are now about 3,000 switchmen employed in the Chicago district on the roads on whom the demand has been made, who are receiving the following rates: Night foremen, 40 cents; night switchmen, 38 cents; day foremen, 38 cents; day switchmen, 35 cents. It is estimated by the railways that to grant the five cent increase demanded would increase their expenses by \$500,000 a year. The members of the Switchmen's Union who are employed on nine of the roads have not submitted demands, but the managers point out that any increase given to the members of the Brotherhood of Railroad Trainmen would have to be given to all switchmen in the Chicago district, which would include a total of 5,000 men, and would involve a total additional expenditure of \$700,000 a year. The railroads also say that the increase in wages could not be confined to the Chicago district, as the rates of pay prevailing in Chicago are

used as the basis for rates throughout the western territory, and if an advance of five cents an hour were extended throughout the western territory the additional expenditure involved would run into millions, whereas if it were not extended outside of the Chicago switching district, an additional burden would be placed on the commerce of Chicago.

The railroad managers are not entirely clear as to whether the local committees are backed by the Brotherhood of Railroad Trainmen organization, as the brotherhood has recently joined the movement for an eight-hour day, while the Chicago switchmen are asking for the advance in pay on the basis of their present working day. It is understood that the Brother-

hood of Railroad Trainmen at a recent meeting at Cleveland passed resolutions practically condemning the Chicago switchmen on the ground that their actions might tend to jeopardize the movement for an eight-hour day.

The Conference Committee of Managers consists of the following: George Hannauer, general manager, Indiana Harbor Belt Railroad, chairman; J. H. Brinkerhoff, general superintendent, Belt Railway, vice-chairman; H. O. Dunkle, general manager, Erie; W. J. Towne, assistant general manager, Chicago & North Western; P. L. Rupp, superintendent of terminals, Chicago, Milwaukee & St. Paul; E. T. Whiter, assistant general manager, Pennsylvania Lines West; J. F. Keegan, superintendent, Baltimore & Ohio; W. J. O'Brien, general superintendent, Chicago Junction Railway, and G. W. Berry, superintendent of terminals, Illinois Central.

The switchmen are represented by J. W. Richert, chairman, and W. W. McKirchy, secretary of the association of local committees of the Brotherhood of Railroad Trainmen.

New York Railroad Club

At the next meeting of the New York Railroad Club, to be held Friday, November 19, in the Engineering Societies' building, 29 West Thirty-ninth street, New York, a paper will be presented by George D. Snyder, deputy chief engineer of the Hudson & Manhattan, on "Railroads and National Defense." This is also the annual meeting of the club.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, January, 1916, Atlanta, Ga.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, The Blackstone, Chicago.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldori-Astoria, Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Bood House, Toledo.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.—John J. Kantzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldori-Astoria Hotel, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—E. M. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The Missouri Pacific has put into effect an improved time table of suburban trains on its line into St. Louis, shortening the time of many of them.

The Baltimore & Ohio, the Chesapeake & Ohio and the Norfolk & Western announce that beginning December 15 there will be an advance of about 15 cents a ton in the rates on coal from the mines in West Virginia to western points.

The registered tonnage passed through the canals at Sault Ste. Marie, Mich., and Ontario, during October amounted to 9,283,260 net tons. The total freight amounted to 11,557,851 short tons, of which 9,399,436 was eastbound and 2,158,415 was westbound. The total number of vessel passages was 3,231.

The Georgia College of Agriculture is running an instruction train over a large part of the railways of the state, the itinerary providing for stops at 200 towns, and trips to occupy about 100 days. Pure-bred animals will be carried on the train to be exhibited. The United States Bureau of Animal Industry and the railroads will co-operate with the state officers.

It is announced in West Virginia that the railroads carrying coal from that state to western points have decided not to make the proposed advance of 15 cents a ton in the rate for transportation which had been decided upon with a view of putting it into effect on December 15. The shippers are said to have convinced the roads that a large falling-off in traffic would result.

The meeting of the Southern Classification Committee, scheduled for Chicago on November 8, has been indefinitely postponed, because a number of important lines were unable to be represented on account of a number of Interstate Commerce Commission cases being set for hearing and the great pressure under which southern roads are now working in making a revision of their tariffs to become effective on January 1.

The Missouri Pacific and the St. Louis, Iron Mountain & Southern have announced a new passenger train which is to be put in service on December 1, from St. Louis to Houston, Dallas, Galveston, Fort Worth and San Antonio. The train is to be called the Sunshine Special, and will leave St. Louis at 6:15 p. m., considerably shortening the running time between St. Louis and Texas points. The Missouri, Kansas & Texas also announced an additional train from St. Louis to San Antonio, to be put in service on December 1, to leave St. Louis about 6:30 p. m., and arrive in San Antonio at 9:30 the following evening.

The temporary rate of \$3 a ton, announced by the Panama Railroad on October 6, for the transfer of freight between steamers on the Atlantic and Pacific oceans, on account of the closing of the canal by slides, was cancelled effective on October 31, and rates ranging from \$2 to \$15 a ton, according to classification, were to be put in effect. The announcement of the new rates, however, caused several protests from ship owners, which were followed by an announcement that the secretary of war has decided that in view of the many questions involved in changing from the \$3 flat rate to the classified rate, the flat rate will be temporarily continued under the conditions now in effect until he has had a full opportunity to thoroughly investigate the subject. During the month of August, according to the Canal Record, for the first time since February, the cost of the items charged to operation and maintenance of the canal was more than the amount of tolls collected. The deficit amounted to \$63,177, which reduces the excess of tolls over expenses for the present fiscal year from \$117,570 at the end of July, to \$54,392 at the end of August. The charges for dredging in the Gaillard cut during August were nearly half of the total expense of operation and maintenance.

THE ALTAI RAILWAY OF SIBERIA.—The construction of the Altai Railway is reported to be almost completed. It will soon be opened to traffic. This new line will serve the richest grain and mining areas of Siberia. Its present length is 500 miles. Its central offices will be in Barnaul.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has denied the petition of the carriers for a rehearing of the Western advance freight case. It has, however, on its own initiative, ordered an investigation of rates, rules, and practices of Western railroads in relation to the transportation of live stock, fresh meats, and packing-house products. These commodities are among those on which the roads sought to have rates increased. No reason was assigned for the refusal to reopen the case.

Alleging that none of the benefits expected from the original Shreveport rate case have accrued to Shreveport or the neighboring territory, the Railroad Commission of Louisiana has filed another complaint with the Interstate Commerce Commission asking in effect that the class freight rate scale prescribed by the commission in its original and supplemental orders be made to apply intrastate in Texas. It is asserted that by reason of the competitive conditions now surrounding traffic between Shreveport and Texas points, the relief sought in the original petition and the supplemental petition will not be obtained until an investigation is made by the commission of the interstate rates from and to Shreveport, to and from all points on the lines of the respondents in the state of Texas.

Rates on Distillers' Supplies

Kentucky Distilleries & Warehouse Company v. Louisville & Nashville, et al. Opinion by Commissioner Meyer.

The commission finds unreasonable the present rates of the Louisville & Nashville on distillers' supplies, consisting of corn, rye, malt, empty barrels and glass bottles from Louisville, Ky., and Cincinnati, Ohio, to Kellers, Silver Creek, Lair, Athertonville, New Hope, Coon Hollow and Withrow, Ky. Rates in effect prior to February 10, 1910, are ordered. (36 I. C. C., 293.)

STATE COMMISSIONS

The Alabama Public Service Commission—which, by a law passed this year, has taken the place of the former state railroad commission—has denied an application of the railroads for authority to continue beyond December 1 a ten per cent advance in certain freight rates which is now in effect and which was authorized some months since. The commission holds that business is now resuming a normal condition and that the order permitting the advance was intended only to cover the period of serious depression.

The Illinois Public Utilities Commission began a hearing at Chicago on November 9, on the tariffs filed by the railways providing for a general five per cent advance in intrastate freight rates. The tariffs were filed about the time of the Interstate Commerce Commission's decision in the general five per cent advance case, but have been suspended from time to time by the commission. Tuesday, Wednesday, Thursday and Friday of this week were set aside for a general presentation of the case, including financial and accounting matters, the first two days to be devoted to respondents' evidence and the next two days to protestants' evidence and rebuttal. Separate hearings on individual commodities have been set for later dates up to January 13, 1916.

COURT NEWS

The United States district court in Omaha, Neb., has granted a temporary injunction restraining the enforcement of the Nebraska two-cent passenger fare law, so far as the Missouri Pacific is concerned.

Misrouting Does Not Cause Liability for Shippers' Act

A railroad contracted to route horses through a certain town and failed to do so. The shipper's agents, upon their failure to appear on the expected train, wired to destination to a commission house to take charge of the animals when they arrived.

The commission house did so, putting them in a stockyard barn, where they contracted stockyard fever and subsequently died. In an action for their loss the Wisconsin Supreme Court held that the railroad was not liable, since the loss was not the result of its misrouting, but of the act of the shipper through his agents.—*Rosenthal v. C. & N. W.* (Wis.), 154 N. W. 367.

Twenty-Eight Hour Law—"Opportunity to Rest"

The federal district court in North Dakota holds that the construction of section 3 of the 28-hour law, providing that when animals are carried in cars in which they can and do have opportunity to rest, the provisions as to unloading shall not apply is for the court and not for the jury. It holds that the section deals with the structure of a car in which animals are transported, without taking into account the habits of animals, and where a car is so constructed that animals transported therein, such as horses, have no opportunity to rest by lying down, the carrier must unload them, "opportunity to rest" meaning opportunity to lie down; and the fact that horses often take their rest standing cannot be taken into consideration.—*Northwestern Pacific v. Finch*, 225 Fed. 676.

Safe Place to Work

Action was brought for the death of a fireman, killed while his engine was shifting cars in a street in Philadelphia. It appeared that the clearance between the tracks was about two feet less than the standard, but it also appeared the sidings had been located under proper municipal authority, and had been in use for 15 years. While rounding a curve near which a car was temporarily standing on the adjoining track, the fireman leaned out beyond the tender and came in contact with the car. It was held by the Circuit Court of Appeals, Third circuit, that the railroad company was not bound to foresee the fireman's action and therefore to construct its tracks in such a manner as to guard against an event so remote and so unlikely to occur, and was not liable for the result.—*Reese v. Reading*, C. C. A., 225 Fed. 518.

Animals on Tracks—Private Crossings

A railroad company agreed that in consideration of a land owner's conveyance of a right of way through his farm it would construct a grade crossing, with gates which might be left open at the land owner's risk. A Washington statute requires railroad companies to fence their right of way, and permits owners of land on both sides of the right of way to put in gates at a crossing for their own use, while another statute requires land owners to keep crossing gates closed. The owner of the land left the gates open, and horses strayed through the crossing to the other portion of the farm and from there out to the country road. At a distant point they entered the railroad's right of way and were run down. In an action for their loss the Washington Supreme Court held that, while the contract supplanted the statutes as between the parties, the railroad company could not escape liability on the contractual grounds; the plaintiff assuming the risk of leaving the crossing open only in so far as accidents might happen on the crossing.—*Snodgrass v. Spokane & Inland Empire* (Wash.), 151 Pac. 815.

Injury to Trespasser on Yard Track

Action was brought for the killing of plaintiff's infant son on defendant's track. The railroad had fences along both sides of its right of way within yard limits, and had posted notices to prevent trespassing. After these had been ignored and broken down, the company continued to warn trespassers and children from the right of way, though both adults and children frequently crossed the tracks. The Michigan Supreme Court holds that there was no express or implied invitation to cross the tracks at that place, and those doing so were trespassers or licensees. It is well settled that railroads are not required to fence their yard limits, and a failure to do so is not evidence of negligence. The child suddenly appeared on the track when the train was within 200 feet of him, and too near to be stopped before striking him. It was held that the accident resulted from the sudden and unanticipated act of the child itself, which could not be foreseen, or, in the reasonable operation of the road, guarded against, and there was no liability for its death.—*Hoover v. Detroit, G. H. & M.* (Mich.), 154 N. W. 94.

Railway Officers

Executive, Financial, Legal and Accounting

T. S. Ford, auditor of the San Antonio, Uvalde & Gulf, at San Antonio, Tex., has resigned, effective December 1.

J. L. Goree has been appointed assistant general attorney of the Chicago, Rock Island & Pacific, with office at Chicago, Ill.

Charles A. Vilas, whose appointment to the position of valuation attorney of the Chicago & North Western, as announced



C. A. Vilas

in the *Railway Age Gazette* of last week, was born at Madison, Wis., on September 21, 1878. He received his education at the University of Wisconsin, graduating from that university in 1899, and from the Wisconsin Law School in 1901. From 1901 to 1909 he engaged in private practice in the city of Milwaukee, Wis. He first entered railway service on June 1, 1909, when he was engaged by the Chicago & North Western as general attorney assigned to office work. In 1914 he was assigned to trial work in Cook county. In his present capacity as valuation attorney he has been assigned to legal duties in connection with the federal valuation of the road.

Col. Wells H. Blodgett, general counsel for the receivers of the Wabash, retired from active service with the reorganization

of the company on November 1. He was born at Downers Grove, Ill., in 1839, and was educated at the Illinois Institute at Wheaton, Ill. In 1873 he entered railway service as assistant attorney for the St. Louis, Kansas City & Northern, and from 1874 to 1879 served as general attorney for the same road. From 1879 to 1884 he was general solicitor for the Wabash, St. Louis & Pacific; from 1884 to 1889, general counsel for the receivers of the Wabash Lines; from 1889 to August 8, 1901, general solicitor for the Wabash Railroad, and from August 18, 1911, to November 1,



W. H. Blodgett

1915, general counsel for the receivers of the same road. He served through the Civil War in the volunteer service, and was mustered out in July, 1865, as colonel of the Forty-eighth Regiment, Missouri Volunteers.

E. M. Durham, Jr., has been appointed general agent of the Cincinnati, New Orleans & Texas Pacific with headquarters at Chattanooga, Tenn., reporting to the president or vice-president.

E. M. Willis, secretary to the president of the New York, New Haven & Hartford, has been appointed assistant to the president with office at Boston, Mass. Mr. Willis is a director of the Berkshire Street Railway Company, the Vermont Company, the Hoosick Falls Railroad Company and the Old Colony.

He formerly served as assistant chief clerk to President Elliott on the Northern Pacific.

Arthur Coppel, of Maitland, Coppel & Co., New York, N. Y., has been elected president of the Denver & Rio Grande, succeeding B. F. Bush. It is understood that the election is temporary and that H. U. Mudge, who has just resigned as chief executive officer of the Chicago, Rock Island & Pacific, will be elected shortly.

The Wabash Railway having taken over the property of the Wabash Railroad on November 1, the following appointments are announced: J. E. Taussig, assistant to the president; J. L. Minnis, general solicitor; S. E. Cotter, general manager; F. L. O'Leary, local treasurer; T. J. Tobin, auditor; W. C. Maxwell, general traffic manager; T. J. Frier, purchasing and supply agent, and Dr. M. P. Parrish, chief surgeon, all with headquarters at St. Louis, Mo.

At a meeting of the directors of the Chicago, Rock Island & Pacific in Chicago on November 5, John G. Shedd, president of Marshall Field & Co., Chicago, was elected chairman of the board, and N. L. Amster, of Boston, was elected chairman of the executive committee, succeeding T. M. Schumacher, who resigned both offices some time ago. J. M. Dickinson, receiver, also has announced the appointment of J. E. Gorman, vice-president, in charge of traffic and chief traffic officer for the receiver, as chief executive officer, succeeding H. U. Mudge, who resigned that office and as president and director.

Traffic

Elmer H. Wood, whose retirement as freight traffic manager of the Union Pacific has been announced in these columns, was

born on January 12, 1854, at Clarkson, Monroe County, N. Y. He was educated at Grand Prairie Seminary, and entered railway service in 1875. From November, 1875, to June, 1876, he was station agent and chief clerk in the general freight and passenger department of the Chicago & Pacific. From 1876 to 1884, he was chief clerk to the general agent of the Union Pacific, at Chicago, Ill. From 1884 to 1888, he was general agent in the freight department of the same road at Chicago. From 1888 to 1889, he was chief clerk in the general freight department



E. H. Wood

at Kansas City, Mo. From 1889 to June 1, 1898, he was assistant general freight agent of the same railroad at Omaha, Neb. From June 1, 1898, to October 30, 1911, he was general freight agent, and on November 1, 1911, was promoted to freight traffic manager, with office in the same city. Ill health caused his recent retirement from the service of the road.

W. M. Hardin, commercial agent of the Minneapolis & St. Louis at Minneapolis, Minn., has been appointed assistant general freight agent, with headquarters in the same city.

Erwin C. Meyer, formerly traffic manager for the Banner Buggy Company, has been appointed commercial agent for the Chicago & Alton at Birmingham, Ala., vice C. R. Prince, resigned. Effective November 1.

Charles A. Call, general passenger and freight agent of the New York, Westchester & Boston, at New York, has been appointed manager of the industrial bureau of the New York, New Haven & Hartford, with office at Boston, Mass., to succeed W. H. Seeley, who has resigned to go into other business. Mr. Call began railway work in 1883 in the passenger department of the New York & New England. In 1898 he was appointed passenger agent at Boston, and in 1905, was appointed general

agent of the passenger department of the New York, New Haven & Hartford at New York City. In 1908 he became general agent of the New Haven at Boston in charge of the general office and in 1912 was appointed general passenger and freight agent of the New York, Westchester & Boston.

Operating

P. A. Ellerman, traveling chef of the Lehigh Valley, has been appointed superintendent of dining car service, with headquarters at Easton, Pa., succeeding G. E. Cooledge, resigned.

Joseph M. Boyd, trainmaster of the Northern Pacific at Dickinson, N. D., has been transferred to the Rocky Mountain division, with headquarters at Missoula, Mont., vice D. J. Hagerty, resigned. Effective November 1.

David S. Farley has been appointed superintendent of the Plains division of the Atchison, Topeka & Santa Fe, at Amarillo, Tex. Mr. Farley entered the service of the Santa Fe on October 15, 1887, in the local freight station at Denver, Colo. From that time until July, 1899, he held various clerical positions for Santa Fe in that city. From August 1, to August 18, 1899, he handled Santa Fe accounts for the Colorado & Southern; from August 18, 1899, to May 12, 1900, he was chief clerk to the agent of the Santa Fe, at Pueblo, Colo.; from May 12, 1900, to August 1, 1907, he was chief clerk to the superintendent in charge of the station, at Kansas City, Mo.; from August 1, 1907, to July, 1915, he was superintendent and agent at Kansas City. In July, 1915, he was called to Amarillo, Tex., to take the place of Daniel Elliott, superintendent of the Plains division, who had been forced to leave active service on account of illness.



D. S. Farley

E. B. Heath, trainmaster and traveling engineer of the Spokane, Portland & Seattle, has been promoted to assistant superintendent of the Spokane & Inland Empire and the Spokane Traction Company, with headquarters at Spokane, Wash.

Homer W. Loomis, trainmaster of the New York Central at Hillsdale, Mich., has been promoted to the same position on the main line at Toledo, Ohio. J. J. Crowley, assistant trainmaster at Elkhart, Ind., has been appointed to succeed Mr. Loomis at Hillsdale.

F. L. Sheppard, general superintendent of the New Jersey division of the Pennsylvania Railroad, at New York, has been granted leave of absence on account of illness, and C. S. Krick, superintendent of the Philadelphia Terminal division at West Philadelphia, Pa., will temporarily assume all the duties of the general superintendent, with the title of acting general superintendent, with headquarters at New York.

J. H. Carlisle, superintendent of the Clifton Forge division of the Chesapeake & Ohio, at Clifton Forge, Va., has been appointed assistant to the general superintendent of transportation with headquarters at Richmond, Va. F. S. Rockwell, trainmaster at Silver Grove, Ky., has been appointed superintendent of the Clifton Forge division with headquarters at Clifton Forge, Va., vice Mr. Carlisle, and D. T. Evans, road foreman of engines at Silver Grove has been appointed trainmaster of the Cincinnati division with headquarters at Covington, Ky., vice Mr. Rockwell.

F. E. Lewis, superintendent of dining cars and hotels for the Union Pacific Railroad, has been appointed manager of dining cars and hotels for the Union Pacific System. E. C. Sutton, assistant superintendent of dining cars and hotels of the Union Pacific Railroad, has been promoted to superintendent of dining cars and hotels to succeed F. E. Lewis. H. A. Hansen has been appointed

assistant superintendent of dining cars and hotels for the railroad, vice E. C. Sutton, promoted. The headquarters of all three officers will be at Omaha, Neb., and their appointments were effective November 1.

H. E. Allen, superintendent of the Louisiana division of the Chicago, Rock Island & Pacific, at El Dorado, Ark., has been transferred to the Nebraska division, with headquarters at Fairbury, Neb., vice W. A. Sheahan, resigned. D. Van Hecke, superintendent of the Amarillo division, with headquarters at Amarillo, Tex., has been appointed superintendent of the Louisiana division, to succeed Mr. Allen. H. J. Sewell, trainmaster at El Reno, Okla., has been appointed acting superintendent of the Amarillo division of the Chicago, Rock Island & Gulf, with headquarters at Amarillo, Tex., vice D. Van Hecke, resigned. Appointments effective November 1.

Thomas E. Hill, superintendent of the Louisiana division of the Illinois Central, has been appointed superintendent of the Kentucky division, with office at Louisville, Ky., vice L. A. Downs, promoted. George M. Patterson, superintendent of the Springfield division, with headquarters at Clinton, Ill., has been transferred to McComb, Miss., to become superintendent of the Louisiana division. The jurisdiction of the Louisiana division has been changed so as no longer to include the New Orleans terminals. F. D. Mooney, terminal superintendent, has been appointed superintendent of the New Orleans terminal division. Joseph W. Hevron, trainmaster at Kankakee, Ill., has been promoted to superintendent at Clinton, Ill., vice G. M. Patterson. C. A. Thelan has been appointed trainmaster at Kankakee to succeed Mr. Hevron.

Beginning on November 15, the Ozark division of the St. Louis & San Francisco, will be consolidated with the Southeastern division, the combined divisions to be known as the Southern division. R. F. Carr, superintendent of the Southeastern division, will be superintendent of the Southern division. J. P. Hulehan, assistant superintendent of the General division, with headquarters at Ft. Smith, Ark., has been appointed assistant superintendent of the Southern division, with office at Thayer, Mo. C. H. Hensley, assistant superintendent of the Ozark division, at Thayer, Mo., has been assigned to other duties. That portion of the Red River division of the Frisco, which extends from Sapulpa, Okla., to Sherman, Tex., will be added to the Southwestern division, effective November 15. C. F. Hopkins, present superintendent of the Southwestern division, will continue in that position. J. M. Chandler, superintendent of the Red River division, with office at Francis, Okla., has been appointed assistant superintendent of the Southwestern division, with headquarters at Oklahoma City, Okla., succeeding W. M. Coombs, assigned to other duties. J. W. Claiborne, superintendent of the River and Cape division, with office at Chaffee, Mo., has been appointed assistant superintendent of the Southwestern division at Sapulpa, Okla., vice W. H. Hutchison, assigned to other duties. C. F. Kirshner, assistant superintendent of station service of the Red River division, has been assigned to other duties, this position having been abolished. That part of the Red River division of the Frisco extending from Hope, Ark., to Ardmore, Okla., will be added to the Central division, effective November 15. C. H. Baltzell, superintendent of the Ozark division, at Thayer, Mo., will be transferred to the Central division as superintendent, with headquarters at Ft. Smith, Ark. W. G. Koch, superintendent of the General division, under the present organization, has been appointed assistant superintendent of the new division and will continue to have headquarters at Ft. Smith. The Northern division of the Frisco will be increased to include the Kansas division, effective November 15. O. H. McCarty, superintendent of the Northern division, will continue in that position for the Northern division, with headquarters at Ft. Scott, Kan. H. H. Brown, superintendent of the Kansas division, has been appointed superintendent of the Western division, with headquarters at Enid, Okla., vice C. T. Mason, transferred. B. S. Shirk, assistant superintendent of the Eastern division, at Springfield, Mo., has been appointed assistant superintendent of the Western division. J. W. Marring and George Bailey, assistant superintendents of the Western division, have been assigned to other duties. F. E. Brannaman, assistant superintendent of the Eastern division at Springfield, Mo., has been appointed assistant superintendent of the Western division, with headquarters at Enid, Okla., vice J. W. Claiborne, transferred. C. T. Mason, superintendent of the Western division, at Enid, Okla., has been appointed assistant

superintendent of the Eastern division, vice B. S. Shirk. The position of assistant superintendent of station service of the Eastern division, has been abolished.

Engineering and Rolling Stock

J. H. Baker has been appointed roadmaster on the Crows Nest subdivision of the Canadian Pacific with headquarters at Lethbridge, Alta., in place of J. Carlson.

W. L. Kinsell, chief clerk to David Van Alostyne, assistant to the vice-president of the New York, New Haven & Hartford, has been appointed assistant shop superintendent at Readville, Mass.

J. M. Campbell, roadmaster of district 2 of the Manitoba division of the Canadian Pacific with headquarters at Winnipeg, Man., has joined the force of engineers which has left Canada to work on railways in Russia.

E. L. Landorph, resident engineer of district 2 of the Manitoba division of the Canadian Pacific with headquarters at Winnipeg, Man., has been appointed resident engineer of district 1 of the Manitoba division with office at Kenora, Ont., succeeding T. D. Ruggles, resigned.

J. L. Starkie has been appointed assistant engineer of the Atchison, Topeka & Santa Fe, with headquarters in Galveston, Tex., succeeding E. H. Olson. R. C. Emmett has been appointed acting roadmaster on the New Mexico division, with headquarters in Las Vegas, N. M., vice L. Lenehan.

M. E. Hamilton, northwest railroad representative of the Garlock Packing Company, with headquarters at St. Paul, Minn., has been appointed general air brake inspector of the St. Louis & San Francisco, effective November 1. Mr. Hamilton was formerly general air brake instructor on the Atchison, Topeka & Santa Fe.

Frank R. Judd, whose appointment as engineer of buildings of the Illinois Central has been announced in these columns, was born in Hamilton, Ont., on May 28, 1882. He attended the Chicago Manual Training School from 1896 to 1899, and entered railway service on October 18, 1899, with the Illinois Central. From that time until November, 1909, he did drafting and field work for the Illinois Central, the Chicago, Rock Island & Pacific, and the Crane Company of Chicago. From November, 1909, to December, 1913, he was chief draftsman of the bridge and building department of the Illinois Central, and from December, 1913, until February, 1915, was assistant engineer in charge of a joint depot and track elevation project at Memphis, Tenn. From February, 1915, to October, 1915, he was in charge of special surveys, track plans and building designs at Chicago. By virtue of his recent appointment he became engineer of buildings of the same railroad with office at Chicago.

Purchasing

F. B. Calhoun has been appointed division storekeeper of the Atchison, Topeka & Santa Fe, at Waynoka, Okla., vice Erle Preston. R. L. Stewart, division storekeeper at Dodge City, Kan., has been appointed division storekeeper at Wellington, Kan., vice Louis Mathiasmier, transferred to the Topeka general store. H. W. Hallenbeck, division storekeeper at Belen, N. M., has been transferred to Dodge City, vice R. L. Stewart. Erle Preston, division storekeeper at Waynoka, Okla., has been transferred to Belen, N. Mex., succeeding H. W. Hallenbeck.

George G. Yeomans, formerly assistant to the president of the Wabash, has been appointed purchasing agent of the New York, New Haven & Hartford, with headquarters at Boston, Mass., succeeding H. A. Fabian, resigned, effective November 15. Mr. Yeomans was in the service of the Chicago, Burlington & Quincy for 23 years, and during that period worked in practically every position in the purchasing agent's office, including the position of purchasing agent, which he filled for seven years. About 1905 he resigned to become assistant to President C. F. Delano, of the Wabash, leaving in 1911, when the road went into the hands of receivers. Since that time he has made a specialty of investigating methods of purchasing and handling supplies on various large roads, including the Santa Fe, the Baltimore & Ohio, the Chicago & North Western, the New York, New Haven & Hartford and others.

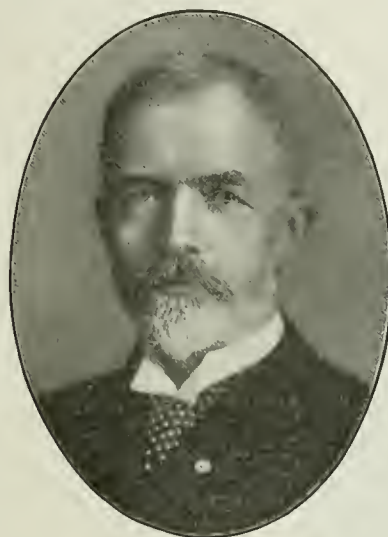
OBITUARY

R. S. Stephens, until June 1, 1913, purchasing agent at Houston, Tex., for the Galveston, Harrisburg & San Antonio, the Houston & Texas Central, and the Texas & New Orleans, died at his home in Houston on November 2.

Daniel Elliott, superintendent of the Plains division of the Atchison, Topeka & Santa Fe, died at his home in Amarillo, Tex., on October 19. He was born on October 19, 1856, in Northfield, Vt., and entered railway service at the age of sixteen. In 1882 he was employed by the Santa Fe for the first time as a brakeman on the Atchison branch. In less than a year he was promoted to yard foreman at Las Vegas, N. M., and later was appointed roadmaster with headquarters at the same place. In 1908 he was appointed superintendent of the Plains division, with office at Amarillo, Tex. Poor health forced him to retire from active service in July, 1915.

W. F. Allen

William Frederick Allen, general secretary of the American Railway Association and its predecessors, since 1875, and manager of the Official Rail-



W. F. Allen

way Guide since 1873, died on November 9 at his home in South Orange, N. J. Mr. Allen was one of the most widely known men in American railroad life. He was born October 9, 1846, at Bordentown, N. J., and received his education in the Bordentown Model School and the Episcopal Academy in Philadelphia. He began railway service in May, 1862, as a rodman in an engineering corps of the Camden & Amboy, becoming in May, 1863, assistant engineer of the same road. From February, 1868 to 1872, he was resident engineer of the West Jersey Railroad.

In 1872 he entered the service of the National Railway Publication Company, and shortly afterwards was made assistant editor of the Official Railway Guide. In June, 1873, he became the editor and manager of the Guide, and has been at the head of it ever since. In April, 1875, he was appointed secretary of the General Time Convention and in October, 1877, of the Southern Railway Time Convention. In April, 1886, the American Railway Association succeeded these organizations and Mr. Allen continued as secretary; and in June, 1909, his title was made general secretary and treasurer which positions he held until his death.

In 1910 Mr. Allen was elected vice-president of the National Railway Publication Company and since 1914 had been its president. At the time of his death he was also secretary of the General Managers' Association of New York and the Bureau for the Safe Transportation of Explosives.

In his capacity as secretary of the American Railway Association Mr. Allen has become intimately acquainted with a larger number of railway managers than any other man in the country; and he has had a corresponding measure of influence. The presidency of the association has been held successively by different men, from different parts of the country, but the secretaryship has been a permanent feature, and his administration of the office has been an important element in the association's prosperity.

Outside the railroad world Mr. Allen was known chiefly as the "father of standard time." To him was referred for solution, in 1881, the problem of working out a standard of time reckoning that would obviate the confusion resulting from the use of the fifty-odd standards then prevailing on the railroads in the United States. His report was submitted to the Association in 1883. It provided for an elastic boundary line between the hour zones, instead of a strictly longitudinal division; and

in its details fixed every point at which the hour change was to be made, and embodied every practical provision for putting the system into immediate effect. The report was unanimously endorsed by the Association, and Mr. Allen thereupon accomplished the unique diplomatic task of securing its adoption by the numerous diverse interests whose approval was essential to success. In this work he had the co-operation of the Cambridge and the National Observatories.

The change in the operating time tables of the many different railroads was made at noon, eastern time, on Sunday, November 18, 1883, without delay or disturbance. For this achievement Mr. Allen was elected to honorary membership in many American and foreign scientific societies, and received the honorary degree of master of science from Princeton University. Mr. Allen was a delegate of the United States Government to the International Meridian Conference in 1884, and to the International Railway Congress at Paris in 1900. He was a delegate of the American Railway Association to the International Railway Congresses at London, 1895; Paris, 1900; Washington, 1905; Berne, 1910. Since 1910 he has been a member of the Permanent Commission of the Congress Association.

In 1905 he had charge of all the arrangements for the session at Washington. For his services in connection with the Congress he was decorated by the order of Leopold by the Belgium government.

James F. DeVoy, assistant superintendent of motive power for the Chicago, Milwaukee & St. Paul, at Milwaukee, Wis., died at his home in that city on November 5, following an illness of eight months. He was born in Ithaca, N. Y., on June 23, 1866, and graduated from Cornell University in 1888. During his college career he won distinction not only as a football player and crew man, but as an honor student in the college of mechanical engineering. Following his graduation he entered the service of the New York Central in its mechanical department, where he remained for seven years. He was then employed by the American Locomotive Company both at Dunkirk, N. Y., and Schenectady.



J. F. DeVoy

Fifteen years ago he came to Milwaukee as chief draftsman in the mechanical department of the Chicago, Milwaukee & St. Paul. On September 1, 1902, he was promoted to mechanical engineer, and on April 15, 1910, he was appointed assistant superintendent of motive power. At the time of his death he was a member of the executive committee of the American Railway Master Mechanics' Association, a member of the committee on design, maintenance and operation of electric rolling stock and also a member of the committee on brake shoes and brake beam equipment and the coupler committee of the Master Car Builders' Association. From 1910 to 1911, he was president of the Western Railway Club.

LOST.—The San Pedro, Los Angeles & Salt Lake, the "Salt Lake Route," has issued a "Special Bulletin on Freight Handling," which says: "LOST, between Salt Lake City, Utah, and East San Pedro, California, since 1910, through a hole in the treasury known as the 'freight claim leak,' a quarter of a million dollars. Owner, Salt Lake Route. No reward; it is gone forever. . . . A freight claim payment does nobody good. It does not even put the claimant in statu quo. He may have lost a customer, the customer a sale. An engineman receiving \$6 a day who, by rough handling, causes a freight claim of \$10 would better have lain off that day. A trainman drawing \$100 a month who causes \$150 damage to merchandise can count that month lost, so far as his value as a revenue producer is concerned.—Howard Elliott, Salt Lake Route.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE ERIE is in the market for 10 Pacific type locomotives.

THE CHICAGO & EASTERN ILLINOIS will purchase five Mikado type locomotives.

THE STANDARD OIL COMPANY, Whiting, Ind., has issued an inquiry for another locomotive.

THE NEW YORK, NEW HAVEN & HARTFORD has issued inquiries for 30 Mikado type locomotives.

THE TOLEDO, ST. LOUIS & WESTERN is inquiring for prices on five Consolidation type locomotives.

THE MOBILE & OHIO has ordered one Mikado type locomotive from the Baldwin Locomotive Works.

THE KIN HAN RAILWAY is inquiring for a number of ten-wheel locomotives.

THE GEORGIA SOUTHERN & FLORIDA, recently reported as being in the market for two passenger locomotives, has ordered two ten-wheel locomotives from the Baldwin Locomotive Works.

THE DES MOINES UNION has ordered 2 six-wheel switching locomotives from the Baldwin Locomotive Works.

THE YOUNGSTOWN SHEET & TUBE COMPANY has ordered two six-wheel switching locomotives from the Baldwin Locomotive Works.

THE BIRMINGHAM SOUTHERN is inquiring for prices on two six-wheel switching locomotives and one Consolidation type locomotive.

THE PENNSYLVANIA RAILROAD, which recently placed an order for 75 Mikado type locomotives with the Baldwin Locomotive Works, has issued additional inquiries for 155 more locomotives, including 45 freight and 60 switching locomotives for the Lines East, and 50 freight locomotives for the Lines West of Pittsburgh. With the 75 engines already contracted for this makes a total of 230 locomotives. It is also further reported that the Pennsylvania Lines West have ordered 53 Consolidation type locomotives from the Lima Locomotive Corporation and 10 Consolidation type locomotives from the American Locomotive Company, but this item has not been confirmed.

THE ATCHISON, TOPEKA & SANTA FE, as stated recently, ordered 30 Mikado type superheater locomotives from the Baldwin Locomotive Works, all of which will have 25-in. by 32-in. cylinders, 57-in. driving wheels, a boiler pressure of 200 lb., a weight on driving wheels of 220,200 lb., a tractive effort of 59,600 lb., and a total weight in working order of 283,700 lb. The locomotives will be oil burners. The tenders will have six-wheel trucks, 10,000-gallon water tanks, and 3,300-gallon oil tanks.

CAR BUILDING

THE VIRGINIAN has issued inquiries for 250 40-ton box cars.

THE DULUTH & IRON RANGE is inquiring for 750 50-ton ore cars.

THE LEHIGH VALLEY is negotiating for the purchase of two dining cars.

THE CONSOLIDATION COAL COMPANY is in the market for 1,400 Gondola cars.

THE DULUTH, MISSABE & NORTHERN is inquiring for 1,000 50-ton ore cars.

THE CHICAGO, BURLINGTON & QUINCY is in the market for 54 passenger train cars.

THE WESTERN PACIFIC has ordered 1,000 40-ton box cars from the Pullman Company.

THE PHILADELPHIA & READING has ordered 20 coaches and 10

combination cars from the Harlan & Hollingsworth Corporation.

THE CHICAGO, ROCK ISLAND & PACIFIC has cancelled its inquiry for 500 center constructions.

THE NEW YORK, ONTARIO & WESTERN is contemplating the purchase of possibly 500 freight cars.

THE NEW YORK, NEW HAVEN & HARTFORD is in the market for 20 milk cars and 50 refrigerator cars.

THE ERIE has cancelled an order for 200 automobile cars recently given the Pressed Steel Car Company.

SWIFT & Co., of Chicago, have ordered 150 center constructions from the Western Steel Car & Foundry Company.

THE BINGHAM & GARFIELD was reported in last week's issue as being in the market for 125 freight cars. These include 100 ore and 25 gondola cars.

THE MONTGOMERY RAILROAD is reported to have given the Standard Steel Car Company an order for 800 steel car bodies. This item has not been confirmed.

THE PENNSYLVANIA EQUIPMENT COMPANY is in the market for five 50-ton capacity flat bottom gondola cars either all steel or with steel underframes and strong wooden bodies.

THE DELAWARE, LACKAWANNA & WESTERN is in the market for 10 60-ft. express cars and 2 dining cars, and, as previously noted, will also purchase 1,000 box and 500 gondola cars.

THE MISSOURI, KANSAS & TEXAS, as stated last week, is inquiring for prices on 2,000 coal cars. The specifications provide for gondola cars, 41 ft. long, with a capacity of 50 tons.

THE FRENCH GOVERNMENT has ordered 1,000 four-wheel box cars from the Standard Steel Car Company. The cars will be built at the plant of the Keith Car & Manufacturing Company, Sagamore, Mass.

THE MUSCATINE & IOWA CITY has ordered 4 R. E. 70-B-11 gas electric motor cars from the General Electric Company, and will also purchase some gas-electric locomotives. See item in Railway Financial News.

THE INTERBOROUGH RAPID TRANSIT has issued inquiries for 311 steel subway cars for use on the company's new lines in the boroughs of Bronx and Queens. Included there are 234 motor cars and 77 trailers.

THE LOUISVILLE & NASHVILLE has ordered 400 underframes from the Pressed Steel Car Company. They are to be used, it is understood, for 400 gondola cars, reported in last week's issue, which the company will build in its own shops.

THE TORONTO SUBURBAN has ordered six steel coaches from the Preston Car & Coach Company, Limited. These will be center entrance interurban cars, 61 ft. long over vestibules; they will be mounted on Standard Motor Truck Company trucks, and will be equipped for 1,500 volt D. C.

THE LAKE ERIE & WESTERN has ordered eight steel frame coaches from the Preston Car & Coach Company, Limited. The cars will be 60 ft. long, will be mounted on Baldwin trucks, and will have all the features of a steam coach, including end doors, buffing attachments and M. C. B. draw bars. They are equipped for 1,500 volt D. C. with multiple unit control, and automatic air brakes.

THE PENNSYLVANIA's inquiry for freight cars, mentioned in last week's issue, includes 1,000 box and 5,000 gondola cars for the Lines East, and 1,000 automobile box and 2,000 gondola cars for the Lines West of Pittsburgh, a total of 9,000 cars. Inquiries have also been issued for 240 passenger cars, including 100 coaches, 20 passenger and baggage cars, 55 baggage cars and 5 horse express cars, a total of 180 passenger train cars, for the Lines East, and for 18 coaches, 4 passenger and baggage cars, 6 dining cars, 12 baggage and mail cars and 20 baggage cars, a total of 60 cars, for the Lines West.

IRON AND STEEL

THE MAINE CENTRAL is in the market for 10,000 tons of rails.

THE BALTIMORE & OHIO is inquiring for 300 tons of steel for a small pier shed.

THE CHESAPEAKE & OHIO has ordered 2,250 tons of rails from the Pennsylvania Steel Company.

THE NORFOLK & WESTERN is inquiring for prices on 2,000 tons of steel for a pier shed at Norfolk, Va.

THE CINCINNATI, HAMILTON & DAYTON is regarded to have ordered 6,000 tons of rails from the Steel Corporation.

THE CHICAGO & NORTH WESTERN has ordered 405 tons of steel from the Allen & Milwaukee Bridge Company for a terminal grain elevator at Milwaukee, Wis.

THE CHICAGO, ROCK ISLAND & PACIFIC.—Jacob M. Dickinson, receiver, has been authorized by the Federal Court to purchase 40,000 tons of rails for 1916 delivery.

THE DULUTH & IRON RANGE has ordered 10,000 tons of steel for an ore dock at Two Harbors, Minn., the contract to include approaches, ore spouts, doors and fittings.

THE CHICAGO, MILWAUKEE & ST. PAUL has ordered 110 tons of steel from the American Bridge Company, to be used for two 49-ft. approach spans and intermediate floor beams.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS is reported to have ordered 7,000 tons of rails from the Tennessee Coal, Iron & Railroad Company in addition to orders previously placed.

THE ILLINOIS CENTRAL, reported in the *Railway Age Gazette* of October 22 as having ordered 15,000 tons of rails from the Illinois Steel Company, and in the October 29 issue as having ordered an additional 5,000 tons from the same company, has increased its order to include another 10,000 tons. As the company has also ordered 15,000 tons of rails from the Tennessee Coal, Iron & Railroad Company, this makes a total of 45,000 tons.

SIGNALING

The Union Pacific will install approximately seven miles of two-arm, lower-quadrant Union Switch & Signal Company, style B, automatic block signals between East Ogden, Utah, and Gateway, on the line which has recently been double-tracked.

The Galveston, Harrisburg & San Antonio will shortly begin the construction of a 16-lever mechanical interlocking plant, with full approach and detector locking, at the crossing of its line with the International & Great Northern, at San Antonio, Tex.

BRITISH RAILWAY MEN ENLIST WITHOUT PERMISSION.—Although strict injunctions have been laid down by the Railway Executive Committee stipulating that railway men must not offer themselves for military or naval service without first obtaining the permission of their superior officer, many cases have, nevertheless, occurred in the different branches where men have taken the matter into their own hands and enlisted without troubling to inquire whether or not their services could be spared. In the majority of cases, up to the present, no action has been taken to bring these men back to their ordinary duties, the only difference drawn between members who have obtained permission and those who have not, being that in the latter case all connection with the company has been severed and the men entered up in the staff books as resigned. The efficient carrying on of transport work is quite as important to the country as the manufacture of munitions, and it is a mistaken idea of patriotism which prompts the men thus to desert.—*Railway Gazette, London*

THE RAILWAY MEN OF THE SOUTH AFRICAN RAILWAYS WITH THE COLORS.—According to the annual report of the Union of South African Railways, out of a white staff of 31,000, 3,922 men, or 12 per cent, were on active service during the recent rebellion. The South African Engineer Corps, a unit of 650 strong, under the command of two railway officials was composed almost entirely of railway officers. The duties performed by the corps were of the first importance to the success of the operations. At the outset it was faced with difficulties in landing heavy railway material and rolling stock at places where such appliances, as existed, had been largely destroyed. The work of discharge had to be completed hurriedly to enable work to be started on shore, and many contrivances were resorted to in connection with the landing work. Extensive repairs to existing railways, damaged by the enemy, had to be undertaken. For one short section of 10 miles the hue was damaged in 900 places.

Supply Trade News

Elmer B. Van Patten has been appointed sales representative of the Acme Supply Company, with headquarters at Chicago, Ill.

R. W. Burnett, for many years general master car builder of the Canadian Pacific, has been elected vice-president of the National Car Equipment Company, of Chicago, Ill.

The Toledo Scale Company announces that H. O. Hem, formerly of Kansas City, Mo., has become a member of its engineering staff in the capacity of consulting engineer, and has opened office at Toledo, Ohio.

Guy E. Tripp, chairman of the Westinghouse Electric & Manufacturing Company, is quoted as saying: "The total of war orders booked by Westinghouse Electric and subsidiaries amounts to approximately \$94,000,000. This includes firm orders, orders subject to cancellation for undelivered goods by payment of an agreed profit, and orders subject to cancellation on undelivered goods on three months' notice to stop work. Out of a total of \$18,695,000 5 per cent convertible bonds issued, approximately \$11,500,000 have already been converted."

Judge Hazel in the United States circuit court for the western district of New York on November 4 handed down a decision holding that the present standard car lighting equipment, involving the use of an ampere-hour meter to control battery charging, as put out by the U. S. Light & Heat Corporation, Niagara Falls, N. Y., does not come under the injunction or the accounting ordered in the prior decision sustaining the Creveling Patent 747,686 recently handed down also by Judge Hazel. It was maintained by the owners of this patent that the decision was broad enough to cover the use of the ampere-hour meter system of car lighting as put out by the U. S. Light & Heat Corporation, and it was sought to bring this system into the accounting ordered by the court.

The United States circuit court of appeals for the fourth circuit, at Richmond, Va., on November 6 handed down a decision affirming that of District Judge Rose, of Baltimore, in the suit of John B. Tate v. the Baltimore & Ohio, directing a verdict for the defendant. The Tate Patent sued on, No. 643,560, dated February 13, 1900, which was for a furnace bearer or expansion pad, was held by Judge Rose and by the court of appeals to be invalid and fully anticipated by the Sharp British Patent No. 3558 of 1879. The decision is of importance to a number of railroads, as the suit was an attempt to cover, and collect damages of \$22,477.50 for, the use of the well-known expansion attachment of the firebox to the frames through the mud ring instead of through the side sheets, and if the decision of the court of appeals had been adverse to the Baltimore & Ohio, other of the numerous roads using this attachment, which has been applied to locomotives in the United States as early as 1862, would doubtless have been attacked. The case was argued by O. E. Edwards, Jr., of New York, for the plaintiff, Tate, and by William A. Redding and J. Snowden Bell, of New York, for the Baltimore & Ohio.

TRADE PUBLICATIONS

SELF ROTATING HAMMER DRILLS.—The Chicago Pneumatic Tool Company, Chicago, has issued a booklet describing its "Hammer" drills for drilling rock and similar work. This booklet describes in detail and illustrates the various parts of this apparatus.

IRON PIPE.—The A. M. Byers Company has recently issued Bulletin No. 26, dealing with the excellencies of Byers genuine wrought iron black and galvanized tubing, casing, line pipe and drive pipe. The bulletin contains considerable useful information about Byers pipe, such as its resistance to corrosion, fabricating qualities, welding qualities, specifications for genuine wrought iron pipe and details about hand puddling, rolling of muck bar, skelp, etc. In the back of the book are complete tables showing not only list prices, but dimensions, areas, hydrostatic tests, etc. There are also given specific cases showing the superior rust resistance of Byers in the same service as cheaper grades of pipe.

Railway Construction

ALTUS, ROSWELL & PACIFIC.—Construction work is to be resumed, it is said, on the first section of about 100 miles between Memphis, Tex., and Lubbock. This line was projected in 1911. The plans call for building an extension from Lubbock west to Roswell, N. M., also an extension east to Altus, Okla. T. C. Nobles, Houston and associates are back of the project.

CANADIAN GOVERNMENT RAILWAYS.—According to press reports, surveys are now being made by the Intercolonial from Painses, N. B., through Baie Verte, Tidnish and Pugwash, thence to Truro, N. S., for a revised location for portions of the line. The surveys between Truro and the Nova Scotia-New Brunswick boundary are about finished and survey work on the section in New Brunswick will be finished in December.

It is reported that the National Transcontinental will build about three miles of line to the proposed site of a large pulp mill to be built at Neclands, Ont., which is 30 miles west of Cochrane.

CANADIAN NORTHERN.—Train service on the Ontario division has been extended from Reul, Algoma, northwest to Port Arthur, 543 miles. The Carlton subdivision of the Western division has been extended from Laird, Sask., west to Carlton, eight miles.

DETROIT, BAY CITY & WESTERN.—This road has been extended from Sandusky, Mich., south to Peck, 11 miles.

EDMONTON, DUNVEGAN & BRITISH COLUMBIA.—Work is now under way on the branch line from Spirit river, Alta., to the Grand Prairie settlement. J. Timothy is the contractor. The route is from Spirit river settlement, thence crossing Burnt river and Bad Seal river, and via Lake Cleremont to Grand Prairie City on the Beaver river, 60 miles. The maximum grade will be 1 per cent and the maximum curvature 6 deg. The only difficult work on the line will be at the crossing of Saddle mountain. The grading work is about 60 per cent finished, and is expected to be completed by December of this year, and track laying will be completed early in 1916. (Oct. 15, p. 714.)

FARNHAM & GRANBY.—Application is being made to the Dominion parliament for an extension of time, it is said, to build the projected line from the Canadian Pacific, near Farnham, Que., north to Granby, thence northeasterly to Windsor Mills or to Richmond, about 60 miles. Pringle, Thompson, Burgess & Cote, Ottawa, Ont., are solicitors for applicants. (March 13, p. 555.)

GULF, COLORADO & SANTA FE.—Bids were received recently, it is said, for rebuilding the Gulf and Interstate division from High Island, Tex., to Port Bolivar, 27 miles, to replace the damage caused by storm and flood. It is probable that the line will be constructed over a new route to extend along East Galveston bay instead of along the shore of the Gulf of Mexico. This will increase the distance three or four miles.

INTERCOLONIAL RAILWAY.—See Canadian Government Railways.

JACKSON-TINNEY LUMBER COMPANY'S LINE.—This company is planning to build a logging road, about six miles long, extending southwest from Wadley, Ala. Contracts for the work are to be let at once. W. J. Tinney, president, Talladega, Ala.

KANSAS CITY & TIFFANY SPRINGS.—This company was incorporated under the Missouri laws on November 2, and proposes to construct a railway from Kansas City, Mo., to Tiffany Springs, Platte county, a distance of about 15 miles. The incorporators are T. N. Smith, Charles J. Smith, Bayless Steele and C. W. Chandler, of Kansas City, Mo.; J. N. Baird and Henry G. Post, Kansas City, Kan., and Robert Engelman, of Parkville, Mo.

LINVILLE RIVER.—An officer writes that work is now under way on the extension from the existing line at Montezuma, N. C., which has an altitude of 3,800 ft., via Grand Father mountain to Shulls Mills on Watauga river, 14 miles. The work is being carried out by H. C. McCrary, Knoxville, Tenn., and involves handling about 10,000 cu. yd. to the mile. The maximum grade

is 3½ per cent and the maximum curvature 22 deg. Some of the track has already been laid on the extension. The principal commodities the line will carry are lumber, bark and wood. The company now operates a 14-mile line from Pineola, northwest via Montezuma to Cranberry, where connection is made with the East Tennessee & Western North Carolina. (Nov. 5, p. 879.)

McComb & Magnolia Railway & Light Company.—See Mississippi Roads.

MISSISSIPPI ROADS (ELECTRIC).—Surveys are now being made by N. A. Kramer, Magnolia, Miss., it is said, for an interurban electric line to be built from Summit, Miss., south via McComb and Fernwood to Magnolia, about 12 miles. G. M. Walker, New York, is said to be interested. The McComb & Magnolia Railway & Light Company is said to have been incorporated recently with a capital of \$500,000, by M. R. Walker, S. M. Jones and others.

MUSCATINE & IOWA CITY.—This company has been incorporated for the purpose of operating a railway between Muscatine, Iowa, and Iowa City. The capital is \$400,000, of which \$100,000 will be common, and \$300,000 preferred stock.

NASHVILLE & EASTERN ELECTRIC.—An incorporator of this company is reported as saying that construction work will be started at once on an electric line from a connection with the Nashville, Chattanooga & St. Louis, at Lebanon, Tenn., southeast to Smithville, about 35 miles. The Myers Construction Company of Chicago is to build the line. (See Tennessee Roads, July 2, p. 39.)

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has approved the award by the New York Municipal Railway Corporation of a contract to Connors Brothers Company, Inc., the lowest bidder, at \$726,168, for the construction of the second section of the new elevated railroad in Jamaica avenue. The work will include the erection of the steel work between Walnut street and Cliffside avenue, in the borough of Queens. (October 15, p. 714.)

The commission has approved the award of a contract by the New York Municipal Railway Corporation to the Charles A. Myers Contracting Company, Inc., for grading, removing existing tracks, laying new tracks and special work, installing contact rail and other electrical work, etc., in the improvements now being made by the company in the Fresh Pond yard in the borough of Queens. The contract amounts to \$17,123.

Bids are wanted by the commission on November 23, for track installation on the White Plains Road extension of the existing subway. The White Plains Road extension is a three-track elevated line from the terminus of the Lenox avenue branch of the existing subway at One Hundred and Eightieth street, north to Two Hundred and Forty-first street, near the northern city boundary, in the borough of the Bronx.

OCILLA SOUTHERN.—The section of this road between Rochelle, Ga., and Hawkinsville, via Pope City, 25 miles, has been opened for business. (April 30, p. 955.)

OIL FIELDS & SANTA FE. The connecting links of this road—from Pemeta, Okla., to Oilton, and from Pemeta to Drumwright, have been completed.

OREGON, CALIFORNIA & EASTERN.—Surveying work is now in progress on this road under the direction of N. H. Bogue. The maximum grade will not exceed 2 per cent, and the maximum curvature 8 deg. The grading cost is estimated at \$6,000 per mile. Robert E. Strahorn, president, Portland, Ore. (October 22, p. 779.)

PIEDMONT & NORTHERN (ELECTRIC).—A contract is reported let to the Charlotte Construction Company, and work is now under way on the construction of a branch from Belmont Junction, N. C., to Belmont, four miles. A sub-contract for grading work is reported let to P. R. Huffstetler, Gastonia, N. C.

RAILWAY VALLEY RAILWAY. This company is building, with its own forces, a one-mile branch from Morris avenue, Springfield, N. J., to Vauxhall Road.

SAPULPA & OIL FIELDS (ELECTRIC). This road is being built from Depew, Okla., to Drumwright, a distance of 16.4 miles. Approximately 5 per cent of the grading has been completed under the direction of Joseph T. Lantry, superintendent of construction. About 25,000 cu. yds. of material is being handled per

mile. J. A. Frates, general superintendent of the first district of the St. Louis & San Francisco, at Springfield, Mo., is president of the road. J. T. Lantry may be reached at Tulsa, Okla.

TEANAWAY LOGGING RAILWAY.—Incorporated in the state of Washington by the Cascade Lumber Company, which owns a large mill in North Yakima, Wash., and has extensive timber holdings in the Cascade mountains, to build a 12-mile logging road to connect with the Northern Pacific main line, also to build seven or eight miles of branches. R. E. Slaughter, president, Hudson, Wis.

TEXAS ROADS.—A proposition has been submitted to residents of Krum, Tex., and Denton for the construction of a short railroad between these two places, which would connect the Gulf, Colorado & Santa Fe with the Texas & Pacific. It is understood that work will be started on the line in the near future. E. P. Turner, Dallas and associates are back of the project.

TORONTO SUBURBAN (ELECTRIC).—Track has been laid, it is said, on the extension from Lambton, Ont., to Guelph, 46 miles, over the Humber river bridge, to the junction with the present line on Dundas street at Lambton park, and ballasting work is now under way. Sub-stations are also being put up at Georgetown and at Guelph and a car barn is being built at Lambton park. The company expects to let contracts for the catenary line equipment in the near future. (May 14, p. 1034.)

WISCONSIN & NORTHERN.—This road has been extended from Van Ostrand, Wis., north to Lily, 13.1 miles. (May 28, p. 1140.)

RAILWAY STRUCTURES

ADEL, GA.—Construction work has been started on a new station in Adel, it is said, for the Georgia & Florida.

ARDMORE, OKLA.—The Oklahoma, New Mexico & Pacific has let a contract for a combination shop and engine house to Redpath & Co., of this city. The building will have a concrete foundation, galvanized iron sides and Genasco roof. Its dimensions will be 70 ft. by 80. About 70 per cent of the work has been completed, and the approximate cost is estimated at \$6,000. W. J. Stoneburner, Ardmore, Okla., general superintendent; W. T. Buck, Ft. Worth, Tex., architect.

BELLEVILLE, ONT.—Application has been made by the Canadian Pacific for an order to elevate the tracks within the city of Belleville to allow for the construction of subways and for building an interswitching track with the Canadian Northern Ontario.

BELMONT, N. C.—According to press reports the Piedmont & Northern is planning to build a combined freight and passenger station at Belmont.

BROOKLYN, N. Y.—The New York Public Service Commission, First district, has denied the request of the New York Municipal Railway Corporation for permission to let the contract for the construction of the Coney Island terminal to the George W. McNulty Company without competitive bidding. (Nov. 5, p. 880.)

The commission has opened bids for the construction of station finish for 11 stations on the New Utrecht avenue elevated line in the borough of Brooklyn. (October 29, p. 829.)

COUNCIL BLUFFS, IOWA.—The Roberts & Schaefer Company, of Chicago, has been awarded a contract by the Chicago Great Western for a fireproof coaling plant of 100 tons capacity, to be a duplicate of the plant now being built for the railroad at Clarion, Ia.

DALLAS, TEX.—The Union Terminal Company is drawing up plans for a power plant, to cost about \$10,000, and two signal towers, to cost \$20,000. They will be of reinforced concrete and steel construction.

DARLING, ONT.—According to press reports a contract has been let to the Foundation Company, Montreal, Que., for building a bridge at Darling, on the Toronto-Sudbury line of the Canadian Pacific. The cost of the new structure will be about \$50,000.

DERRY, PA.—The Pennsylvania Railroad will rebuild the engine house at Derry, at a cost of \$35,000. This is a renewal of the present facilities, and the work will be carried to completion this year.

FREESPORT, PA.—The Pennsylvania Railroad has given a contract to the Henry Shenk Company, Pittsburgh, Pa., for building a new freight station at Freesport.

GALLUP, N. M.—The Atchison, Topeka & Santa Fe is preparing preliminary sketches for a combination depot, hotel, rectory and office building, to be approximately 250 ft. by 60 ft., and two stories in height.

GRAY BULL, WYO.—Fire damaged the Chicago, Burlington & Quincy roundhouse recently. Plans are being prepared to repair the building.

MOUNT VERNON, N. Y.—The New York Central has let to the R. H. Howes Construction Company, 105 West Fortieth street, New York City, the contract for a new passenger station in this city. Piles for the foundation are being driven, and work on the station proper will be begun within a few weeks. The building is to be modern Italian Renaissance, of rough texture brick, limestone trimmings and tile roof. This building is on the new four-track line (nearer the Bronx river than the present two-track line), which was begun over four years ago and which is just now being finished.

NASHVILLE, TENN.—The Nashville, Chattanooga & St. Louis, the Nashville Railway & Lighting Company and the city of Nashville will replace the present steel girder bridge over Cedar street, used as an overhead crossing by the railroad, it is said, with a concrete slab structure, to be about 78 ft. long. The old masonry abutments will be used as part of the new abutments. Plans for this improvement are being made by the railroad company's engineering staff, but the work will be carried out by contracts under the supervision of the city engineer.

NEWKIRK, OKLA.—The Atchison, Topock & Santa Fe has sent plans and specifications for a combination depot to prospective bidders. The building will be approximately 178 ft. by 43 ft., will have brick walls and tile roof, and will cost about \$20,000.

PILOT ROCK JUNCTION, ORE.—The Oregon-Washington Railroad & Navigation Company has awarded a contract to the Roberts & Schaefer Company, of Chicago, for the construction of a 250-ton, standard counterbalanced bucket locomotive coaling station. The plant will be of reinforced concrete construction, and will be equipped to weigh all coal before passing it to tenders.

REGINA, SASK.—An officer of the Grand Trunk Pacific is quoted as saying that this road expects to proceed with the construction early next spring, of the terminal facilities at Regina and at three other points in the province of Saskatchewan, under an agreement with the provincial government.

SPRINGFIELD, MO.—Fire of unknown origin destroyed the mill, shop and coach repair department of the St. Louis & San Francisco reclamation plant on November 2. Four passenger coaches were lost.

TAYLORVILLE, ILL.—A fire, which originated in the boiler room of the Chicago & Illinois Midland shops on November 4, destroyed the roundhouse, car shops, offices and storerooms. Two locomotives also were damaged. The company plans to replace the structures as soon as possible. The loss incurred is not definitely known, but it is estimated at from \$65,000 to \$80,000.

WINDBER, PA.—New freight and passenger facilities for the Pennsylvania Railroad have been authorized for Windber, at an estimated cost of \$12,000. The freight facilities will be separate from the passenger facilities. Bids have been received for the erection of a freight station, and the contract for this work will work will be undertaken on the passenger station.

NORWEGIAN STATE RAILWAYS.—The state railway construction in Norway is progressing on a very large scale, although some of the important work now in hand will not be completed at the time originally intended. Thus the Doore railway and the Ramma railway were to have been ready in 1917, but neither undertaking will be completed at that time. According to the railway plan of 1908 the railways which it comprised were calculated to cost \$13,600,000, but the actual expenditure has now been put at \$23,200,000. Alterations and further new lines, which have been decided on later, were calculated to entail an aggregate expenditure of \$9,400,000, but they will, it has transpired, cost some \$2,700,000 more than originally calculated.

Railway Financial News

BIRMINGHAM, ENDSLEY & BESSEMER.—This property was sold under foreclosure recently and bought for \$700,000 by J. D. Kirkpatrick, representing the bondholders' committee.

CHICAGO, ROCK ISLAND & PACIFIC.—N. L. Amster has been elected chairman of the executive committee, succeeding T. M. Schumacher. John G. Shedd, J. S. Morron, N. J. French, Charles Hayden, Charles G. Dawes and E. D. Hulbert are the other members of the executive committee.

KANSAS CITY, MEXICO & ORIENT.—An application has been made to the Kansas Public Utilities Commission for permission to issue \$51,238,000 securities by a new company which is to take over the Kansas City, Mexico & Orient, now in the hands of receivers.

LEWISBURG & NORTHERN.—See Louisville & Nashville.

LOUISVILLE & NASHVILLE.—This company has taken over the Lewisburg & Northern. The Lewisburg & Northern runs from Bentwood, Tenn., to the Alabama state line.

MISSOURI, KANSAS & TEXAS.—All interest due November 1 on Missouri Pacific certificates was suspended, there being a provision for 30 days' grace in interest on the \$19,000,000 6 per cent notes and six months' grace on the Missouri, Kansas & Texas extension 5 per cent bonds, the Missouri, Kansas & Oklahoma first mortgage 5 per cent bonds, the Dallas & Waco first mortgage 5 per cent bonds and the Boonville Railroad Bridge first mortgage 5 per cent bonds.

SOUTHERN PACIFIC.—Reports have been current for some time that a syndicate was being formed for the purchase of \$38,292,400 Southern Pacific stock, which was sold by the Union Pacific to the Pennsylvania Railroad. The firms whose names have been connected with this syndicate by report are Kuhn, Loeb & Co., Hallgarten & Co., Hayden, Stone & Co. and Bernard M. Baruch. It is said that the Pennsylvania has not accepted any offer made by any syndicate so far.

THE MUSCATINE & IOWA CITY.—As was briefly indicated last week, this company was incorporated under the laws of Iowa on October 25, and has leased from Chicago, Rock Island & Pacific the line that extends from Muscatine, Iowa, to Montezuma, 87.3 miles; the line from Thornburg, Iowa, to What Cheer, 4.7 miles, and the line from Iowa Junction, Iowa, to Iowa City, a distance of 11.8 miles. The Muscatine & Iowa City will take over this property on January 1, 1916, under a lease of 50 years, and will operate and maintain it exclusively, the Rock Island withdrawing all of its service. The new road will conduct freight, passenger, express, mail and all other forms of common carrier business, and will use for passenger service General Electric Company self-propelled gasoline electric motor cars of the G. E. type, R. E. 70-B-11, four of which have been ordered. For freight purposes gas electric locomotives of the G. E. type 404-G-114-4-GE-205-D will be used. Temporarily steam will be the motive power. The officers of the new corporation are as follows: A. D. Bowen, president; F. O. Block, vice-president; S. W. Mercer, vice-president; W. R. Jayne, secretary; E. L. McCollm, treasurer; C. D. Van Hecke, general manager. The main offices of the company are in the Hershey building, Muscatine, Iowa.

WABASH.—The secretary of state of Missouri has declined to grant a license to the new Wabash Railway Company to operate in Missouri, on the ground that an act of the Missouri legislature of April, 1913, prohibits such operation unless the railroad is incorporated in the state. He has therefore returned to the company the check for \$19,665, tendered in payment of the license fee. The secretary of state offered, however, to assist in having the matter presented to the courts in case the railroad is of the opinion that the statute is not applicable. President Kearney has announced that the decision of the secretary of state will not interfere with the operation of the road, and that probably action will be taken as soon as possible to test the law.

ANNUAL REPORT

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE RAILWAY COMPANY—TWENTY-SEVENTH ANNUAL REPORT

FOR THE FISCAL YEAR ENDED JUNE 30, 1915

Including Chicago Division (Wisconsin Central)

Submitted herewith is a report for the fiscal year ended June 30, 1915.
The Gross Earnings, Operating Expenses, Fixed Charges, Surplus, etc., are as shown in the following condensed statement.

	Soo Line.	Chicago Division.	Soo Line System.
Gross Earnings	\$17,817,855.04	\$9,945,369.76	\$27,763,224.80
Operating Expenses.....	11,059,594.21	6,751,779.60	17,811,373.81
Net Earnings.....	\$6,758,260.83	\$3,193,590.16	\$9,951,850.99
Income from other sources..	1,043,965.49	61,280.75	1,105,246.24
Total Income.....	\$7,802,226.32	\$3,254,870.91	\$11,057,097.23
Fixed Charges, Taxes, etc....	4,828,222.39	3,118,138.78	7,946,361.17

Surplus Income..... \$2,974,003.93 \$136,732.13 \$3,110,736.06
Dealing with the entire system and comparing the year's results with those of the preceding year, the Gross Earnings decreased \$1,542,997.79, Net Earnings decreased \$112.90, and the Surplus Income decreased \$260,462.26. The decrease in Freight Revenue was \$580,633.33, largely due to decreased shipments of lumber, manufactured iron, machinery, building materials and agricultural implements. Attention has been called in previous reports to the increase in live stock shipments; there was a further increase during the year. Shipments of iron ore also show an increase and with the development of the Cuyuna Range there should be a continued increase in shipments of this commodity.

The decrease in Passenger Revenue was \$859,153.95, due to depressed business conditions, but it has been found impossible to materially reduce the passenger train expenses. Your attention is called to the fact that while the Passenger Revenue decreased thirteen per cent, the decrease in miles run by passenger trains was but five and one-half per cent.

Maintenance expense shows a decrease of \$904,685.14. Owing to the decreased business handled our facilities have not been fully employed. The large expenditures in previous years for permanent bridge and road work and for new equipment have contributed to the reductions in Maintenance expenses.

Transportation expenses show a decrease of \$466,075.90, caused partly by decrease in business handled. Every effort consistent with the safe conduct of the business has been made to reduce transportation expenses.

During the year the company purchased the railroad and property of the Fairmount & Veblen Railway Company, extending from Fairmount, North Dakota, to Grenville, South Dakota, a distance of 87 miles, and commenced operation of same July 1st, 1915. The company also purchased the railroad and railroad property of the Minnesota Northwestern Electric Railway Company, extending northeast from Thief River Falls, Minnesota, a distance of 18.55 miles. The Minnesota Northwestern Electric Railway Company will continue to operate the property under lease from this Company.

The only new construction in progress at this time is an extension

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE RAILWAY COMPANY GENERAL BALANCE SHEET

ASSETS		LIABILITIES	
Property Investment:		Capital Stock:	
Road	\$97,620,782.34	Common	\$25,206,800.00
Equipment	20,829,517.77	Preferred	12,603,400.00
	\$118,450,300.11	Total	\$37,810,200.00
Less Reserve for Accrued Depreciation.....	2,860,578.01	Mortgage, Bonded and Secured Debt:	
Total	\$115,589,722.10	First Mortgage M. & P. Ry. Co. 4% Bonds	\$286,000.00
Miscellaneous Physical Property.....	271,952.45	First Mortgage M. S. S. M. & Atl. Ry. Co. 4% Bonds	8,136,000.00
Securities of Proprietary, Affiliated and Controlled Companies:		First Consolidated Mortgage M. St. P. & S. S. M. Ry. Co. 4% Bonds.....	56,863,000.00
Wisconsin Central Ry. Co. Stock.....	\$3,658,337.00	First Consolidated Mortgage M. St. P. & S. S. M. Ry. Co. 5% Bonds.....	2,637,000.00
Central Terminal Ry. Co. Stock.....	1,380,000.00	Second Mortgage M. St. P. & S. S. M. Ry. Co. 4% Bonds.....	3,500,000.00
Central Terminal Ry. Co. Bonds.....	139,500.00	Fairmount & Veblen Ry. Co. Second Mortgage 6% Bonds	14,450.00
Belt Ry. Co. of Chicago Stock.....	240,000.00	Equipment Trust Obligations.....	6,075,000.00
Belt Ry. Co. of Chicago Stock.....	103,600.00	Total	77,511,450.00
St. Paul Union Depot Co. Stock.....	64,000.00	Working Liabilities:	
Minnesota Transfer Ry. Co. Bonds.....	50,000.00	Traffic and Car Service Balances due to Other Companies	\$322,017.44
Western Express Company Stock.....	37,500.00	Audited Vouchers & Wages Unpaid.....	2,531,435.93
Sainte Marie U. D. Co. Stock.....	7,000.00	Miscellaneous Accounts and Bills Payable	491,940.02
Minnesota Transfer Ry. Co. Stock.....	500.00	Matured Interest and Dividends Unpaid	2,139,686.50
New Jersey Bridge Construction Co. Stock	500.00	Total	5,485,079.89
Total	5,680,437.09	Accrued Liabilities not Due:	
Miscellaneous Investments:		Unmatured Interest	\$132,819.32
First National Bank and Soo Line Building Company Stock.....	\$375,000.00	Taxes Accrued	417,126.42
Advances to First National Bank and Soo Line Building Company.....	125,000.00	Total	549,945.74
Coeur d'Alene & Pend d'Orielle Ry. Co. 5% Bonds	25,200.00	Deferred Credit Items:	
Tri-State Land Company Stock.....	25,000.00	Operating Reserve	\$189,034.08
Advances to Sainte Marie Union Depot Co.	22,776.31	Insurance Fund	78,904.67
Pillsbury-Washburn Flour Milling Co., Ltd., 5% Bonds	4,700.00	Other Deferred Credit Items	78,308.39
Miscellaneous Stocks	376.00	Total	346,247.14
W. C. Ry. Co. Equipment Contracts....	1,851,500.80	Profit and Loss	14,750,595.70
Total	2,429,553.11		
Working Assets:			
Cash	\$6,048,447.00		
Traffic and Car Service Balances due from other companies	149,522.22		
Net Balances due from Agents.....	1,225,403.11		
Misc. Accounts and Bills Receivable.....	774,816.64		
Material and Supplies	2,027,997.86		
Total	10,226,186.83		
Accrued Income Not Due:			
Unmatured Dividends	\$111,696.00		
Unmatured Interest	20,370.39		
Accrued Income from Lease of Road..	1,558.34		
Total	133,624.73		
Deferred Debit Items:			
Tri-State Land Co.....	\$1,248,287.14		
Land Sales (Deferred Payments).....	80,000.00		
Other Deferred Debit Items.....	99,830.80		
Working Funds	51,374.18		
Unextinguished Discount on Securities..	642,550.04		
Total	2,122,042.16		
Grand Total	\$136,453,518.47	Grand Total	\$136,453,518.47

Contingent Liabilities:

As joint maker with the Central Terminal Railway Company of Illinois of Bonds secured by mortgage on property of the Central Terminal Railway Company	\$6,000,000.00
4% Leased Line Certificates of the Minneapolis, St. Paul & Sault Ste. Marie Railway Company, issued in exchange for Preferred Stock of the Wisconsin Central Railway Company, held therefor.....	11,169,600.00

from Van Hook, North Dakota, to the Missouri River, a distance of ten miles.

During the year there has been expended for Additions and Betterments \$723,829.64.

Equipment changes amounting to \$72,230.66 are fully shown in detail on pages 26 and 43.

The Company purchased 400 forty-ton capacity steel frame box cars and 100 forty-ton capacity steel frame automobile cars, which were delivered during August, 1915, and six switching locomotives for delivery in December, 1915.

The outstanding funded debt was increased during the year by the sale of

Minneapolis, St. Paul & Sault Ste. Marie Railway Company
First Consolidated Mortgage Five Per Cent Bonds..... \$2,637,000.00
Wisconsin Central Railway Company, Three Year Five

Per Cent Secured Gold Notes.....	1,000,000.00
	<u>\$3,637,000.00</u>

The outstanding funded debt was decreased during the year by the retirement of

Minneapolis, St. Paul & Sault Ste. Marie Ry. Co.:

Equipment Trust Obligations	\$982,000.00
Wisconsin Central Railway Company:	
Equipment Trust Obligations	367,500.40
First General Mortgage Bonds.....	12,000.00
M. & S. E. Div. P. M. M. Bonds.....	5,000.00
	<u>\$1,366,500.40</u>

During the year the Company has continued its efforts to assist in the development of the territory tributary to its lines. The results have been exceedingly satisfactory.

The Northwestern States have an excellent grain crop this year. This should produce considerable increase in tonnage and if general business conditions improve the results for the current fiscal year should show much improvement. The property is in condition to economically handle a largely increased business.

Respectfully submitted,
E. PENNINGTON,
President.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE RAILWAY COMPANY

OPERATING REVENUES AND EXPENSES

Revenue from Transportation:

Freight Revenue	\$12,576,373.74
Passenger Revenue	3,810,891.36
Excess Baggage Revenue	43,099.61
Sleeping Car Revenue.....	259,366.53
Parlor and Chair Car Revenue	9,384.00
Mail Revenue	431,929.61
Express Revenue	328,948.48
Other Passenger Train Revenue.....	338.60
Switching Revenue	54,025.59
Special Service Train Revenue	2,499.74
Total Revenue from Transportation....	<u>\$17,516,857.26</u>

Incidental Operating Revenue:

Dining and Buffet Car Revenue.....	\$91,879.10
Station and Train Privileges.....	9,904.30
Parcel Room Receipts.....	1,112.50
Storage Freight	6,210.61
Storage, Baggage	1,927.03
Demurrage	29,379.87
Telegraph Service	97,457.46
Rents of Buildings and Other Property....	46,499.19
Miscellaneous	5,801.87
Total Incidental Operating Revenue	<u>\$290,171.93</u>
Joint Facilities Revenue	10,825.85
Total Operating Revenues	<u>\$17,817,855.04</u>

Operating Expenses:

Maintenance of Way and Structures.....	\$2,095,306.62
Maintenance of Equipment	2,724,035.79
Traffic Expenses	337,332.22
Transportation Expenses	5,495,980.27
Miscellaneous Operations	92,537.00
General Expenses	384,839.90
Transportation for Investment.....Cr.	71,437.59
Total Operating Expenses.....	<u>\$11,059,594.21</u>
Net Operating Revenue	<u>\$6,758,260.83</u>

INCOME ACCOUNT, FISCAL YEAR ENDED JUNE 30, 1915

Net Operating Revenue	\$6,758,260.83
Taxes Accrued	1,135,439.31
Operating Income	<u>\$5,622,821.52</u>

Other Income:

Dividends on Stock Owned	\$465,328.00
Hire of Equipment	275,995.52
Interest and Discount.....	115,901.27
Rents Receivable	76,734.77
Interest on Wisconsin Central Railway	
Equipment Contracts	93,966.60
Interest on Bonds Owned	14,636.68
Premium on Funded Debt.....	1,402.65
Total Other Income	<u>1,043,965.49</u>
Gross Income	<u>\$6,666,787.01</u>

Deductions from Gross Income:

Interest on Bonds	\$2,795,289.44
Interest on W. C. Ry. Leased Line	
Certificates	446,784.00
Interest on Equipment Notes	299,109.15
Rental of Terminals	151,600.49
Total Deductions from Gross Income	<u>3,692,783.08</u>
Net Income	<u>\$2,974,003.93</u>

PROFIT AND LOSS ACCOUNT TO JUNE 30, 1915

By Balance June 30, 1914.....	\$14,576,889.82
Net Income for Year Ended June 30, 1915..	<u>2,974,003.93</u>
	<u>\$17,550,893.75</u>

Additions for Year:	
Unfunded Ticket Overcharges.....	\$1,061.40
Interest Items	14,336.68
	<u>15,398.08</u>
	<u>\$17,566,291.83</u>

Deductions for Year:

7 per cent Dividend on Preferred Stock....	\$882,238.00
7 per cent Dividend on Common Stock.....	1,764,476.00
Extinguishment of Discount on Bonds and	
Equipment Notes	35,269.06
Loss on retired Road and Equipment.....	133,713.07
	<u>2,815,696.13</u>
Balance Credit June 30, 1915.....	<u>\$14,750,595.70</u>

OPERATING REVENUES AND EXPENSES

Wisconsin Central Railway Company

("Soo Line," Chicago Division)

Revenue from Transportation:

Freight Revenue	\$7,237,915.51
Passenger Revenue	1,994,824.13
Excess Baggage Revenue	20,415.28
Parlor and Chair Car Revenue.....	6,332.72
Mail Revenue	138,993.91
Express Revenue	177,311.66
Other Passenger Train Revenue.....	343.19
Milk Revenue on Passenger Trains.....	140,287.17
Switching Revenue	58,578.17
Special Service Train Revenue.....	925.94
Other Freight Train Revenue.....	1,648.00
Total Revenue from Transportation.....	<u>\$9,777,575.68</u>

Incidental Operating Revenue:

Dining and Buffet Car Service.....	\$60,369.00
Station and Train Privileges.....	4,142.86
Parcel Room Receipts.....	234.90
Storage, Freight	4,812.60
Storage, Baggage	176.06
Demurrage	36,179.49
Rents of Buildings and Other Property.....	12,579.48
Miscellaneous	46,133.49
Total Incidental Operating Revenue.....	<u>164,627.88</u>
Joint Facilities Revenue.....	<u>3,166.20</u>
Total Operating Revenues.....	<u>\$9,945,369.76</u>

Operating Expenses:

Maintenance of Way and Structures.....	\$1,211,190.20
Maintenance of Equipment	1,252,717.68
Traffic Expenses	260,188.96
Transportation Expenses	3,734,414.83
Miscellaneous Operations	76,611.69
General Expenses	225,586.06
Transportation for Investment.....Cr.	8,929.82
Total Operating Expenses.....	<u>6,751,779.60</u>
Net Operating Revenue.....	<u>\$3,193,590.16</u>

INCOME ACCOUNT, FISCAL YEAR ENDED JUNE 30, 1915

Wisconsin Central Railway Company

("Soo Line," Chicago Division)

Net Operating Revenue	\$3,193,590.16
Taxes Accrued	667,614.10
Operating Income	<u>\$2,525,976.06</u>

Other Income:

Interest and Discount.....	\$28,469.10
Interest on Bonds Owned.....	520.00
Rents Receivable	32,291.65
Total Other Income.....	<u>61,280.75</u>
Gross Income	<u>\$2,587,256.81</u>

Deductions from Gross Income:

Interest on Bonds.....	\$1,551,887.21
Interest on Equipment Notes.....	106,735.95
Rentals of Terminals.....	657,399.99
Hire of Equipment.....	134,501.53
Total Deductions from Gross Income....	<u>2,450,524.68</u>
Net Income	<u>\$136,732.13</u>

Railway Age Gazette

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WE GUARANTEE, that of this issue (the monthly Engineering and Maintenance Edition) 10,750 copies were printed; that of these 10,750 copies 7,270 were mailed to regular paid subscribers to the weekly edition, 1,846 to subscribers who get the Engineering and Maintenance Edition only, 135 were provided for counter and news companies' sales, 1,034 were mailed to advertisers, exchanges and correspondents, and 465 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 433,450, an average of 9,222 copies a week.

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*Illustrated.

The importance of making a careful economic study of the distribution of power between the various divisions of a road and the benefits that will accrue from such a study when the purchase of new or additional power is considered is forcefully illustrated in the article on Mikado Versus Consolidation Locomotive by N. D. Ballantine, printed elsewhere in this issue. Mr. Ballantine outlines the method followed by the Rock Island for the determination of the most economic distribution of power between four divisions of that road, and while the conditions obtaining on the Rock Island controlled, to a certain extent, the method of procedure, the outline will serve as a guide to others desiring to make a similar study. In the problems discussed, Consolidation locomotives using saturated steam were compared with Mikado locomotives using superheated steam and having a tractive effort 46 per cent greater than the Consolidations. With both types of locomotives loaded to their full rating a saving would naturally be expected by the use of the Mikados, but the low loading efficiencies (51.3 per cent on Division A) obtained in the study make it interesting to note that the Mikados proved to be the most economical engines. Division B, having the highest loading efficiency, showed the greatest saving, namely, 23.3 per cent. These results should make it plain that in order to know exactly what is actually being accomplished some such study should be made. With the data obtained from such investigations the opportunities for study with resultant increases in efficiency are almost unlimited and if similar studies are made before the purchase of new or additional power there is no question but that the power bought would more efficiently meet the traffic requirements with ultimate saving in the investment and operation.

The postoffice department evidently intends to continue its fight to prevent the compensation of the railways for carrying the mails from being put on a remunerative basis; and it is not scrupulous in its choice of weapons. The lack of fairness has been shown and is still showing regarding this matter should warn people who

are disposed to favor extensions of government ownership and operation of business concerns. As the department is so arbitrary and unfair may we not assume that a government management of the telegraphs or the railroads might also be arbitrary and unfair? These thoughts are suggested by a statement prepared by the department and published in the newspapers on November 14. This shows that the railways of certain territories are to receive an increase in their mail compensation, and might convey the impression that the increase is due to advances in the mail rates. In fact, it will be due to increases in the amount of mail traffic handled. The department points out that there is active competition between the railways for an opportunity to carry mails on certain routes, and concludes that this is "good evidence of the unjustness of the oft-repeated assertion that the railroads are handling the mails at a loss." This logic is as imbecile as the want of efficiency shown in managing most of the affairs of the department. The two routes to which the department's statement specifically refers are those between New York and Chicago and between Chicago and Minneapolis. The mail traffic on these routes is extremely dense. Now, no one claims that the railways do not make a profit from the mail traffic on the densest routes in the country. What is claimed is that their compensation for carrying the mail on all routes, those on which the traffic is light as well as those on which it is heavy, is inadequate. Furthermore, active competition for the mail business on every route would prove nothing as to the remunerativeness of the rates. If a man had a sum of money to lend, and the law prohibited him from receiving more than two per cent interest, he probably would accept it, although he might denounce as unjust a statute which prohibited him from receiving less than six, or even eight per cent. He would be better off with two per cent than with nothing at all. The

case of the railways is analogous. A road would rather carry the mail if it earned only two, or even one per cent, on the investment in facilities devoted to that service than not to carry it at all. As, however, railways need to earn six or seven per cent on their business, as a whole, and as the mail traffic is of such a character that it can easily afford to pay rates which will yield a fair profit, the roads, very naturally, complain of legislation and department orders which have been shown to restrict them to a return on their mail traffic smaller than the return they derive from handling either freight, passengers or express. The government is constantly preaching to private corporations the doctrine of equity in transacting their business, but there is not a business concern in the United States which is as petty and unfair in its business methods, or is as pertinacious in seeking unfair discriminations from the railways, as is the postoffice department; nor is there one which defends its course with such fallacious and dishonest arguments.

TEN DOLLARS FOR A DIALOGUE

ONE of the significant remarks at the recent "safety first" meetings in Philadelphia, reported in the *Railway Age Gazette* October 29, was that of F. T. Bowler, one of the Pennsylvania's committeemen, who said that in admonishing fellow-employees he made enemies for himself. In giving advice that is not asked for, on subjects which the person addressed thinks he knows fully already, one always runs that risk. And yet the safety-first propaganda owes much of its progress to just this thing; stirring up men's minds on matters in which they had thought they needed no further light. How is it done? Or, rather, what is the best way in which to do this disagreeable thing with the least friction? Pages and pages, and whole books, have been written, but the rules to be followed are still vague and shadowy.

In this paucity of acceptable theory we may do well to study actual practice. Who has succeeded in giving undesired advice with pleasant results? What did the other fellow say? Give the readers of the *Railway Age Gazette* the whole conversation. For the three best dialogues of this character, concerning "safety-first," we will pay ten dollars each. The thing desired is actual experience; report conversations verbatim. Dialogues should not contain more than three or four hundred words each, but very good ones will be accepted even if longer. After the best three the regular rate will be paid for others which are used. All must reach New York by December 31.

Each writer should give all necessary explanations, and, in particular, his own position and that of the person spoken to, whether superior, inferior or equal. Writers must give their names, but matter may be published without names where mutually agreeable.

"THE OUTLOOK" ON RAILROAD RECEIVERSHIPS

WHEN a paper with such breadth of vision and reputation for scholarly accuracy as *The Outlook* makes an absurd blunder in discussing railroad receiverships and regulation it is pretty good evidence of how much there still is to be done in the way of frank discussion of railroad problems before these problems will be understood by the great majority of educated people. *The Outlook* agrees with the *Railway Age Gazette* that state regulation as opposed to and conflicting with federal regulation is pernicious. But *The Outlook* is a bit suspicious that in a recent article discussing railway receiverships the *Railway Age Gazette* was attempting "to discredit the general principles of government regulation." It would, indeed, take a hardened fighter of the old school of railroad men to come out now in favor of the abolition of government regulation of railroads.

The Outlook adds: "If government regulation can be applied successfully to railways through receiverships it is certainly possible to apply it successfully through a federal commission."

Would *The Outlook* say that because a federal court can appoint a manager for a bankrupt dry goods firm, this is proof that the United States government can regulate the dry goods business of the country? There is no more connection between regulation and receivership in the one case than in the other. A receiver is a man appointed by a court, as an officer of the court, to so administer a business as to preserve the assets for the benefit of the creditors, the stockholders and all others who may be concerned; and he performs the functions of management, not of regulation. Regulation may and often does assume some of the functions of administration. It is a matter for the courts to determine just how far in each case regulation can go without depriving the owner of rights which under the constitution can be taken from him only by due process of law.

The Outlook says that railway receiverships have been generally successful financially. What this can mean it is difficult to see. A receivership is successful if it preserves intact the assets of the creditors of the bankrupt corporation. In the case of a railroad company, the most important asset which it has is its earning power. This can be conserved through a wise policy of maintenance, a sound and aggressive bid for traffic and the economical conduct of the business of transportation. The court which assumes charge of a property when it is taken out of the hands of its owners appoints one or more receivers. Often one of these receivers is a lawyer, the other an operating man—a railroad man. If, however, a lawyer only is appointed as receiver, his first step is invariably to appoint an operating man as his representative to run the railroad, and this man manages the railroad, whether his title be receiver or chief operating officer for the receiver. In the one case he reports directly to the court in the same way as the president of a solvent railroad company reports to the directors; in the other case he reports to the receiver, who in turn reports to the court. In any event, the seeming success of the receiver always is due to the fact that he can and does use in operating and improving the property parts of the earnings which a manager for a private corporation would have to pay out in interest. If this is "financial success" it is a queer kind!

Would *The Outlook* suggest that the Interstate Commerce Commission appoint a chief operating officer for each one of the railroad companies of the United States, which officer should report to it instead of the board of directors? Only so could there be any analogy between the administration of a railroad property under receivership and the regulation of railroads by the Interstate Commerce Commission; and this would not be government regulation, but government management.

THE SCARCITY OF FREIGHT CARS

A SHORT time ago the remark was made in these columns that "this year, talk of a car shortage would seem as music to the ears not only of railroad officers, but of most business men also." Since that time, somewhat unexpectedly, the band has begun to play. But while most people are inclined to welcome the sound as the herald of returning prosperity there are some discords. If business conditions during the past two years had not been such that the roads were more worried about the large actual number of surplus cars than about possible shortages of equipment they might have had more money to buy more new cars before they were needed. As it has happened, the revival of business has succeeded the long period of depression so suddenly that the large surpluses have melted away almost over night, and shortages are appearing in many parts of the country—shortages of box cars in Central Freight Association territory and the Northwest, and of coal cars in Trunk Line and Central Freight Association territory.

The monthly bulletin of the Committee on Relations between Railroads of the American Railway Association for November 1 showed a shortage of 26,628 cars and a surplus of 52,867, the smallest net surplus since the fall of 1913, the surplus having been reduced by 35,474 in October and by 103,248 in September. For 90 per cent of the time since 1907 the American Railway

Association has reported large surpluses, but now the shippers are filling the newspapers with complaints because they cannot get cars and the Interstate Commerce Commission and some of the state commissions are issuing the usual circulars urging the railroads and shippers to co-operate by handling and releasing cars as promptly as possible. The Interstate Commerce Commission also urges the railroads to endeavor to improve their methods of operation of terminals.

All of this sounds very much like old times, but some of the conditions which are at the bottom of the present situation emphasize the need of a remedy different from those that usually are suggested. The failure of car supply is ordinarily a failure of car movement. In the present case it is largely caused by a shortage of vessel capacity as a result of the European war. There has been for some time a serious congestion of freight at New York and to a less extent at other Atlantic and Gulf ports. The movement of export grain and of many other articles for export, including war materials, is very heavy, and the trunk lines have many miles of side tracks at the ports filled with delayed cars. It is reported that over 50,000 cars, nearly twice the amount of the shortages reported for the entire country, are thus tied up in the vicinity of New York alone, and it was recently estimated that there was ready for export at New York harbor five times as much freight as the available vessels could take.

The situation has been aggravated by the closing of the Panama Canal by slides since September 20. While the Panama Railroad has trans-shipped a large amount of the freight that had started through the canal before the slides occurred, the closing of the canal has resulted in much congestion of freight at the Gulf ports and the number of boats that have taken their cargoes around South America or the Cape of Good Hope has appreciably diminished the vessel capacity available at the United States ports.

Meanwhile, as there is no demurrage or storage charge on export grain and very little charge on other export freight, the accumulation at the ports continues to be increased by shipments from the interior, and thousands of cars are being used as warehouses, while shippers that want cars are clamoring for them elsewhere. If adequate demurrage and storage could be charged shippers would not keep sending shipments to the congested ports, but would hold back some of their freight until there appeared some chance of its being loaded into vessels.

A similar situation arose at Galveston in August, 1914, immediately after the war started, when an enormous congestion of freight was caused by the shortage of vessels, and so much demurrage accrued that Commissioner Clark of the Interstate Commerce Commission recommended to the roads that demurrage be cancelled, without admitting, however, "that the principle of demurrage on export grain is wrong or a mistaken one." Commissioner Clark at that time was dealing with an unprecedented situation. No one had warning of the war and the shippers had a right to expect that vessels would be available for their shipments. But now the war has been in progress for over 15 months. The scarcity of ships is well understood, and a penalty for sending export shipments to points of congestion without having made some arrangements for their disposition would not be unjust and would help to relieve the congestion.

The railroads themselves have been unable to agree on a demurrage or storage charge, for the usual reason that some roads have preferred to please the shippers who do not like to pay demurrage. The Committee on Relations between Railways in its report to the American Railway Association, at its meeting on Wednesday, said: "One cause of delay to box cars has been that it has not usually been practicable to charge demurrage on cars loaded with export grain consigned to elevators located at the seaboard. Your committee has represented to the traffic associations that the greatest congestions have occurred when the export elevators are filled with grain, and it is, therefore, impossible to unload the cars consigned to them. The point has further been made that this situation would be improved if the storage rates applicable to grain in the elevators should

also apply to the grain in cars which cannot be unloaded into the elevators." The report added that the railway traffic associations have taken up the suggestion and that it had been hoped that the arrangement could go into effect as of December 1, at all Atlantic and Gulf ports; but Arthur Hale, chairman of the committee, stated at the meeting that the hopes had not been well founded.

The Interstate Commerce Commission has tried to bring about co-operation between the railroads and the shippers to minimize car shortages by prompt handling of cars. If it would promote the efforts to establish a demurrage or storage charge on export shipments something tangible might be accomplished toward the alleviation of such situations as the present one, and their prevention in future. The commission, by immediately calling representatives of the carriers and of the leading boards of trade together at Washington and keeping them there until they agreed upon something, without the long, painful process of hearings and the usual procedure, could apply the remedy in time to do some good this year.

MISSOURI COMMISSION ALLOWS RATE ADVANCES

THE Missouri Public Service Commission has just rendered a decision, reported elsewhere in this issue, which is unique in the annals of state railway regulation. It allows not only a general advance in passenger fares but an increase in freight rates, which, with some exceptions, is estimated to average about 5 per cent. Orders of state commissions ordering extensive reductions in both freight and passenger rates are not unknown, and several commissions have recently authorized increases either in freight rates or in passenger fares, but this is believed to be the first case on record of a voluntary, comprehensive decision by a state commission affecting both branches of the service favorable to the requests of the carriers.

The railroads are not given all they asked for. They had requested a passenger rate of 3 cents a mile in place of the present rate of 2 cents, and the commission has granted them permission to charge 2½ cents a mile for one-way tickets, 2¼ cents for round-trip tickets and 2 cents for mileage books. They had asked for general increases in freight rates and the commission has excepted some commodities and reduced the proposed advance on others. But considering the circumstances, the long and unsuccessful fight the railroads have waged in the courts and the fact that the commission is overruling the acts of the state legislature, the commission is to be congratulated on an act of broad statesmanship.

The decision includes some 300 typewritten pages, and printed copies have not yet been distributed, but extracts from the opinion, which is unanimous, make it clear that the commissioners were convinced that regulation of railway rates downward has gone altogether too far, that to obtain good railroad service it is necessary to encourage further investment, and that it is unjust to penalize all of the carriers for individual instances of corporate mismanagement. It is also noted that the commission finds from the evidence that the reduction of passenger fares from 3 cents to 2 cents a mile was not compensated by an increase in traffic. The passenger rates, which the railroads are allowed to advance, were reduced by the legislature in 1907 and the freight rates in 1905, and in 1907 by the legislature. Temporary injunctions were secured by the roads in the federal court, but in 1913 the United States Supreme Court decided that the railroads had not succeeded in proving the rates confiscatory. As the condition of the railroads became steadily worse, the way for an appeal to the commission was paved by a decision of the state supreme court in the case of the Missouri Southern, holding that the act creating the public service commission and authorizing it to pass upon the reasonableness of rates had given the commission jurisdiction to set aside the statutory rates.

As would naturally be expected in Missouri, the commission was not easily convinced and its decision was not reached until after a most thorough investigation and a protracted series of hearings in which the railroads presented a voluminous record

of statistical and other evidence. Moreover, its action was not taken until most of the railway mileage of the state had passed into the hands of receivers. Missouri having been "shown," it would seem that a large number of other states, which are still trying to reduce rates or are opposing increases or in which applications for advances are still pending, might find it profitable to give serious consideration to so excellent an example before their railways reach the extreme condition which has prompted such a reversal of policy in that state.

THE COMMISSION AND WESTERN FREIGHT RATES

THE Interstate Commerce Commission has denied the petition of the railways for a rehearing of the case involving advances in western freight rates. This is disappointing, as by this action the commission again, in effect, declines to pass on the question as to whether the net earnings of the western lines are adequate. Many persons will continue to believe that both the railways and the public were entitled to be told by the commission what conclusion it reached on this point. The data that were presented in its opinion seem to demonstrate the inadequacy of the roads' earnings, but as long as the commission dodges committing itself as to this matter neither the railways nor the shippers will know just where they stand.

At the same time that it refused to reopen the rate advance case, the commission took a step which seems commendable, important and significant. It issued an order on its own motion for a general inquiry into rates on live stock, dressed meat and packing house products in Western Classification territory. In its decision in the western rate advance case it refused increases in the rates on live stock because there were some state rates which already were lower than the interstate rates. The railways, in their petition for a rehearing, argued that it should have upheld the proposed interstate rates if they were reasonable and made the states advance the intrastate rates to the same basis. They contended that the action of the commission in letting rates fixed by state authority control its policy in regulating interstate rates was an abdication of the paramount authority of the federal government over interstate commerce. The issuance of the order for a general investigation of the rates on live stock and packing house products may mean that the commission intends to ascertain the exact relations which do exist between the rates, state and interstate, and then to take such action as may be necessary to eliminate existing discriminations.

That unfair discriminations in the rates on live stock and packing house products do exist is charged by many shippers and conceded by the traffic managers of most of the railways. Some of these discriminations grow out of the fact that the state rates made by public authorities are lower than the corresponding interstate rates. Others grow out of the action of certain railways in making interstate rates which are unduly low as compared with other rates in the same territory. The investigation on which the commission is entering will enable it to determine what are the extent and nature of the existing discriminations.

It is not charged that any of the discriminations now alleged grow out of the fixing of any rates that are too high. They grow out of the fixing by state authorities and by the railways themselves of some rates which are too low. If the commission decides that this is the situation, how will it proceed to remedy it? The act to regulate commerce gives it authority to reduce interstate rates and prevent advances in them in order to prevent excessive charges or remedy unfair discriminations; but it does not give it express authority to require an advance in any rate, state or interstate, or to prevent a reduction in any rate. Members of the commission have contended that it should be given authority to fix minimum as well as maximum rates. Many railway men and economists have taken the same view. The *Railway Age Gazette* long has advocated legislation empowering the commission to fix minimum rates. It seems highly probable that one of the main results of the investigation just

ordered will be the disclosure of a situation arguing unanswerably for legislation empowering the commission to fix minimum rates; and another important result is likely to be the disclosure of facts demonstrating that the commission cannot deal effectively with interstate commerce without exercising authority over the activities of state regulating bodies.

BALTIMORE & OHIO

A YEAR ago four men out of five, not officers of the Baltimore & Ohio, who had been following that company's monthly earnings fairly closely, would have said that there was hardly a chance for the Baltimore & Ohio to earn its 5 per cent dividend in the fiscal year ended June 30, 1915. It earned that dividend with a margin of \$771,000. The optimism of a year ago of the Baltimore & Ohio officers was a considerable factor in the success which has been achieved.

Operating revenues in the fiscal year ended June 30, 1915, amounted to \$91,816,000, a decrease as compared with the previous year of \$7,348,000, or 7.41 per cent. Operating expenses amounted to \$63,926,000 in 1915, a saving of \$10,478,000, or 14.08 per cent, and of this saving almost exactly half, or \$5,731,000, was in transportation expenses, and of the remainder \$2,112,000 was a saving in maintenance of way, which represents the difference between the normal expenditures in a normal year—1915—and in 1914, when so much replacement work had to be done after the unprecedented floods. Income from rent, interest and other sources not directly connected with the operation of the road showed a decrease of \$873,000, and interest charges and hire of equipment an increase of \$655,000, so that of the \$3,056,000 increase in operating income due to the proportionally larger decrease in expenses as compared with loss in revenues, there was \$1,523,000 saved for net available for common dividends, making the total in 1915 \$8,368,000. Five per cent dividends on the common call for \$7,597,000.

For the first time since 1909 the Baltimore & Ohio's operating ratio was below 70. In 1910 total operating expenses amounted to \$63,196,000 and the operating ratio was 70.09; in 1915 total operating expenses amounted to \$63,926,000 and the operating ratio was 69.62. The ton mileage handled in 1910 was 12,024,584,000; in 1915, 12,415,384,000. The passengers carried one mile in 1910 were 763,449,000; in 1915, 714,368,000. Since 1910 there have been increases in wage schedules of all classes of employees in train service ranging from 5 to 15 per cent. The cost of wages of enginemen and firemen per 100 miles was \$8.66 in 1910 and \$10.61 in 1915; the cost of engine house expenses per 100 miles was \$1.78 in 1910 and \$2.40 in 1915; the cost of fuel per 100 miles was \$8.16 in 1910 and \$9.63 in 1915; the cost of water per 100 miles was 60 cents in 1910 and 87 cents in 1915. The total cost of transportation expenses in 1910 was \$29,739,000, and in 1915 \$34,255,000; but net operating income in 1910 was \$26,968,000, and in 1915 \$27,890,000. Interest charges in these five years have increased from \$14,938,000 to \$22,428,000; in other words, about the same amount of business was handled in 1915 as in 1910, with a materially higher wage schedule in effect, and still the management was able to show a slightly larger net operating income in 1915 than in 1910; but this result was achieved only through the expenditure of additional borrowed capital, the interest charges on which amount to between seven and eight million dollars. In other words, with a slightly smaller net operating revenue in 1910 than in 1915 the owners of the property had a profit of \$15,832,000 in 1910 and \$10,723,000 in 1915.

The somewhat extended comparison with 1910 is worth while because it is essential to keep it in mind while studying the results obtained on the Baltimore & Ohio in 1915 as compared with 1914. The showing made in the reduction of expenses this year as compared with last year is so brilliant that if this showing is not kept in proper relation with the history of the railroad company's operations over a period of years it will give a quite wrong impression of the factors which go to make up the present railroad problem.

The saving of \$5,731,000, or 14.33 per cent, in transportation expenses, with a decrease of 7.71 per cent in ton mileage and 13.65 per cent in passenger mileage, is the combined result of the economies which come from improved facilities and the economies which come from a more effective effort of the individuals that go to make up an organization through the improvement in the organization itself. As an example of the first class, the completion of the Magnolia cut-off has made it possible to increase the eastbound slow freight trainload to 6,180 gross tons, an increase of 36.36 per cent. The importance of this Magnolia cut-off may be in part understood by the fact that the freight density on the line between Patterson Creek, W. Va., and Cherry Run, 57 miles, is over 24,000,000 ton miles per mile of road. As an example of the second class, it might be pointed out that by the end of the fiscal year the actual results being obtained on the Cumberland division averaged above 90 per cent of the theoretically perfect train loading and wage costs.

Some of the detail accounts under transportation expenses are worth mention. Wages of train engineers in 1915 amounted to \$4,730,000, a decrease of \$980,000; fuel for train locomotives cost \$4,850,000, a decrease of \$788,000; wages of trainmen amounted to \$4,703,000, a decrease of \$785,000; wages of yard conductors and brakemen amounted to \$2,160,000, a decrease of \$540,000; loss and damage to freight cost \$1,177,000, a decrease of \$424,000.

The average revenue trainload in 1915 was 692 short tons as compared with 645 short tons in 1914. The percentage of loaded car mileage to total car mileage was 61.16 in 1915 and 63.24 in 1914. The average tons of freight per loaded car was 27.44 in 1915 as against 26.97 in 1914. The average length of haul per ton was 201 miles in 1915 and 194 miles in 1914. A larger proportion of bituminous coal moved east in 1915 than in 1914. This gave a longer average haul and also gave a better average ton-mile rate. The ton-mile rate on coal in 1915 was 3.77 mills as against 3.76 mills in 1914. The average ton-mile rate on traffic other than coal was 7.10 mills in 1915 and 7.16 mills in 1914.

The total tonnage of freight handled by the Baltimore & Ohio

of equipment expenses in 1915 probably represents in part the efforts of the department to make these economies effective.

The Baltimore & Ohio spent \$3,745,000 for additions and betterments to road and \$4,232,000 for additions to equipment. The net increase in the outstanding securities was \$3,992,000. The company had \$16,718,000 cash on hand at the end of the year and total current assets, including this cash, of \$35,348,000. There were no loans and bills payable, and total current liabilities amounted to \$17,810,000.

The following table shows the principal figures for operation in 1915 as compared with 1914:

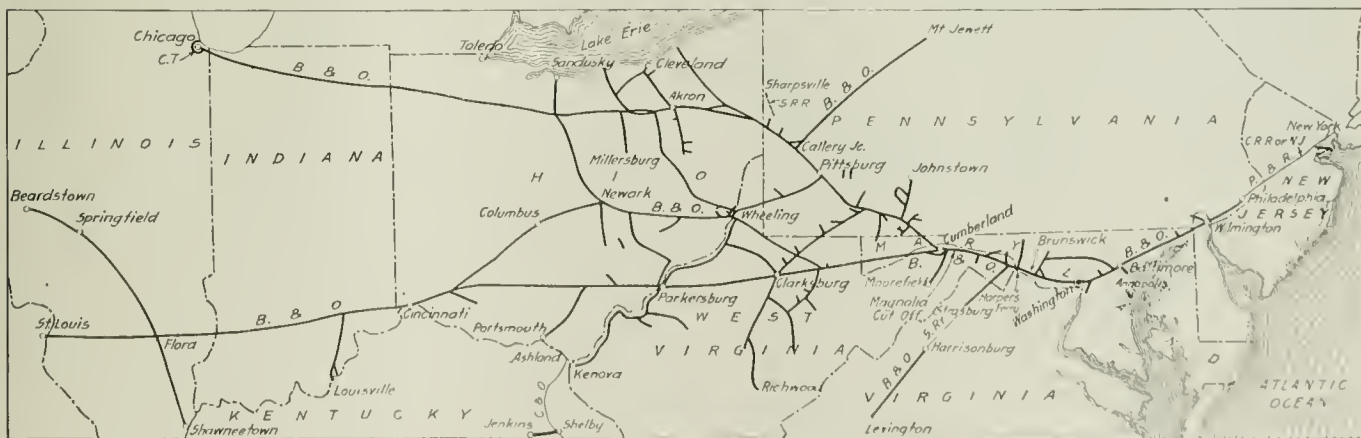
	1915	1914
Average mileage operated	4,535	4,515
Freight revenue	\$70,780,809	\$76,398,717
Passenger revenue	14,059,940	15,889,991
Total operating revenues	91,815,797	99,164,010
Maintenance of way and structures	8,985,627	12,418,435
Maintenance of equipment	16,002,589	17,149,775
Traffic expenses	2,905,496	2,152,826
Transportation expenses	34,254,572	39,895,496
Miscellaneous expenses	557,613	561,246
General expenses	2,228,274	2,135,609
Transportation for investment—Cr.	8,663	
Total operating expenses	63,925,508	74,403,389
Taxes	3,289,611	3,236,881
Operating income	24,581,697	21,523,741
Gross income	29,842,545	27,657,158
Net income	10,780,881	9,250,024
Reserves	57,633	49,457
Dividends	9,951,774	11,473,397
Surplus	771,474	*2,272,830

*Deficit.

PERE MARQUETTE

SELDOM, if ever, has there been a more drastic and thoroughgoing attempt to operate a bankrupt railroad economically than that made by the receivers and officers of the Pere Marquette in the fiscal year ended June 30, 1915. In the previous fiscal year the receivers showed a loss from operation, before the payment of interest charges, rentals or taxes, of \$1,119,000. In 1915 the net operating revenues amounted to \$4,584,000, a difference as between the two years of \$5,703,000, accounted for by an increase in revenues of \$1,113,000 and a decrease in the expense of handling the business and of maintaining the property of \$4,590,000.

The Pere Marquette operates 2,322 miles of road. The com-



The Baltimore & Ohio

in 1915 was 64,376,000 tons. Of this, 29,618,000 tons, or 46.01 per cent, was bituminous coal. This compares with 34,105,000 tons of bituminous coal carried in 1914, forming 47.19 per cent of the total tonnage of that year. On the other hand, the tonnage of agricultural products totaled 4,191,000 tons in 1915, or 6.51 per cent of the total tonnage, comparing with 3,523,000 tons carried in 1914, or 4.88 per cent of the total tonnage of that year.

Maintenance of equipment cost \$16,003,000 in 1915, a decrease of \$1,147,000. This is a decrease of 6.69 per cent and compares with a decrease in locomotive mileage of 9.5 per cent; of freight car mileage of 6.2 per cent, and of passenger car mileage of 4.8 per cent. There was possibly room for economies in the mechanical department in 1914 and the reduction in maintenance

pany has been in receivership since 1912, having taken over the property from a former receivership in 1907. If it were probable that the company could make as good a showing over a series of years as it did in the fiscal year ended June 30, 1915, and could count on an increase in net proportional to the normal increase in gross, there might be some ray of hope for some classes of securityholders. It may be that such a showing will be possible, but the figures for 1915 do not conclusively demonstrate this.

Full credit is due to the operating officers for the remarkably good showing which is made in transportation expenses. Revenue ton mileage carried totaled 1,967,000,000, an increase of 158,000,000 ton miles, or about 8.8 per cent. Passenger mileage

amounted to 199,700,000, a decrease of about 3.5 per cent. Transportation expenses amounted to \$7,023,000, a decrease of 7.6 per cent. The average trainload of revenue freight was 498 tons in 1915, as against 459 tons in 1914. The passenger-train mileage was 3,643,000 miles, a decrease of about one per cent. There was an increase in the empty car mileage of 26.12 per cent, partly due to the routing of empty cars over the Pere Marquette by other roads which preferred to avoid paying per diem rather than hold the cars for loads, and the efforts of the Pere Marquette itself to get rid of its foreign cars. Under these conditions, especially the two noted—that of only a very slight cutting down of passenger service and the much heavier empty freight car movement—a saving of 7.6 per cent in transportation expenses is well worth comment.

The saving was made primarily because of the interest which was aroused in all classes of officers and employees in the efforts of the management to make the best possible showing. There was a large saving in fuel cost, ascribed partly to more economical buying and partly to greater efficiency in consumption, a part of the credit for the latter saving being given to the fact that a larger number of superheater locomotives were in service during 1915 than in 1914. The energy and ingenuity of everybody have been directed to making large or small savings. Local freight train service has been reduced without, it is thought, inconveniencing the shippers; both station expenses and train supply expenses have been zealously guarded, and the results speak for themselves. Paul H. King is the operating receiver and his co-receiver is W. E. Waters. In their report they especially express their appreciation of the work done by the general officers and conclude their report as follows: "Personally it has never before been our pleasure to be associated with men more interested in the work at hand, more untiring in their efforts, or more loyal to the property they all serve, and

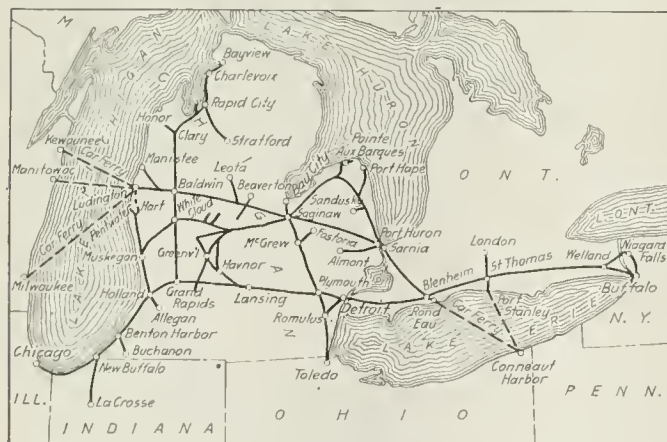
considerably less than will be required on an average over a series of years for maintenance of way and structures. Repairs per locomotive in 1915 cost \$2,828; per passenger-train car, \$535, and per freight-train car, \$66. These figures for repairs of equipment are not so low as to preclude the possibility of keeping them at about this rate. On the other hand, they are not high enough to permit of any probable further reduction, and if further economies in transportation expenses are to be effected, considerable sums will have to be charged to expenses for retirement of equipment, the company having 48 eight-wheel locomotives and 50 Mogul locomotives of light tractive power. The principal freight power is made up of 166 Consolidations, with 10 Mikados as the only modern heavy freight engines.

It is impossible to give even an adequate summary of the quite unusually comprehensive report made by the receivers. It is recommended, however, that any one who is interested in the question which is of so vital importance at present—the interfering state and federal regulation of railroads—read the report of the officers of the court who are administering the affairs of a railroad which has been largely at the mercy of state regulation.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated	2,314	2,324
Freight revenue	\$12,562,523	\$11,435,126
Passenger revenue	3,938,086	3,912,186
Total operating revenues	18,028,210	16,915,198
Maintenance of way and structures	2,000,282	2,996,118
Maintenance of equipment	3,492,973	6,487,963
Traffic expenses	379,126	411,910
Transportation expenses	7,022,741	7,596,675
Miscellaneous expenses	53,045	63,344
General expenses	500,859	478,163
Transportation for investment Cr.	5,011	.....
Total operating expenses	13,444,014	18,034,174
Taxes	512,844	643,168
Operating income	4,071,352	*1,762,145
Gross income	4,265,890	*1,577,108
Deficit	1,419,265	7,152,895

* Deficit.



The Pere Marquette

the showing which we have been able to make during the year was largely due to their efforts."

For all the substantial and praiseworthy success which has been made in reducing transportation expenses only about one-fifth of the total saving in expenses was made in this account. Maintenance of way and structures cost \$2,000,000 in 1915, a decrease as compared with the previous year of \$996,000, or 33 per cent, and maintenance of equipment cost \$3,493,000, a decrease as compared with the previous year of \$2,995,000, or 46 per cent. While it is undoubtedly true, as the receivers point out, that a large part of the maintenance of equipment and a certain part of the maintenance of way expense reductions were due to the fact of abnormally high expenditures in 1914, it is by no means conclusively demonstrated that the 1915 rate of expenditures for maintenance can be continued without detriment to the property. In 1915 maintenance of way and structure expenditures averaged \$864 per mile operated. Under present conditions of operation, with the necessity for heavy rails, ballast, etc., and probable cost of track labor, \$864 appears to be

NEW BOOKS

Investors and Money-Makers. By F. W. Taussig, Henry Lee Professor of Economics, Harvard University. Published by the Macmillan Company, New York.

This little book of 138 pages gives the substance of lectures delivered at Brown University in celebration of the one hundred and fiftieth anniversary of the university's foundation. The lectures cover a much broader field than would be suggested by the title. The relations between the workman and the employer, between the individual and society, and between the desire for individual gain and the desire to be of service to the community as a whole are discussed in a searching but common sense way which makes unusually interesting reading. Professor Taussig, while sympathizing with the views of the workman and with his limitations and understanding his difficulties discards entirely the sentimental in his discussion. He shows clearly that it is the desire for personal gain which is the motive power behind the actions of people in the great majority of cases. He believes that the present economic organization, while tending to stimulate the instinct of contrivance, which is the instinct that is exercised by the inventor in the capitalist employer, often smothers it in the hired laborer. He recognizes that the individualistic system turns an inborn bent to the contriving of those things which are of general service; but he believes that something of the same result could be obtained in a collectivist society. He believes, however, that deliberate regard for general welfare is within the possibilities of a private business as well as a public. He cherishes no expectations of a radical change in our present economic system, but is hopeful that present tendencies will correct the worst abuses of this system and develop the feeling of interdependence and of responsibility on the part of the individual to society as a whole.

Mikado Versus Consolidation Locomotives

A Study for the Purpose of Determining the Economical Distribution of Power from a Net Revenue Standpoint

By N. D. BALLANTINE

Assistant to Chief Operating Officer, Rock Island Lines

For the purpose of determining the relative merits of the Mikado and Consolidation locomotives on certain divisions of the Rock Island, a study was made under practical operating conditions, which showed, among other things, where a given number of locomotives of each type could be used to the best advantage from a net operating revenue standpoint. The month selected for the study was during a period of heaviest traffic, when there was a constant demand for power; the data was tabulated subsequent to the performance, and none of the division officials knew that such a study was to be made, hence the freedom from chances for preferential handling of either class of power. The records made currently were tabulated and

freights; combined slow and fast freights; and slow and fast freights on the round-trip basis, the latter figures, for the sake of brevity, being used in this article. None of the divisions on which these locomotives were used have a very large percentage of their traffic of a low grade which will admit being held any considerable length of time for tonnage, the controlling business being made up of merchandise, live stock, packing-house products and perishable freight, which fact makes a study of this nature all the more necessary. The detail information as shown permits a variety of deductions to be drawn directly or by combinations, many of which will be apparent on inspection; a few of them will be pointed out, however.

TABLE A—LOCOMOTIVE UTILIZATION, OR A TIME STUDY SHOWING DAILY AND OTHER AVERAGES

	Division A		Division B		Division C		Division D		Averages	
	Mik.	Cons.	Mik.	Cons.	Mik.	Cons.	Mik.	Cons.	Mik.	Cons.
Time under mechanical department (hr. and min.).....	9-11	9-18	8-54	9-6	10-39	10-43	9-42	8-15	9-53	9-8
Time at terminals (hr. and min.).....	6-42	5-18	7-22	7-18	3-25	3-11	7-12	7-34	5-37	6-8
Time between terminals (hr. and min.).....	8-7	9-24	7-44	7-36	9-56	10-6	7-6	8-11	8-30	8-44
Actually running, hr. and min.	5-5	6-6	5-47	5-46	6-25	6-51	5-30	6-23	5-56	6-25
Meeting trains, hr. and min.	1-31	1-46	1-6	0-55	1-30	1-25	0-58	0-56	1-16	1-9
Station work, hr. and min.	0-21	0-37	0-38	0-34	1-6	0-49	0-23	0-33	0-40	0-38
Track conditions, hr. and min.	0-3	0-1	0-2	...	...	...	...	0-1	0-1	...
Block signals, hr. and min.	0-1	0-1	...	...	0-6	0-4	...	...	0-3	0-2
Engine failures, hr. and min.	0-1	...	0-2	0-5	...	...	0-2	0-3	0-2	0-1
Car failures, hr. and min.	0-9	0-3	0-5	0-4	0-11	0-4	0-1	0-3	0-7	0-3
Miscellaneous, hr. and min.	0-56	0-50	0-4	0-12	0-38	0-53	0-12	0-12	0-25	0-26
Total time—hours	24	24	24	24	24	24	24	24	24	24
Speed between terminals (m. p. h.).....	10.7	11	15.9	18	13.6	14.6	14.5	14.5	14	14.7
Speed actually running (m. p. h.).....	17.1	17.1	21.2	23.6	21.2	21.7	18.7	18.6	20.2	20
Delays per 100-train miles, meeting trains (hr. and min.).....	1-44	1-43	0-53	0-42	1-11	0-57	0-57	0-79	1-36	0-53
Delays per 100-train miles, station work (min.).....	24	34	29	25	45	33	18	27	33	29
Gross ton miles per day.....	130800	121669	174109	123997	273780	223980	151373	130193	205600	154600
Gross ton miles per hour (actually running).....	25700	20077	30010	21452	42644	32698	27522	19739	34730	24081

carefully checked against train sheets, train registers, roundhouse registers, work sheets and fuel tickets. Every practical means was used to secure correct information. There are some apparent discrepancies with respect to the maintenance features, which it is thought were due to the fact that the Mikado locomotives were practically new, there being no question about the expense for heavy repairs made during such a limited time not being as correct a basis as it would be if a year's figures were used. These being the only figures available, they were used, and as they are clearly set out, one can accept or ignore that portion of the study if desired.

The study covers the performance in freight service other than local or way freights and work trains on four divisions for 31 days of the same month, of 27 Mikado superheater locomotives of 57,000 lb. tractive power, making 71,000 miles, and 59 Consolidation saturated steam locomotives of 39,000 lb. tractive power, making 116,275 miles. A total of 262,815,000 gross ton miles was handled, of which the Mikados were responsible for 48 per cent.

No attempt was made to include or compare the expense of maintenance of way and structures, general expenses, supervision, station service, yard service, train supplies, loss and damage and a number of other factors in operating expenses, a variation of which would not be appreciably affected by the class of power handling it. The items included do not purport to represent the total actual cost of handling traffic, but it is thought they include the essential variable items that can practically be located and that are of sufficient importance to justify their inclusion in a study which does not contemplate a degree of refinement in costs to produce figures accurate to the fifth or sixth decimal part of a cent.

In tabulating the data for our own use, it was separated to show the items in the *direction of traffic* for slow freights, fast

Table A shows the locomotive utilization, and it is interesting to note the variation in the mechanical department detention on the various divisions. On three divisions it was less for the Mikados, and on the other division, where most of the Mikados were located, it was considerably more, averaging for all divisions 45 minutes more than for the Consolidations. The terminal delay varied from 3 hrs. 11 min. to 7 hrs. 34 min., depending on local conditions; but it is interesting to note that on the division where the greatest volume of traffic was moving, the terminal delay was the lowest for both classes of engines. The time between terminals varied from 7 hrs. 6 min. to 10 hrs. 6 min., averaging for all Mikados but 14 min. less per day than for all Consolidations. The actual running time varied from 5 hrs. 5 min. to 6 hrs. 51 min., averaging for all Mikados 29 min. less per day than for the Consolidations. The miles per hour between terminals varied from 10 hrs. 7 min. to 18 hrs. averaging 14 hrs. for the Mikados, or 0.7 m. p. h. less than the Consolidations. The miles per hour when actually running varied from 17 hrs. 1 min. to 23 hrs. 6 min., averaging 20 hrs. 2 min. for the Mikados, or 0.2 m. p. h. more than the Consolidations. The delays per 100 miles, meeting trains, varied from 42 min. for the Consolidations to 1 hr. 44 min. for the Mikados, averaging 1 hr. 36 min. for the Mikados, or 43 min. (equal to 81 per cent) more than for the Consolidations. This fact may or may not be due to longer trains, but as the 43 min. increase is more than 8 per cent of the total time between terminals for the Mikados, its significance should be studied more in detail. The average delay per 100 miles doing station work only varied 4 minutes.

The gross ton miles per day varied for the Consolidations from 121,669 to 223,980, or 184 per cent, and for the Mikados from 130,800 to 273,780, or 210 per cent, while the average for all Consolidations was 154,600 and for the Mikados 205,600, or

33 per cent more than the Consolidations. It should be recalled that the Mikados have 46 per cent more tractive power. The gross ton-miles per hour when actually running varied for the Consolidations from 20,077 to 32,698, or 63 per cent, and for the Mikados from 25,700 to 42,644, or 66 per cent, while the average for all Consolidations was 24,081, and for the Mikados 34,730, or 44 per cent more than the Consolidations. It should be

the Consolidation locomotives than on any other division. It should be borne in mind that the figures given are for round-trips and an analysis of the figures covering only the *direction of traffic* may produce somewhat different results. In reality, it is *directional* figures which are of the most vital moment to the study, particularly where the traffic is unbalanced to an appreciable degree, high loading efficiency in the direction of traffic being a

TABLE B—PHYSICAL DATA

	Division A		Division B		Division C		Division D		All Divisions	
	Mikados	Consols	Mikados	Consols	Mikados	Consols	Mikados	Consols	Mikados	Consols
Number of engines	2	13	4	9	14	15	7	22	27	59
Engine days	50	75	125	111	250	251	170	47	595	908
Locomotive miles	4358	7814	15402	15210	33762	37163	17478	56088	71000	116275
Locomotive miles per day	87	104	123	137	135	148	103	119	119	128
Gross ton miles	6544.5	9125.2	21763.7	13763.7	68445	56219.2	25633.4	61320.9	122386	140429
Gross tons per train mile	1500	1170	1413	904.2	2015	1470	1466.6	1093.3	1723	1207
Loading efficiency (per cent)	51.3	64.2	76.4	72	62	68	62.2	68.7	67	68.5
Number of trains	43	80	123	125	216	229	147	476	529	910
Average distance run (miles)	102	98	125	122	156	162	119	118	134	128

particularly noted that for the time the engines were *actually running* the increase in tons handled by the Mikados was within 2 per cent of the increase in its tractive power over the Consolidations, but by referring to the first part of this paragraph it will be noted that when compared with a *daily performance*,

most significant figure to ascertain.

Table C gives the costs in cents per thousand gross ton-miles for the different items considered in this study. Interest at 6 per cent has been figured on the locomotives and cabooses, and depreciation at 5 per cent for the locomotives and 6 per cent for

TABLE C—PRINCIPAL VARIABLE COSTS PER THOUSAND GROSSTON MILES IN CENTS

	Division A				Division B				Division C				Division D				All Div.			
	Mik.	Con.	Inc. or Dec.	Amt.Percent	Mik.	Con.	Inc. or Dec.	Amt.Percent	Mik.	Con.	Inc. or Dec.	Amt.Percent	Mik.	Con.	Inc. or Dec.	Amt.Percent	Mik.	Con.	Inc. or Dec.	Amt.Percent
Coal	20.3	22.5	-22	9.8	15.4	20.3	-4.9	24.1	11.4	15.6	-4.2	26.9	13.6	18.0	-4.4	24.5	13.0	17.6	-4.6	26.1
Wages, train and engine crew..	13.5	16.9	-3.4	20.1	13.2	20.9	-7.7	36.5	9.8	12.5	-2.7	21.6	13.4	17.4	-4.0	23.0	11.4	15.8	-4.4	27.8
Roundhouse charges	4.0	4.0	...	...	3.2	3.4	-2	5.9	2	...	...	...	3.0	2.7	...	...	11.1	1.5	1.9	-4
Water	1.5	1.7	-2	11.8	1.3	1.5	-2	13.3	...	1.2	...	25.0	1.0	1.4	...	28.6	1.0	1.3	...	23.1
Lub. oils and waste.....	...	...	...	...	...	...	...	33.3	...	1.2	...	33.3	...	...	...	...	...	...	...	14.3
Running repairs	6.6	2.4	+4.2	143.3	4.0	2.5	+1.5	60.0	2.2	2.1	+1	4.8	5.9	3.5	+2.4	68.6	3.5	2.8	+7	25.0
Classified repairs	2.0	3.6	-1.6	44.4	2.1	4.7	-2.6	55.3	1.9	4.0	-2.1	52.7	2.6	4.5	-1.9	42.2	2.1	4.2	-2.1	50.0
Int. on locomotives at 6 per cent	3.3	2.4	+9	37.5	2.5	2.3	+2	8.7	2.0	1.6	+4	25.0	3.6	2.5	+1.1	44.0	2.5	2.1	+4	19.0
Int. on cabooses at 6 per cent...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Depreciation loco. at 5 per cent	2.8	2.0	+8	40.0	2.1	1.9	+2	10.5	1.6	1.3	+3	23.1	3.0	2.0	+1.0	50.0	2.1	1.7	+4	23.5
Depreciation cabooses at 6 per cent	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Totals	54.7	56.0	-1.3	2.3	44.7	58.3	-13.6	23.3	31.0	39.9	-8.9	22.3	46.6	52.7	-6.1	11.6	38.0	48.3	-10.3	21.3

it is not within 13 per cent of its efficiency as compared with the Consolidations from a ton-mile standpoint.

Table B indicates by divisions the number of locomotives, locomotive days, mileage and average miles per day, gross ton-miles and gross tons per train-mile, and loading efficiency. It will be noticed from the gross ton-miles produced that there is quite a difference in the volume of business handled on the various divisions; there was also a difference in the class of the traffic. It will be noted that on each division the Mikados made from 13 to 17 miles less per day than the Consolidations, the percentage for all Mikados during the entire period being 7 per cent less. It should also be noted that the division upon which both classes of locomotives made the highest mileage per day was that upon which the length of the average trip was the greatest. The distance between terminals generally has a very important bearing upon the miles per day locomotives make and that it increases with the distance between terminals is to be expected, as it decreases the roundhouse handling and yard terminal delays per 100 miles; hence, the importance of running locomotives through terminals or making turn-arounds if the power is in condition to permit this being done without unduly increasing engine failures.

The gross tons per train mile for the Mikados varied from 28 to 56 per cent more than that handled by the Consolidations; the average for all divisions is 43 per cent, or about 3 per cent less than the difference in tractive power, indicating that, as a whole, there was less loading efficiency obtained with Mikados than with the Consolidations.

This is reflected more clearly in the loading efficiency column which shows that Division B, while having but four locomotives, had a condition which enabled it to obtain a higher efficiency with the Mikados than on any other division, and this regardless of the fact that it also obtained a higher loading efficiency with

the cabooses. These figures per thousand gross ton-miles vary from 3.1 cents for the Consolidations on Division C, to 6.8 cents for the Mikados on Division D; for all Mikados it amounts to 4.8 cents, or about 12 per cent of the costs enumerated, while for all Consolidations it amounts to 4 cents, or 8.3 per cent of the costs enumerated. Special mention is made of this point for the reason that for certain purposes it is essential to include such items, while for others they probably should not be included; for example, if the question is one dependent on the type of new locomotives to be purchased, or the question of additional locomotives, it manifestly should be included; if, however, it is a question of once having the equipment and of determining the best location for its utilization, interest and depreciation will accrue regardless, and can as well be omitted for purpose of an immediate comparison. It will be noted the costs for the variables listed, run from 31 cents for the Mikados on Division C to 54.7 cents on Division A, and for the Consolidations from 39.9 cents on Division C to 58.3 cents on Division B, while for all Mikados it was 38 cents as compared with 48.3 cents for the Consolidations.

A glance at Table A might cause one to feel that the proper place to put the Mikados would be where they would produce the most gross ton miles per day or hour, in which event it would point to Division C, as on this division they produced 273,790 gross ton miles per day, or 42,644 gross ton miles per hour when actually running. What we are trying to determine, however, is whether it is more economical to keep the Mikado on a particular division as opposed to another division. Let us compare Divisions B and C. By referring to Table C and Division C it is noted the cost per 1,000 gross ton miles is 8.9 cents less for the Mikados than for Consolidations, and as the Mikados produce 273,790 gross ton miles per day, this is equivalent to their saving \$24.36 per day, while by referring to Division B, it will be noted

the Mikados save 13.6 cents per 1,000 gross ton miles, which with the 174,109 gross ton miles they produce per day, makes a saving of \$23.68, a difference of only 68 cents in favor of Division C. As previously referred to, however, the maintenance feature was known to be a little uncertain, and inspection indicates the running and classified repairs on Division B was 6.1 cents as against 4.1 cents on Division C, or nearly 50 per cent more. With such a wide difference in this item, it would not be unfair to average the two, or eliminate the feature; in either of which events, it will indicate that the greatest saving per day can be effected on Division B.

A knowledge of local conditions is, of course, an advantage in making such an analysis, as in this particular instance it is known that with the volume of traffic moving on Division B, and the necessity for protecting local work, it would not be economical to place any more Mikados on that division under present traffic conditions. The above analysis indicates in this specific case, economy in operation to use a Mikado locomotive on a division where it will not produce within 65 per cent of the ton miles which it produces on another division, a condition which will doubtless appeal to many as an anomaly.

In this connection there might also be pointed out the relation existing between handling tonnage with large versus small power when the train mile unit is used. It is frequently considered by some, that increasing the size of power and being able to utilize it as efficiently as the smaller power, thus reducing train miles, will bring about a reduction in expenses equivalent to the cost of a train mile saved; but that this is a fallacy, can, I think, easily be pointed out from the data contained in the above tables. For example, the costs on Division A per 1,000 gross ton miles for the Mikados were 54.7 cents, the average tons per train were 1,500, therefore the cost per train mile was 82 cents. The cost for the Consolidations per 1,000 gross ton miles was 56 cents, the average tons per train was 1,170, therefore the cost per train mile was 65.5 cents. Here there was an increase of 330 tons in tons per train mile with an increase of 16.5 cents in the cost per train mile. Inasmuch as the Mikado handles 330 tons more than the Consolidation it will take 3.55 Mikado trains to save one Consolidation train mile. Inasmuch as each Mikado train costs $16\frac{1}{2}$ cents more per train mile than the Consolidation the product of $16\frac{1}{2} \times 3.55$ equals 58.5 cents, or 7 cents less than the cost for a Consolidation train mile. In other words, the real saving per train mile is 7 cents instead of $65\frac{1}{2}$ cents as might be roughly estimated.

When such a narrow margin of saving exists as shown in this case, it is worth while investigating the matter very carefully, considering another factor, namely the interest on "additions and betterments" which were necessary to especially provide for the Mikados' repairs, housing, turning and their safe movement over the road. The feature of "additions and betterments" is one which should always be taken into account when considering change from small to large units; after they have once been made, as there is no way to get away from the interest charge thereon, it is of course, unnecessary to consider them if the two divisions to be compared have the necessary facilities; if, however, one division has the facilities and the question arises about transferring some of its power to another division which is not provided with the facilities, then in order to determine the propriety of switching a given amount of power to such division the determination should be made upon the new division's economy including interest on "additions and betterments" versus the equipped Division's economy, excluding the interest on those expenditures already made.

Consideration of the effect upon maintenance of way and structures due to the use of the larger locomotives has been purposely avoided, for the reason that it is still a moot question among engineers. The above study should indicate that a variety of angles exist from which to approach this subject, as well as the importance of having the detail information such as is set forth currently prepared. Unless it is prepared currently, much of it is impractical to secure and thus precludes a definite knowledge of many vital items. Also, in making any such study the actual traffic conditions must be carefully considered.

BUREAU REPORT ON ARDMORE EXPLOSION

Colonel B. W. Dunn, chief inspector of the railroads' Bureau of Explosives, has issued Special Bulletin No. 2, giving the results of his investigation of the explosion of gasoline at Ardmore, Okla., September 27, when 39 persons were killed and several scores injured, and when property was destroyed to the extent of \$500,000 to \$1,000,000. The action of President Ripley, of the Atchison, Topeka & Santa Fe, in offering to pay for the damages, though not accepting responsibility on behalf of the road, was noticed in the *Railway Age Gazette*, October 15, page 703.

Colonel Dunn says that the accident was caused by the escape of a large quantity of inflammable vapors from a tank car "whose lading was billed as gasoline," this being due in part to insufficient space in the top of the tank for the expansion of the liquid. The gasoline was loaded at a temperature of 50 deg. F., while the temperature at Ardmore for two days, while the car had been standing on a side track there, was 93 deg. in the shade.

The immediate cause of the disaster, however, was the removal of the dome cap of the tank car by an employee of the consignee, while the tank was subjected to interior pressure. Such removal is forbidden by the government regulations. The bureau has records of five serious accidents (not explosions) in the past four years from this cause. The safety valves on the car at Ardmore had shown the existence of interior pressure by their continual popping, and the railroad called for a man from the refinery of the consignee to take charge of the car. This man, in consequence of ignorance or carelessness, neglected to cool the car before taking off the cap; and he paid the penalty with his life. The regulations say that tank cars in cases like this must have at least 2 per cent vacant space; and in this case the outdoor temperatures were so high that probably more than 2 per cent was needed, but the actual space left when the tank was loaded was not much over 1 per cent.

Colonel Dunn gives no details of the exact cause or nature of the explosion or explosions; and, indeed, he says that heretofore errors of this kind have resulted in serious fires, but not in explosions. In this case the first explosion occurred about one minute after the man had taken off the cap and had descended to the ground.

The report recommends the distribution of the bulletin among railroad officers and employees, for information, and the careful instruction of employees in all the rules, but says that beyond that no special instructions are needed at this time. Proposals to change the rules will, however, be taken under consideration. Special insulated tank cars are now prescribed for any product with a vapor tension exceeding 10 lb. per square inch; and Colonel Dunn recommends shippers to provide themselves with these cars. Those who have used them are more than satisfied with their service; they prevent losses during transit, and these losses, with ordinary cars, have been considerable.

LIQUID FUEL ON ROUMANIAN RAILWAYS.—For the past few years the consumption of liquid fuel on the Roumanian railways has been steadily increasing, and though the figures of consumption for the past year do not reach those for the preceding 12 months, it must not be inferred that the use of oil fuel for the Roumanian State locomotives has reached its zenith. As a matter of fact, the opposite is the case, for the decrease for the past 12 months in the consumption is explained by the reduced traffic upon the lines owing to the European war. During the 12 months the engines consumed about 198,000 tons, which is a decline of just over 6,000 tons when compared with the figures for the preceding 12 months. To-day no less than 85 per cent of the locomotives on the Roumanian railways use liquid fuel in preference to coal, there being 751 engines regularly using oil out of a total of 873 working on the various State railways. The value of the consumed oil for the past 12 months is estimated at \$1,300,000, admittedly a low figure, yet due to forward contracts for supply having been made by the state.

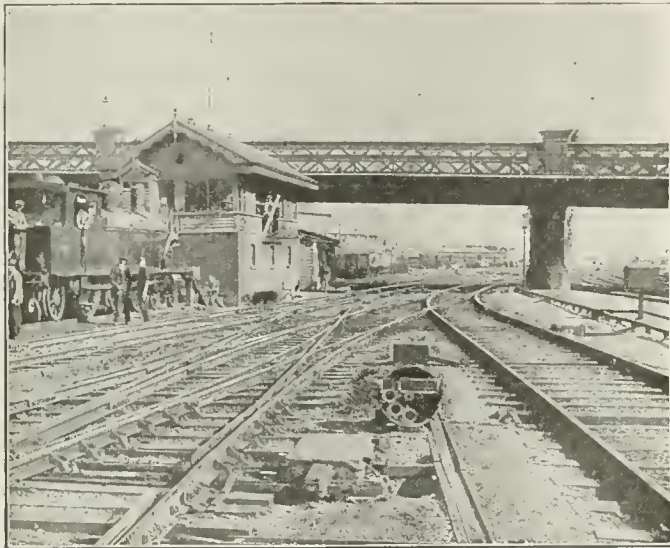
Electric Interlocking at Adelaide, South Australia

First Use of Speed Signaling and Three-Position Upper Quadrant Indications in the Southern Hemisphere

By C. G. PILKINGTON

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The recent enlargement of the passenger terminal of the South Australian Railways at Adelaide, South Australia, made necessary by a rapidly increasing suburban traffic in this important south coast city, involved an increase in the number of platforms from 6 to 13, extensive changes in the track layout, and the duplication of main lines from Adelaide Wye to the terminal station. These changes required a complete revision



Terminal Yard Cabin; Three-Position Dwarf Signal in the Foreground

of the terminal yard interlocking, which consisted of 67 mechanical levers, and also of the South Line Junction mechanical plant, containing 42 levers. This latter plant and a similar one at Torrens Bridge Junction, with 35 levers, controlled the two legs of Adelaide Wye.

The cramped position of the yard interlocking and lack of space for mechanical connections practically precluded the extension of the mechanical frame to handle the final layout, and electro-mechanical working offered practically no better solution. The matter finally resolved itself into a question of straight power interlocking, and after careful consideration of the various types, the General Railway Signal Company's dynamic indication, all-electric system was selected as being best adapted to conditions, and an apparatus of 100 levers and 36 spare spaces was installed.

Since these changes would require the rebuilding of the South Line Junction plant, it was found that one power plant between the two junctions at the Wye, replacing both mechanical plants, would effect a substantial saving through the reduction in operating expenses, which, capitalized, would more than pay for the cost of the installation of the power scheme. Accordingly it was decided to install a second machine of the same type at the Adelaide Wye, consisting of 43 levers and 13 spare spaces. These installations are unique in that the South Australian Government Railway management is a pioneer south of the "line" in using all-electric interlocking, speed signaling, the three-position upper quadrant signal with yellow light for caution, and permissive automatic signals.

INSTALLING A NEW SYSTEM

Scheme No. 3 of the Railway Signal Association's recommendation for speed signaling was adopted. This gives ade-

quate information to the enginemmen; it reduces the signal arrangement to two combinations of arms for the absolute signals and two combinations of arms for the permissive signals, and finally, because of this simplicity, it makes an economical installation. It should be understood here that the signal practice, as well as the railway methods as a whole, were up to this installation patterned after the British Board of Trade requirements. British signal practice, of course, is based on route signaling, and under the old arrangement at the station, at least one of the inbound lines to the station had six arms, or one for each platform. Therefore, to continue this scheme for the three approach mains either meant nine or ten arms for each signal location, or the use of three signals with route indicators below the arms, giving the platform number.

Hence, after careful study and discussion between the operating and the engineering branches the officers of the former declared themselves willing to try the American scheme of upper quadrant speed signaling and the yellow light for "caution." As the old scheme required the use of only two lights, red and green, it will be apparent that this was a decided revolution for



Station Platforms and Tracks from Morphett Street Bridge

the operating branch, and meant discarding everything except the red light and horizontal position of the arm for "stop" and the green light for "proceed." The top or normal speed arm indicates the authorized speed for the vicinity; the medium speed arm indicates 15 miles an hour (it was the desire to make this 20 miles an hour, but it was necessary to limit it to 15 on account of the general use of 1 in 8 compounds); and the low speed arm indicates 10 miles an hour.

A signal diagram about 13 ft. long showing the yard and Wye was made and fastened to a large table in a building adjacent to the yard cabin. Small working models of the various signals about 10 in. high were furnished and the two head signalmen in the yard cabin took turns instructing classes of the enginemmen and guards. The men having been previously furnished with copies of the rule book, were required to arrange the signal indications for imaginary train moves through both plants. That this time was well spent was proved after the plants went into service, for so far as is known no delays or confusion resulted from the enginemmen not being able to grasp the new indications promptly.

Although the absolute block had been consistently maintained prior to the new signaling, and the rules required trains to come to a full stop before passing a horizontal distant signal arm, the enginemmen soon saw the advantage of the permissive auto-

matic signals which took the place of the starting and distant signals, and proper observance of these permissive signals has materially expedited traffic during the rush hours. Absolute lock and block is maintained between all cabins, but the installations between yard cabin, South Line Junction, Mile End, Torrens Bridge, Bowden and North Adelaide were removed and automatic signals, with continuous track circuit, without manual control, were installed.

CABINS

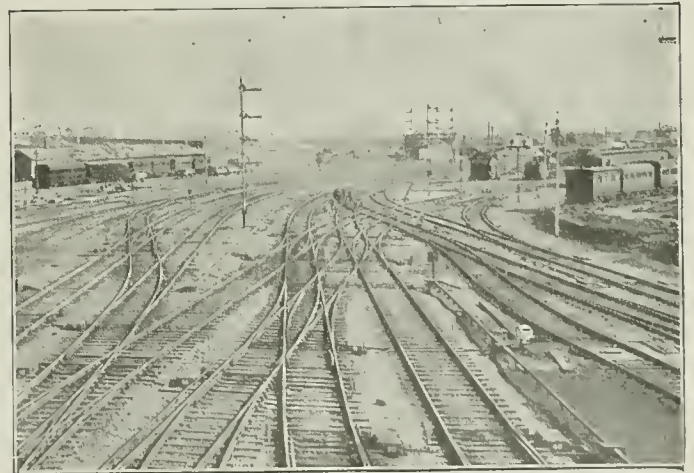
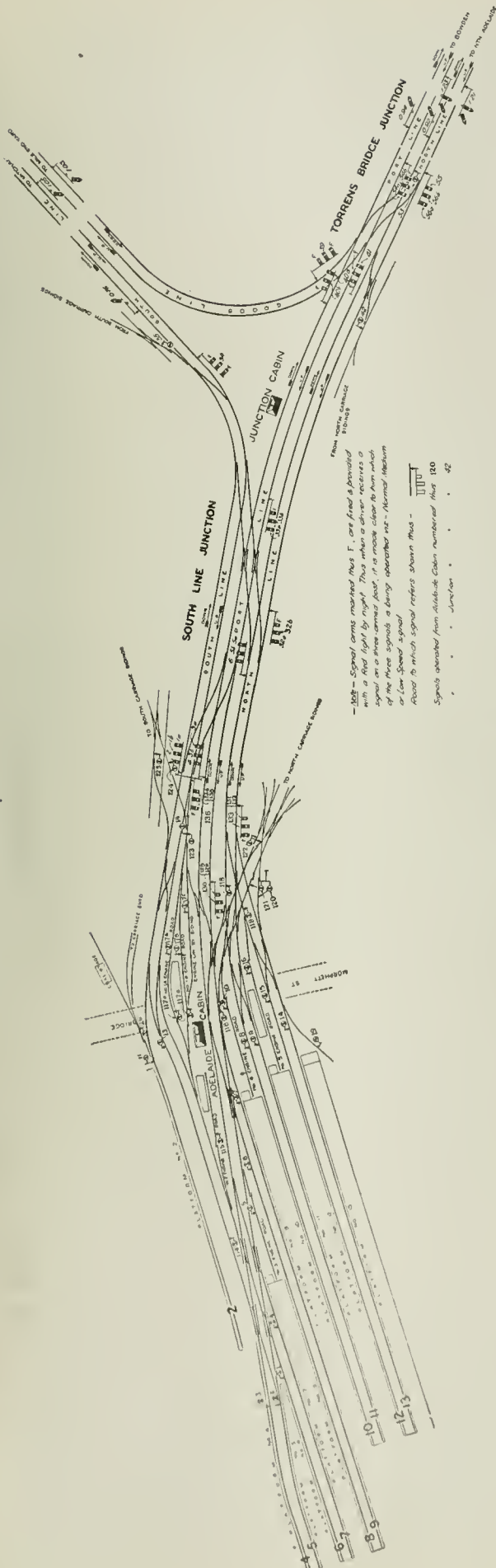
The existing yard cabin, being a substantial building and in a most suitable position, was used; but the depth of the power machine is less than 3 ft. and it was set up on the same floor and parallel with the mechanical machine. This made it easy for the signalmen to pass from the old to the new when the plant went into service.

The Wye cabin is a new brick building, built on the edge of the embankment with the battery room in the basement, relay room and power board on the first floor and operating room on the second floor. The location is such as to give an uninterrupted view of the three legs of the Wye. Both machines are of the G. R. S. multiple unit type.

SIGNALS AND SWITCHES

The incoming signals at the yard plant for the three mains—North, Port and South—are Model 2-A three-arm posts, one

Electric Interlocking at Adelaide, Australia Passenger Terminal



Terminal Yard from Morphett Street Bridge, Looking Toward the Junction

of which is placed on the signal bridge with the Wye signals. As the station is dead end, the top arms are immovable, and the medium speed arms, which are semi-automatic, stick, work from 0 deg. to 45 deg. only. The "calling on" or lower arms work in two positions also and are controlled by two levers. One of these levers controls movements into the platforms when occupied, and the other lever is used for a movement into the coal stages. The coal stages are much nearer to the signals, and the signalman can only let an engine into them by pulling the lever for that purpose.

The platform starting signals are three-position, Model 2-A dwarfs—0 deg. to 45 deg. lever control, and 45 deg. to 90 deg. semi-automatic non-stick, the third position being controlled through the track circuits and the outbound home signals at the Wye plant. The back up dwarfs and carriage siding starters are of the two-position, Model 3, solenoid type. The dwarf signal spectacles are enameled steel round disks about 22 in. in diameter, with the arm indicated in red on a white background. These dwarfs are considered a great improvement over the small arm type. At the Wye the three-arm signal arrangement was carried out for all interlocked signals; but the normal, medium or calling on arms are fixed in all cases where they are not required.

The Model 4-A switch machines were used for all single switches and compounds as well as catch points. Hayes derails are used, except at the siding derails, some of which are catch points and others Hayes derails. These siding derails are operated mechanically from the detector bar connection on the switch machine at the switch through the medium of switch and lock movements. The standard fittings of the General Railway Signal Company were employed, the only change necessary being that occasioned by the 5-ft. 3-in. gage, which is standard in this state. As the switches are supported on cast iron chairs, raising the rail about 2 in. off the tie plates, this permitted the No. 1 or switch tie plate to be laid without set, while still keeping the cover of the machine below the top of the rail.

The rail section is 80-lb. and the ties of Jarrah. This timber is much harder than any with which American railway men are familiar, all holes for dog spikes as well as coach screws being drilled. The Australian practice is to use round iron spreader rods, but the American arrangement of flat rods and point lugs was adopted so as to simplify the fitting of insulations and switch adjustments.

CIRCUITS

The track circuits are of the single rail type; that is to say, no insulations were placed in the negative rail, as the negative rails were all bonded together, forming the negative return to the storage battery in the cabin. Both Weber and Continuous joints of the 4-bolt type were installed to enable a test to be made to determine what type of insulated joint should be adopted for future work. The American oak in the Weber joints eventually will be replaced by Jarrah timber, as it is believed longer life will be secured thereby.

The control circuits are patterned very closely after the specifications of the R. S. A. All running signals are detected through switch boxes on facing switches and all catch points and Hayes derails are equipped with point detection for dwarf signals. Route locking for all high signals at the yard and Wye plants is secured by the use of normal indication locks on the signal levers, the route being held until the front of the train has reached the last track circuit in the route. No detector bars were employed for protecting switches, the detector track circuits with lever locks being used in lieu thereof.

G. R. S. relays were used throughout, carbon to copper contacts for 110-volt signal circuits, and silver to carbon for all other circuits. Standard 4-ohm relays were used for the automatic signals and 11-ohm relays for the interlocking circuits. The line relays were 1,000 ohm except where the control voltage was 110, in which case 2,000 ohm external was added.

As the ravages of the white ant are severe in South Australia, Oregon pine, because of the ease with which it can be worked, was used for all trunking, first being thoroughly soaked in "Carbolineum Avenarius" wood preservative, a dipping trough being built for this purpose. Pointed Jarrah stakes, rough sawed, 3 in. by 4 in. by 3 ft., were used to support the trunking line. Two stakes side by side were employed where the line exceeded 7 in. in width.

The power for the plants is furnished from duplicate sets of 200-volt to 110-volt d. c. motor generators placed in the same power house as the vacuum car cleaning equipment, at a point about midway between the yard and Wye cabins. It is a matter of interest to know that the total energy required for the operation of switches and signals at the two plants probably would not be equal to half a dozen 16 c. p. lamps burning continuously.

The construction work was carried out by the contractors, R. W. Cameron & Co., with local labor under the direction of two skilled men brought out from America to direct the work. Considering the fact that the maintainers required educating in the art of power signaling, in addition to the instruction of enginemen and signalmen, the plants have been working with a most satisfactory smoothness, and all the advantages anticipated, and more, have been realized.

RAILWAY DEVELOPMENT ASSOCIATION

The proceedings of the first two days of the convention of the Railway Development Association, held in New York City, November 9, 10 and 11, were reported in the *Railway Age Gazette* last week, page 909. On the third day, Thursday, the convention sat only from 10 to 1 o'clock. The principal business was the discussion of three papers: "Markets and Rural Organization," by G. C. White, United States Department of Agriculture; "Opportunities in the Making," by W. P. Hartman (G. R. & I.), and Harbor Development (New York), by Thomas O. McGill.

Mr. Hartman was the first speaker. His activities have been mostly with the farmers. He makes it a point to attend to the wants of the men already on the ground, even if new-comers may thus be neglected. His road has five experimental farms, the largest of which is one of 80 acres at Howard City, Mich. This is a region of poor soil and the lessons taught to farmers are correspondingly valuable. On two of the company's farms operations are carried on jointly with local farmers. One of the company's enterprises in this connection is a picnic grove which has helped to make the road's propaganda popular. Committees in the towns get up local fairs and co-operate in the picnic business, furnishing, perhaps, free coffee and ice-cream. In discussing the question of promoting good markets, Mr. Hartman cited examples to justify the view, not only of himself, but of apparently all railroad industrial agents, that the main objective must be the improvement of the quality of products.

H. B. Fullerton (L. I.) in the discussion of this paper, again emphasized the importance of markets. The farmer has been instructed in the production of his wares, and has made improvements; and yet he has come short of the desired prosperity because of the difficulty of always finding satisfactory markets. The United States Agricultural Department has lately established a market bureau, in this matter taking action which, if it had followed the lessons taught by the experience of the Long Island road, it would have done nine years ago.

Another member called attention to the importance of promoting markets impartially for all farmers and shippers. It is easy sometimes to help the grower who produces the very finest products; but what is wanted is a market for every shipper who will conform to prescribed standards. In New York State there is now a state standard for apples, and any grower may pack his apples in accordance with this standard and get the corresponding advantage. Good results have already been made manifest.

G. E. Cassel (N. & W.) described the lecture train which has been run recently over his road, giving instruction to the farmers by lectures and also exhibiting blooded animals. Both state and federal lecturers went with this train. Mr. Cassel pointed out some of the insuperable difficulties in maintaining ideal conditions year after year. This present year southern farmers have suffered large losses on potatoes, from causes which no one has been able to control. The railroads cannot do everything; it should be a constant aim to get farmers into the habit of watching markets on their own account. The discussion was closed by a short exchange of experiences in dealing with unenterprising farmers. The railroad agent who goes into a farming community must expect to find some lethargy and some opposition; his best course, as a usual thing, is to pass by the opposers, and seek men who are receptive.

Mr. White's paper began with a careful description of the organization and activities of his office at Washington. One of the difficulties in starting was to secure competent men for field agents. Most of those who were employed were men with commercial experience. The department has encouraged local co-operative associations of shippers of farm products; has investigated city markets and their location as related to the railroads, and has made market surveys of a number of cities. The transportation section, of which Mr. White has immediate charge, has a valuable library which is made use of in answering a great

variety of questions from all over the country. He is preparing to issue a bulletin on preventable freight claims. Market information has been gathered and edited concerning strawberries, cantaloupes, tomatoes and peaches; and this information, prepared daily in the market season, has been freely given out by telegraph to all persons who were willing to pay the telegraph tolls. The bureau was of material benefit to the Southern Pacific in disposing of the fruit crop in the Imperial Valley, Southern California. These activities have had to do with perishable products; but there is need of a similar organization to disseminate information by mail regarding markets for farm products less perishable. To enable the government to estimate fruit and vegetable markets with satisfactory accuracy, it is necessary that the railroads be willing to inform it of all diversions of carload freight en route.

Mr. White had found that many traffic managers do not properly cultivate the acquaintance of farmers; and on many roads he thinks there ought to be a more numerous force of traffic men. The railroads have a large field for enterprise where they might help those farmers who raise a variety of products, but who cannot ship carload lots of any one product.

In the discussion of this paper, W. H. Olin (D. & R. G.), said that he had been indebted to Mr. White's bureau for telegraphic reports which were of assistance in finding markets for cantaloupes. Mr. Hartman spoke of the importance of securing competent managers or secretaries for local market associations, citing an example of such an association which failed, and by its failure discouraged the farmers, when the only trouble was that an incompetent man was put at the helm.

The point was brought out that the railroad man who acts as a market agent, seeking good markets for farmers, is useful, but that for every man of this sort a large railroad should have at least four men to act as field instructors. Cases were cited where peaches, sweet potatoes and other commodities had to be thrown away, not because there was not a market for good products, but because the quality of the goods or the method of packing had been unsatisfactory.

Mr. McGill's address was mainly a sketch of the activities of state and city officers during the past four or five years in their work of improving docks and other terminal facilities in and around New York City. He explained the serious obstacles which had been the cause of the very slow progress. In two years about 45 acres of new or improved dock space has been provided by the city. At present piers 1,000 ft. long are being built on the Hudson river, between Forty-fourth and Forty-sixth streets. These piers involved great expense and delicate engineering problems. Piers now under construction in South Brooklyn will provide important additional space. The New Haven Railroad is building eight new piers on the East river front. The Marginal Railway, being built in South Brooklyn, will save manufacturers important cartage costs. Intelligent foresight would have provided some of these facilities many years ago. If the city of New York could be as enterprising as are some of the railroads it could reduce the cost of living in the city six per cent.

THE ENGLISH RAILWAY MEN'S WAR BONUS.—The increased war bonus which was detailed in the *Railway Age Gazette* of November 12, will apply to the salaried as well as the wages staff who are receiving not more than £150 (\$720) per annum, and who have previously been in receipt of war bonus. Thus railway clerks 18 years of age or upwards whose salary is at the rate of 30s. (\$7.50) per week or more and who have been receiving 2s. (50 cents) per week war bonus, and those under 18 years of age whose pay is less than 30s. per week, and who have been receiving 3s. (75 cents) per week bonus, will now in each case receive 5s. (\$1.25) per week. Further, those employees of the railways under 18 years of age who have received war bonus at 1s. 6d. (36 cents) per week will in future receive 2s. 6d. (60 cents) per week. This liberal provision was put in effect on October 16.

THE FUEL DEPARTMENT—A CONSTRUCTIVE CRITICISM*

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Were it possible to obtain a composite picture of the fuel department as it does, or does not, exist on each railroad, to compare the "average" with the "potential" fuel department, the comparison would invite criticism from at least a dozen standpoints fundamental to the success of a department responsible for the efficient selection, distribution and use of locomotive fuel. This criticism may apply in no particular instance; it is the average situation that is concerned. The conspicuous results that have been obtained on a few roads indicate how much remains to be accomplished on American railroads as a whole before the fuel department can be regarded as an entire success.

The fuel department has failed to establish its position in the organization of the railroad; it has never been recognized as an essential and integral part, equal in importance to the transportation, engineering and mechanical departments. In the original structure of the railroad only those departments essential to actual operation were included. Efficiency in operation has not until recently been given the attention it has always received in private enterprises where ownership is more intimately identified with the operation of the business. A department responsible for the efficient selection, distribution and use of locomotive fuel is essential to efficiency in railroad operation. To appreciate its importance, one has only to review the expenditures for fuel on American railroads or to consider the cost of this item on his own road in comparison with other operating costs. The position and responsibilities of the fuel department should be as well defined as that of any other department. It should afford a legitimate and effective means for dealing with the fuel problem in co-operation with other departments, not an opportunity for some individual or faction to exploit fuel efficiency at the expense of these other departments.

The fuel department has never developed any well-defined form of organization. The organization of the average fuel department is haphazard, its responsibilities are vague and it may be misplaced in its affiliation with another department. The transportation, engineering and mechanical departments have each a generally accepted type of organization found to be the most practical and efficient; the same should apply to a fuel department. This department should be responsible for efficiency in the selection, distribution and use of locomotive fuel. It should include two elements: One experienced in the use of coal, the handling and drafting of locomotives; the other technical, familiar with available fuels, their preparation and relative efficiency. The first element should include only experienced engineers whose personality assures them the co-operation of the men whose work they supervise; the latter offers an attractive field for the technical graduate in railroad work. The organization of a separate department to supervise the selection, distribution and use of fuel may be justified under some circumstances; otherwise this work should unquestionably be conducted under the direction of the mechanical department. It must be borne in mind that the mechanical department is at all times held responsible for the satisfactory performance as well as the maintenance of motive power. The fact that fuel is a transportation charge does not justify the transportation department in attempting to supervise details of a mechanical or technical nature.

The fuel department has not yet adopted standard methods for supervising the selection, inspection, distribution and use of locomotive fuel. Local conditions may require some variation in the form of organization, the character and extent of supervision, the inspection and distribution of fuel; but there is so little variation in the purpose of the fuel department, the men and materials with which it deals are so generally alike, that there is an excellent opportunity for the wider application of those methods that have been found most successful. Wherever

*A paper presented before the New England Railway Club, November 9, 1915.

fuel economy has been given considerable attention some strong points in connection with this work have usually been developed. The organization of the fuel department may be unusually well arranged, the supervision over fuel use may be very thorough or the inspection of coal may be particularly effective. A complete study of the work being done on each railroad and of the results obtained in reducing fuel consumption would be of the greatest value towards raising the general average of efficiency in the fuel department. It is interesting to know that the United States Bureau of Mines is contemplating a detailed investigation to determine what steps are being taken by each railroad in the country to improve fuel efficiency; but it would be unfortunate if the government should undertake this work before a single railroad association had completed a similar investigation and before the railroads can exhibit a more uniform standard of fuel efficiency.

The fuel department has not been successful in arousing any widespread interest in fuel economy. Fuel consumption is, in a sense, the pulse of the railroad. It not only responds to the manner in which the locomotive is handled, but it reflects the condition of the engine and, in a measure, the condition of the track. It is sensitive to delays at terminals and on the road, and is directly affected by train loading. Hence, the co-operation of practically all departments is essential to securing maximum fuel efficiency. A division fuel committee, developed along lines similar to the safety committee, has been suggested as an effective means for enlisting co-operation. Its membership on each division should include an engineman and fireman from both passenger and freight service, and a roundhouse foreman from each important terminal. The division superintendent, chief train despatcher, master mechanic, road foreman of engines and fuel supervisor, if any, should complete the personnel of the committee. Meetings may be held monthly, at which all matters pertaining to the economical use of fuel can be discussed. Besides arousing a more general interest in fuel efficiency, these discussions will develop surprising breadth and result in a fund of valuable suggestions.

Failure to provide supervision in proportion to that found in any other branch of railroad service is the most conspicuous defect in the average fuel department. The best ratio of supervision generally in effect is that of one travelling representative of the mechanical or fuel department to 50 engine crews. A well-managed shop usually provides a better ratio of supervision, although the potential saving in the shop is a fraction of the possible saving on the locomotive. Furthermore, this comparison does not reveal so great a discrepancy between the wages of the shopmen and their foreman as may be found between the enginemen and the road foremen, where in many instances the road foreman earns considerably less than many of the men whose work he supervises. There are certain well-established methods for the economical handling of locomotives that will not be described here; the necessity for adequate supervision to insure their enforcement, however, is emphasized. Supervision over fuel use at terminals is equally important, as the opportunity usually exists for making a greater saving at terminals than on the road, in proportion to the fuel used. Supervision over the condition of the motive power is incident to the foregoing. Locomotives must be properly maintained if economical results are to be expected; but in this there is much detail, neglect of which will not actually cripple an engine, so that constant supervision is essential. Supervision must, in fact, cover every activity in the operation of the railroad in which fuel is a factor.

Education in the economical use of fuel is a relatively neglected feature in the work of the fuel department. Instruction in the use of the air brake and many other details connected with railroad operation is considered necessary. The air brake instruction car has become an established institution; why not a fuel instruction car? The necessity for such a car is perhaps not so urgent, the results to be obtained are not so tangible, but the possibilities are just as great. Education does not necessarily imply an instruction car, but it can probably be conducted to

the best advantage through this means. The success of an instruction car depends upon the personality of its management, and, to a certain extent, upon the calibre of the men it is intended to reach. Instruction should be arranged for both enginemen and firemen. Cars designed for this purpose are equipped with a simple apparatus for demonstrating the process of combustion and a screen where pictures may be effectively used to illustrate details in connection with the proper firing of locomotives. Motion pictures can be used to the greatest advantage and these should be taken to illustrate local conditions. The value of this car simply as an "advertisement" for fuel economy must not be overlooked.

The fuel department has not furnished any tangible incentive for exercising economy in the use of fuel. One of the earliest attempts at fuel economy was the money premium awarded enginemen for saving coal. This has been discarded because it was impossible to award premiums with accuracy and fairness and because it was objectionable to the enginemen as a whole. The individual fuel performance record, however, remains as the best possible incentive that can be offered, provided an accurate and effective record can be published currently. The average fuel record is a failure because it disregards the effect of conditions beyond the control of the enginemen. It includes his performance with light, as well as with full tonnage trains, and superheater engines are often compared on the same sheet with engines using saturated steam. If based on correct principles, a very satisfactory and effective record can be computed without facilities for weighing individual coal issues. A record of every engine movement must be kept, giving the name of the engineman, the coal consumed, the freight ton-miles or passenger car-miles, as the case may be, and the coal consumption per ton- or per car-mile. This record is based on daily reports received from each terminal and is posted daily in a book similar to the familiar car record. Where operating conditions are taken into account and the engineman's weekly or monthly average includes only records made with tonnage trains under normal conditions, the record will prove a very fair estimate of the engineman's relative standing. This work must not become simply a routine clerical matter; the records require individual attention and a good performance deserves personal recognition. The performance records should be bulletined promptly after the close of each period. The bulletins can be effectively designed with two columns, one showing enginemen above the average in red type; the other, enginemen below the average in blue type. The various types of engines and classes of service may be grouped separately. Such a record can be maintained at a cost of less than one dollar per month for each engine in service and will prove a conspicuous success towards stimulating interest in fuel economy.

The average fuel department has not assumed the same responsibility for efficiency in the selection of fuel as for economy in its use. The selection of coal is more frequently a matter of price than the result of a thorough study of available fuels. The cheapest fuel may not represent an ultimate saving, while higher priced coal should not be considered without assured facilities for utilizing its potential value. The breadth of selection is, of course, considerably greater where purchase is not confined to mines located upon the line of road. The fuel department should make a thorough study of available fuels, including comparative tests between coals from each field. These tests may be conducted upon a single engine operating preferably in passenger service and the evaporation per pound of coal carefully determined as an index to the relative value of the fuels tested. Where, as in some instances, a 10 per cent variation in efficiency has been found between coals obtainable at the same price, the value of these tests is obvious. There are few sections of this country that do not afford some undeveloped opportunity for effecting a reduction in fuel costs through utilizing inferior grades of fuel. For instance, it has been shown in a test that Texas lignite could be burned more cheaply than other fuels available in the Southwest; this fuel is so well adapted to the requirements of the locomotive stoker that its use on large

stoker-equipped engines in that territory would doubtless result in an important economic saving. The adaptation of locomotives to cheaper fuels is consistent with other economies undertaken by the fuel department.

The fuel department has not shown the same discrimination in the purchase of coal as is exercised in the purchase of many other materials. Specifications for coal are not as easily framed nor as readily applied. Following its investigation of available fuels, the fuel department should frame specifications adjusted to the character of the coal obtainable. Where mine run coal is purchased, the best percentage of lump and the lowest percentage of ash that may be expected with careful preparation are the most important items in the specification. Where coal is prepared over screens or through washers, the preparation should be specified in detail. B.t.u. specifications cannot be applied to locomotive fuel; the expense of sampling and analyzing is alone prohibitive. The laboratory investigation of coal should precede rather than follow its purchase.

Where the fuel department has recognized the necessity for fuel inspection, it has seldom appreciated its possibilities. The fuel inspector is usually the only representative of the railroad who remains in touch with the mine operators. He is responsible for the careful preparation of the coal and can very materially assist the operator in maintaining good standards. Being familiar with both the preparation and use of fuel, he is in a position to recommend some improvement in the method of preparation or the trial of a cheaper grade of coal. He can materially assist the transportation department in the handling of equipment to and from the mines, especially when the mines are not located upon the line of road. The inspector should have authority to reject, without question, coal inferior to the specifications in any detail. He may, for instance, suggest facilities for cleaning the coal or a method that will increase the percentage of lump; he may recommend the use of a 4-in. in place of a 6-in. coal from a certain mine; or, he may advise the transportation department of an impending shutdown at the mines and otherwise make his services of value to that department. The inspection of coal should be constructive rather than purely critical; where possible, it should be assigned to men with some technical ability.

The fuel department has given comparatively little attention to the economical distribution of locomotive fuel. Distribution of fuel is a matter in which convenience and expediency are generally the controlling factors. Important questions relating to the effect of foreign freight, the necessity for storage and the actual cost of distributing coal upon the line of road, enter into the problem of economical distribution. The effect of foreign freight should be considered in connection with the purchase of coal. The necessity for storing coal depends upon fluctuations in its price and other current conditions affecting each railroad. The distribution of coal should be arranged and supervised by the fuel department. A careful estimate of the actual cost of moving company coal should be made in place of estimating this cost upon an arbitrary charge per ton-mile. The relative cost of coal at each chute, quality considered, should be determined and a schedule arranged requiring engines to take as large a portion of coal as possible at points in their district where the cost is lowest. Observance of this schedule will result in an indirect but substantial saving.

The charge that the fuel department has failed to take its part in developing the economy devices that have made the efficiency and capacity of the modern locomotive possible, is perhaps an unfair one. It is generally assumed that it is not within the scope of this department to attempt this phase of the fuel problem. From a broad standpoint, however, why should this be so; why is credit for the introduction of the superheater and the brick arch largely due the manufacturer? Apparently the fuel department has neither time nor money for perfecting new devices; in some instances it has not even the facilities for giving them a fair trial. It is an unfortunate commentary on the fuel department that manufacturers of important economy devices must keep traveling representatives on the railroads to insure their proper use and maintenance.

Reviewing the foregoing, the success of the fuel department depends upon the following factors:

Recognition.—The railroads must recognize the fuel department as essential. It should be considered a logical branch of the mechanical department with a definite responsibility for efficiency in the selection, distribution and use of locomotive fuel.

Organization.—The fuel department should comprise an organization associated with the mechanical department. It should have a direct representation upon the road which will supplement rather than duplicate the organization of traveling engineers for the mechanical department. It should include a technical staff to assist in the testing and selection of fuel, to conduct its inspection and to investigate devices and methods affecting fuel use. It should further include a small office organization for handling routine matters and computing individual fuel records.

Standardization.—Methods for obtaining maximum efficiency in the handling and use of fuel should be standardized. This should be the result of a thorough study of the best practices in effect on each railroad. If the railroads do not make this study and do not effect a more uniform standard of fuel efficiency, it is probable that the United States government will.

Co-operation.—The fuel department must enlist the co-operation of every other department. The personality of the department and the spirit in which it is conducted are very important factors. The division fuel committee should be as widely established as the safety committee.

Supervision.—The mechanical department should provide supervision over the operation of locomotives to the extent that the performance of every engine and engine crew may be personally observed within a period of 60 days. This supervision may be divided with the fuel department, affording the latter a direct representation in the form of fuel supervisors. While the fuel supervisors can concentrate upon details concerning fuel use, their work should otherwise supplement the regular duties of the traveling engineers. Their compensation should be such that it will not prove a limiting factor in their selection.

Education.—Adequate supervision implies a degree of education, but to this should be added education of a more thorough and systematic character. The organization of the department should include an instructor qualified through experience and personality to conduct an educational course designed to reach all concerned in the handling of locomotive fuel. Where possible an instruction car should be provided.

Enthusiasm.—Where individual efficiency is concerned enthusiasm is a vital factor. The competitive fuel record presents one of the best incentives for enthusiasm among the men, upon whom results ultimately depend.

Breadth.—The scope as well as the spirit of the fuel department must be broad. The selection of fuel should represent a balance between theoretical and practical considerations;—its inspection should be "constructive." The policy of the fuel department toward the invention and use of new devices must be progressive—it should play a leading role in the conservation of fuel.

DISCUSSION

H. C. Oviatt, assistant mechanical superintendent, New York, New Haven & Hartford, said that practically the same organization as that outlined in Mr. Plant's paper is employed on that road. Including the road foremen of engines, there is one supervisor to about every 40 enginemen. He did not believe it advisable to attempt to check up enginemen too closely without having some means of knowing the actual amount of coal placed on the tender.

R. D. Smith, superintendent of motive power and rolling stock, Boston & Albany, believed in personal contact and co-operation with enginemen and firemen in bringing about economy in fuel consumption. This was also emphasized by Henry Bartlett, chief mechanical engineer of the Boston & Maine, who also referred to the importance of keeping similar grades of coal at both ends of a run. Mr. Bradley, fuel supervisor of the

Boston & Maine, advocated a central bureau to deal with all departments concerning fuel. In referring to the use of performance sheets for checking up enginemen, he gave it as his belief that any performance sheet was a great deal better than none.

W. J. Cunningham, president's assistant, Boston & Maine, dwelt on the effect of guesses as to the amount of fuel placed on a tender and the varying conditions on the road on fuel consumption and fuel consumption records. H. C. Oviatt also stated that, while he has never been able to find a satisfactory method of using the individual record, he believes in such records if it is possible to work them out satisfactorily. In closing, Mr. Plant explained in more detail the system of records employed on the Seaboard Air Line, which was described in the *Railway Age Gazette*, April 3, 1914, page 788.

MISSOURI COMMISSION ALLOWS GENERAL ADVANCES IN RATES

The Missouri Public Service Commission, in a decision rendered on November 13, allowed the railroads a general advance in passenger fares and advances in freight rates, with a few exceptions, making an average advance, it is estimated, of five per cent, effective on January 1, 1916. The railroads had asked for an advance in passenger fares from two to three cents a mile. The commission authorizes a fare of $2\frac{1}{2}$ cents a mile on one-way tickets, $2\frac{1}{4}$ cents a mile on round trip tickets and 2 cents a mile on mileage books of 500 or 1,000 miles. The freight rate advances in many cases are less than those asked by the railroads.

The commission finds from the testimony that a minimum passenger rate of two cents a mile does not give the carriers two cents a mile for each mile a passenger is hauled, because of the necessity of the carriers to constantly meet each other's short line rates. The commission also finds that the reduction in passenger rates from three cents a mile to two cents a mile has not resulted in an increase in traffic. The minimum charge for carrying a passenger is reduced by the commission from 10 to 5 cents. It is provided that each full fare ticket shall carry with it the privilege of carrying 150 lb. of baggage and each half fare ticket 75 lb. The commission also orders that the rate for excess baggage shall be 15 per cent of the $2\frac{1}{2}$ -cent rate. As to joint line freight rates, the order provides that where a shipment moves from one line of road to another through mileage rates shall be applied as a maximum, with small arbitraries added to cover the additional service of switching and other incidentals. Grain rates are readjusted by provision for a lower rate on corn than applies on wheat, and a provision that the rate on grain shall include transit arrangements, terminal allowances and the usual absorption of switching charges. Increases are allowed on some livestock rates and decreases made on others. There is an advance on some classes of stone and a reduction in others. On the following commodities the application of the roads for increases was denied: Hard coal, soft coal, fuel oil, barytes, ore, ore products, mill logs, drain tiles, sewer pipes, canned goods, ice, hay, straw, broom corn, flour and feed.

The rates which are now advanced were reduced by the legislature, the freight rates in 1905 and in 1907, and the passenger rates in 1907. Temporary injunctions were secured from the federal court, and in 1913 the rates were put in effect after a decision by the United States Supreme court that the roads had not proved the rate laws confiscatory. The decision follows a long series of hearings at which elaborate statistical and other evidence was placed before the commission by the carriers.

The decision, which was written by Commissioners John Kenish and H. B. Shaw, and concurred in by the other commissioners, says that there is no doubt that the financial problems of the railroads operating in the state, as well as those in the entire country, have been made more acute by the European war; that the operating expenses of the roads have increased from year to year, due to increases in wages, increased cost of

material and by other matters over which they have had no control, and that these conditions are not peculiar to Missouri, but apply generally throughout the United States. The decision comprises some 300 typewritten pages. Some extracts from the opinion are as follows:

"The carriers must be enabled to afford safe and adequate service to the public, meet their financial obligations and maintain dividends in such manner as to encourage further investments in railways and their stocks and bonds in this state, in order that such railroads may be able to perform the increasing duties demanded by the public.

"This state still needs many miles of new steam and inter-urban railroads to aid in its fuller development and the construction of such roads will require much new capital.

"We have carefully examined and considered all the evidence; we have also investigated the passenger rates of other states for comparative purposes, taking into consideration the similarity and geographical conditions as well as the density of population and difficulties of operation, together with the increased cost of operation not offset by increased revenue.

"We believe that all classes of passenger fares should be made reasonable and just, so as to encourage passenger travel. The automobile and the jitney which have come in the last few years and since the passage of the 2-cent rate, have doubtless reduced the short local passenger earnings of the roads of this state. What will be the future reductions no one can tell.

"When it is considered that we are asked to fix one schedule of rates that will be reasonable for 14 railroads serving territory dissimilar in cost of construction, in destiny and character of traffic, some containing large commercial centers and forming valuable connections with other carriers, while others do not, it is apparent, however well informed the commission should be as to the value of the property upon which the carrier is entitled to earn a reasonable return, no adjustment of the rates could be expected in which equal results would follow as to the return received by each carrier.

"The rates fixed will doubtless prove more profitable to some of the carriers than to others, nor do we think a general schedule is open to criticism because of that fact.

"For a carrier should not be denied all benefit of the advantage that comes from favorable location and from the efficient and economical management of its property.

"The most we can hope to accomplish is that the schedule of rates which we shall adopt, considering all of the carriers and all of the intrastate traffic devoted thereto, will be just and reasonable and will yield a reasonable average return on the value of such property."

It was contended by the railroads that higher freight rates are more necessary in some parts of the state than in others, but the opinion says that the evidence offered fails to justify a recognition by the commission of the state into A and B territories for the application of the proposed higher rates.

ELECTRIC RAILWAY IN SWEDEN.—The electrification of the railway from Kiruna to Riksgransen, in the extreme north of Sweden, is now complete. It is the first line on which the Swedish State Railways have employed hydraulically generated energy for railway traction. The line is also noteworthy by reason of the fact that a large section of it is within the Arctic Circle, where 50 deg. of frost are often experienced in the winter. It was to deal with the transport of iron ore from the mines which are located at the southern end of the railway to the Norwegian frontier that the electrification was undertaken.

LONDON & SOUTH WESTERN RAILWAY ELECTRIFICATION.—The first portion of this company's newly electrified lines, from Waterloo station, in London, to Wimbledon (through East Putney), was opened for traffic on October 25; the second portion of the electrified system (Waterloo, Barnes, Richmond, Kingston, Wimbledon, Clapham Junction, Waterloo) was nearly ready for operation at that time.

The Efficiency of French Women as Railway Workers

There Are Now 25,000 Satisfactorily Filling Such Positions as Porters, Car Cleaners, Conductors or Agents

By WALTER S. HIATT

Our Special European Correspondent

The labor problem of Europe is slowly finding a solution.

The railroads of France, for instance, are to-day making one of the first absolute tests yet made on a large scale among civilized nations of woman's ability to fill man's place fully in one of the most hazardous of occupations. The test has already shown that in some respects woman is not merely the equal but the superior of man in his allotted field of manual labor.

The first street car I boarded on landing in France many months ago had a woman conductor and a woman motorman. Since then the employment of women has grown apace and one of the most important interior tasks of France, as is the case with other nations of Europe, has been the adaptation of women to places once regarded as belonging exclusively to men. It is, however, not a question of the invasion of men's places by women, or of the exploitation of female labor, but, rather, of getting the work of the country done at all.

The employment of large numbers of women on the railways has made woman's entry into the field of transportation more

munitions factories or at the front, or else crippled beyond the capacity of manual labor. In view of the fact that the latter condition will have a lasting result and since there will be so many widows and other women forced to earn their own living henceforth, it is time to ask if woman is making good in her new occupation. There can be no doubt of it, and that answer has a meaning not only for Europe but for the United States,



Photograph by Georges Rodt

Cleaning a Second Class Car

than a curious or passing phase of the war. Her working on railways is a result of urgent necessity and has long since passed the experimental stage. The work of German prisoners has been limited to the handling of freight at ocean ports and is considered a makeshift. The native male population is busy in



Photograph by Georges Rodt

Women Cleaners at Work in Paris Yards of the P. L. M.

where we know women as stenographers, as clerks, telephone operators, but where, notwithstanding woman's invasion of industry, we do not know women as railroad telegraph operators, porters, ticket-sellers in railway stations, car conductors or car and locomotive cleaners.

Be it said in passing that Europe has for a long time been used to seeing woman as a manual laborer in the fields, as a fruit vendor, a janitor, a grocer, or as a railway grade crossing tender. It does not entertain any sense of pity, or of shame, if you will, in seeing her at a man's job. It watches her work from the standpoint of results. The laboring man once even watched her work with jealousy, feeling that her success meant lower wages and fewer places for him. Her work in the fields was such this year, however, that in France certainly it called forth the admiration and gratitude of the whole nation, for with less land to cultivate owing to the German invasion, she actually obtained a more abundant harvest than man had secured in past years. A Frenchman who had travelled throughout the country and seen the woman's wonderful work in the fields, jokingly said to me: "Would it not be a good thing to keep the men at war?" But for her active hands the munitions factories could not have been kept going at their high speed; but for her the entire post-office system of the country would have broken down under the double strain resulting from the enormous free military correspondence. Unspoiled by too much prosperity or by false

standards of social and economic equality, she works with a will and does her task well down to the last detail.

It is in the highly specialized work of the railroads, however, that the real test of her abilities has come. There are to date in France no less than 25,000 women occupying such positions as subway guards, conductors, station masters, porters, carpenters, clerks, platform cleaners, or cleaners of cars and locomotives, and each month sees this number increase as the men are taken out of the offices and put to work in the operating and shop departments. Months ago the telephone service was turned over to the women, and but recently the railway telegraph lines in the Paris station of the Paris-Lyon-Mediterranee railway began to be operated by women. In the south of France, on the Southern railway, women have replaced men as porters and freight handlers in large numbers.

On the State Railways alone, but one of the six great systems of France, more than 5,000 women are already employed, and they are on an equal footing with the men. While preference is given to the widows and daughters of employees, other women may enter the service after examination, and once in the service they become entitled to participation in the sick benefits and pension funds of the men. On this railway women are permitted to hold the position of station master (*chef de halte*) at village stops. Here, as on some of the other systems, uniformed women also travel as attendants or porters on the expresses and other through trains, their work being primarily to keep the first, second and third-class cars clean during the journey. On the Paris-Orleans system women hold positions as station agents at some of the important small cities, attending to all the duties of ticket selling, checking baggage and handling freight.

This expansion of woman's work on the French railways has been so rapid that the French public does not realize its extent, or has not paused to notice, so greatly has the war absorbed attention and upset old notions of fitness. For all that, the railway heads are closely studying woman's capabilities, as they must, in their splendid effort to keep their roads going smoothly. Every day the war lasts the railway officers must use a little more ingenuity to make ends meet, they must make old material wear a little longer, they must adapt old material to new uses, and one of their many heavy tasks is that of stretching the work of the decreasing amount of trained labor, putting women in places where men are not absolutely needed.

WOMEN CAR CLEANERS

Offhand, it is safe to say that women have not failed these railroad chiefs and particularly is this true of women engaged in lighter duties or in those places where courtesy counts. The most surprising test of woman's adaptability to a man's job I saw in the yards of the Gare de Lyon, the Paris terminal of the Paris-Lyon-Mediterranee railway. The chiefs of this railway have never hesitated to adopt any means, however novel, to accomplish a given end. When I visited its yards its officers had just come to the very definite conclusion that in many respects woman's labor was a factor worth considering even in normal times, and particularly in matters of railway cleanliness, where their work was far superior to that of men. I went to the yards where the women were at work amid the busy rush of moving trains. The foreman in charge of car and locomotive cleaning told me that in times of peace he had employed some 200 men on passenger cars, but that now he had but 105 men left. He had 80 women, the number of which he was gradually increasing, who had taken the place of the missing men. He explained that while these women were somewhat slower at cleaning the outsides of cars, which were washed with water and then dried with a squeegee, he found them not only quicker but neater with the inside work.

"Those women really clean cars," he said, and to prove his statement took me to some cars then in the hands of the women cleaners. The latter were not in uniform. Their hands and faces were quite clean and bore none of the traces of soot and grime familiar to the man cleaner. Those on the outside of

the cars, armed with buckets of water and squeegees, were grooming them down, making the paint shine as if the cars belonged to the train of the President of the Republic. "Look how that brass work shines," continued the foreman. "Never have I been able to get men to polish it so. The only difficulty with the women is that they can't do the outside work very quickly, as it tires them to lift their arms."

The insides of the cars, whether first, second, or third class, were clean and neat as new pins. The windows shone like those of a London haberdasher. There was not a spot of grease or coal dust on the tan-brown cloth cushions. The lace curtains placed over the cushions to protect them from wear were newly laundered and looked as sweet as those of a parlor. The linoleum floors were as spotless as a Holland kitchen floor. I was surprised, because French trains used to be very dirty. Surely war has some compensations!

We walked through the cars where the women were busy with their soap and water, brushes and vacuum cleaners. The foreman tipped his cap in the pleasant French way, and the women smiled, proud of their work. I remarked that none of them were young.

"Oh, that's quite right," he answered. "The women we employ are all over thirty and we make a rule about their age. These women were chosen from 500. It won't do to employ young women. For one thing the older women are stronger and healthier; they know how to work and they know just how much they can do. Then, there isn't any foolishness about them, no joking with the men in the yards."

"There are only two objections I have found with women for railroad work. One is that they can't do much overhead work."

"And the other?" I asked.

"Would you believe it," said the foreman, "they're not afraid of trains. I can't get it into their heads that a train in motion is a dangerous thing to the most experienced railroad man. However, they are so cool in their ways that so far there have been no accidents."

"On the whole, then, they are quite efficient?" I asked.

"Indeed, there is no grumbling or back-talk from them ever. They do what they are told to the best of their ability. Besides, they neither drink nor steal."

WOMEN ENGINE CLEANERS

When I went across the Seine to find out how satisfactory the manual work of the women employed in the yards of the Paris terminal of the Orleans system had been, I heard the same story of woman's efficiency, though lively regret was expressed that the war had forced more women than ever into men's occupations.

In the yards of one railway the women had worked so well that a number of the stronger and more capable had been promoted to the cleaning of locomotives, which is surely a man's job. All engineers become careful to a fault about their engines and the French engineers are no exception. It was explained to me that since these women had been employed the engineers had been satisfied, for the first time perhaps since the war began. I watched the women at work. They were clambering over the engine, oiling it, rubbing it down, in a matter-of-fact manner, much as if they were scouring their kitchen floors, handling their oil cans and cotton waste with surprising ease. Here, too, they went about the job cheerfully.

"They've fallen in love with those engines, that's plain," laughed the foreman.

While there is no doubt now that after the war these women will be continued as car cleaners, it is yet a question as to how long they will be employed on the locomotives.

The same results obtained on these great railway lines have also been secured by the Metropolitan's subway lines in Paris. Its chief of personnel expressed himself to me as more than satisfied with their work. "There had been so many complaints about the untidy condition of the platforms," he explained, "that some months ago I replaced 75 men by as many women, and since then there has been an astonishing improvement."

Where the men left dust and papers in every corner, and failed to mop the concrete, leaving it sticky, slippery and alive with dirt, women have so cleaned the platforms that they look each day as clean as the day they were laid."

This officer further said that from a company point of view the work of all the other women employees had proven on the whole as "satisfactory" as that of the men who had been called away to do soldier duty. The company before the war employed 2,500 persons, 300 of which were women ticket-sellers. Since the war 515 men have been replaced by as many women, who act as conductors and guards and ticket punchers at the platform entrances. Most of these women are wives or relatives of the men mobilized as soldiers.

WOMEN EMPLOYEES MORE COURTEOUS

In an address before the New England Railway Club last January on "Making Friends," Roy V. Wright, managing editor of the *Railway Age Gazette*, said: "It behooves railway executives to bend every energy toward making friends with the public," and also, "ordinary acts are sure to cause friction unless courtesy is used as a lubricant."

Fine lessons in courtesy to the public are being given just now all over France by these women railway employees to an extent that is notable even in a country that prides itself on the politeness of all of its people, rich and poor.

Consider the women of the Paris Metropolitan. First, and despite their newness to their work, they are thoroughly efficient in answering questions regarding directions. Any subway, because of its winding underground passages and blinding lights, is confusing except to the habitual user. Paris just now is full of strangers, crippled and wounded French soldiers, soldiers on leave from the front, refugees and people who do not know their way about, and these women ticket-sellers and ticket-punchers show a surprising quickness in setting the stranger aright and doing so patiently and politely. This subway cuts under Paris in a dozen different directions; it has no less than 200 stations, no less than 50 transfer stations, and at that I have never seen a stranger fail to secure proper information or to secure this information promptly and courteously.

It must not be inferred that Paris is not crowded in war time, that it has not its rush hours like New York or Chicago, or that these women are not sometimes sorely tried in their duties. It is true that the Paris crowd of war-time is a quieter and more preoccupied crowd than the lively crowd of peace; universal suffering has tamed it, saddened it, and made it forbearing. For all this, there are periods during its rush hours when everyone is scrambling to get to or from work, or when crowds troop along at a Brooklyn-Bridge rate, and are impatient at delays.

For instance, the station at the Place de l'Opera is mobbed every evening towards six o'clock, and there a few months ago I noted the disputes that arose between the patrons and one of the men ticket-punchers whose duty it was to close a wicket to the platform before the train went on its way. This man, who was mobilized and therefore empowered to arrest turbulent passengers, was frequently nagged by people who arrived just as he was closing the wicket barring entrance to the platform. Later he was replaced by a woman, and either because of the subtle influence a woman exerts because she is a woman or because of her defensive smile as she barred the way in the course of her duty, those disputes have ceased. So much for the heart of Paris.

In the populous suburbs towards St. Denis and Pantin, where the very poor people live and work, the tramways are more commonly used. Disputes between men car conductors and men passengers were formerly rather frequent, but now they have materially decreased because of the magic smile of the woman conductors.

These women have but one fault—that is, if it is a fault. She is kind-hearted where soldiers are concerned. At car stops she cries out: "Soldiers enter first!" and frequently she forgets to collect their fares.

REPORT OF SPECIAL COMMITTEE

The Special Committee on Relations of Railway Operation to Legislation has issued its semi-annual report, showing that 235 railway companies operating 224,610 miles, are supporting the work of the committee. The report says in part: In response to Circular 70, May 3, 1915, the committee was authorized to apply to the Interstate Commerce Commission for an extension of time within which freight cars must be brought into conformity with the United States safety appliance standards. The application for an extension of two years from July 1, 1916, was made on July 6, 1915. A hearing was set by the Interstate Commerce Commission for September 28, 1915.

The data presented by the railways indicated that on July 1, 1916, there would be approximately 356,000 cars not equipped; that there had been expended to June 30, 1915, approximately \$30,482,000; and that to complete the work would require an estimated expenditure of \$13,860,000. It was also shown that cars in service prior to July 1, 1911, had been brought into conformity with the standards at the following rates:

Six months ending:		Number of Cars Equipped
December	31, 1911.....	36,720
June	30, 1912.....	86,777
December	31, 1912.....	133,203
June	30, 1913.....	154,149
December	31, 1913.....	167,165
June	30, 1914.....	154,430
December	31, 1914.....	173,223
June	30, 1915.....	182,332

The commission has not yet made any order on the subject.

In response to Circular 69, March 10, 1915, the committee was authorized to represent a large number of railways in the formulation of the rules and instructions for the inspection of locomotives and tenders required under the law passed March 4, 1915. A meeting of officers of the mechanical departments was called on May 25, in Chicago, and certain rules were formulated to serve as a basis for discussion before the matter was presented to the Interstate Commerce Commission; these rules were very generally filed by the railways.

It having become apparent that the passage of this act was to be used as a means to secure the installation of high-intensity headlights under all conditions of traffic, the committee called for certain information to enable it to meet the situation thus presented. In the meantime the chief inspector of locomotive boilers formulated a code of rules and sent it to the railways generally. A meeting was thereupon called at which these rules were carefully considered, and a series of conferences was held between the chief inspector of locomotive boilers and his assistants, the committee representing the railways and representatives of the employees. At this conference agreement was reached on all the rules submitted, except those relating to automatic bell ringers and high-intensity headlights. A hearing on the rules and instructions was called by the Interstate Commerce Commission for September 28 and 29, and after further conference with the chief inspector and the representatives of the employees on the preceding day, the matter was submitted to the commission for determination. The hearing continued until October 2, inclusive.

All parties agreed in asking the commission that all of the rules, with the exception of those relating to automatic bell ringers and high-intensity headlights, be made effective at such time as the commission might find it practicable to issue this order.

In view of the probable effort to secure legislation, specifying standard horizontal and vertical clearances, the sub-committee of engineering officers has been following the matter and will suggest a course of action in case the emergency presents itself.

The 43 legislatures which were in session during 1915 have all adjourned. In these there were introduced 1,097 bills affecting railway operation, of which 137 were enacted into law. This compares with similar figures for 1913 of 1,395 bills introduced and 230 laws enacted.

The character of the legislation enacted is indicative of a modification in the attitude of legislative bodies toward railway matters. This condition is due to a variety of causes, but there

can be little doubt but that the method of presentation on the part of the railways has contributed greatly to the result.

Beginning in 1911, the principle of handling matters pending before state legislatures through committees of operating officers, appointed by concerted action on the part of the railways interested, was inaugurated. In the two following years, this method of procedure was extended until nearly all of the states west of the Mississippi river, together with Ohio, Indiana and Michigan, had such committees, and during the year just passed the same form of organization was used.

The course pursued by these committees differed in the several states as the conditions required, but it is the consensus of opinion of the chairmen of all these committees that despite the loss of time involved in attendance upon the legislature, the handling of matters in this manner has been largely instrumental, not only in presenting the passage of much legislation urged by special interests, but in the establishment of more satisfactory relations between the members of the legislatures and the representatives of the railways, through the straightforward presentation of the facts and arguments in each case.

FUTURE METHODS

Whether the above method of carrying on the work in the several states will be sufficient to meet future needs is a problem. So long as bills are dealt with with practical finality in committees the presentation of the railways' arguments through individuals is effective, but a tendency is noted for committees to report out bills, not only with their approval, but in some cases with their disapproval, which has the effect of throwing the ultimate decision into the legislature itself. No argument is possible before the legislature, and in many instances a large proportion of its membership are uninformed as to the merits of a given proposition.

This is further complicated by the quite general practice on the part of various organizations of pledging individual legislators to certain courses of action in advance of their election.

To meet this situation, in some of the states extensive newspaper advertising was successfully utilized; in others, a large number of circulars of an informing character were issued to the public.

POSSIBLE RAILWAY SECURITIES LEGISLATION

By W. L. STODDARD

WASHINGTON, D. C., November 17.

According to an apparently authentic rumor in circulation here, the Interstate Commerce Commission will not, in its forthcoming annual report, renew its recommendation for the federal regulation of the issue of railroad securities. Those who are in a position to secure information on this subject declare, furthermore, that the President has determined to abandon the railroad securities bill, which was one of the chief items in the Democratic trust program.

It is probable that the commission's report will set forth its reasons for this change in policy, and such an explanation will be awaited with considerable interest. The Rayburn bill, which passed the house last year, was generally understood to be the commission's bill, and members of the commission, both at that time and since have publicly declared it to be their opinion that this legislation is of pressing necessity.

Of course, failure upon the part of the administration and the Interstate Commerce Commission to urge this measure at the present time would not mean that the measure in question could not be taken up independently and passed by both houses of Congress. If the advocates of federal regulation of railroad securities make known their will with sufficient emphasis, Congress is sure to respond to a certain degree. The case of the immigration bill is one in point—a measure finally vetoed by the President, but passed by Congress in spite of his lack of support, and, as a matter of interesting record, nearly passed by a Democratic house over the veto of a President of the same party.

Back of the railroad securities bill there lies a growing mass of favorable opinion. As far ago as 1885 the senate committee which framed the original interstate commerce act called attention to the evils arising from lack of regulation of railroad finance. It is interesting to recall that the late Senator Cullom of Illinois was chairman of that committee and may himself have written these words:

"This pernicious practice (fictitious capitalization, popularly known as stock watering), has unquestionably done more to create and keep alive a popular feeling of hostility against the railroads of the United States than any other one cause. It has imposed a serious and continuous illegitimate burden upon commerce. Excessive capitalization operates as a mortgage upon the industry of the country."

Apparently, however, not till the passage by the house of the Mann-Elkins Act of 1910 was federal security regulation advanced beyond the stage of denunciation and recommendation. That act amended the original interstate commerce act and gave the commission control over the issuance of railroad securities. The senate killed the section and substituted a provision for a commission to investigate the whole subject. Hence the Hadley Railroad Securities Commission, whose report declared that "accurate knowledge of the facts concerning the issue of securities and the expenditure of their profits is a matter of the utmost importance. It is the one thing on which the federal government can effectively insist today; it is the fundamental thing which must serve as a basis for whatever additional regulation may be desirable in the future."

In this historical connection it is also worth noting that the platforms of the big parties have declared for railroad security regulation. "We favor . . .," said the Democratic platform of 1912, "legislation preventing over-issue of stocks and bonds by interstate railroads, express companies, telegraph and telephone lines."

In both the house and senate there are many members of the party in power who will unquestionably make the point that the railroad securities bill has been before the country long enough to warrant Congress in enacting it without further delay. Some of the Democratic senators and representatives will undoubtedly argue that the party must redeem its platform pledge on this question, if it is to appeal successfully to the people to be returned to power in 1916. These arguments will be not without weight, and they may possibly be not without effect upon the situation.

It is rumored that the Interstate Commerce Commission, if it refers at all to the railroad security question, will suggest that doubtful points in the legislation hitherto presented to congress cannot be completely and satisfactorily settled until the valuation work is finally concluded—three or four years hence at the least. However, this is only a rumor and incapable of official confirmation at this time.

The overwhelming vote for the Rayburn bill in the house on June 5, 1914, may be an indication of its present strength with that institution. The yeas were 325, the nays 12; those answering "present" numbered 2, and 94 failed to vote.

THE RAILWAYS OF GREECE.—There are about 950 miles of railway at present open to traffic in the so-called "Old Kingdom," i. e., the territory occupied by Greece before the conclusion of the second Balkan war, while the new provinces possess a further 1,720 miles. An ambitious program of new lines has been drawn up, as the Turks have never constructed a single mile in Epirus or Crete, while in Macedonia they have contented themselves with such main arteries as were absolutely necessary. Two lines, with a length of 60 miles, are proposed in Crete, while Macedonia is to have five, with a total length of 320 miles. The most important of these, the Calambaka-Sarowitz line (100 miles), not only runs through a district hitherto absolutely devoid of modern transport facilities, but is of great strategical importance, as it will enable troops to be concentrated rapidly on the north-east frontiers.

AMERICAN RAILWAY ASSOCIATION

The fall session of the American Railway Association was held at the Blackstone hotel, Chicago, on Wednesday, November 17. There were present 250 members and associate members represented by 195 delegates. The executive committee reported a membership of 403, operating 278,950 miles. The executive committee reported that J. E. Fairbanks had been appointed general secretary and treasurer to fill the unexpired term of W. F. Allen, who died last week. H. J. Forster was appointed assistant treasurer.

The committee on transportation reported that it had completed its work on the revision of the standard code of train rules, block signals and interlocking rules, upon which it has been engaged since July, 1911. The codes as presented by the committee were approved by the association. The committee expressed the belief that the rules are adequate to fulfill all the exigencies of train operation.

The committee on maintenance reported that it would issue a circular of inquiry concerning rules governing the determination of physical and educational qualifications of employees to ascertain whether a necessity exists for a further amendment of these rules. The committee presented specifications for high carbon steel joint bars and specifications for heat-treated oil-quenched steel joint bars, as recommended by the American Railway Engineering Association. These were approved. The committee also presented amendments to the specifications for carbon steel rails, which were approved.

The committee on the safe transportation of explosives and other dangerous articles called attention to the necessity for uniformity in connection with the carriage of dangerous articles by passengers in passenger cars. It also called attention to the large amounts of explosives and ammunition now being transported and to the fact that no explosion or fire has occurred in handling this material. Attention was also called to the necessity of active interest on the part of all operating officials in the enforcement of the regulations prescribed by the Interstate Commerce Commission covering the transportation of gasoline.

The committee on electrical working reported that it has had under consideration the question of third-rail working conductor clearances, and submitted diagrams covering the clearances for rolling equipment, which interchanges between different roads and clearances for work equipment which does not leave the individual road. From information obtained, the committee is of the opinion that it would be unwise to extend the design nearer to the rail than at present. Attention was called to the National Electrical Safety Code which is being prepared by the Bureau of Standards of the Department of Commerce, and on the recommendation of the committee it was authorized to represent the association at hearings on this subject.

The committee on relations between railroads reported that it has approved the applications of eight roads to join the per diem rules agreement and has rejected the applications of three roads. It has reported to the executive committee on the eligibility of five roads to become associate members of the association and has rejected the application of one road. It has recommended the restoration of one road to the per diem rules agreement and it has passed upon the withdrawal of one road. In view of the last report of the Interstate Commerce Commission in the industrial railways case the committee is now recommending for admission to the per diem rules agreement, on proper application and approval of railroads which are recognized by the Interstate Commerce Commission as common carriers.

With the report was submitted a report of the committee on packing, marking and handling of freight, which has been conducting its work in accordance with the resolution passed by the association at its last meeting, and has been securing the co-operation of the traffic, accounting and freight claim organizations and departments. Statistics were submitted showing a

saving of over \$3,500,000 in loss and damage payments for the first six months of the year 1915 on 99 roads, as compared with six months of 1914, indicating the increased interest taken in this important subject and that the efforts of the railroads are meeting with success. There was also submitted a report of the committee on weighing, stating that negotiations with the United States Bureau of Standards and with the traffic associations in regard to the free testing of railway master scales by the government scale testing equipment had been successful, and that a program has been submitted to the members of the American Railway Association under which the government will test free, annually, all railway master scales, and in addition, in the states where there are no railway master scales, one scale which will be agreed upon between the bureau and the association. In return the railways undertake to move the government testing equipment to the designated scales without charge. The committee also reported on per diem, car service, switching reclaims, storage, national track storage rules, collection of waybill revenue, business, mail claim papers and statistics. The executive committee has now authorized the resumption of a monthly car location report, and this is being received and tabulated for the use of the members of the association, beginning with November 1.

Additional amendments to the code of LCL rules and rules for loading carload shipments of flour were presented and approved. Recommendations for a number of changes in the per diem and car service rules were approved.

The following were elected members of the committee on the safe transportation of explosives and other dangerous articles: New York Central, Norfolk & Western and the Pennsylvania. The following were elected members of the committee on electrical working: Delaware, Lackawanna & Western, New York Central and New York, New Haven & Hartford. C. W. Gallo-way, general manager, Baltimore & Ohio, and W. B. Storey, vice-president, Atchison, Topeka & Santa Fe., were elected members of the committee on nomination. The next session of the association will be held in New York, May 17, 1916.

REPORT ON COLLISION AT ORIENT, OHIO

The Interstate Commerce Commission has issued a report, dated October 12, giving the conclusions of H. W. Belnap, chief of the division of safety, on the causes of the rear collision on the Baltimore & Ohio South Western at Orient, Ohio, August 12, about 3 a. m., when seven passengers were killed. The facts of this collision were reported in the *Railway Age Gazette* September 17, page 504; and the present report agrees substantially with the statement then made, but goes much more fully into detail. Special attention is called to the fact that the car in which the passengers were killed was of wooden construction, with open platforms. It was built in 1883.

It will be recalled that the freight train, which ran into the rear of the standing passenger train, had been following it for about 10 miles under a rule requiring it to be run under control; and that it had been flagged more than once, both trains being compelled to move at low speed because of the damaged condition of the track due to heavy rain. The engineer of the freight claimed that he was running under control approaching Orient, but that the heavy rain which was falling interfered with his vision and also prevented sand from becoming effective on the rails; but the event proved that he was not running under control. The grade was descending, about 26 ft. per mile, and there was a view of the standing train from about 750 ft. back. The passenger train stopped short of the station to take water.

The inspector holds the freight engineer mainly responsible for his disregard of the rule requiring him to run under control at all times after being passed by the passenger train until he should reach the next telegraph station [i. e., for about 20 miles]; but the conductor and flagman of the passenger train also are censured for not flagging, in strict accordance with rule 99, and also for not throwing off fuses.

The rule under which the freight was running is made specially for cases where a freight is passed by a passenger train at a non-telegraph siding; in that case it may follow the passenger after ten minutes, running under control. Mr. Behnap interprets this rule as being intended to provide for the movement of a train which had entered a block and for some reason was unable to clear the block for a following passenger train and was compelled to take a siding, to be passed, where no means of communication were available. In other words, it is a provision for unexpected emergencies. But in this case the side track where the freight had waited was less than a mile from the entrance to the block section, and there was a telephone by which the conductor could communicate with the block station. To have enforced the absolute block system the freight would have had to be kept 21 miles back of the passenger train. Prior to April 1, 1914, the block sections were much shorter than 21 miles, but on that date certain night offices were discontinued. If, says the report, it was safe and expedient to thus lengthen the block sections, it was the duty of the road to restore them, or at least to enforce the absolute block system, whenever the volume of traffic was increased, or a special passenger train was to be moved at night.

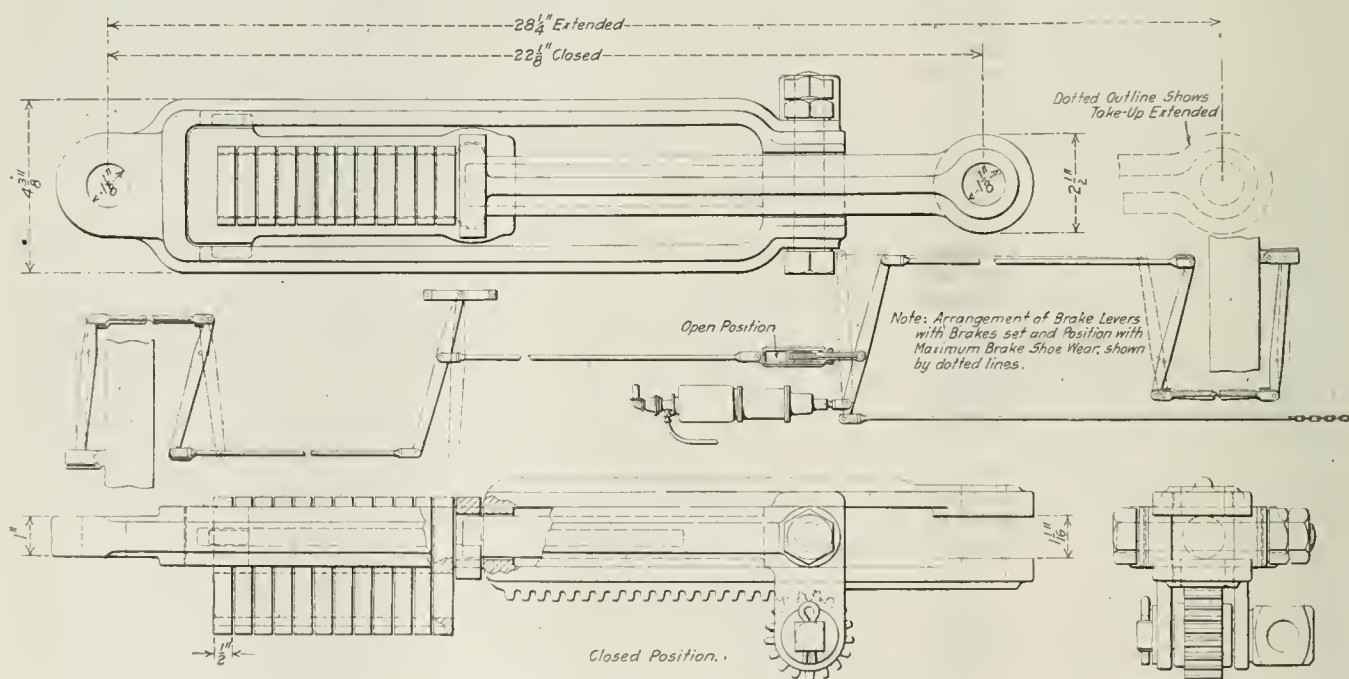
MANUAL SLACK ADJUSTER

A manually operated slack adjuster for use on freight equipment has recently been placed on the market by the H. W. Johns-Manville Company, New York. The purpose of the device is to make it unnecessary to crawl under each truck in order to take up slack due to brake shoe wear, a task both dangerous

which is cored a hole $1\frac{1}{8}$ in. in diameter. Lugs on the inner end of the double yoke fit into grooves in the side of the body, thus holding the end of the yoke in position and guiding the relative movement of the two parts. The jaw at the open end of the body is closed by a block of rectangular section on the end of a thrust rod, the upper and lower faces of this block serving as a guide for the open end of the double yoke. The thrust rod, which is about 9 in. long, extends back on the center line of the body and passes through the cored hole in the throat of the double yoke.

Within the closed part of the yoke are placed 12 thrust blocks, each one-half in. thick. The width of the opening between the sides of the yoke is increased at the throat to permit the passage of the retaining lugs on the ends of these blocks. A key block is inserted in this opening when the device is assembled and is locked by the thrust rod, which passes through a hole in the block. The thrust blocks have a length of 3 in. between the retaining lugs and through the lower end of each is a hole $1\frac{1}{8}$ in. in diameter. When the blocks are raised until the lugs on the lower ends are brought in contact with the yoke these holes are in line with the thrust rod, thus permitting the yoke to be moved to the position shown by the broken lines in the drawing.

When slack is to be adjusted, the brakes are set lightly in order to show the piston travel. A pinion secured to the body meshes with a rack on one side of the yoke. By inserting a short bar in the capstan head of the pin which holds the pinion in place, the yoke may be moved back, thus shortening the length of the cylinder tie rod. As soon as the rod has been shortened one-half in. one of the thrust blocks will be released from the end of the thrust rod and will drop to its lower posi-



Manual Slack Adjuster for Freight Equipment

and difficult of performance. The device is located in the cylinder tie rod, where it is easily accessible, and but one adjustment is necessary for both trucks. The adjustment is made when the brakes are applied lightly so that correct piston travel may be obtained without trial adjustments.

The location of the device in the brake rigging as well as its construction are shown in the drawing. Adjustment is effected between the body of the device and a double yoke sliding within the body. The body is a malleable iron casting about 18 in. long of yoke form, the closed end being provided with a tongue which is connected to the end of the tie rod. The double yoke consists of two parts the sides of which are turned at right angles to each other. These two parts join at a throat through

tion by gravity. The other blocks follow successively for each succeeding one-half in. adjustment. In the lower position the solid portion of the block is opposed to the end of the thrust rod, thus preventing the return of the parts to the original position. The adjustment is continued till the piston travel has been reduced to standard. The total adjustment of 6 in. provided by the device is sufficient to take care of maximum brake shoe wear.

DRILLING TEMPERED STEEL.—To drill tempered steel or other hard material (even glass) use a drill tempered as hard as possible and camphor and turpentine, equal parts, in place of oil, on the drill.—*Power.*

Maintenance of Way Section

Preparing for the Winter

While any predictions regarding the weather to be expected this winter are very likely to prove widely inaccurate, the general expectation is that we are due to have a season of severity. The past year already has been one of hard trials for the maintenance of way department. Storms and washouts have been unusually frequent, while the rainfall has been considerably above normal in nearly all parts of the country. As a result, it has been difficult to maintain the track to its proper standards. At the same time, maintenance of way expenditures have been restricted so that it has been necessary to cope with these unfavorable conditions with less than the usual allowances of materials and men. Under normal conditions in the larger part of the country there now remains only a short time in which to get the track in proper condition for the winter. With the outlook before us, and the experiences of the past summer, the maintenance officer will only take reasonable precautions if he makes a special effort to get his track into the best possible shape in the short time remaining.

Using Second-Hand Ties

While the use of tie plates is now quite general, many ties are still being removed from track because of being badly rail cut rather than because of failure from decay. A desire to utilize the remaining life of the timber has led on some roads to the practice of turning the ties over and returning them to their original location in the main track. While from the standpoint of decay, such a tie is still good for considerable further service, there are serious objections to this practice, as pointed out elsewhere in this issue by W. E. Schott. A tie is not only required to transmit the vertical load from the rail to the ballast, but also to absorb lateral stresses. An old tie which has been turned over will show a materially decreased resistance to spreading rail and will be harder to hold to line, surface and gage. The cost of track maintenance will therefore increase. With the increasing cost of ties it is highly desirable to secure the maximum life from them. However, as the service required in high speed main lines is especially severe and as ties are also required for side and yard tracks subject to less exacting service conditions, it would seem advisable to use them there. Even under these conditions one must be careful that the cost of replacing a tie of this kind in a secondary track combined with the increased cost of maintenance does not exceed the value of the remaining life of the tie, just as in reclaiming scrap, constant care is necessary to prevent the cost of reclaiming material from exceeding its value after being reclaimed.

CHANGING THE FISCAL YEAR

ALMOST without exception, railway maintenance of way officers individually favor changing the fiscal year so that it will end on December 31 instead of June 30, as the most important single step which can be taken to increase the efficiency of this department. At the same time, no concerted movement to secure this change has been started by these officers through their associations, although this would be a natural course to take, as it is the maintenance of way department which is most directly affected by the present fiscal year.

There has been a general impression that the only serious opposition to this change would arise among accounting officers, who would have to adjust their records to correspond with the

new year. For this reason the attitude of the railway accountants, as reflected by the action of the Association of American Railway Accounting Officers, is highly illuminating and encouraging. At its last convention, a committee reported the results of a canvass of members representing 200 railroads with an aggregate mileage of 271,857. Of these, members representing 130 roads operating 212,542 miles, or 78 per cent of the total mileage, favored making the suggested change, while those representing only 38 roads with 17 per cent of the total mileage opposed the change, and those from 32 roads with 5 per cent of the mileage did not vote.

The Association of Accounting Officers has not stopped with this vote, but is continuing the agitation, and at the recent convention of the National Association of Railway Commissioners at San Francisco, the president of the Association of American Railway Accounting Officers addressed the railway commissioners on this subject. While the co-operation of both the national and state commissions would be necessary to make such a change, there is reason to believe that this would not be difficult to secure if the railways were united in favoring the change. Now that the accounting officers have taken the lead in the movement for this improvement, it is to be hoped that the engineering and maintenance of way officers, individually and through their respective organizations, will give all possible help. No subject now before the American Railway Engineering Association or the Maintenance committee of the American Railway Association is more important. There has never been a time when it would seem that conditions were so ripe for making the proposed change.

PROPER RECORDS OF REINFORCED CONCRETE STRUCTURES

THE investigation of old steel structures for the purpose of determining their ability to carry increased loading is an important part of the work of the bridge engineer's office. Reinforced concrete structures are, as a rule, of such recent origin that the investigation of their ability to carry increased loading has not yet been called for, except perhaps in the case of culverts under deep embankments, which are to be widened or increased in height. However, it is only a question of time until train loads will have increased to such an extent as to raise the question of the carrying capacity of certain classes of the concrete structures we are building to-day.

The old plans of steel bridges, if on file, will play an important part in these investigations, but for purposes of checking the old plans and determining the state of preservation of the structure, frequent inspections are, of course, necessary, even to the extent of scaling and calipering the individual members. When the old plans are not available, detailed measurements are imperative.

The investigation of an old concrete structure presents a difficulty not arising in the case of a steel bridge. Once the former is completed, the record plan offers the only means of knowing the details of its construction. Subsequent inspection will give an idea of the quality of the concrete and perhaps disclose something of the state of preservation of any reinforcement it may contain, but it cannot disclose such details as the percentage of reinforcement, the number of stirrups or in the case of a culvert, even the thickness of the slabs. Superficial information, such as it would be possible to obtain by conversation with some one engaged in the construction work, would be valueless; for, just as we may find it necessary to order the heavy power off a steel bridge because of inadequate pin plates

or flange riveting, so the weak feature of a concrete girder may be the improper spacing of stirrups or inadequate bond lengths.

In view of such facts, the need of a complete record of a concrete structure is obvious. Not only should the design plans be complete as to detail, but all alterations made by the construction forces should be made a matter of record. The field man is frequently inclined to express his contempt for the office man, and may even intimate that he changes the plans sent to him to suit himself, or that he builds according to his own ideas because the office plans have not arrived in time. Aside from the incorrectness of such a position from the standpoint of administration or the proper subdivision of duties, it is especially serious in connection with the preservation of adequate records. Without question, the field man must occasionally modify the plans sent him to suit unforeseen contingencies, particularly with respect to foundations. It should be an invariable rule, however, to make an accurate record of all such changes that are required. This applies no less to the maintenance officer, who has to make emergency repairs or extensions upon the structure already built, in accordance with old plans, standard plans or designs of his own. No matter what plan or method is used, he should do his part to see that an accurate record is made of the structure as he built it.

THE MAINTENANCE OF WAY ASSOCIATIONS

THE successful conventions of the Roadmasters' and Maintenance of Way Association, held in Chicago, September 7-10, and of the American Railway Bridge & Building Association, held in Detroit, on October 19-21, which were reported in the Maintenance of Way Sections for those months, bring to the attention of railway officers the work that these and the other maintenance of way associations are doing. The common purpose of all of these organizations is to develop and standardize methods and materials in their respective fields and thereby increase the economy of railway operation. For this reason they deserve the support and co-operation of the railways.

The position of the American Railway Engineering Association is recognized in the railway world and we refer here more particularly to the other associations in this field, the support of which is not so universal. At the present time some railways urge their men to attend the meetings of these organizations and pay their expenses. Other railways not only do not pay the expenses of their men but even discourage or prohibit them from attending. This is wrong. It is just as important and beneficial for the roadmaster or supervisor of bridges and buildings to be familiar with the latest developments in his line and to take advantage of the advanced methods brought out in his association as for the higher officer. One has only to compare methods on different roads to realize how rapidly materials and methods are changing.

There is a feeling in some quarters that the minor associations should be combined with the American Railway Engineering Association and that all the work should be done through it. If this plan were carried out it would mean the dissolution of the present associations without changing the American Railway Engineering Association to any appreciable extent, for this latter organization approaches the common problems from a standpoint different from that of the smaller associations and the members of these other associations would not feel free to take the floor in discussion with their superior officers.

There is, however, a field for the closer correlation of the work of the various associations, striving as they are towards the one common end of the improvement of railway maintenance of way. This should not take the form of dictation or censorship by the American Railway Engineering Association, but rather the work should be so divided that each association would confine its studies to its particular sphere of activity and the work of all the organizations would harmonize rather than overlap.

It has been seriously suggested that the reports of all railway

association committees be submitted to the American Railway Association for approval before their presentation to their respective associations. This would not appear to be practical, both because of the delay which would necessarily ensue and because of the spirit of resentment which would be created by the exercise of censorship. The same results can be secured more satisfactorily by the roads stating their positions on various, important matters to their more capable men and then urging them to attend and present these views at the conventions of different associations. It has been further suggested that a plan be worked out whereby the recommendations of the smaller maintenance of way associations may be passed on to the American Railway Engineering Association for its approval and incorporation in its Manual. In this way practices could be standardized and the results of the work of the smaller associations made available for all.

At the present time there are four associations in the maintenance of way field in addition to the American Railway Engineering Association, viz., the Bridge & Building Association, the Roadmasters' Association, the Maintenance of Way Master Painters' Association and the American Wood Preservers' Association, the last-named being composed only partially of railway men. If the work of these associations were properly organized and directed there would be no necessity for the organization of other associations, for if this is carried beyond a certain point it serves only to divide and weaken the activities of all. As at present organized, and in view of the work they are doing, the railways can well afford to lend their support to the existing associations by encouraging the men to participate in their activities. In this way only can the work of these associations be made of the most value to the roads.

NEW BOOKS

Field Engineering. By William H. Searles. Seventeenth edition, revised and enlarged by William H. Searles and Howard Chapin Ives, professor of railroad engineering, Worcester Polytechnic Institute. Size 4 in. by 6½ in., 632 pages, bound in flexible leather. Published by John Wiley & Sons, New York City. Price, \$3.

This edition of one of the oldest and best known handbooks for railway engineers has been extensively revised to meet the changes which have taken place since the publication of the last previous edition, 11 years ago. It also contains over 100 pages more than the previous edition. The principal changes have been in the chapters on Maximum Economy of Grades and Curves, Reversed Curves, Spiral Curves, Earthwork Tables and Diagrams, Turnouts and Crossings and Calculation of Earthwork. The section on tables is also greatly enlarged, the principal addition being the earthwork tables and the data on spirals. Other new data in the book come under the heads of metric curves, velocity heads, grade angles, barometric heights, temperature coefficient, stadia reduction and mean refractions in declination.

The A B C of Iron and Steel. Edited by A. O. Backert. Size 8 in. by 11 in., 338 pages, bound in cloth. Published by The Penton Publishing Company, Cleveland, Ohio. Price, \$5.

As indicated by the title, this book is a popular though comprehensive exposition of the iron and steel industry, intended for the layman or for the technical man in other lines who desires specific information somewhat remote from his own field. The separate chapters are by different authors. The treatment in each case is descriptive of the present practice and also historical. The 222 illustrations are of a high character and add much to the value of the book. There are five chapters on mining ores and transportation, two on the manufacture of coke, and other chapters on the manufacture of pig iron, wrought iron, crucible, Bessemer and open hearth steel, rolling mill practice, wire and wire rods, and three chapters on castings. The closing chapter describes the electric furnace and its use. Sixty-four pages are devoted to statistics and a manufacturers' directory.

Letters to the Editor

A GRADUATED WAGE SCALE

PROWERS, Colo.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The ideas set forth in the letter from J. L. Coss in the *Railway Age Gazette* of July 16, in regard to the training of section laborers, are good as far as they go, but I believe the plan of working the men on a graduated wage basis is a better one. Thus, if a man goes to work the first of August, put him on at \$1.35 per day. If he proves to be a good man after a few months pay him a higher scale of \$1.60, and after he has worked a year put him on a maximum wage of \$1.80 or \$2 per day.

If the railways were to do this they would find that the work of their foremen would improve 100 per cent because the men would have something to work for and would give a better grade of work and more of it. As it is now a new man who never saw a railway before receives the same wages as a man who has worked for years. Under these circumstances a foreman cannot expect first-class work out of his older men, while a new man is inefficient because he does not know how to do the work. I believe a foreman can train his own men better than some one else can train them for him, as each man has a different way of doing things. If some one else trained the men it would make it very hard for the foreman as well as for the men.

R. E. PITTS

Section Foreman, Atchison, Topeka & Santa Fe.

TURNING TIES OVER

SAN FRANCISCO, Cal.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Whenever track forces are engaged in raising track out of face this work is generally accompanied by a heavy renewal of track ties. Almost everywhere except on lines of late construction we find thousands of ties, especially cypress and redwood ties, which are still in a good condition, as far as the timber is concerned, but which are cut down under the rail base from $\frac{1}{2}$ in. to 2 in. on account of having had no tie plates. In such cases most foremen, with the sanction of their roadmasters, are in the habit of turning those ties over.

There is no question but that by so doing any piece of track will look neater after the job is finished; but in place of improving the actual condition of such track distinct harm has been done. In the first place, the thickness of the timber under the rail is exactly the same. Even if the ties are turned end for end the cut part is still directly under rail and the actual increase of rail support is practically nil. The really bad effects of this tie turning though will appear from one to two months after the job is finished. About this time that piece of track will get rough and upon investigation it will be found that most of those turned ties are churning more or less, according to the quality of the ballast. The dirt or fine ballast will rise in mounds on both sides of those ties and most of them will be found swinging.

As every experienced trackman knows, the most difficult place to tamp a tie is directly under the rail. It is a procedure which is watched closely by every foreman when performing this kind of work. No doubt this was supervised closely when all those redwood and cypress ties were turned over, but, notwithstanding, it is almost impossible to get those cut places in the ties properly packed with dirt or ballast, especially when shovel tamped. Directly under the rail there was left a small space where there was no dirt, or, at the best, loose dirt, as this space could not be reached with tools, leaving an air space, and this same space, through compression by the weight of every passing engine and car, acting like an air cushion, has started to force all dirt from under the tie to the surface.

Retamping those ties is only a temporary relief of very short

duration. The only remedy for this churning is to adze down to the depth of those cuts for about 8 or 10 in. from each side. It is a question, though, if this would be economical or if it would not be cheaper to prohibit this turning of ties altogether on main lines and use only new ties in all these cases, putting the cut ties only in side tracks or using them as fence posts or for other purposes, especially since they are inclined to break easily where cut out.

W. E. SCHOTT

Section Foreman, Southern Pacific.

ELEVATING CURVES IN YARDS

LOS TANOS, N. Mex.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

My experience in yard work has led me to discontinue elevating curves in a yard when there is slow traffic, as I have found that if such curves, regardless of their degree of curvature, are gaged to 4 ft. $8\frac{1}{4}$ -in., or $\frac{1}{4}$ -in. tight, one will experience less trouble in maintaining correct gage. The wheel produces less wear on the inner rail, prevents the rail from cutting into the tie and the track remains in surface and alinement longer. I have noted quite often that where turnouts were elevated back of the frogs they have been a constant source of trouble in maintaining gage, surface and alinement. I have also noted quite often on curves from $\frac{1}{4}$ to $\frac{1}{2}$ -in. wide gage in yards that the excessive pressure on the inner rail causes it to cant outward and the gage to widen very rapidly. It is understood that the gage of trucks is 4 ft. 8 in. from flange to flange, so why should it become necessary to leave curves wide gage even on the main line?

The writer put up one 5-deg. curve on main line, leaving the gage $\frac{1}{4}$ -in. tight, and also a 4-deg. curve to standard gage. Both curves were equal as to timber, surface and alinement. The 4-deg. curve needed attention two years after it had been put up because the gage spread on account of the inner rail cutting into the ties. The ties then had to be adzed and the rail reset, gaged and given the proper elevation, while the 5-deg. curve remained in good condition for at least two years longer and held its uniform gage, surface and alinement.

A curve properly put up is easily maintained regardless of the degree of curvature. One will experience very little trouble in maintaining a curve of good timber, gage, surface and alinement. I have noted places where section foremen were unable to tell when a curve was uniform, and the spreading of the track seemed to be their trouble. They kept on gaging until the ties were spike killed, putting all the blame on big engines with long trailers. Upon examination I found the curves put up with improper elevation both on the body of the curve and on the easement. A car travels as a single body and the force of the car does not reach its full effect until the car is wholly upon the curve; therefore the approach and runoff on curves on high speed track should have the proper elevation and alinement or trouble will never end.

HENRY KOCH

Section Foreman, El Paso & Southwestern.

PENNSYLVANIA LINES ANNUAL TRACK INSPECTION

The annual track inspection of the Pennsylvania Lines west of Pittsburgh was made on October 5-8, inclusive, by the general manager and his staff, including the chief engineers maintenance of way and their assistants, the general and division superintendents, the division engineers, assistant division engineers and supervisors, traveling by special train. The inspection covered the main line of the Panhandle from Pittsburgh to Chicago and of the Fort Wayne from Chicago to Pittsburgh. The first prize for the best supervisor's subdivision based on line and surface was awarded to William Ballenger, supervisor, Indianapolis division, Bradford, Ohio. The prize for the best supervisor's subdivision based on all points was awarded to Henry Rice, supervisor, Indianapolis division, Urbana, Ohio. The prize for the best track foreman's section based on line and surface was awarded to Fred Manning, track foreman, also of the Indianapolis division.

The Proper Repair of Tools for Track Maintenance

Work on This Equipment Should be Done in a Limited Number of Shops Under Adequate Administration

By M. E. CARROLL

While many large and serious problems confront the master mechanic in his daily work, there is one which, while comparatively small in magnitude, is nevertheless always present and therefore aggravating. That is the problem of repairing track tools for the maintenance of way department.

In the average railroad shop, it is considered a small task to forge a locomotive main rod, to build a new tender or to perform any similar work for which the shop may be equipped. However, it seems a tremendous task to repair a few track chisels, dress a dozen tamping picks or put a track jack in good working order. This is not because these tasks are at all difficult, nor because the shop is not equipped for doing the work, or lacks mechanics sufficiently experienced to properly perform it, but rather because such work is a little out of the ordinary. If every locomotive had a few tamping picks as part of the equipment, or if every box car carried a rail drill, the shops would be accustomed to handling and repairing such items and consider it part of the regular daily routine. It is the unusual duty which we somehow associate as belonging to the other fellow and not belonging to us which is the hardest to perform.

Track tools are articles which must be used every day on each

most railroads is the concentration of this work at fewer shops. Where supply cars are operated, all worn and repairable track tools should be gathered up from each track gang and delivered at only one or two shops on the entire system. This will increase the number of each kind of tools to be repaired at that shop, making it possible to keep certain mechanics regularly occupied in doing this work. In consequence they will become expert and turn out repaired tools which will give service equivalent to new ones. The time of these mechanics can be charged direct to the proper operating account or to the division superintendent, and the master mechanic will therefore not need to feel that he is being robbed of time which rightfully belongs to his locomotives



(1) Ground Down Until Worn Out. (2) Could be Put in Shape by Track Forces Without Being Sent to the Shop. (3) Has Been Reground Ready for Further Use

railroad system and in connection with such use, tools will wear out and sometimes become broken. The railroads do not earn money in sufficient quantities to permit them to throw away these worn or broken tools and they must therefore be sent to the shops for repair. It is the customary practice on most railroads to permit each foreman to bundle up a few spike mauls and chisels and a claw bar or two, sending them in a baggage car to the nearest division shops with a request to have them repaired and returned to him. It is not unusual for a section foreman to telegraph the master mechanic that his track drill or track jack is broken and is coming on "No. 21 today" with a request to have it repaired and returned "tomorrow morning."

There is scarcely a division railroad shop anywhere that is equipped properly to repair track tools because there is not enough of this work to occupy the full time of any mechanic. The very irregularity of delivery of the old tools to the shop is one of the reasons why the mechanics cannot be occupied regularly on work of this kind. When performed hurriedly and considered as an outside job to be rushed and disposed of in the easiest manner possible, it is small wonder that these repairs are sometimes improperly or indifferently made. The result is poor service and loss of time and money when the track forces attempt to use them.

The first remedy needed to improve the condition existing on



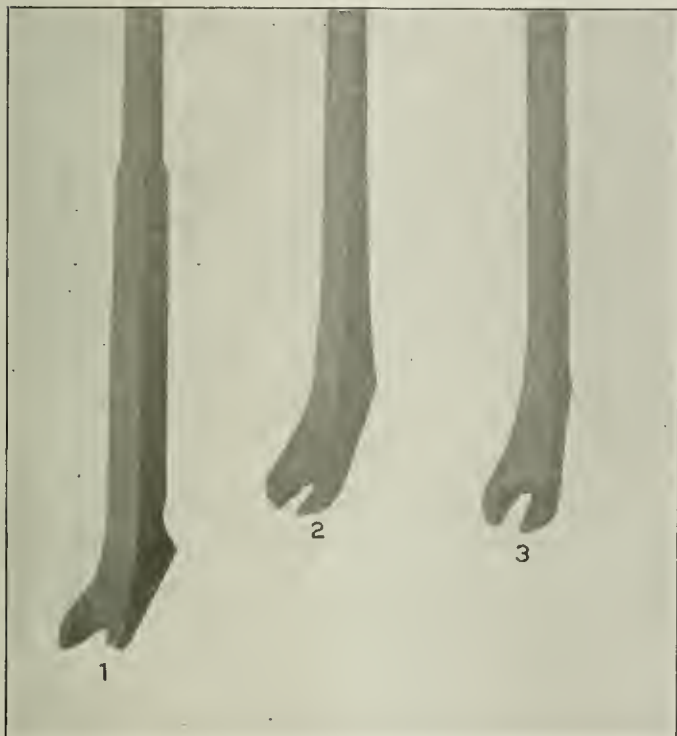
(1) Scrap Shovel with a Good Handle. (2) Scrap Shovel with a Good Blade. (3) A Serviceable Shovel Made by Piecing Together a Good Handle and a Good Blade Taken from Scrap Shovels

and cars. By concentrating tools in this manner, the smaller shops are relieved entirely of this kind of work and the division track forces escape the necessity of using indifferently repaired tools. When we have successfully concentrated this work at one or two shops and have perfected a system of gathering up all of the tools on the system regularly, making repairs and delivering them to the shops as suggested, it becomes an easy problem properly to organize the forces and equip the shop for handling the work.

The most difficult track tool to repair properly is the claw bar. Not one railroad blacksmith in twenty can take a badly worn claw bar and shape it so it will readily take and hold the head of a track spike imbedded in a hard wood tie, or temper it so that it will not break or the claws spread when in use. If, how-

ever, we can accumulate two or three hundred claw bars in one shop every month, we can keep one fire working on claw bars almost constantly and employ an expert for repairing them. Some claw bars will be received which are so badly worn that there is not enough steel left to dress them down properly, or perhaps one of the claws may be broken off entirely. Instead of consigning such a bar to the scrap pile, the claw should be cut off and the bar placed under a Bradley hammer and drawn down to make a standard lining bar. This operation will show a net saving of about 35 cents on each bar.

Where a fire is worked constantly to repair track picks with a small power hammer for making the welds, it is astonishing how cheaply these picks can be dressed down and re-tempered ready for use. Many picks will be received which are worn down so short as to make it impossible to re-dress them for



(1) Very Difficult to Repair, but Can Easily be Made into a Serviceable Lining Bar. (2) Can be Repaired Easily by a Competent Blacksmith. (3) An Example of Good Repairing

further use, and it is the customary practice to weld new steel and form new ends on them. The average railroad is not paying more than 35 cents each for new clay picks and 45 cents each for new tamping picks and if much welding is done on the old pick, it is going to cost more than a new one. It will be found the best practice to limit the welding of picks to the putting on of new points. If the tamping end of a pick is worn so it cannot be refaced to make a serviceable pick, the tamping end should be cut off and the end sharpened to make a clay pick. When both ends of a clay pick are worn down too short for repointing, the pick may well be scrapped. Some tool manufacturers make a practice of furnishing short tamping ends for picks, also the claw ends for claw bar, which can be welded onto the old pick and old bar, but unless shop costs are watched very closely, these welded tools will cost more than new ones.

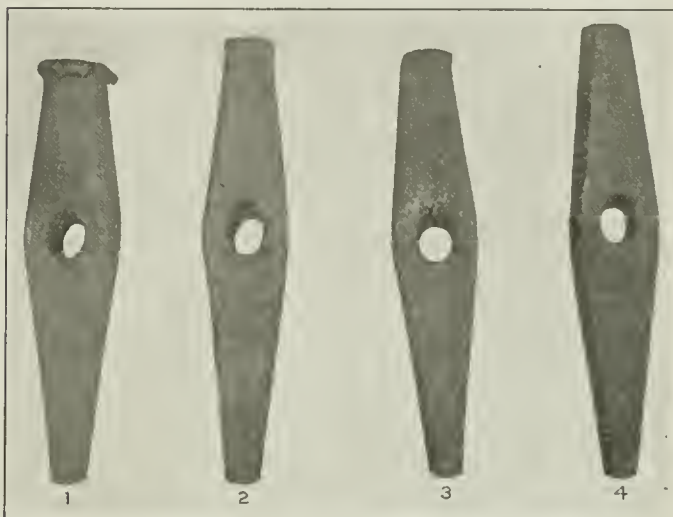
When bent lining bars are sent in for repairs, in addition to straightening and re-dressing points, the bar should be tempered so it will not bend readily when re-issued for use.

The repairs of tamping bars should be handled much the same as tamping picks, the face of the bar being re-dressed when there is enough steel and if worn too short for re-dressing, the tamping end should be cut off and the remainder of the bar used for general purposes as bar steel.

Much care should be given to the dressing and tempering of

spike mauls, this being a very important tool in track work, and personal injury accidents are likely to result if improperly repaired spike mauls are sent out for use. It is impossible to strike a true blow on a track spike or the head of a track chisel if the face of the maul is not finished true, and if tempered too hard, pieces are likely to chip off and fly. If, on the other hand, the spike maul is tempered too soft, it will give only a few days service and will then come back to the shop.

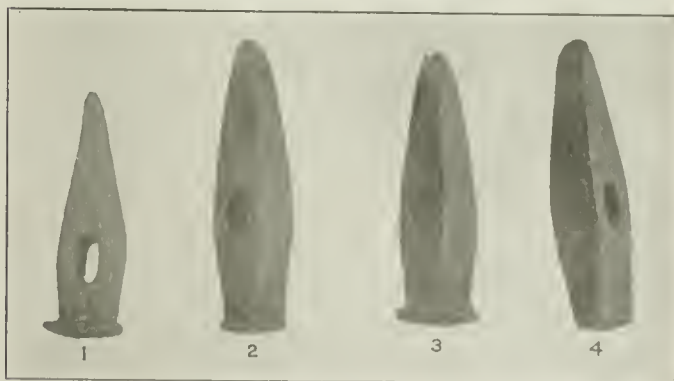
A tool which causes a great deal of trouble to a track gang



(1) Improperly Tempered When Repaired. (2) Should Have Been Ground by Track Forces Instead of Being Sent to the Shop. (3) Unserviceable Unless It is Repaired. (4) An Example of Good Repairing

is the track chisel. It is no uncommon thing to use six or eight chisels in cutting one rail, whereas one good track chisel properly handled should easily cut 15 or 20 rails. The first requisite of a track chisel is good steel, a matter for the attention of the Purchasing department, and in making repairs, it is equally necessary to shape and temper the cutting edge properly and to dress the head so that pieces will not chip off when struck by the hammer.

It is a serious mistake for track gangs to use track jacks which are not in perfect working order and equally wrong for shops to return jacks for use when not properly repaired. The rack bar of a track jack can be dressed up easily by a competent smith, making it equal to a new one, and the main or body casting



(1) Improperly Repaired Track Chisel. (2) Could Have Been Repaired by the Section Gang on a Grinding Wheel Instead of Sending It to the Shop. (3) Must be Repaired by a Blacksmith. (4) An Example of Good Repairing

if slightly bent or distorted, may be straightened in the fire if carefully handled. The remaining parts, if worn too badly to give the proper fit, can be replaced with new parts at such small expense that it usually does not pay to do much shop work on them.

The repair parts for track drills on the other hand are relatively

more expensive and quite a saving can be made if intelligent work is done by the man assigned to repair the drilling machines. A track drill is usually sent to the shop because it has been abused in service, rather than worn out, and a small amount of work will put such machine in first-class condition for further service.

There are two track tools which get out of order in service very easily and show defects which are difficult for the average track foreman to detect, namely, the track gage and the track level. The accuracy of these two tools is vital to the success of the track foreman in making and maintaining good track, and when repaired in the shops, the utmost care should be taken to see that repairs are made in such manner that the tools will give reasonable service. A rigid test for accuracy should be applied to every gage or level before it is issued for service. In repairing the Huntington track gage (this being the one made of gas pipe with malleable end castings), it is not good practice to plug and re-drill rivet holes in the pipe if the end castings are loose. The castings cannot remain tight with such repairs and it is better economy to use the old pipe for making pipe nipples and repair the track gage by applying a new piece of pipe.

In re-setting the spirit level in a track level, care should be taken to remove all of the old setting and see that the new glass is fully protected on all sides by fresh plaster of Paris. Not only should the level be carefully tested after repairs are completed, but the supply car clerk or other person making the delivery to the track forces should repeat this test at the time the delivery is made, so that only accurate track levels, as well as gages, shall be issued for use.

The use of tool grinders, such as are handled by most of the tool manufacturers at this time, should be encouraged among the track gangs, so that the grinding of edged tools and a certain amount of tool dressing may be done on the road, thus enabling the men to keep their tools in service a greater length of time before sending them to the shops.

The problem of repairing railroad track tools is a serious one with every maintenance of way officer, and with most master mechanics. It can never be satisfactorily handled unless the work is first systematized and made a definite part of the daily routine of some shop organization. To make this effective, tools must be gathered up regularly from the railroad as described, brought to some designated shop and there given thorough and effective repairs by a well organized and experienced shop force. Not only will these repairs be made at less cost than when made indiscriminately at all shop points, but tools will be repaired under this system which might be scrapped by the ordinary shop mechanic, and the repaired tools when returned to service will give much better results.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since October 22, 1915:

Elimination of the Tower Grove Crossing, St. Louis.—The Missouri Pacific and the Frisco have recently completed the separation of grades at Tower Grove and Vandeventer avenues. The structures and the methods of construction were described in an illustrated article in the issue of October 29, page 799.

Completing the Summit Cut-Off of the Lackawanna.—This project was finished with the completion of the Tunkhannock viaduct, the largest concrete viaduct ever built, and was placed in service on November 7. The interesting details of the last work on this structure and others forming a part of the project were described in an illustrated article in the issue of October 29, page 809.

Completing the Mt. Royal Tunnel at Montreal.—This tunnel, which will provide an entrance for the Canadian Northern Railway into the heart of Montreal is nearing completion. Construction details of the more recent work on this project were described in an illustrated article in the issue of November 5, page 857.

Progress on the Hell Gate Bridge.—The closing members of the 1,000 ft. arch were placed on September 29; the details of this step in the work were described in a short article accompanied by a page of photographs in the issue of November 5, page 865.

The Cold Straightening of Rails.—J. T. Atwood, chief engineer, Pittsburgh & Lake Erie, discussed this question in a Letter to the Editor in the issue of November 12, page 888.

Gauging of Rails in Transverse Fissures.—A discussion of this subject in connection with the Cold Straightening of Rails in the form of a Letter to the Editor by A. W. Thompson, third vice-president, Baltimore & Ohio, was published in the issue of November 12, page 888.

Electrification of the Pennsylvania at Philadelphia.—The Pennsylvania

Railroad has just recently completed the electrification of its line from Philadelphia to Paoli, a distance of 20 miles, for suburban service. The plant, equipment and construction involved in this project were described in detail in an illustrated article in the issue of November 12, page 889.

THE STABILITY OF UNANCHORED TANKS

By C. R. KNOWLES

General Foreman of Water Service, Illinois Central

The stability of unanchored railway water tanks has been the subject of more or less discussion from time to time, with advocates both for and against the practice of anchoring the tower of the tank to the foundation. Some authorities have claimed that the tower of tank should be firmly anchored to the foundation in all cases, while others have insisted that anchorage was unnecessary with railway water tanks 24 ft. to 30 ft. in diameter on standard 12-post towers 30 ft. high and under.

In view of this difference of opinion, it may be interesting to note the fact that three unanchored standard 20 ft. by 30 ft. wood tanks on the Louisiana division of the Illinois Central withstood the hurricane of September 29, 1915, with no more damage than the unroofing of one of the tanks. The tanks in question are located at Government Yard, New Orleans; La Branch, La., and Hammond, La. The tower of the tank at New Orleans is a 12-post steel tower, well braced with a floor system of "I" beams, the total height from the top of foundation to bottom of the tank being 20 ft. The tower of the tank at La Branch is constructed of 12 in. by 12 in. creosoted posts, each bent being braced with two sets of 6 in. by 8 in. braces, and the floor system consisting of 12 in. by 12 in. caps and 4 in. by 14 in. floor joists. The total height from the top of foundation to bottom of tank was 20 ft. The tank at Hammond, La., is on a 28-ft. tower of the same type of construction as that at La Branch.

The storm began on the night of September 28 with rain and a gradually increasing northeast wind. By 7 o'clock on the morning of the 29th, the wind had increased to a gale of 40 miles per hour, and during the day both wind and rain increased in intensity until between 5 and 5:30 p. m. when the weather bureau reported there was a sustained wind velocity of over 80 miles per hour and velocities up to 120 and 130 miles per hour for the hardest gusts, with a minimum barometer reading of 28.11 in. At about 6 p. m. there was a slight lull in the wind and shortly after a reversal of direction, with very high velocities for the greater part of the night, but not nearly so high as during the afternoon.

A large electric power station and concrete stack located directly across the street from the New Orleans tank were destroyed, and the Government Yard roundhouse, a frame structure about 200 ft. distant from the tank, was partly demolished. This tank was full of water throughout the duration of the storm and was not damaged in the least.

The La Branch tank is located 20 miles north of New Orleans in an exposed position near the shore of Lake Ponchartrain and among 12 or 15 houses, including the store and pumping plant of a drainage company. The tank and pump house are the only structures left standing. This tank was full of water when the storm began, but water connections to houses, which were destroyed during the storm, were broken, letting the water out of tank through openings aggregating perhaps a 2-in. stream. In addition to the wind at La Branch, the level of Lake Ponchartrain was raised about 12 ft., throwing about 7 ft. of water over the top of the rail and washing away both tracks. There was no damage done to this tank and but little to the pumping station.

The Hammond tank is 54 miles north of New Orleans and, while not directly in the path of the storm, it stood perhaps the most severe test of the three, as this tank was unroofed during the early part of the night of the 29th, and the valve to the tank spout pulled out, allowing the tank to empty through a 10-in. opening. Not more than 30 or 40 minutes were consumed in the water running out of the tank. As a result, the tank undoubtedly stood a great wind pressure while empty. This strain was especially severe on account of the height of the tower.

Railway Roadside Water Tanks for Locomotive Supply*

Important Details of Construction and Maintenance With Comparative Costs of Wood and Steel Structures

Up to within the past few years, the standard tanks rarely exceed 50,000 or 60,000 gal., while the standard roadside tanks on many lines today include tanks holding 100,000 to 150,000 gal. While the tendency of the railroads within the past few years has been to erect tanks of greater capacity, the development along this line has been all too slow and the efficiency of the water service is impaired in many cases to a great extent by small tanks. Particularly is this true at terminals, where a large number of engines take water in a limited time, and at roadside stations where it is necessary to employ night pumpers, thus materially increasing the cost of water. It is not economy to erect a tank good for a life of 30 or 40 years and then find within a few years that it is too small to supply the demand for water without continuous pumping.

The construction of large permanent tanks has been handicapped to some extent by the fact that, where tanks were located adjacent to tracks, the uncertainty of track changes and other construction features often prevented the selection of permanent locations. The result is that many of the tanks constructed are more or less temporary structures. By installing penstocks it is possible to select a permanent location that will not be affected by future construction changes. It is now the practice on many roads to erect the tanks remote from the tracks and deliver water through penstocks. In addition to permitting a more satisfactory location of a tank there are many other arguments in favor of this practice in preference to taking water direct from the tank.

The height of the tower or frame of the tank will be determined by the size of the outlet pipe. A 12-in. penstock with a 14-in. main will deliver 4,000 gal. per minute with approximately the same loss of head as a 10-in. penstock with a 12-in. main delivering 2,750 gal. per minute, or an 8-in. penstock with a 10-in. main delivering 1,750 gal. per minute.

The standard height of tank for locomotive supply is usually 20 ft. from top of rail to bottom of tank. With from 16 to 20 ft. of water in a tank, a 12-in. penstock with 1,000 ft. of 14 in. main will deliver from 3,500 to 4,000 gal. per minute, and for economic reasons, it would not be practical to exceed a height of 20 ft. to the bottom of the tank in ordinary practice.

SUB-STRUCTURE

There has been but little variation in the methods of constructing frames or towers for wood tanks, the common practice being to use a 12-post structure of 12-in. by 12-in. timber braced according to the height. Steel frames for wood tanks and in a great many instances for flat-bottomed steel tanks have also been of the 12-post type. The American Railway Engineering Association found in 1910, in answer to inquiries sent out, that of the roads reporting, 82 per cent of the 50,000 gal. tanks had 12 posts, 10 per cent 16 to 26 posts and 8 per cent 4 posts. Of the 75,000 gal. tanks reported 100 per cent had 12 posts with two exceptions, one with 21 posts and one with 16 posts. Of the 100,000 gal. tanks 100 per cent had 12-post frames with one exception of 4 posts. The general practice of constructing 12-post tank supports is explained in the fact that with a 12-post structure it is possible to secure a better distribution of the load than with a lesser number of posts, and to support every part of the tank bottom without an elaborate floor system. It also permits a good distribution of the foundation load. Treated timber will prove more economical than untreated for the construction of towers for flat-bottom tanks, notwithstanding its higher first cost, as treated timber will have a much longer life and does not require painting.

A treated timber tower is more economical than either a steel

or an untreated wood tower for towers of standard height for locomotive supply. A steel tower will undoubtedly prove more economical and satisfactory for tanks on elevations greater than 20 ft.

WOOD TANKS

Most of the water tanks used for railway water service in the past have been constructed of wood, and while other materials are being used extensively for this purpose, there is no question but that timber will continue to enter into the construction of tanks of 100,000 gal. capacity, and under.

The life of timber in a water tank will vary widely with climatic conditions and with other factors which cause or prevent decay. The mechanical strain or wear a tank may be subjected to will also affect the life of the timber. Many tanks have been replaced, not so much because of the deterioration of the tank itself as of the decay of the structure supporting the tank, or more probably the decay of the floor and chime joists immediately supporting the tank bottom. All these factors have to be given consideration so far as the length of life and the general utility of various timbers and other material used in wood tanks are concerned.

The life of a wood water tank, no matter of what kind, depends largely upon the care in selecting and inspecting the timber entering into the construction. It is needless to say that the best selection and best quality of a cheaper timber will give a better and more lasting tank than a poor selection of high-priced timber. Few railroads properly specify a tank in their inquiries. They may give elaborate specifications for the hoopage, as well as for the dimensions of the tank itself, and may specify the kind of timber that shall be used, but they do not rigidly specify and inspect the quality and grade of timber to be furnished.

The average life of the various timbers entering into the construction of water tanks is about as follows:

Cypress	40 years
Redwood	30 "
Cedar	30 "
White pine	20 "
Douglas fir	16 "

To secure this life the most rigid specifications and inspection must be adhered to. Cypress is beyond question the best timber for the construction of water tanks. Next is the Pacific Coast redwood, which is an admirable tank material, but is little used in the central and eastern states. Eastern cedar, which is practically the only one of the cedars available for tanks, makes an excellent tank when the best grade is obtained. White pine is also a very good tank material, but is rarely available in suitable sizes and lengths for large tanks. Douglas fir is obtainable in almost any size and length, but is of comparatively short life.

A 20-ft. by 30-ft. water tank, consisting of staves and bottom planks, should be made of tank stock, heart red cypress, sound, seasoned, out of wind, free from shakes, sap, pitch pockets or streaks, unsound knots, loose knots, knots in clusters and large knots extending through the material. Small loose or unsound knots may be bored out and the holes thoroughly plugged with the same material as the tank. Material having knots in the edges should not be accepted.

Staves shall be 6 to 8 in. wide and 20 ft. long, of uniform width end to end, and 3 in. thick, with the edges accurately planed on radial lines from the center of the tub. The croze in each stave should be 3 in. in the clear from the end of the stave with a $\frac{5}{8}$ -in. gain and should be accurately cut to uniform dimensions on one circle for all staves. Three one-inch dowel pins made of the same material as the staves should be furnished with each stave, and the staves should be bored for dowel pins properly spaced. The bottom planks should be 12 in. wide and 3 in. thick.

* Abstract of a report presented at the convention of the American Railway Bridge and Building Association, held in Detroit, Oct. 19-21.

The bottom should be 30 ft. in diameter with a 3½ in. chamfer. All pieces should be full length without splicing, and every joint machine-made and perfect. The planks should be joined by one-inch dowel pins on 30-in. centers, of the same material as the bottom.

While the material in the tub is perhaps of the first importance, it does not embrace the entire structure. The frame, frost box and roof are constructed of entirely different timber than the tank proper. When these various features of tank construction are given consideration, it would not be fair to base the life of wood tanks altogether on the life of cypress or other timbers entering into the construction of the tub. Where the structure consists of a wood tank mounted on a steel or treated timber frame, the question of the life of the structure as a whole is further complicated. The life of the treated frame will depend on the treatment applied to the timber and may represent a longer or shorter life than the tank. As a means of fixing the approximate life of wood tanks on different types of frames the following tables are submitted:

The following table shows the life of various timbers suitable for the construction of tank frames:

Long leaf pine, untreated	10 years
Long leaf pine, treated with creosote	25 "
Long leaf pine, treated with zinc-chloride	15 "
Loblolly pine, untreated	3 "
Loblolly pine, treated with creosote	25 "
Loblolly pine, treated with zinc-chloride	15 "
White oak, untreated	15 "

The table below shows the life of hoops:

Flat steel hoops	3 to 5 years
Flat iron hoops	15 "
Oval steel hoops	6 "
Round steel hoops	10 "

When properly manufactured, a machine-made wood tank is better than one framed by hand. Of course, if the proper care is not taken with the machine, or if the machines are not properly set for each tank it is very likely that the framing or jointing will be poorly done.

The tank bottom should be carefully laid out, doweled and put together by hand. It is then scribed and cut to circle on a band saw, dressed and chamfered and the planks marked and numbered consecutively. The staves are then put on the tank and driven up, making the complete tank ready for the hoops. This enables the inspector to examine the tank carefully from the inside as well as the outside for possible defects in the lumber that may have escaped the timber inspector and the machine operators. There are virtually four inspections of the timber before it is shipped and the possibility of inadvertently overlooking a defective stave or bottom plank is remote.

While the tank is set up each stave should be marked consecutively, its position on the tank bottom also marked and a number corresponding with the number of the stave placed in the proper place on the tank bottom. This not only insures a perfect fit of the tank throughout, but simplifies and lessens the work of erection in the field.

The hoops comprise the most important feature in the maintenance of water tanks. With very few exceptions tank failures may be traced directly to the failure of the hoops. Flat hoops have been used almost universally up to the last few years, and as practically all of the older tanks are equipped with them, it is a popular belief that the flat hoop is more subject to failure than any other shape. This is probably true if the hoops are not constructed of the proper material and given the proper attention. So far as corrosion is concerned the flat hoop has a greater surface exposed than a hoop of different section; 40 per cent of this surface is next to the staves. Aside from presenting a greater surface to the corrosive elements this leaves 40 per cent of the hoop inaccessible to inspection. On the other hand it is easier to apply, forms a more uniform bearing against the stave, does not crush the fibre of the wood, conforms more readily to the circle of the tank, can be secured more readily for repairs than the odd shapes (with the exception of round hoops), will not break as easily as a hoop of different section, and lends in part at least to the life of the stave the loss due to corrosion.

Round hoops have come into general use only within the

past few years, chiefly through the efforts of the insurance people. Round hoops are required on tanks used for sprinkler and other fire protection systems. The round hoop lends itself readily to inspection; any corrosion or deterioration may be easily seen and the whole surface of the hoop is painted more readily. One great objection to this type of hoop is the little bearing it has on the stave, which has a tendency to cut into the wood, crushing the fiber and inducing decay. This decay is further aggravated by the accumulation of dirt, cinders and moisture in the pocket formed by the upper half of the hoop.

Oval hoops or half round hoops have not come into general practice, while at the same time they have much to commend their use. They have the advantages both of the flat and half round hoop in that they give an even flat bearing to the stave and are heavier at the center like the round hoops, and they are not so quickly weakened by corrosion. The principal objection that could be offered to this type of hoop is that it is much harder to apply than either the flat or the round hoop on account of the difficulty in making it conform to the circle of the tank. The rigidity of this hoop is also objectionable in the fact that when the staves are softened by partial decay there is a tendency for the hoops to straighten out and throw the tank out of round, especially if the tank is empty or only partly filled with water. Various methods are used to fasten the lugs to the hoops, but it would appear that riveting is the most popular and economical method of applying them to the flat hoops. The method of applying lugs to other types of hoops will depend largely on the shape of the hoops. The single bolt is generally accepted as preferable to the double bolt for the reason that it is easier to apply it and there is a uniform pull on the lug and hoop. With the double bolts there is a danger of breaking the lug or shearing off the rivets unless great care is used to keep the bolts pulled up uniform in tightening the hoops.

Several factors enter into the life of a tank hoop, the most important being the material of which the hoop is constructed. The hoop should be constructed of wrought iron, but as few railroads pay much attention to this feature the hoops usually furnished are of steel. In fact there is a question as to whether wrought iron may be purchased in the open market in suitable sizes for tank hoops. The question of the quality of iron is of far more importance than the shape of the hoop. The seeming indifference of the many railroads to this feature compels the few who insist on wrought iron to pay a premium on the cost of hoops that even at the best do not come up to the standard that should be maintained.

Eliminating the question of adding to the appearance of the structure, the utility of a roof on a water tank is divided between frost prevention and protection from dirt. In the northern states there is no question as to the necessity of the roof on account of protection from frost, but it may be assumed that where the tank is not affected by frost, or the water is not used for drinking purposes, the only advantage in a roof is to add to the sightliness of the structure.

As a matter of frost prevention in cold climates there is no doubt but that water tanks should be well roofed. Decks constructed with double layers of dressed and matched boards with building paper between are of great value as a protection from frost. The objection to this type of roof and decks so constructed with the joists beneath them is that they are subject to rapid decay, on account of moisture and poor ventilation. Some roads are constructing the deck of two layers of 2-in. by 8-in. timbers spaced ¼ in. apart. It is claimed that this is as nearly frost proof as the double decking and it certainly is more substantial as far as decay is concerned. The roof should be conical of 1½ in. to 1 ft. pitch, with 14-in. eaves. The roofing material should be a good composition roofing, or good felt, with tar and gravel.

There are several points of primary consideration in the protection of water tanks and tank fixtures from frost. The protection required will be determined by climatic conditions and should be designed to afford protection against the most severe weather conditions likely to prevail. This condition can not be

based altogether on a minimum temperature, but upon the duration of low temperatures as well.

The source of water supply is another important feature. Where water is pumped from streams or ponds, the temperature is lower than where pumped from wells. As a result more insulation is required where surface water is used than with an underground supply. Where the pumping is continuous, or nearly so, and there is practically a constant flow of water to the tank, less protection is required than where the pumping is intermittent.

Where it is difficult to protect the supply line from frost properly, the pipe should be extended to the top of the tank and the line drained when not in use. The best type of frost box for supply pipes to wood tanks is one constructed of dressed and matched lumber, and lined with building paper with alternate 2-in. air spaces, the number of air spaces required varying with weather conditions. Five air spaces should be effective against a minimum temperature of 30 deg. below zero. It is important that the frost box extend into the ground well below the frost line to get the benefit of the radiation from the earth. That part of the box below the ground should be of concrete or brick. It is unnecessary to carry the air spaces below the ground, but the joint at the top of the foundation should be absolutely tight. The lumber used in the construction of a frost box should be thoroughly seasoned to prevent shrinkage, and the box should be made as nearly air tight as possible.

Some northern roads completely house in their smaller tanks, and heat them with stoves or steam. The usual type of construction is octagonal in shape, ceiled and lined with building paper between the walls. This leaves a dead air space between the inner and outer walls. The wall is carried about two feet above the top of the tank and the entire structure is housed in. The method is applicable only to the smaller tanks, is very expensive and is a bad fire risk. Where pumps are operated by steam it is sometimes practical to run the exhaust pipe through the frost box and tank. This is a safe and effective method of protection from frost, but is practical only where the tanks are in close proximity to the pumping stations.

In extremely cold climates, the usual method is to house in the sub-structure of the tank and install stoves, extending the stove pipes up through the tank, the portion through the tank being standard wrought iron pipe. This method is effective, but offers a hazardous fire risk, as well as requiring a great deal of attention to keep up the fires.

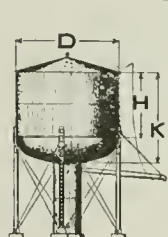
It is often difficult, if not impossible, to keep the outlet pipe and valve from freezing without a stove or heater of some kind, but they should not be used if there is any other practical method to follow, as by using stoves under wood tanks the fire risk is increased ten-fold. The outlet valve should be kept in good condition, as leakage will cause ice to form in the outlet pipe. Locomotives on many roads are equipped with small sections of steam hose for thawing out outlet pipes and valves. Another effective method is to bring the end of the spout down over the stack of the locomotive and turn on the blower. This throws a hot blast against the outlet pipe and will thaw out a heavy accumulation of ice in a very short time. This should be used only as a last resort, as it plays havoc with the spout on account of the intense heat.

The winters vary in severity to such an extent in different parts of the country and the tanks constructed present such varied types that it is difficult to present methods of frost proofing applicable to all cases. However, the conclusion may be drawn that, with the modern type of wood tank construction delivering water to locomotives through penstocks, the riser pipes may be effectually protected by properly constructed frost boxes provided the consumption of water per 24 hr. is equal to the capacity of the tank. In the extreme north, where the winters are most severe and where the water consumption is small, a frost box would hardly prove adequate as the water in the tank itself may freeze solid. Under these conditions a heater of some kind must be provided to keep the ice from forming. In some cases the riser pipes of steel tanks are surrounded by wood frost

boxes with air spaces as protection from frost. This is not good practice as it hastens the corrosion of the steel and does not permit proper inspection and painting. The best method of protecting a conical bottom steel tank from frost is by installing a stove or other heater in the riser pipe. The flat bottom steel tank may be protected in the same manner as the wood tank.

STEEL TANKS

The comparative life and value of wood and steel tanks has been the subject of much discussion, each type of tank having its more or less disinterested champions. While no doubt there are wood tanks in existence that will justify the strongest claims of the advocates of that type of tank, such cases can not be taken as examples of what can be expected of tanks constructed at the present time, for the reason that select tank timber is becoming more difficult to obtain year by year. Also the tanks cited as to long life of timber are smaller tanks than are being constructed today. Forty years ago a wood tank rarely if ever exceeded 20 ft. in diameter with 14 to 16 ft. staves, while many of the modern wood tanks are 30 ft. in diameter with 18 to 20 ft. staves. The mechanical wear on a larger tank is undoubtedly greater than on a small tank and deterioration is more rapid accordingly. On the other hand it would not be consistent to attempt to base the life of a modern steel tank on the life of an iron tank as constructed 30 or 40 years ago, as corrosion will necessarily be greater with the steel tank. There are



Capacity Thousand Gallons	Elliptical Bottom			Conical Bottom		
	D	H	K	D	H	K
15	15'-0"	9'-0"	12'-9"	15'-0"	8'-0"	13'-7"
20	16'-0"	11'-0"	15'-0"	16'-0"	9'-9"	15'-11"
25	17'-0"	11'-0"	15'-4"	17'-6"	9'-11"	16'-11"
30	18'-6"	12'-0"	16'-7"	18'-6"	10'-10"	17'-5"
35	19'-0"	13'-4"	18'-1"	19'-0"	12'-3"	19'-1"
40	20'-0"	13'-9"	18'-9"	20'-0"	12'-6"	19'-11"
50	22'-0"	14'-0"	19'-6"	22'-0"	12'-7"	21'-2"
60	24'-0"	14'-0"	20'-0"	24'-0"	12'-2"	21'-11"
65	25'-0"	13'-8"	19'-11"	24'-0"	13'-8"	23'-5"
70	25'-0"	15'-0"	21'-3"	25'-0"	13'-4"	23'-8"
80	26'-0"	16'-0"	22'-6"	26'-8"	14'-3"	24'-2"
100	28'-8"	16'-0"	23'-2"	28'-8"	14'-2"	25'-7"
150	34'-0"	16'-6"	25'-0"	33'-0"	15'-0"	29'-8"

Dimensions of Standard Steel Railway Water Tanks

no examples of steel railway water tanks that may be quoted to show the extreme life of steel tanks, as they were not in general use previous to 20 or 25 years ago.

In an attempt to arrive at some definite conclusion as to the comparative value of wood and steel tanks the following table has been prepared. The estimated life of each tank is given as 40 years, which would probably be the extreme life of either tank. The data regarding the wood tank is based on a clear heart red cypress with wrought iron hoops, creosoted pine frame and concrete foundation. The cost of the steel tank is based on a price for the tank complete erected on a foundation furnished by the railroad. The foundation in each case is figured on the basis of 60 yd. of concrete at a cost of \$8 per yard. The freight rate is based on a haul of 400 miles on all material entering into the construction of the tanks except the sand and gravel used in the foundation, which is based on a haul of 50 miles. The insurance rate on the wood tank is based on 1 per cent per annum. The cost of painting the wood tank covers the wood tub, hoops, frost box and roof only, for the frame, being creosoted, does not require painting. The cost of painting the steel tank is based on two coats of paint inside and outside every four years. The cost of the steel tank is based on 5-lb in. steel throughout.

It will be noted that the capitalized cost to build and perpetuate a 100,000-gal. wood tank is \$4,907.82, while the cost to build and perpetuate a steel tank of the same capacity is \$4,111.24; this leaves a balance in favor of the steel tank of \$396.59, and indicates that the steel tank is more economical than the wood tank. Perhaps the most important point in favor of a steel tank with a conical bottom over the wood tank is that a great deal of the suspended matter is precipitated in the mud drum. This mud drum may be cleaned very readily without taking the tank

out of service by simply opening the washout valve, while with the wood tank it is necessary to take the tank out of service at least once a year and more frequently where muddy water is used. The settling drum of the steel tank undoubtedly takes a great deal of the suspended matter from the water that can not be removed with a wood tank, and the advantage of removing this matter through the washout valve of the tank rather than from the locomotives in the roundhouse is apparent. It would appear that there is but little deterioration in a steel tank where the surface of the sheets is always covered with water and it is quite possible that it would be necessary to paint only the inside

intermediate position the car straddles the section so that part of the load is transmitted to the sections on either side. It is the practice to estimate from the observation, the nature of the real sectional error, the adjustment being made in accordance with this estimate. It is also possible to determine the errors mathematically. Let E_L , E_2 , E_3 and E_R be the observed errors of the scale reading for the four positions of the car shown in the figure and let e_L , e_2 and e_R represent the actual errors of the several sections for a concentrated load of 100,000 lb. Assume the distance between sections to be 12.5 ft. and the distance between the axles of the car as 5 ft. Then with a 100,000 lb. car

COMPARATIVE COST OF 100,000 GALLON WOOD AND STEEL WATER TANKS

DETAILED COST TO BUILD AND MAINTAIN A 20-FT. BY 30-FT. TANK ON WOOD FRAME.								
	Material and Labor.	Freight.	Material, Labor and Freight.	Estimated Life in Years.	Percentage of Total Value.	Maintenance.	Cost to Build and Maintain.	Capitalized Cost.
Foundation	\$480.00	\$42.50	\$522.50	Perm.	18.70	None	\$522.50	.....
Substructure	600.00	44.32	644.32	25	23.00	\$386.55	1,030.87	\$268.40
Tank	1,050.00	14.53	1,064.53	40	38.00	None	1,064.53	176.24
Ladders	36.90	.95	37.85	10	1.35	113.55	151.40	60.17
Hoops	250.00	7.18	257.18	15	9.18	685.14	942.32	238.13
Frostbox	90.00	6.67	96.67	15	3.45	257.79	354.46	89.51
Roof	125.00	6.55	131.55	10	4.70	394.65	526.20	209.14
Painting	45.00	.40	45.40	4	1.62	408.60	454.00	210.67
Cleaning	20.00	.....	.....	1	.....	780.00	780.00	400.00
Insurance 1%	22.77	.....	.....	..	.....	911.40	911.40	455.53
			\$2,800.00			\$3,937.68	\$6,737.68	\$2,107.82
DETAILED COST TO BUILD AND MAINTAIN A 100,000-GALLON STEEL TANK.								
Foundation	\$480.00	\$42.50	\$522.50	Perm.	15.26	None	\$522.50	.....
Tank	2,715.00	49.60	2,764.60	40	80.77	None	2,764.60	\$ 457.71
Painting	135.00	.80	135.80	4	3.97	\$1,222.20	\$1,358.00	630.62
			\$3,422.90			\$1,222.20	\$4,645.10	\$1,088.33

upper sheets, which are alternately exposed to the air and covered with water, every four years, it being necessary to paint the bottom and riser pipe only at longer intervals. This would reduce the cost of painting the steel tank from the figures given above.

C. R. Knowles (chairman), I. C.; A. A. Wolf, C. M. & St. P.; O. M. Suter, I. C.; T. J. Stuart, W. P.; Jas. Dupree, C. T. H. & S. E.; A. C. Syddell, C. B. & Q.; F. M. Case, C. & N. W., committee.

ADJUSTING RAILROAD TRACK SCALES

For the sake of simplicity it will be assumed in this discussion that the track scale is provided with articulated loading girders, or, in other words, that the car-loading is applied to the several scale sections by means of a series of simple beams. As the reading of the weigh beam is the sum of the loads applied to it through the train of levers from the several sections, the errors in the multiplication of any or all of the sections are added algebraically to give what we may designate as the "observed error" on the weigh beam. If we could apply a load to only one section at a time in making a test, the error of that section alone would be apparent at once on the weigh beam, but this would be possible only if we could have a test car with a single pair of wheels. As soon as we have more than one pair of wheels, the load is

in position over the left end of the scale the load carried by section L is 80,000 lb., and that carried by section 2 is 20,000 lb., and the reading of the scale is

$$100,000 + E_L = (80,000 + \frac{80,000}{100,000} e_L) + (20,000 \frac{20,000}{100,000} e_2) \text{ then}$$

$E_L = 0.8 e_L + 0.2 e_2$ (where E_L , e_L and e_2 are negative or positive quantities). In the same way we find for Sec. 2 that

$$E_2 = 0.1 e_L + 8 e_2 + 0.1 e_3$$

$$\text{and } E_3 = 0.1 e_2 + 0.8 e_3 + 0.1 e_R$$

$$E_R = 0.2 e_3 + 0.8 e_R$$

Thus we have four equations and four unknowns e_L , e_2 , e_3 and e_R , for which to solve simultaneously. Though the theory is simple the solution requires considerable tedious, painstaking effort.

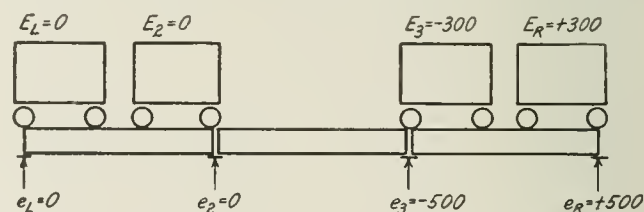


Fig. 2—Simplified Method of Placing Test Loads

This same condition is responsible for the difficulty experienced in making a trial adjustment by correcting for an estimated actual error, as the estimate will generally be far from correct because the error observed may be the sum of the errors on all three of the sections carrying the load.

It is possible, however, to use a system of placing the test load which will greatly simplify the mathematical solution and likewise make the trial adjustment a matter of definite steps, eliminating the guess work entirely. Assume the car placed successively in the positions shown in Fig. 2. Then according to the method given above we can write the equations,

$$E_L = 0.8 e_L + 0.2 e_2$$

$$E_2 = 0.2 e_L + 0.8 e_3$$

Here we have two equations with only two unknowns, e_L and e_3 , and the solution is a simple matter. Two similar equations can be written for the determination of e_2 and e_R . It is also possible to solve the above equations to give the general form, $e_1 = (E_1 - E_2) N + E_2$, where N is a constant depending upon the dis-

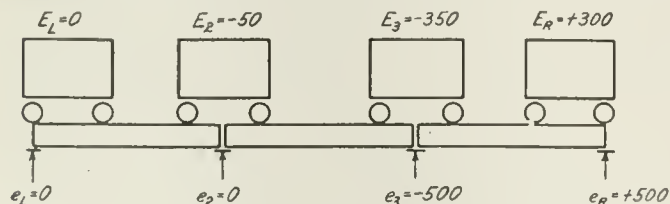


Fig. 1—Customary Method of Testing Scale Sections

distributed to two or more sections, and the errors of the several sections are recorded together. For this reason a two-truck test car would prove entirely impracticable and a four-wheel car should have a short wheel base, at least shorter than the distance between sections, as will be shown later.

In testing, the cars are commonly placed successively in the positions shown in Fig. 1, and it should be noted that in each

tance between axles and the spacing of sections. Values of N for different values of these two variables are computed readily from which a diagram like that shown in Fig. 3 may be obtained.

It should be noted that the values of N are relatively large for long wheel base test cars. It follows then from the formula that

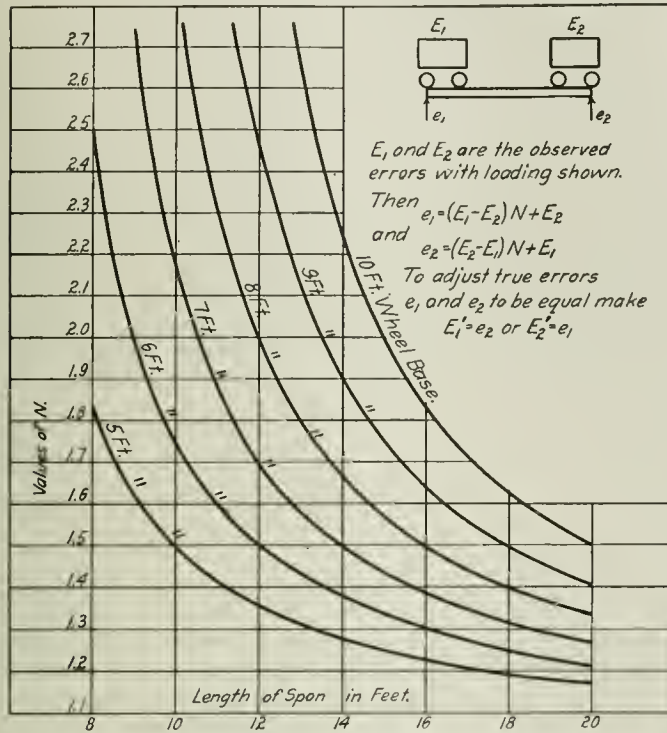


Fig. 3—Values of Constant- N , for Different Lengths of Spans

the longer the wheel base of the test car used the greater will be the difference between the errors of the sections and the observed values, and the use of a test car with a long wheel base makes the proposed method more necessary than if a short test car is used.

For the scale under consideration which has 12.5 ft. spans, we find the value of N for a 5-ft. wheel base test truck to be equal to 1.33. If we assume, for example, that $E_s = -300$ lb. and $E_r = +300$ lb. and use this value in the formula we find that $e_s = (-300 - +300) 1.33 + 300 = -500$ lb. If the leverage is then adjusted so that the observed error of section R is -500 lb., the observed error of section 3 would be -500 lb., and the actual errors of both sections would be -500 lb. Both sections

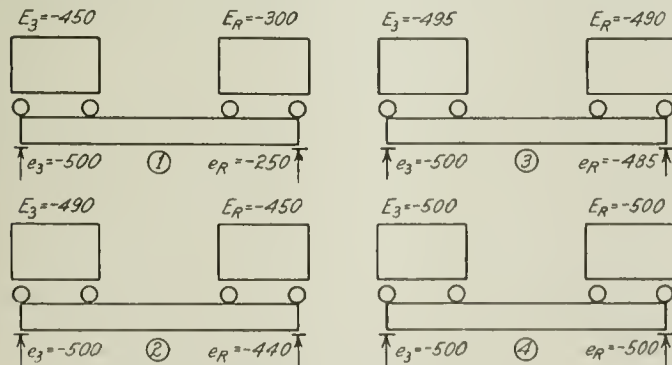


Fig. 4—Adjusting a Scale by Trial

are then corrected by moving the nose iron on the center extension lever.

Instead of using the foregoing method of finding the value to which section R is to be adjusted, the correct result may be obtained by trial. If E_R is made -300 lb., E_s will be -450 lb. (see Fig. 4.) Then E_R is made -450 lb. and E_s becomes -490 and so on until E_R equals -500 lb., and E_s equals -500 lb. The real errors of sections 3 and R are under these conditions both

equal to -500 lb., and when the right end is then quickened by 500 lb. the sectional errors disappear.

In the case of a five or six section scale, where it is desired to bring the errors of three sections to the same value, the method of procedure is as follows: The two sections nearest the fifth lever are first made to have the same real errors as previously outlined. The errors observed for the offset positions of the truck on the span between these two sections will then be equal to the real errors of the sections. The end section is then adjusted until the observed error for the position of the truck adjacent to the end section is equal to the real errors of the other two sections or the errors observed when these two sections are in a condition of adjustment.

Thus far the discussion has been applied to scales of the articulated type, but the method may be applied with advantage to scales having continuous girders, as can be shown from the re-

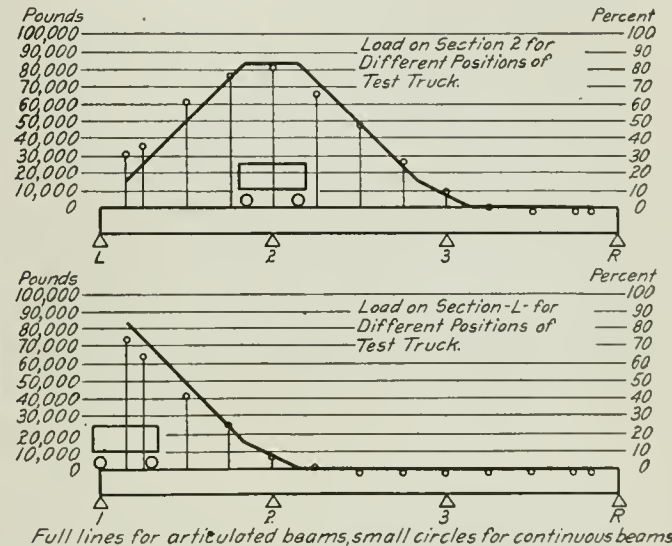


Fig. 5—Distribution of Load for Different Positions of the Test Car

sults of tests made to compare the distribution on scales with continuous girders to that on scales with simple beams. This is shown in Fig. 5. Any ordinate to the heavy full line in the upper diagram represents the amount of the load carried by section 2, as calculated for simple beams, when the center of the car coincides with that ordinate. In other words, the line represents what is known as an influence line. In the same way the vertical distance to each of the small circles is the concentration on section 2, when the center of the car coincides with the ordinate through that circle, as determined by actual experiment on a continuous girder scale. The lower figure gives the same data relative to section L . It is to be noted that the agreement is close, but of particular importance is the fact with the continuous girder as well as with the simple beams, with both wheels in the space between two sections no load is transferred to any other section than the two between which the load is placed.

It is advisable then, when adjusting a track scale either of the articulated or continuous girder type, to use the offset method of

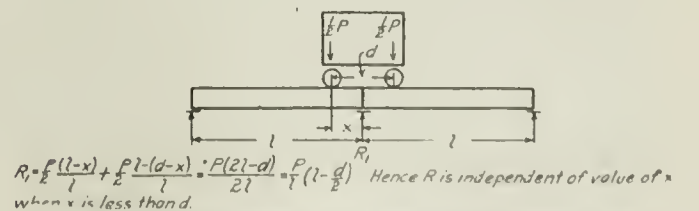


Fig. 6—Relation of Center Concentration to Position of Load

loading as explained. The use of a relatively long wheel base test truck makes this method even more necessary. The placing of one wheel over the section instead of straddling does not reduce the proportion of the load carried on the section, for as

shown in Fig. 6 the section concentration is constant as the truck passes over it.

The advantages of the off-section loading may then be summarized as follows:

(1) The load concentration on the section is the same as if the truck is centered over the section.

(2) The resulting observed errors are composed of the errors of only two sections.

(3) The nature of the sectional errors is easily determined from the observed errors.

(4) Whether or not the formula is used the adjustment of the multiplication of track scales is simplified.

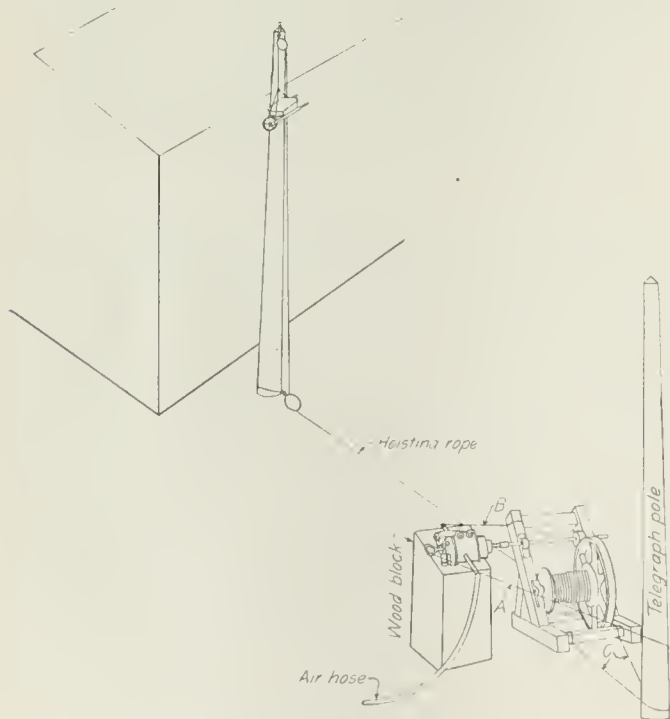
This article is taken in part from a paper presented before the last convention of the American Scale Men's Association, at Washington, D. C., by H. L. Van Keuren, of the United States Bureau of Standards, Washington, D. C.

USING A PNEUMATIC DRILL MOTOR AS A HOISTING ENGINE

By V. T. KROPIDLOWSKI

Chicago & North Western, Winona, Minn.

It is surprising to note the many uses to which an air motor may be adapted. Only a short time ago a bridge and building gang was engaged in renewing a gravel roof on a machine shop. Gravel was being hoisted to the roof by the wheelbarrow-full by three men working with a windlass. The idea occurred to someone to replace the three men at the windlass with a motor secured from the shops. As this motor requires but one man to operate it, the two men were relieved for other work, while



Manner of Attaching a Motor to Hoist Gravel to a Roof

three wheelbarrows of gravel were handled in this way to one by the men. The motor was attached as shown in the accompanying sketch. The windlass was anchored to a nearby telegraph pole by two ropes "C," as shown in the sketch. The motor was placed on a wooden block to bring it to a height so that its socket was on a level with the crank shaft of the windlass. The motor was then anchored to the block with a light chain, and to keep it from moving it was further held in place by wires "A" and "B." While it was necessary to fit a square socket to the crank shaft, this required very little work, as a Morse taper with a square socket was secured from the shop

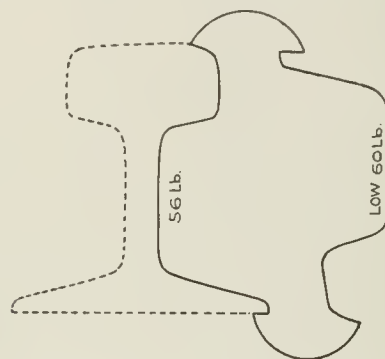
and this was made to fit by filing the square of the crank shaft slightly. At first a No. 2 Little Giant motor was tried, but this was found too small and a No. 0 motor was substituted. This latter motor was able to hoist a heaped wheelbarrow of gravel without any difficulty.

A RAIL TEMPLAT FOR USE IN VALUATION INVENTORY

By F. V. PURCELL

Assistant Engineer, Chicago & Eastern Illinois, Chicago

On most railroads the various weights of rail used in sidings and spur tracks vary by such small differences that it is difficult to distinguish the weight without spending considerable time and energy in measuring the individual rails, especially where the base of rail has become more or less imbedded in the ground. An added obstacle is the fact that the weight was usually not stamped on these old rails. However, each railroad has in the past adopted certain sections of the different weights of rail



Rail Templet for 56 and 60-lb Rails

for main track use, which in later years have been used on sidings and by making a templet of every section of rail which is known to have been used, it is possible to identify the rails very readily. These templates may be made of tin and if made like the one shown in the drawing, two sections of rail may be shown on each templet. This device has proven valuable to parties making inventories on valuation surveys.

INFLUENCE OF TEMPERATURE ON THE STRENGTH OF CONCRETE

Bulletin No. 81 of the Engineering Experiment Station of the University of Illinois contains a report by A. B. McDaniel of tests made to determine the variation in the strength of concrete cured at various temperatures. The test specimens were 6 by 6-in. cylinders, 6-in. cubes and 8-in. by 16-in. cylinders, the concrete being 1:2:4 and the storage temperatures varying from 95 deg. F. to 26 deg. F. Diagrams of compressive strength of the specimens at the ages of 3, 7, 10, 14 and 28 days, plotted against temperature show a surprisingly uniform increase of strength with higher temperatures. Tests on specimens subjected to a variation in temperature accord with the well known effect of freezing and thawing upon green concrete. As a limitation upon the practical application of the results of these tests in estimating the strength of actual concrete structures, it is well to call attention to the small size of the specimens. In large masses of concrete the conditions might be greatly different because of the effect of the heat generated by the chemical reaction of setting.

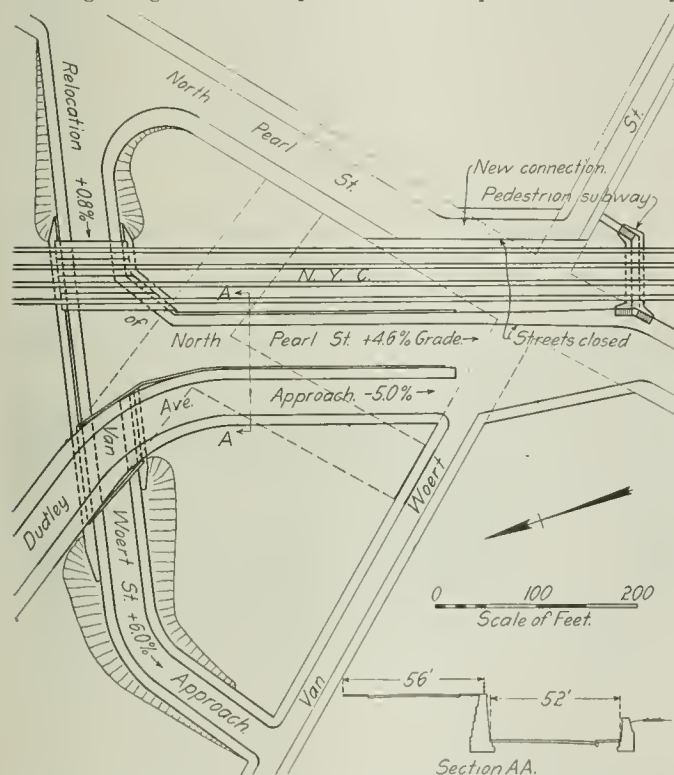
BRIDGE AND BUILDING CONVENTION AT NEW ORLEANS

At the closing session of the convention of the American Railway Bridge & Building Association, at Detroit, on October 21, it was decided to hold the next annual convention at New Orleans, La., on October 17-19, 1916.

Difficult Grade Crossing Elimination in Albany, N. Y.

A Description of the Measures Adopted at a Particularly Busy Intersection and of the Structures Erected

The New York Central has recently completed the solution of its grade crossing problem in the city of Albany, N. Y., by the elimination of the grade crossings at North Pearl and Van Woert streets. For an understanding of the importance of this work, and of the difficulties that have been overcome, it is necessary to point out certain prevailing conditions. The crossings are at a point on the railroad where railroad traffic is extremely heavy and congested. There are four main line tracks, consisting of two westerly tracks, numbered 1 and 2, for all local and through passenger trains, and a few fast freight trains; and two easterly tracks, numbered 3 and 4, for all freight, consisting of that leading to the interchange with the Boston & Albany, at Rensselaer, New York Central Hudson division freight, Albany local freight, besides light engines used to push the trains up the West Albany



Ground Plan in the Vicinity of North Pearl and Van Woert Streets

hill, which ascends westerly from the crossings. A record of train movements taken in November, 1911, showed an average of 155 movements for the 11 hours, from 7 a. m. to 6 p. m., or a train movement over the crossings about every four minutes.

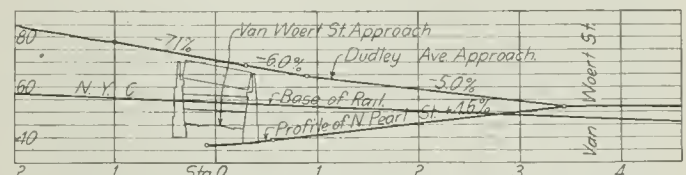
The street traffic consists not only of that along North Pearl street, a main artery leading north from the city, but also that of Van Woert street, a much used thoroughfare leading from a residential section to the city's industries and river front. Observations made in November, 1911, showed an average number of vehicles and pedestrians during the corresponding period of 11 hours, of 1,626 on North Pearl street, and 1,586 on Van Woert street, or 3,212 over the crossing.

The original order of the Public Service Commission called for the elimination of these grade crossings within the lines of North Pearl and Van Woert streets by means of a subway. It was found, however, on account of the unreasonable prices claimed by the property owners for land and damages, that the cost of the elimination would be extremely high. After considering this, and the further fact that the amount of money the state had available with which to pay its share of the cost was limited,

the case was reconsidered with the result that the final method of eliminating the crossings was determined upon.

In the new layout the location of both the tracks and streets are changed. The track changes consist in straightening the alignment by replacing a 4 deg. 30 min. reverse curve with a tangent formed by producing the tangent over the Broadway bridge. This affords more economic operation, especially since the tracks are on about a 1.5 per cent grade.

The street changes consist in detouring North Pearl street and carrying it under the tracks through a subway located about



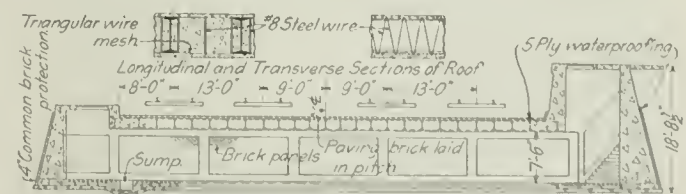
Profile of New Location of Dudley Avenue and North Pearl Streets and New York Central Tracks

400 ft. northerly of the existing grade crossing, in constructing a new street leading from the subway to Van Woert street on the west, and in extending Dudley avenue at a high level over the Van Woert street approach, to a plaza, where the new streets connect with the old. A portion of the space occupied by the old track alignment is utilized for the construction of a new street connecting North Pearl and Van Woert streets east of the tracks.

To reduce the damage to property, the low level North Pearl street approach and the high level Dudley avenue extension are placed directly adjacent to each other and the railroad tracks, being separated by mass type retaining walls supported on 40-ft. timber piles.

The bridges, one carrying the tracks over the North Pearl street, and the other carrying Dudley avenue over the Van Woert street approach, are both steel structures supported on solid concrete mass abutments having timber pile foundations. Both bridges have clear spans, it being deemed advisable to preserve unobstructed streets in order to permit of better views. The design of these bridges offers some interesting features.

The railroad bridge is a four-track through plate girder struc-



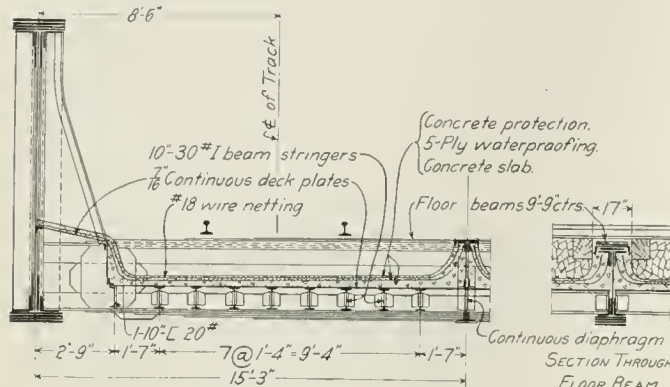
Longitudinal Section Through Pedestrian Subway

ture, with three girders and a ballasted floor. In an effort to improve traffic conditions, an angle is introduced in the east street line half way under the bridge, which necessitates an unsymmetrical structure, the west girder being 106 ft. 6 in. long, the center girder 72 ft. 6 in. long, and the east girder 68 ft. 6 in. long. Pin bearings are used for the long west girder, in order to maintain the coping lines unbroken and to avoid the use of excessively high pedestals under the center and east girders. The pin bearing at the expansion end of the west girder, where rollers are used, is made on the web of the girders, instead of on a casting bolted to the bottom flange.

In order to provide adequate drainage and to minimize the large amount of excavation for the approaches, a bridge with a shallow floor was desirable. To obtain the restricted floor depth and

avoid the undesirable through floor construction, a special design was adopted, consisting of transverse floor beams spaced 9 ft. 9 in. apart with their top flanges as close to the underside of the rails as possible, supporting longitudinal 10-in I-beams covered with a continuous top deck plate.

On the center lines between girders are placed steel diaphragms having the same depth as the floor beams, and attached to the webs of the latter by means of connection angles. These diaphragms are made continuous by means of cover plates passing



Floor Details of the Through Girder Span for the North Pearl Street Subway

over and under the flanges of the floor beams and riveted to them, and connecting the flanges of the successive diaphragms. The object of the diaphragms is to distribute the wheel loads and produce an even deflection in the floor. They also provide a convenient stop for the waterproofing, making practicable the complete waterproofing of one track at a time.

The girders are spaced 30 ft. 6 in. center to center, and the steel deck has a width of 25 ft. 6 in., thus leaving a space 2 ft. 6 in. wide along each girder. Along the outer edges of the steel deck are riveted fascia girders with their top flanges at the same elevation as the flanges of the floor beams. This arrangement gives sufficient space for the ties and ballast, reduces the weight to a minimum and permits convenient inspection and maintenance of the floor beam connections. The open spaces are covered by reinforced concrete slabs made continuous with the concrete protection over the waterproofing.

The design of the floor produces depressions or pockets, each of which is drained through nipples screwed into the deck plate

On this mortar course is laid a waterproofing course, consisting of five thicknesses of tarred felt, one of which is reinforced with cotton fabric and six moppings of coal tar pitch. The waterproofing membrane is carried up to the underside of the top flanges. Over the membrane is placed a protection course of mortar reinforced with wire netting.

The bridge carrying Dudley avenue over the Van Woert street approach consists of six deck plate girders spanning the street and supporting on their top flanges I-beams transverse to the roadway, which in turn support the roadway, consisting of a brick pavement on reinforced concrete slabs, and sidewalks of reinforced concrete.

This bridge is designed for the following moving loads in addition to the dead load:

On the roadway two trucks weighing 18 tons each, and a uniform load of 100 lb. per sq. ft.

On the sidewalks a uniform load of 100 lb. per sq. ft.

An impact allowance of $\frac{150}{L+300}$ times the live load stress.

In order to connect with the existing Dudley avenue as laid out, it was necessary to use a 7-per cent grade and introduce about a 29-deg. curve, which of necessity occurs directly at the point of crossing the Van Woert street approach, which is on a 6-per cent grade. The combination of grades, skew and curvature complicated the layout and some ingenuity was required to work out a suitable roadway over the bridge, which is accomplished by warping the surface.

A subway to accommodate pedestrians is installed in the vicinity of the original crossing. The subway is 8 ft. wide and



Looking North—Pearl Street Incline and Subway on Right, Dudley Avenue Approach on Left

has 7 ft. 6 in. headroom. Its floor is reinforced against hydrostatic pressure, the walls are of gravity section and the roof is constructed of I-beams encased in concrete. The whole subway is waterproofed by a continuous membrane consisting of five plies of felt, the middle one being reinforced. This concrete filling between roof I-beams is reinforced with wire mesh laid under the I-beams and securely wired to rods laid across the top.

The subway is drained by a gutter along one wall leading to a sump at the easterly end. From there a pipe with trap and back-water valve carries the drainage to Van Woert street sewer. The subway is electric lighted and has vault lights to give natural light during the daytime. The monotonous appearance of the concrete is relieved by a series of brick panels constructed of buff tapestry brick. The kiosks over the entrance are constructed of cement plaster on wire mesh.

The railroad made all track and signal changes, including the support of the tracks on timber falsework during the construction of the two subways, with its own forces. The other work was done under contract. Substructural and approach work was done by the Walsh Construction Company, of Davenport, Iowa; steel fabrication by the Fort Pitt Bridge Works, of New York City; and the steel erection and waterproofing by the Johnson-Gifford Company, of New York City.

In addition to the track work, the approximate main quantities involved in the improvement are 50,000 cu. yd. of earth excava-



Looking East Down Van Woert Street Approach Under Dudley Avenue

and discharges into longitudinal gutters, which connect with downspouts located in the face of the south abutment, the downspouts emptying into a city sewer. The nipples have flared tops, and extend about 1½ in. above the deck plate, this space being taken up by a course of 1:3 Portland cement mortar carried up against the sides of the floor beams, diaphragms and fascia girders.

tion, 7,000 cu. yd. of concrete, 30,000 ft. of timber piles, 4,000 ft. of steel sheet piling, 9,000 sq. yd. of brick and stone block pavement, 34,000 sq. ft. of concrete walk, and 500 tons of steel.

Owing to the congested location, and to the fact that westerly from this location the tracks run up grade for a considerable distance through a cut, and on the east the tracks run into the city, the problem of disposing of the excavated material economically had to be solved. This was accomplished by teaming the greater part of it to the Albany Basin improvement on the Hudson river front, where the railroad required considerable filling. Some that could not be used in this way was hauled by train to a point just south of Rensselaer, and used to widen out the roadbed for future additional tracks and strengthening some weak spots in the roadbed in this vicinity.

Considerable trouble and expense was entailed due to the character of the subsoil encountered, which consisted, below the elevation of footings, of about 3 or 4 ft. of blue clay and then a stratum of soft yielding material composed of blue clay, sand and water, for a depth of about 30 ft. to hard pan. As an illustration of the condition of this stratum a 2-in. pipe was driven about 10 ft. into the ground and when some heavy timbers were dropped in its vicinity, a jet of sand, clay and water was forced up through the pipe and about five ft. into the air.

Perhaps the greatest difficulty to be overcome was to allow uninterrupted train movements during the process of constructing the undercrossing and particularly during the erection and waterproofing of the steel bridge. With the exception of causing a little slower movements of trains than usual, the steel was erected and the floor waterproofed free from interference from traffic, by the following procedure:

Falsework piles were driven under tracks 2, 3 and 4, and for a temporary track outside the east girder, the tracks being all shifted to the east after the falsework was completed and before



Kiosk Approach to Pedestrian Subway

the excavation for the abutments was started. In the temporary locations, track 1 was in the permanent location of track 2, etc. The girders were then set in place between tracks, and when everything was in readiness for the erection of the steel floor to support tracks 1 and 2 in permanent locations the traffic on temporary tracks 1 and 2 was carried for twelve hours on track 2, to permit the erection of the floor free from traffic interference. This portion of the work was completed in the time allotted, and track 1 placed in its original position. The erection of floor to support tracks 3 and 4 was carried out in the same manner.

The waterproofing of the floor which carries track 1 in permanent location was first completed free from traffic interference, track 1 was then shifted to its permanent position, and the balance of the bridge was waterproofed in a similar manner.

In taking care of street traffic during the construction period, a point in favor of the method of elimination is emphasized;

that by reason of the crossing relocation, traffic along the street has been allowed to go on undisturbed. By an intermediate track shift the original crossings will be undisturbed until street traffic is turned into the new street and undercrossing.

This work was carried out under an order of the Public Service Commission, Second District, dated June 12, 1913, and in accordance with Section 91 of the Railroad law. Under the law the railroad company will pay 50 per cent of the cost of the improvement, the city of Albany 25 per cent and the State of New York 25 per cent. Under the law, the railroad company prepared the plans and did the work. In accordance therewith



Looking West—Tracks on Pearl Street Subway in Foreground
Dudley Avenue Bridge Over Van Woert Street
Approach in the Distance

the work was done under the supervision of G. W. Kittredge, chief engineer, and J. W. Pfau, engineer of construction. E. B. Menuez, district engineer, at Albany, N. Y., had direct charge of the construction.

THE RAPID IMPROVEMENT OF A SECTION

By KENNETH L. VAN AUKEN

Instances frequently occur where it is necessary to assign a new foreman to a section for the purpose of making a rapid improvement in the condition of the track, to insure safety or to obtain conformity with the required standards. There are many reasons for poor condition of a track, among which might be mentioned, lack of labor or poor labor, an incompetent or neglectful foreman, curtailment of appropriations for track work, track on a new grade, or emergency work, such as wash-outs, whereby the section forces have been diverted from their regular duties.

When a new foreman is given a section which has been improperly maintained, he will find enough work for ten gangs of the size he is usually allowed. Nevertheless, he will generally be expected to restore the track to the required standard without even the help of an extra gang. Even if an extra gang were furnished, it would be necessary for the section gang to follow out a program of rapid improvement for the entire section in advance of the extra gang. The foreman will probably find that the track needs surfacing out of face. However, there will be certain places which are rougher and need attention worse than others. The foreman should therefore make it a positive rule always to do the most important thing first and he should bear this in mind on starting out from the section house each day.

It is very difficult for a section foreman to do this kind of work, which one supervisor has aptly called "skirmishing." As a rule, section forces, both foremen and laborers, are trained

to be thorough, keeping in mind, quality rather than quantity. For instance, they are accustomed to tamp track with tamping bars or picks, dress it up, line up the shoulder and ballast line and leave everything in first-class condition. There are other reasons why a foreman dislikes to run over a section hurriedly, spotting out only the worst places; a good foreman will take pride in his work and will be careful to leave nothing behind him which could be criticised by another good trackman or which he could not be proud of himself. Sometimes the foreman will even go so far as to neglect or ignore the orders of the roadmaster, who is constantly riding over the track and is therefore able to locate the roughest spots, or he may postpone fulfilling his superior's instructions because he is trying to complete some other work. This is a great detriment to the work in most cases and should not be allowed. To prevent this the roadmaster should check up carefully to see that his orders are obeyed immediately. On the other hand, there are many foremen who would improve the section quickly and do only the work which requires immediate attention if they knew just what was necessary or had had some experience in this class of work, and it is believed that the following hints may be of value to such men.

Of course, the first thing which a foreman will do on taking over a new section is to make a trip over it on a hand car or motor car, or possibly walk over it, to familiarize himself with the conditions on the section. When making this preliminary inspection he should look carefully for dangerous places in the track, such as low joints on the high sides of curves, low bridge approaches, alinement at highway and railway crossings, the condition of switches (especially facing point switches), low joints alternately on one side and then on the other, skeleton track or track without a shoulder of ballast, churning ties, etc. He may be able to make the inspection thorough enough to make recommendations regarding water pockets, slides, or soft spots in cuts. He can then order the ballast or other material necessary to put the track in a safe condition.

As in all other work, the most important part of the foreman's duties is to lay out the work in the order in which it is to be done. If it is desired to cover the entire section in ten days, for instance, the foreman should divide his section into approximately 10 equal parts, unless some natural division points, such as bridges, suggest themselves. It may also be necessary to lay out unequal sections because some parts of the track will require much more work than others. The foreman should determine, however, to cover his entire section in not more than ten days; seven days would be even better. When raising bad spots, the foreman will find it advantageous to walk ahead of the gang in the morning with a piece of chalk, marking the joints which he wishes to raise by two crosses on the base of the rail, one on each side of the joint, locating these crosses so that they will include between them all the ties that it is necessary to tamp at that particular point. After the foreman has marked off the places on the section which he intends to cover that day, he should return to the gang immediately.

As it is only possible to employ a few men when beginning any piece of work, for instance in surfacing, it is advisable to take part of the gang ahead when there is still some dressing up to be done, leaving the remainder of the gang to finish. After a sufficient amount of track has been raised, the remainder of the gang, with the exception of possibly one man, may be brought ahead. In this manner all the men can be kept constantly at work. The same holds true when lining up a highway crossing. As it will be impossible to employ all of the men in taking up the crossing planks without carrying an unusually large number of lining bars, pinch bars, etc., the work of tearing up the crossings should be done preferably by a few men while the others are finishing up the preceding job. Likewise, after the low joints have been raised in a crossing and it has been lined, all of the gang save two may be taken ahead, leaving these two to replace and spike down the planks and do whatever dressing is necessary.

Wherever a little gaging or spiking is necessary, a couple of

men should remain to do this work, though they should if possible be kept in sight of the foreman. It may sometimes be necessary to take a good share of the gang out of sight of two or three of the men; for instance, around a curve in a cut, and in this case the foreman should leave men whom he can trust to keep at work, even though they are not under direct supervision.

The curves, of course, will require prompt attention. Low joints, in the high side of the track especially, may cause a derailment and wide gage is dangerous. It is possible during the preliminary inspection, to spot cases of wide gage by noting places where the outside rail has drawn away from the inside spike. Bridge approaches will almost always require some attention and they should be raised at least 100 ft. or more back from the bridge rather than only one rail length, as is frequently done. The track should be raised about two inches, particularly if the embankment is settling rapidly, thus obviating the necessity of giving the bridge approaches further attention until after a storm. The foreman should be careful when raising bridge approaches not to run too far back on the track (as he will often be tempted to do because the track is rough), but he must remember that there are other places which need attention first.

Usually the track through highway crossings is neglected because of the extra work involved in taking up and replacing the planks. Of course, this is the result of slovenly work, but when a section has deteriorated through any of the causes previously mentioned, usually the crossings will have suffered. The foreman should be careful to take out the local kinks at the crossing but should also be sure that the track lines up properly with the tangent for some distance each way before he puts down the planks again. The same might be said of railroad crossings, but as it takes a long time to line these up correctly it would be best to let them remain until after the preliminary work on the entire section has been done, unless they are very badly out of line. Wherever there is a piece of skeleton track, or a lack of ballast on the shoulder, the foreman should correct these conditions at the earliest opportunity as sun kinks are likely to develop and cause wrecks. The best treatment for these is to order the gravel and spread it just as soon as it arrives. If the gravel is spread in the middle of the track it will not be necessary to dress off the shoulder or the center immediately, as the weight of the ballast will be sufficient to hold the track.

Churning joints are quickly recognized by a good trackman and will receive his attention in running over the track for the first time, because he knows that the seriousness of the condition does not show up in a case of this kind except when a train is running over the joint. A joint may appear to be only two inches low, but since it has no foundation it may sink three or even four inches when the wheels of a train pass over it. Churning joints should therefore have early attention.

To summarize, the preliminary work of a foreman on a new section should be confined first, to places which are actually dangerous, and second, to such other places in the track as are in particularly bad condition compared with the rest of the bad track on the section. The foreman who will pocket his pride and quickly improve the worst spots, will probably escape the censure of the roadmaster and higher officers and gain for himself credit for having improved the track materially in a very short space of time.

EARLY RAILROADING

The Columbia & Philadelphia Railroad, now a part of the Pennsylvania Railroad, was completed as a single track line in 1834. At first all freight was hauled by teams, and because of battles between opposing teamsters in the first year, it was at once double-tracked. Excepting the inclined planes at Columbia and Philadelphia, the first 1,800 ft. long and rising 90 ft., and the second 2,805 ft. long and rising 187 ft., the maximum grade of the road was 30 ft. per mile, and the minimum radius of curva-

ture 631 ft. The track was mainly constructed with stone blocks and edge rails, with wooden sills at intervals. The rails were secured to the stones by spikes driven into locust plugs inserted into holes drilled for the purpose. To overcome the tendency to spread, 7-in. by 7-in. ties 7 ft. 6 in. long were added at 4-ft. intervals. The first locomotives drew 20 tons of freight over the 82 miles in 10 hours.

The trip from Philadelphia to Pittsburgh was made by the Columbia & Philadelphia, from Philadelphia to Columbia, by canal along the east bank of the Susquehanna, thence across to the west bank and along the Juniata to Hollidaysburg; then by the inclined planes of the old Portage Railroad over the Allegheny mountains to Johnstown and thence by steam packet down the Kiskiminetas and Allegheny rivers to Pittsburgh. (Journal of the Franklin Institute, 1840.)

CONCRETE FLOOR TROUBLES

By MACRAE D. CAMPBELL

From the large number of methods advocated as preventives or remedies for concrete-floor troubles, it might seem to the uninformed that concrete is unsuited to floor construction. This is far from the truth, as concrete is as efficient in floors as in walls or any other part of a building. With concrete floors laid with care, using the best materials and workmanship, none of the too frequent complaints should prevail.

One of the most frequent causes for complaint is "dusting." Extensive investigations have conclusively fixed the cause of this trouble on the failure to observe one or more of certain fundamental requirements, which if observed would have led to success. Dusting may have its cause in any one of quite a formidable list of omissions. The strength and wearing qualities of a concrete floor, particularly the wearing quality of the surface, depend very largely on the quality of material used in making the concrete, the kind of workmanship displayed in placing, and also on the proper protection of the concrete for a sufficient period to complete the early hardening of the floor.

Contributing causes of dusting have been definitely fixed in the use of too fine sand, dirty sand, soft sand, too lean a mixture, improper or insufficient mixing, too much time allowed to elapse between placing and finishing, using mixtures too dry or too wet and the use of dryers (dry cement with or without sand) to dry out the surface so that it may be quickly troweled to the desired finish, permitting the surface to dry out so rapidly that there is insufficient water present to complete hydration or crystallization of the cement, that is, neglecting to protect the surface with a moist covering of earth until early hardening has been completed.

In two-course work when a thin top or wearing surface is placed on a base which has already hardened, there is likely to be dusting because there is no possibility of the base absorbing the excess water from the top course and any excess must get away through evaporation from the top surface. This excess of moisture on the surface prevents troweling to the desired finish until after early hardening has commenced, or invites frequent troweling which results in bringing an excess of cement to the surface and separates some of it from the aggregate and thus impairs the wearing quality of the surface.

Disposing of the question of cement used in floor construction by stating that any one of several well-known brands are known to be manufactured so as to meet specifications of the American Society for Testing Materials, particular attention must be given when preparing concrete mixtures for floor construction, to selecting clean, hard, durable, well-graded aggregates and to proportioning them so that voids will be eliminated as nearly as possible. The use of granite screenings for aggregate in the wearing course to insure a harder and more homogeneous surface has met with considerable success. Various hard or flinty sands and even garnet and carborundum grit have been used in the top course and show remarkable resistance to abrasion. But dusting is not necessarily the result of abrasion of aggregates,

rather it is the result of improper bond between the cement and fine aggregates which permits the fine particles of grit to become loosened from the cement binder, thus subjecting the cement itself to the wear of traffic. This goes on repeatedly after a manner that might almost be referred to as disintegration. This fault, provided materials have been all they should be, results solely from failure to protect the finished concrete by means of a covering of moist earth or sawdust for from 10 days to two weeks to insure complete early hardening.

Materials can be governed by specifications and although it is possible to specify careful supervision and workmanship, it is not always possible to define what these mean or to secure them after having defined them. Since so many thoroughly satisfactory concrete floors have been obtained by following the specifications of the American Concrete Institute, it should be evident that dissatisfaction with other floors results from the neglect of some vital factor.

Floor requirements in certain types of railroad construction are well met by concrete. Some stations may be advantageously floored with concrete; and such construction is adapted to machine shops and roundhouses. Fault is sometimes found with concrete floors in machine shops and roundhouses where naturally much oil is spilled on the surface in the course of time and claims have been made that oil causes disintegration of concrete. This is hardly tenable since there are many instances where concrete oil storage tanks have given satisfactory service and after years of use, a careful examination of the surfaces exposed to oil show no disintegration. The secret of success lies in a well-proportioned concrete mixture that produces an impenetrable surface as well as mass.

There are a number of treatments that may be applied to floors that have caused trouble from dusting, which will allay this trouble, but most of these require renewing from time to time. A mixture of linseed oil and turpentine has been found effective when painted on the surface, likewise a treatment consisting of several applications of a sodium silicate solution which acts by combining with free salts in the cement to form an insoluble compound. In some cases the top may be ground down with one of the common types of floor polishing machines as is done in polishing or surfacing mosaic floor.

This brings to mind the suitability of what are commonly referred to as terrazzo floors, for stations, sometimes referred to as Venetian floors. Careful cost figures that have been kept on many pieces of such construction show that terrazzo or Venetian floors may be laid for a lower cost than any other form of decorative floor. Marble mosaic averages from 60 to 75 cents per sq. ft.; ceramic tile, 35 to 50 cents per sq. ft., and terrazzo, from 20 to 30 cents per sq. ft.

Just as there is in all construction work considerable difference of opinion as to so-called best methods, so there is a wide variation in the specifications which have been drawn up by different engineers, architects or builders covering terrazzo floor construction. This floor has a number of attractive possibilities. There is no limit to the variety of surface finish which may be secured by carefully selecting the aggregate. Crystalline limestone of all obtainable colors may be used singly or in combination. Relatively soft aggregates of uniform hardness are desirable. Different kinds and colors of marbles also may be used, and likewise the cement mortar in the mixture used to bond or bind the particles together and in place may be varied in color by the use of mineral pigments. The finished terrazzo floor should show not less than 80 per cent of aggregate surface.

Terrazzo floors are laid both on the top of a concrete base supported by an earth foundation and over wood or exposed steel sub-floor construction. In the last two cases the terrazzo should be underlaid with a well-lapped course of hard roofing felt or waterproof building paper. The foundation course should consist of concrete mixed in the proportions 1:2½:4. Enough water should be added to make a medium wet consistency. Concrete should be deposited 4 in. thick. Upon this foundation course there should at once be laid a ½ inch layer of 1:2 cement mortar. Within 24 hr. after placing the foundation, a ½-in. to 1-in. layer

of cement and marble chips, or whatever aggregate for the surface is selected, should be mixed to the consistency of a stiff paste and deposited. The marble chips should vary in size from a pea up to $\frac{3}{4}$ in. in the largest dimension. The proportions of this mixture may vary from 1:1½ to 1:2½. The cement marble layer should be spread so evenly that the broad surfaces of the marble particles will turn upward, then should be tamped thoroughly and rolled with a heavy roller weighing not less than 100 lb. to the foot, and preferably more.

After protecting this surface with a moist covering for two or three days, the preliminary surfacing or grinding may be done by using a lubricant of water and pure cement, grinding being done by one of the rotary types of floor polishing machines. In 10 days or more the floor may be ground again to its final surface. The degree of polish will depend upon the hardness attained by the cement and the thoroughness with which it has been protected during hardening. Ingenuity of the individual worker will suggest quite a variation in details of terrazzo construction. There is a considerable latitude for introducing pleasing border effects, even inlaying certain designs in the floor proper.

Frequently the question arises as to the necessity for using reinforcement in the floor when a terrazzo surface finish is contemplated. Best practice seems to indicate that for areas of 75 sq. ft. or less, or in buildings where all settlement has occurred and further settlement is not likely, or in places where the underlying floor slab is thick, say from 4 in. upward, reinforcing is unnecessary. It seems advisable, however, to introduce suitable reinforcing in locations where the construction may be subjected to constant vibration, in new buildings where there is certain to be subsequent settlement, where the concrete floor slab is not very thick, and where the terrazzo is to be laid over wood sub-floor construction.

LINING A DOUBLE TRACK RAILWAY TUNNEL UNDER TRAFFIC

By RODMAN MEACHAM

General Manager, Meacham Contracting Co., Hopkinsville, Ky.

The Diana tunnel of the Louisville & Nashville is located about 65 miles south of Nashville, Tenn., on its new double track, low grade main line to Birmingham. The tunnel is 1,520 ft. in length. It was excavated through limestone and shale formation, and required temporary roof timbering throughout. This timber had to be removed in the north end for the concrete section, but was left in place in the south 1,200 ft. of the tunnel, where, after it was demonstrated that timbering would be necessary, the excavated section was enlarged.

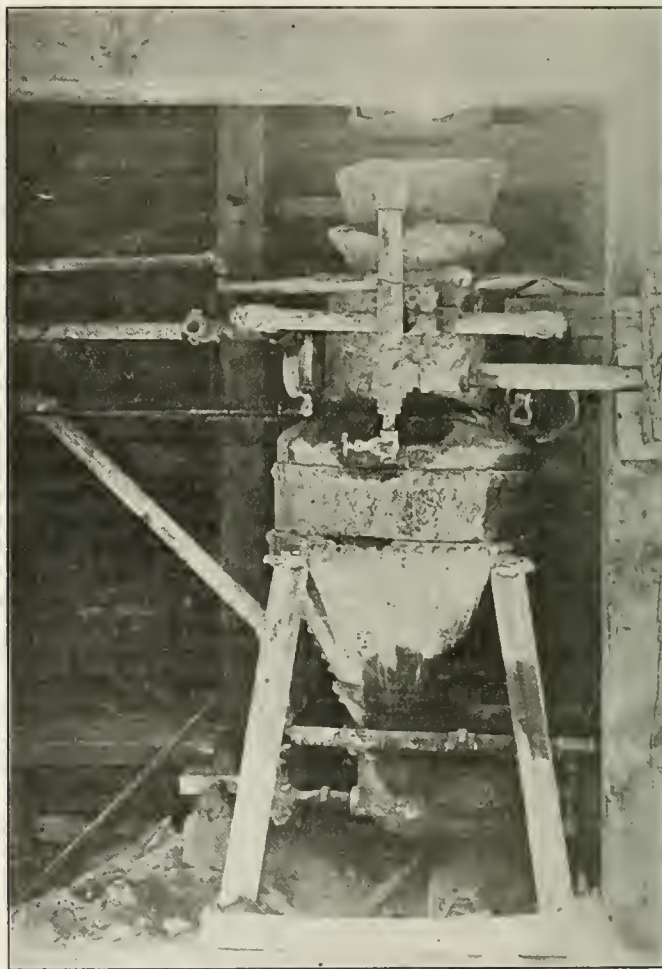
It was the intention at first to pour the side walls, using an incline and hoist to elevate the cars of mixed concrete up to the springing line, where they could be dumped directly into the side walls, and the concrete for the arch section to dump on a platform and shovel and pack it into the arch by hand. After investigating the pneumatic method of placing concrete, however, the estimate indicated the economy of blowing concrete through an 8-in. pipe directly into place, using a steel tunnel form built to the full section of the tunnel. This method permitted trains to pass through the tunnel without interfering with the concreting work and made it possible to pour the full section of the tunnel in a single operation. It also eliminated a cumbersome incline and hoist which probably would have caused some delays to the regular traffic of the road.

The pneumatic method was therefore adopted for the work, in conjunction with two 35-ft. sections of steel forms of the Blaw type, built on travelers. The work was started on January 19, 1915, and was completed on October 22, a total interval of nine months, during which there was an average of 20 trains per day through the tunnel, with a total delay of traffic of less than two hours. This is considered unusual, as some delays were fully expected. The speed of all trains through the tunnel was restricted to six miles an hour while the work was in progress.

FORMS

The traveling forms are shown in the accompanying drawing. They consisted of steel plate side walls to the springing line and 2½-in. by 5½-in. yellow pine lagging over the arch section. The side walls were stiffened with vertical I-beams and two waling pieces of two 4-in. by 8-in. timbers placed horizontally against these I-beams, through which anchors passed. These anchors were fastened to the rock side walls with split point anchor bolts set into the rock about 10 in. to afford rigid supports for the side wall forms.

Two diagonal tie rods and one horizontal tie rod were also placed near the bottom of the form to hold it rigid while being moved, but these were found unnecessary after the first move and were discarded, thereby removing all obstructions to traffic. It was necessary to build the footing course of concrete ahead



View of the Pneumatic Mixer Set Up Under the Bins at the North Portal of Diana Tunnel

of the forms so that the bottom steel plate would fit up against the concrete footing, as shown in the sketch.

In moving the forms the doors M-7 at the haunch of the arch were first opened. The 16-in. jacks were then lowered about 2 in., bringing the arch section away from the concrete. After this, the diagonal braces B-1 were unbolted and the turn buckles M-1 were pulled in to move the side walls away from the concrete at the springing line of the arch. The wall forms were pulled away from the concrete at the base by inserting a crowbar between the rails, on which the forms traveled, and the steel frame which carried the wheels, and prying the forms away. This was possible, as there was enough play in the wheel axles to allow for the side movement.

The forms were first set up at the south end of the tunnel, one at the portal and the other about 350 ft. in. As the lining was placed they were moved north 35 ft. at a time until form

No. 2 reached the center of the tunnel, and form No. 1 reached the starting point of form No. 2. After form No. 2 reached the center of the tunnel it was moved ahead to a point about 350 ft. from the north end, and form No. 1 was moved ahead to the center of the tunnel to continue the work where the other form had left off.

THE PNEUMATIC MIXER PLANT

During the first half of the work the pneumatic mixer was located about 75 ft. outside the south portal, after which it was moved to the north portal. At the south end the mixer was in a deep approach cut and the top of the cement house and of the stone and sand bins erected above the mixer was some 30 ft. below the top of the rock sides of the cut. A large pile



View Showing "Y" in Delivery Pipe, Forms and Roof Timbering

of spoil rock excavated from the tunnel had been deposited on the east side of the cut above the mixer plant. This rock was crushed on the site, screened and dropped through a gravity chute into the bin below within the cut. Sand was brought in cars from Jacksons Lake, Ala., and unloaded into the bins by means of a derrick set at the top of the cut, which handled a large bottom-dump bucket.

When the bins were built, the mixer was placed beneath with a measuring hopper directly above it for measuring 10 cu. ft. batches. A working platform was built at a convenient level for the measuring hopper. This platform was extended to the full area underneath the bins and was used for cement storage. The bins for stone and sand above contained space for about 140 cu. yd. each. The cement storage capacity was about four cars.

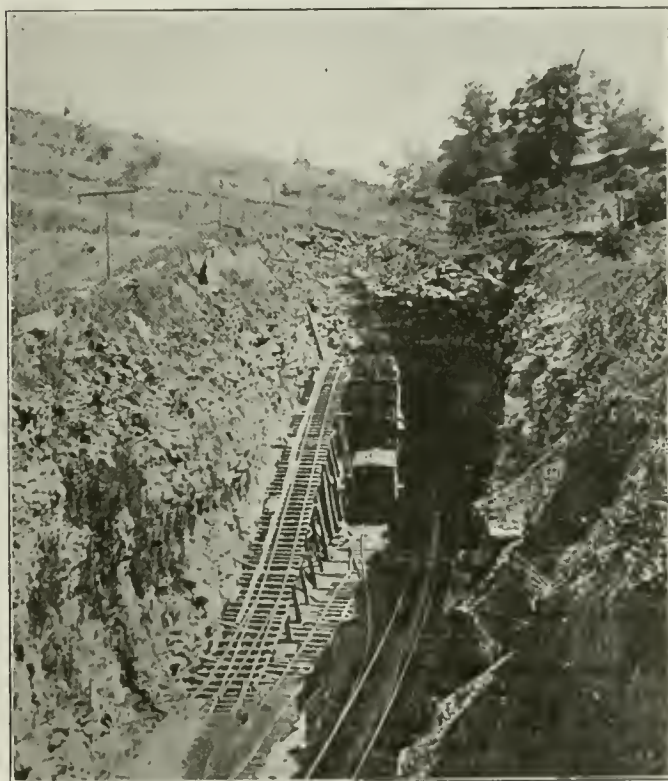
METHOD OF HANDLING

From the pneumatic mixer an 8-in. standard steel pipe was carried to the forms. The pipe was laid along the ground. At the forms it turned vertically with a long radius, 90-deg. elbow, and at the top just before turning horizontally through the bulkhead over the crown of the arch it was divided by means of a "Y" connection into two 8-in. lines which passed over the crown of the arch. The "Y" connection is particularly useful in a double track tunnel where the width of the crown is so great that it is difficult to change the pipe rapidly in directing the concrete from one side wall to the other. As shown in one of the photographs, it consists of a casting with "Y" branches at about 22½ deg. deflection. The concrete passes through one of the branches and is obstructed in the other branch by means of a sliding plate. To switch the flow of concrete from one branch to the other, it is only necessary to slide the plate from one side to the other. This is done by a couple of blows from a sledge and requires but a second's time, so that it may be accomplished after one batch has passed and before another batch is blown

through, without the necessity of holding up or even notifying the operator of the pneumatic mixer.

The two 8-in. pipes passing over the crown of the arch reach about 20 ft. or midway into the forms, and at that point they turn through 90-deg. elbows to each side wall. At the end of the elbow a 9-ft. length of 8-in. hose is suspended. While the concreting is going on two men with ropes attached to the end of this hose station themselves at the ends of the form so that they can pull the hose forward and back and deposit the concrete evenly along the side wall. After sufficient concrete has been poured to bring the side wall up from 2 to 6 ft., depending on the thickness, the concrete is diverted through the other side of the "Y" and deposited in the opposite side wall to balance the weight against the forms.

When the concrete reaches a point too high for the use of the hose, this is detached while concreting is going on at the other side. Concrete is then discharged directly from the elbow until the space is filled close to the end of the elbow. During this period of the pouring the concrete is distributed by means of hoes and concrete rakes. This brings the level of the concrete up to a point nearly level with the top of



Looking South Toward the Mixing Plant Set Up at the North Portal of Diana Tunnel

the barrel of the arch form, and leaves remaining to be filled a space approximately 10 ft. wide and from zero at the sides to 18 in. in height over the crown. The 90-deg. elbows are then removed from the ends of the pipe and a short hose is attached to one of the 8-in. pipes, the other pipe being removed. Concrete is then shot against the rear and built up to the end of the hose, after which this hose is removed and the concrete is shot straight ahead from the end of the pipe until the key is completed.

At the north end of the tunnel the temporary timbering was removed as concreting progressed. Considerable breakage in the roof left cavities of various depths which it was necessary to fill either with concrete or with some variety of packing. Where packing was used it was placed with the pneumatic machine. The material consisted of a mixture of 75 per cent limestone screenings and 25 per cent sand. This was blown in, filling the cavity completely and packing it tightly so that the

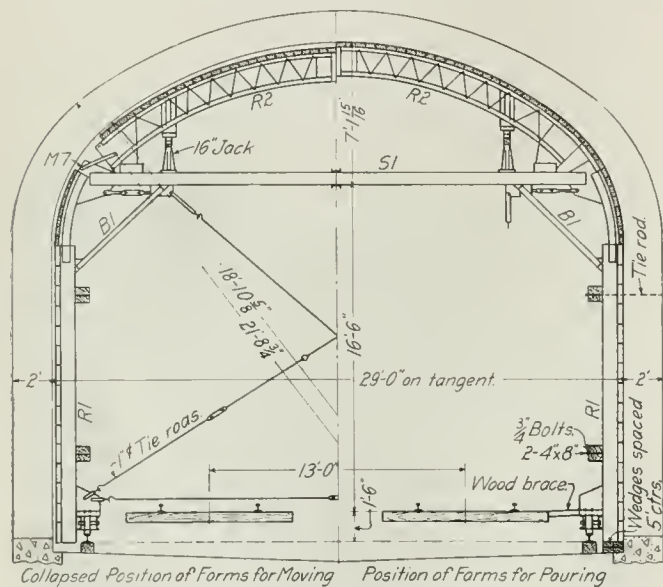
weight or any pressure from rock settlement was evenly distributed over the barrel of the arch through the packing.

The compressor plant consisted of two Ingersoll-Rand steam-driven compressors, which delivered about 1,000 ft. of free air per minute at the mixing plant. The same steam plant and a Cameron duplex pump furnished water for construction purposes and for the camps.

GENERAL

After the mixer plant was moved from the south to the north portal the crusher plant was located about 2,000 ft. north of the mixer. This required handling the crushed material in 4-yd. narrow gage dump cars hauled by dinky locomotives. These cars were hauled from the crusher plant to the base of an incline at the bins and were pulled up the incline by means of a cable from a Munday hoisting engine, located under the bins. A view of this plant as located at the north portal is shown in one of the photographs.

It was found that the 8-in. pipe used wore out first at the joints, as the pipe was thinnest there on account of the threads.



Cross Section of the Tunnel

At the beginning of the work 1,000 ft. of standard pipe was purchased, and after the work was half completed 300 ft. of well casing with Van Stone joints was purchased. This well casing was found to be well adapted and did not give trouble through the wearing at the joints that the standard pipe did. Another advantage of the Van Stone joints was their flexibility, as about 5 deg. deflection could be obtained in this joint without straining the flange. Of the entire amount of pipe purchased, which was bought second-hand, about half was still in very good condition at the close of the work, after having some 11,000 yd. of concrete blown through it.

The elbows used consisted of cast manganese steel and of bent pipe. The manganese steel elbows were purchased at the beginning of the work and were still in good shape at the end, having shown very little wear. The manganese steel elbows were, however, very heavy, weighing about 400 lb. for a 90-deg. bend. For this reason the pipe bends were used over the crown of the arch, where the handling of the pipe was difficult. The pipe bends weighed about 125 lb. each and were worn through on the outside of the curve. When worn through a "half sole" or patch was clamped over the worn part, which usually lasted for another 500 yd.

At the beginning of the work the engineers permitted the moving of the forms after six days, but after a time this period was reduced to four days. In all there were 41 form sections, each of approximately 35 ft. and containing about 250 cu. yd. in each section. The longest distance which concrete was transported was 925 ft. and the average distance was about 400 ft. The

average time required to concrete one 35-ft. section was approximately 24 hr., although some forms were filled in 15 hr. The number of men required to mix and place the concrete was 13, including 3 men in the bins, 1 operating the gate levers, 1 to level off the measuring hopper containing the hatch, 1 man on cement, 1 mixer operator, 1 man on the conveyor pipe, 1 attending to the bulkheads and 1 foreman and 4 men helping in the forms. A gang of 10 men was employed constructing footings and moving and setting the forms.

The work was done by the Meacham Contracting Co., Hopkinsville, Ky., sub-contractors for Walton & Co., Falls Mills, Va., who excavated the tunnel. C. B. Fritchie was superintendent in charge of the work for the Meacham Contracting Co.

The forms were furnished by the Blaw Co., Pittsburgh, and the pneumatic mixer and conveyor was furnished by the Concrete Mixing & Placing Co., Chicago. The work was done under the supervision of H. C. Williams, chief engineer of construction for the Louisville & Nashville, and Geo. B. Bryson, resident engineer in direct charge for the railroad.

MAINTENANCE OF WAY MASTER PAINTERS' CONVENTION

The Maintenance of Way Master Painters' Association held its twelfth annual convention at the American Hotel Annex, St. Louis, Mo., on October 19, 20 and 21, with about 40 members and guests in attendance. Owing to vacancies in the offices of president and secretary-treasurer, F. C. Rieboldt (C. M. & St. P.), Milwaukee, presided and E. H. Brown (Painters' Magazine), New York, acted as secretary.

Martin Kane (D. & H.) read a paper on the sanding of depots and other structures. Sanding is a necessary evil because only by adopting this process is it possible to preserve the interior finish of some stations, particularly the toilet rooms. He has found it possible to obtain a white finish by the use of white sand. J. T. Lewis (Wabash) stated that this road sanded the outside, but not the inside of its stations and that it was his experience



Sign Painting Crew with Outfit Motor Car and Crossing Sign Scaffold

that while sanding prevented writing, it did not necessarily prevent carving. A. E. Wilson (N. Y., N. H. & H.) and Charles Johnson (C. & N. W.) reported a tendency of sanded paint to peel on certain classes of wood.

A. E. Wilson (N. Y., N. H. & H.), Hartford, Conn., read a paper on the proper method of cleaning bridges and other steel structures. He called attention to the fact that the maintenance of way painter had conditions to contend with that did not concern painters in other lines, such as brine drippings, hot cinders, contraction and expansion, engine gases, etc. Unless the fine rust is removed from steelwork corrosion continues under the coating, regardless of the paint used. It was his experience that the only way to clean properly was by means of the sand blast. Heavy scale may be removed by means of hammers and chisels, but the fine rust next to the steel can be removed only by the blast. He

has found this method much cheaper than hand work and also much more permanent. The machine he uses is a 150-ft. machine which can also be used for general work, such as drilling, riveting, etc. It supplies air for two nozzles. It is advisable to have the painters follow the sand blast very closely with the paint, as iron takes a light coat of rust very quickly. H. B. Wilson (B. & L. E.) and J. H. Barkley (I. C.) reported higher cost with the sand blast than for hand cleaning. Attention was called to the expense of spurring out the compressor car for anything but a very large job. H. E. Conrad (P. R. R.) called attention to the advantage of the sand blast where compressed air was available from interlocking plants or other sources. M. F. Ebel (C. H. & D.) reported trouble with pin point rust spots on surfaces painted over sand blast work.

A paper on the method of painting maintenance of way signs was read by O. Stubstad (C. & N. W.), in which he advocated the painting of signs on the ground rather than taking them up and painting them in the shop. The equipment for this work is restricted to what can be placed on a hand car and consists of a scaffold composed of two U-shaped bars and two planks, a 7-ft. ladder, paint and brushes. The crew consists of three painters and the foreman. The operation consists briefly of hanging the U-shaped bars over the sign and laying on the planks, the whole being arranged so that a painter sits on each side of the sign. First they paint the sign white and then with a little clean waste rub the fresh white paint off the black letters and retrace them with a 1-in. flat varnish brush. While the two painters are thus engaged on the sign, the third man paints the flanger signs, whistle posts, etc. After a little experience the men complete one sign in 35 min. and cover an average of $7\frac{1}{2}$ miles of line per day. This progress was with a hand car. After a motor car had been substituted more progress was made, not only because of the speed with which the men were transferred from one sign to the next, but because of the better time made on the signs, the average being reduced to about 25 min. The men had an opportunity to rest while being moved rather than becoming tired from pumping the hand car. According to the method outlined, all the work was finished up at one time and no second trips were required except when it was necessary to do two-coat work on signs which were in bad condition. It is not advisable to do this kind of work during the hottest part of the summer, as the reflection of the sign in a man's face combined with the direct rays of the sun on his back are almost unbearable. Experience is also reported in connection with the new signs required in the state of Minnesota, in which red letters are specified. Difficulty was experienced because of the tendency of the red paint to bleed into the white. M. F. Ebel, H. B. Wilson and Martin Kane disagreed with the author of the paper and favored making two trips over the line, one to paint the body of the sign and the second to stencil on the letters. It was their opinion that tracing over the old letters was much more expensive than stenciling.

"Railway Paint Specifications—Why?" was the title of a paper by Philip L. Maury (The Sherwin-Williams Company). Other questions discussed on the floor were: The Oil Waxing and Varnishing of Hardwood Floors in Station Buildings; Door Jams; Fillers for Checked or Cracked Plastered Walls; Method of Treating Smoke Stacks; Best Formula for Treating Galvanized Iron Before Painting; Treatment for the Ends of Steel Girders, and Methods of Treating Office Furniture.

The question, "Shall the Maintenance of Way Master Painters Unite or Amalgamate with the Master Car and Locomotive Painters," brought forth considerable adverse comment and led to the unanimous adoption of a resolution that it was the sense of that association that they do not amalgamate with the Locomotive and Car Painters' Association.

In the closing business Philadelphia was selected as the place for the next convention, to be held on October 17, 18 and 19, 1916. The following officers were elected: President, Fred C. Rieboldt, C. M. & St. P., Milwaukee, Wis.; first vice-president, H. E. Conrad, P. R. R., Huntington, Pa.; second vice-president, A. E. Wilson, N. Y., N. H. & H., Hartford, Conn.; secretary-treasurer,

F. W. Hagar, F. W. & D., Fort Worth, Texas. An executive committee was appointed by the president consisting of J. H. Barkley, I. C.; A. B. Phelps, N. Y. C.; Martin Kane, D. & H.; H. E. Conrad, P. R. R.; O. Stubstad, C. & N. W.

PAINT AS AN AID IN MAKING THE PUBLIC MORE FRIENDLY TO THE RAILROADS

BY EDWARD HURST BROWN
The Painters' Magazine, New York

The current time table of the Delaware, Lackawanna & Western contains an editorial the opening paragraph of which is so much in line with the thought that suggested the subject I have chosen that I will quote it here: "Realizing the value of a good first impression whenever opportunity offers, the Lackawanna Railroad has endeavored to transform the ugly and commonplace into something more inviting and to contribute its share to the town's attractiveness by beautifying the station surroundings, thereby making them a credit to the town and railroad alike."

This policy shows not only a liberal spirit on the part of the railroad management, but it indicates also that the officers of this road have caught the trend of public sentiment in this country. There is a civic pride in every community which prompts it to put its best foot forward. Every town, no matter how small, wants to make the best possible impression upon strangers, whether they are visiting in the town or passing through it. The railroad station is naturally the first building that the stranger sees, and first impressions are very strong.

To many railroad officers the only use for paint on the station building is to preserve it from the ravages of the elements. Standard colors are chosen because they are cheap or because a station can go for a long time without repainting if a dingy iron oxide paint trimmed with black or some other equally cheerful color scheme has been chosen as the standard station color. But citizens judge the railroad by the condition of its buildings in their own town, and if this is such as to cause passengers on trains to get a bad impression of the town, one can be pretty sure the railroad will not have very many strong friends in that particular place.

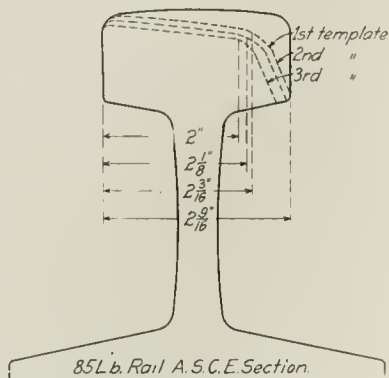
A few years ago a trade newspaper man of St. Louis, Allen W. Clark, conceived the idea of educating the public to an appreciation of better surroundings, to the beautifying of the towns with flowers and shrubbery, and to keeping their houses better painted. He started a movement that has grown to great proportions. Influential trade organizations have backed up this movement and subscribed liberally to it. Local boards of trade and health departments have given valuable assistance and the campaign has become a great movement.

Will our railroads do their part by cleaning up and painting stations and other buildings and thus make this country of ours a cleaner, neater, brighter America? If they do assist in the good work, if they show they are in touch with a movement that is making toward national prosperity and developing a spirit of civic pride in our various communities, they will win the good will of the people. They can endorse this movement in a practical way by keeping their station grounds clean, and planted with flowers where possible, and their stations well painted, and also make some effort to replace the commonplace color schemes that so many roads have adopted with more attractive combinations of colors, selected by men whose training has made them students of color harmony, and whose knowledge of the properties of paint and pigment will enable them to combine utility and durability with attractiveness and good taste. Let the railroads be the first and not the last to clean up and paint up. Then they will truly find that paint is a great help toward winning friendship of the public.

SYRIAN RAILWAY EXTENSION.—It is reported that the railway line from Isifahie to Radju was opened on October 20. The Syrian Railway thus extends some 20 miles nearer the already completed tunnel at Bakdje. The section of the railway just opened is part of the line which, when completed, will link Aleppo with Alexandretta and join up the Syrian Railway with the Konia-Adana line.

A TEMPLAT FOR CURVE-WORN RAIL

At a recent convention of the Roadmasters' Association, much interest was shown in the discussion regarding the time when curve-worn rail should be removed from the track and various limits were suggested. William Shea, roadmaster, Chicago, Milwaukee & St. Paul, Ottumwa, Iowa, has prepared three templets, duplicates of which he has given each foreman for his use in determining when the rail on the high side of curves should receive attention. These templets were prepared for 85-lb. A. S. C. E. rail, which is the section generally used on that division. This rail has a head $2\frac{9}{16}$ in. wide when new. When the rail is worn to the point that templet No. 1, with a width of head of $2\frac{3}{16}$ in. fits it, the foreman notifies the roadmaster. When the rail is worn to a point corresponding with templet No. 2, with a $2\frac{1}{8}$ in. width of head, the foreman makes a further report, following which the roadmaster personally inspects the rail and orders new rail to replace it. When the rail is worn to correspond with the third templet with a head of 2 in., it is replaced with new rail. By this method the roadmaster is kept advised regarding all rail seriously curve-worn and a uniform standard of renewal is maintained instead of leaving each individual curve to the judgment of the foreman in charge of that respective territory.



Templet for Measuring Curve-Worn Rail

TIE PURCHASES IN CANADA DURING 1914

A bulletin prepared by the forestry branch of the Canadian Department of the Interior under the direction of R. H. Campbell, director of forestry, reports the purchase of 19,403,646 cross ties, valued at \$8,664,914 during 1914 by Canadian railways. The companies reported comprise 47 steam railways and 31 electric railways. Of the total number purchased 1,447,576 were treated with preservatives. This represents 7 per cent of the total against 10 per cent in 1913.

The cross ties purchased in 1914 showed a decrease of 2.4 per cent from those of 1913, while the decrease from 1912 to 1913 was 6.7 per cent. Jack pine makes the most suitable tie material of the cheaper, more abundant woods of Canada. It has headed the list since 1911, when it took the place of white cedar, a more durable wood, but one of which the supply is rapidly becoming exhausted. These two woods have formed the greater part of the ties purchased in past years and together form over half the total in 1914.

The average price paid for ties by the railways in 1914 showed only a slight increase over 1913. The prices in the last five years have been as follows:

1910.....	38 cents
1911.....	39 cents
1912.....	44 cents
1913.....	43 cents
1914.....	45 cents

The accompanying table shows the ties bought by steam railways in Canada in 1914. In June of that year there was about 38,000 miles of steam railway right of way in the Dominion. Over 32,000 miles of this was in operation and ties had already been laid on practically all of the remaining mileage. The total number of ties purchased by the steam roads in that year, 19,196,208, represents an average of 500 ties to the mile. A large proportion of these, however, were used on new construction at the rate of about 3,000 ties to the mile.

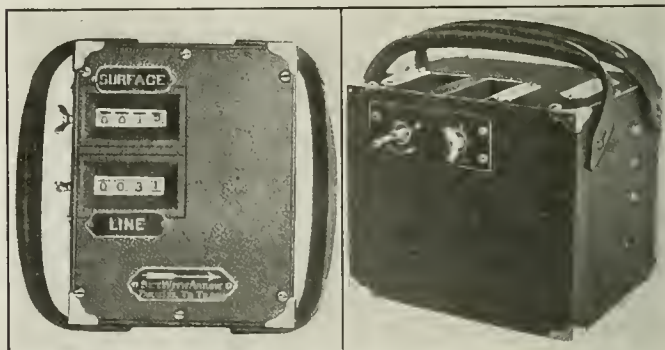
Detailed Record of Ties Purchased by Steam Roads in Canada in 1914.

Kind of Wood.	Number.	Value.	Av. Val.	Per cent.
Total	19,196,208	\$8,545,057	0.45	100.0
Jack pine	8,355,518	3,610,885	0.43	43.5
Cedar	2,574,920	1,232,925	0.48	13.4
Tamarack	1,478,512	646,674	0.44	7.7
Douglas fir	1,452,238	537,374	0.37	7.6
Hemlock	1,369,376	566,502	0.41	7.1
Western larch	1,121,347	459,643	0.41	5.8
Spruce	1,019,249	378,989	0.37	5.3
Oak	602,291	469,828	0.78	3.1
B. C. spruce	547,919	202,234	0.37	2.9
Hard pine	356,473	250,614	0.70	1.9
Chestnut	104,980	69,091	0.66	0.5
Red pine	81,979	30,923	0.38	0.4
Beech	32,637	25,331	0.78	0.2
(Rock) elm	28,973	24,627	0.85	0.2
Maple	22,449	19,995	0.89	0.1
White pine	14,165	6,446	0.46	0.1
B. C. cedar	12,609	4,035	0.32	0.1
Birch	11,018	5,293	0.48	0.1
Cypress	5,430	2,356	0.43	•
B. C. hemlock	4,019	1,246	0.31	•
Ash	106	46	0.43	•
Cherry	•	•	•	•

*Less than one-tenth of one per cent.

THE VAUGHAN TRACK INDICATOR

The Vaughan track indicator is an instrument designed to show the condition of the line and surface of track by mechanical means. The results are given in terms of the sum of all the line swings or surface jolts on any given section of track. In the operation of this instrument, motion is transmitted by car movements to two pendulums, one simple pendulum hanging vertically on ball bearings and one duplex pendulum supported horizontally by a spring bar. The horizontal pendulum is made duplex, being composed of two pendulums with different periods of oscillation, so that there can be no possibility of its period of



Two Views of the Vaughan Track Indicator

oscillation synchronizing with the joint swing a car will sometimes have at certain speeds. Motion of the pendulums is transmitted through ball ratchets to the ball bearing counters, from which the readings are taken. The ball ratchets are sensitive and will record very small movements of the pendulums. As the riding qualities of the car will have some influence on the readings, the instrument should be always carried, if possible, in the same car at about the same speed.

The Vaughan track indicator is a compact instrument measuring 6 in. by $6\frac{1}{2}$ by 8 in., fitted with handles. The finish is in black grain leather with all metal nickel plated. It is manufactured and sold by the M. W. Supply Company, Philadelphia, Pa.

REPAIRING FROGS AND SWITCHES ON THE KATY

By GEORGE P. WHITE

Blacksmith Foreman, Missouri, Kansas & Texas; Parsons, Kans.

At the Parsons (Kans.) shop of the Missouri, Kansas & Texas, many frogs and switches are repaired. One of the recent developments in this work is the application of Oxweld equipment. Several switch points which were built up by the oxy-acetylene process have now been in service for six months and are apparently good for several months' additional wear. In fact, about

the same service is being secured from the repaired points as from new ones. The average cost to repair them in this manner is \$1.25 as against an average cost of \$2.25 for manufacturing new points. While only a few frogs have been repaired in this manner, they are also giving good service.

In addition to making repairs at Parsons, a special car is moved over the road, fully equipped to make repairs to frogs and switches out on the line. Three men accompany this outfit, making light repairs wherever necessary, where such repairs can be made without removing the frogs from the track. The movements of this car are directed by the general manager's office and the car is transferred from one division to another as the amount of work warrants, while on each division the work is outlined by the superintendent. By handling this class of repairs in this manner, it is unnecessary to carry a large number of frogs in stock, as the man in charge of this road repair gang also acts as an inspector, advising in advance when it is necessary to replace certain frogs. With this plan it is also possible to materially reduce the cost of repairs as compared with the practice of allowing the frogs to remain in the track until it is necessary to remove them and then send them into the shop for heavy repairs.

CONSTRUCTION WORK ON THE AMUR (SIBERIAN) RAILWAY

By W. A. D. SHORT

Siberian Russia is a country of vast expanse and distances, the extent of which is not generally appreciated in this country. The area of this part of Russia is 4,833,496 square miles, or 1,276,496 square miles larger than the United States proper, including Alaska. The leading occupation of this country is agriculture, but the country contains considerable mineral wealth, including gold, platinum, silver, iron, lead, etc.

The first determined effort to open up this country and territory was made by the construction of the Trans-Siberian Railway, ground for which was broken in 1891. This road connects

no automatic tie unloaders, rail unloaders, or track layers, as are now being used in this country. The ties used at first are, as a rule, half sections of trees. The trouble is not taken to hew the ties out of the trees in order to give plane surfaces on two sides. Instead they are laid with the flat surface down and are then grooved on the top to receive the "T" rail, generally weighing about 60 lb. to the yard and 24 ft. long. The angle bars have 4 holes and are similar in shape to the American type. As a suspension joint is used these bars are strengthened by addi-

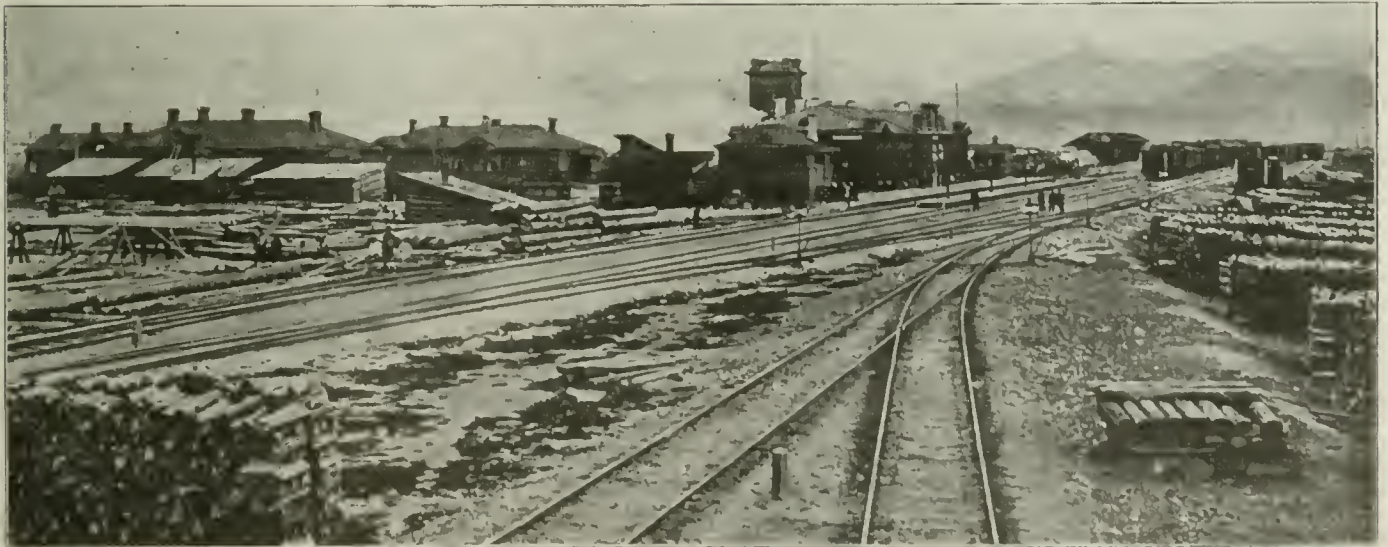


Laying New Track on Half-Round Ties

tional metal in the center, extending on either side of the joint proper. The rails are laid with broken joints and 12 ties per rail length.

The grading on this line was done by hand and horse scrapers and plows, there being no steam shovel work. Construction camps and camp-cars for the laborers are unknown. The engineers sometimes have camp-cars in which they make their headquarters during the actual laying of track. But the laborers have to shift for themselves and erect tents or sleep on the ground as best they can. This is a great hardship at times, particularly as the Amur line traverses mosquito-laden forests for miles.

When the line is completed substantial houses are built every



An Important Station and Fuel Depot

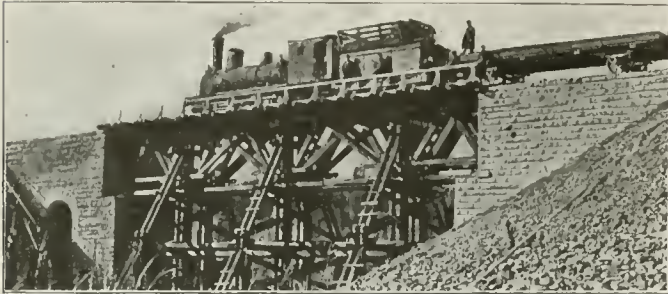
the city of Cheliabinsk with Vladivostok, on the Pacific Ocean, 4,000 miles away to the East. The western terminus is, in turn, 1,525 miles from Petrograd. Therefore the total length, in a continuous line, of this railway in Russian territory is 5,525 miles. In addition branches and extensions have been built, notable among which is the Amur route.

The Russian engineers learned most of their methods of construction and equipment from the Americans, as several years ago a large number of them were serving apprenticeships in American railway shops and on engineering corps. There are

two miles for the track walkers and their families to reside in. Some of these houses are 300 miles from the nearest village, town, or doctor and the track walker sees no one excepting his family and a passing train for days at a time, as there are no inhabitants of these woods and the American "hobo" is unknown. On account of the vast forests and ease of procuring, wood is used as fuel by the locomotives and at important stations, as well as intermediate points, fuel depots are established which have the appearance of American stove yards.

In the illustration of the temporary false work for the bridge

over the Kachu river, it is interesting to note the substantial stone work construction of the permanent abutments. Run-off archways are placed under the centers of the abutments to take care of excessive floods and back wash, which take the place of the wing walls of American construction, particularly of concrete abutments. The form of construction of the bents and the bracing for the stringers and deck is different from our type, and



Falsework Over Kachu River

at the same time heavier than would be used by American engineers for temporary trestle work, but this strength of construction was probably carried out in anticipation of excessively heavy floods before the installation of the permanent span. This trestle work has now been supplanted by a deep single girder span.

CHICAGO, MILWAUKEE & ST. PAUL ROADMASTERS' ASSOCIATION

The ninth annual meeting of the Chicago, Milwaukee & St. Paul Roadmasters' Association was held at the Republican House, Milwaukee, on November 2, 3 and 4, with about 40 roadmasters present. Membership in this association is limited to the roadmasters of the Chicago, Milwaukee & St. Paul, practically all of whom are included. A three-day convention is held annually at some central point on this road, at which problems of general interest to these men are discussed.

The association has annual dues of \$1 and elects officers from year to year. Committees are selected to present reports upon assigned subjects. The control of this organization is entirely in the hands of the roadmasters, the higher officers taking no active part, but attending frequently. The association is encouraged by the railroad, which provides a stenographer to report the discussion, and prints the proceedings for free distribution among the members.

In addition to providing for a free interchange of ideas among the members, all of whom are working to the same standards, this association provides an opportunity for officers in other departments to present matters of mutual interest. Thus, at the recent meeting in Milwaukee, the auditor of material accounts presented to the men several proposed forms for the keeping of time and material records, which forms were the subject of extended discussion and criticism. Likewise, the tie agent presented subjects of interest to his department. While the recommendations of this association are not binding upon the officers of the road, they are given serious consideration, the proceedings going to all maintenance and operating officers.

In addition to the free exchange of ideas, it is felt that this association is a material aid in the standardization of work over the system, clearing up many points not thoroughly understood. As all the men are using the same materials and working under the same general instructions, many topics can be discussed to advantage in such an association which could not be taken up in an organization composed of men from different roads.

Among the subjects considered at the recent meeting were the following: Are We Getting the Maximum Amount of Work Done for the Money Expended for Section Labor as Now Handled, or Can We Get Better Results by Allowing the Road-

master to Have the Labor More Evenly Distributed Throughout the Year? What Should be the Cost Per Mile in Section Labor, of Maintaining Track in First Class Condition on Class A, B and C Divisions? What are the Defects in the Materials Furnished for Our Standard Split Switches and What Can Be Done to Remedy Such Defects? Are Our Present Standard Tool Houses Large Enough for the Requirements of Section Gangs and If Not, What Should be the Dimensions of a Section Tool House? What is the Best and Most Economical Cattle Guard to be Used on All Classes of Divisions? What is the Best Time to Apply Rail Anchors and do Extra Gangs or Section Gangs do the Best Work?

The officers elected for the following year were: President, J. C. Burke, roadmaster, Cedar Rapids, Ia.; Vice-President, J. D. Boland, roadmaster, Sanborn, Ia.; Secretary-Treasurer, W. H. Kofmehl, roadmaster, Elgin, Ill. The next meeting will be held at Seattle, Wash., to give the men an opportunity to see their Western lines.

EARLY TONNAGE STUDIES

The following paragraph, taken from a report made by Luther Hother Hage, engineer of the West Feliciana Railroad (now a part of the Illinois Central system), dated May 24, 1836, is of interest in these days of low grades and heavy tonnage trains as indicating not only the limitations of 80 years ago, but the lead which the United States assumed in freight transportation in those early days and the importance attached to tonnage at that time:

"Eleven years ago the best locomotive engines manufactured in England had a power equal to convey 40 tons at the rate of 6 miles an hour. It was then admitted that these engines were susceptible of great improvements, but the idea was divided that 'any possible improvement' could enable them to proceed at double the velocity named. Four years after this the average rate of traveling was 15 miles an hour on the Liverpool & Manchester Railway. Thrice the velocity first named has been attained 5 years ago, and is now daily performed on some of the railways in this country. The original design of having stationary engines on the Liverpool & Manchester Railway at the Sutton and Rainhill planes was abandoned, and locomotive engines were found capable of surmounting their grade of 55 ft. per mile. The progressive improvements in the construction of these engines in our own country have attained to such a degree of perfection that they are under all circumstances capable of generating an adequate power of steam to overcome the adhesion of the wheels to the surface of the rails, while those of English construction are unable to keep up a sufficient supply. On the Columbia Railroad in Pennsylvania, where an inclination of 45 ft. per mile has been introduced, the 'Canal Commissioners' have reported that 'the majority of the American engines in their ordinary trips draw a gross load of 75 tons. One of them has drawn 100 tons and several others from 80 to 90 tons over the highest grade on the road.' More was done in December, 1834, on the Baltimore & Ohio Railroad, where a locomotive engine passed over the planes at Parr's Ridge, ascending $2/3$ mile at the average rise of 264 ft. per mile, with two cars full of passengers, making with the tender, 11 tons exclusive of its own weight of $7\frac{1}{2}$ tons. Applying the known power of engines of the same construction as those intended for this road, namely, that they have drawn 75 tons up an inclination of 45 ft. rise in a mile, such engines would be capable of ascending the steepest grade upon this road with a gross weight of 48 tons. This would enable such an engine to take more than 9 loaded cars from the Mississippi river toward Woodville. In the opposite direction I am unable to make any calculations of the quantity of burden an engine will move; I presume, however, that 80 tons gross or more than 17 loaded cars may be brought in a train from the interior to the Mississippi river by one locomotive, as the steepest grade of the road in this direction has an ascent of but 30.4 ft. to a mile."

General News Department

In press despatches of November 13 it is announced that the railways throughout Mexico will pass from military to civil control December 6 under a decree of General Carranza, head of the de facto government.

The Chicago, Milwaukee & St. Paul announces the opening to traffic of the Puget Sound & Willapa Harbor Railway, a branch 66 miles long, running from Willapa Harbor, Wash., to Maytown on the Gray's Harbor branch.

According to the Canal Record, excavation from the Gaillard Cut, on account of the slides in the Panama Canal, during October amounted to 1,079,663 cu. yd., compared with 1,052,586 cu. yd. in September, 991,879 cu. yd. in August and 692,109 cu. yd. in July. In October 872,952 cu. yd. were taken from the base of the Culebra slides.

During September the Southern Railway disbursed for labor, material, supplies and other purposes \$4,129,787, of which \$3,660,518, or 88.64 per cent, was paid to the individuals and industries in the South. This amount represents more than 90 per cent of the moneys paid to the company for transportation by people situated on the lines.

The Chicago switchmen who, as reported last week, have filed demands for increases in pay, have asked the roads to defer action looking to the fixing of a date for a conference. It is understood that this request is due to the fact that the switchmen have been called off by the officers of their brotherhood because of the feeling that they might jeopardize the campaign for an eight-hour day.

The President of the United States has appointed a "Board of First-Aid Standardization" with a view to making available for possible military use the first-aid activities of various industries in time of peace. Dr. S. C. Plummer, of Chicago, chief surgeon of the Chicago, Rock Island & Pacific, and representing the American Association of Railway Surgeons, is a member of the board. The purpose of the board is to standardize first-aid packages and equipment, the means of transporting wounded persons and first-aid instruction.

The Baltimore & Ohio has issued for its employees a treatise on first aid to the injured prepared by Dr. Joseph F. Tearney, chief medical examiner of the road. Discussing the effect of alcoholic liquors given in connection with sickness or accident, Dr. Tearney says: "Whiskey, even in small teaspoonful doses, increases the tendency to bleeding. When given in the somewhat larger quantity, known as the ordinary 'drink,' the first effect of stimulation is followed by a corresponding depression, so that, when the surgeon arrives, he will have to lose valuable time in combating this depression, in addition to that caused by the shock of the accident. . . . If the sympathetic friend with the bottle tries to deaden pain with whiskey, he may produce intoxication and it is difficult to put a half-drunken man under an anaesthetic. It may be asked why the surgeon sometimes gives whiskey; the answer is that he knows how much to use and when not to use any. . . . Make it your iron-bound rule to allow the patient to have no whiskey or other alcoholic liquor."

As announced in a previous issue, the first annual track and field meet of the Missouri, Kansas & Texas Athletic Association was held at Denison, Tex., on November 6. The association was organized largely for the purpose of bringing the employees together and to promote good fellowship, and nearly 4,000 employees were present. Those from out of town were brought to Denison in six special trains, and every district on the system was represented in the contest, as well as several of the officers, including W. A. Webb, chief operating officer, and H. F. Anderson, general superintendent. A large number of other officers was present. The C. E. Schaff trophy, donated by Receiver Schaff, which is to be contested for annually, was awarded to the Denison district, and was presented by Vice President Whitehead in the absence of Mr. Schaff. Gold, silver and bronze medals were awarded to the winners of the individual events and

were presented by General Manager W. E. Williams. The officers report that the spirit with which the employees have entered into the activities of the association has been very pleasing and indicates that the organization will be very helpful in many respects. The city of Denison declared a holiday for the occasion and many features of entertainment were arranged for the visitors.

Over three-quarters of the new men employed in the Boston freight houses, following the strike of October 21, are reported as having proved satisfactory for permanent employment; and the reports of "settlements" which have appeared in the newspapers within the last week evidently have no serious meaning except that the roads, in accordance with the attitude which they announced at the outset, have taken back strikers, as individuals, insofar as there was room for them. The marked increase in the volume of freight during the past month also has ameliorated the condition of the strikers somewhat. It is said that some of the men who struck were affiliated with the American Federation of Labor and some with the Knights of Labor; but the chief officers of these organizations were not consulted. The mayor of the city and the governor of the state seem to have been the only persons of prominence who espoused the cause of the strikers. The Boston News Bureau says that the misled members of the freight handlers' unions have had to lose not only several weeks' wages while they have been idle, but also, even when taken back, their record rating; and continues: "A halt has apparently been called upon the arrogance of union labor leaders in disregarding the public's convenience, pecuniary interest and general welfare. The Boston roads, in 'standing up in their boots' in this situation, have set an example that everybody should commend. * * * As often happens in such strike episodes, the hardships involved have borne particularly on the older members of the union, who had little appetite for striking but were overruled in the union councils by the more vociferous and impetuous younger members and their leaders."

"A Corporation with a Soul"

Citizens of Ardmore, Okla., have erected in a prominent location a billboard bearing the words "Great is the Santa Fe. One Corporation with a Soul." This was done as a mark of appreciation for the promptness with which President Ripley, of the Santa Fe, agreed to settle for all damages resulting from the recent explosion of a tank car on the company's tracks at Ardmore in which many people were killed and a large amount of property was destroyed. Without admitting its liability for the accident, the company suggested the appointment of a board of arbitrators from the citizens of the city to pass upon the amount of settlement in each case.

Reduction in Loss and Damage Claims on the North Western

The Chicago & North Western, which during the last year and a half has been conducting a special campaign for the reduction of loss and damage claims, in the fiscal year ended June 30, 1915, showed a decrease of \$238,860 in its payments for loss or damage to freight, a reduction of about 20 per cent, whereas the freight revenue decreased only 3.8 per cent. Largely as the result of the campaign, 40,000 less claims were presented than during the year before. H. C. Howe, freight claim agent, has just issued a circular to all agents of the company and other employees, announcing November 16 and November 24 as special claim prevention days, with the idea that special efforts made on these days to avoid the causes for loss and damage to freight will tend to promote more careful habits on other days. The circular says that "every day is claim prevention day, but the above dates are to be extraordinary," and an especial effort is to be made to show a still greater improvement during the coming year. This campaign is handled by the freight claim agent, who has five inspectors traveling all of the time inspecting

the loading and unloading of freight, and instructing employees in proper methods. Special effort is also made to trace the over, short and damage reports to ascertain causes and endeavor to eliminate damage in future by bringing the matter to the attention of the employees at fault, without discipline. A pamphlet has been distributed among the agents of the road, in which are a large number of illustrations showing improper methods of loading and handling freight, and their results, together with the proper methods.

Applicable also on the X. Y. & Z.

General Manager Robert S. Parsons of the Erie Lines West has issued to enginemen a circular which, according to the *Cleveland Leader*, includes the following:

"If you were a passenger seated at a car window, or sleeping in a berth, you would not like to have a locomotive whistle blown just opposite you, giving you a severe attack of the 'jumps.'

"If you were a passenger you would not like to have the train come to a stop with a jolt rough enough to break the articles in your traveling bag and give you a general shaking up.

"Yet these annoyances occur every day, and many times a day, on the Erie Railroad—all because you do not realize the situation in which the passengers are placed. There is no rule or regulation that can stop these practices. It rests entirely upon your good nature and thoughtfulness. Will you strive to make an improvement?"

Texas Repair Shed Law

The Supreme Court of Texas has rendered a decision holding constitutional the law of that state which requires the maintenance by railroads of suitable sheds for employees when repairing cars. The case was that of the state against the International & Great Northern, on appeal from Harris county. The lower court held that the law was unconstitutional, but this decision is now reversed. The strict enforcement of the law will call for the construction of many repair sheds.

The lower courts held the law unconstitutional because vague and meaningless; but Associate Justice Yantis cites similar language in statutes that have stood the test of constitutionality before the United States Supreme Court.

The car shed law requires the erection and maintenance of a building or shed by every person, corporation, or receiver engaged in constructing or repairing railroad cars, and provides penalties of from \$50 to \$100 for each 10 days of its violation. The law has several exemptions by the terms of which each corporation, etc., would be absolved from its penalties. Among these exemptions is the provision that the act shall not apply at "points where it is necessary to make light repairs only." A general demurrer was sustained to the state's petition upon the ground that the act was too indefinite in its terms to enforceable, the trial court holding that the term "light repair" is a relative term and wholly unintelligible.

The Supreme Court holds that because the act is penal in its nature it should be strictly construed. It notes in the opinion, however, that the term "light repairs" is used in a provision exempting from suit and not in a portion of the act which penalizes an infraction of its provisions. . . . "We think the term 'light repairs' makes plain the intent of the legislators, and that the industries affected by the legislation will not suffer from a failure to understand its meaning; and that the courts and juries will find no difficulty in determining from the facts in each case whether the repairs were 'light' or otherwise."

Mail Pay on Middle West Roads

The Postmaster General announces the completion of the mail pay adjustments for the next four years on all railroads in the Third Contract Section. The third section handles the heaviest bulk of mail of all the sections. It embraces Ohio, Indiana, Illinois, Michigan, Minnesota, Wisconsin, Iowa and Missouri. The adjustments are based on a complete weighing during 105 days, February 18 to June 2.

The statement says: "The pay of all the roads in this territory, for four years, is fixed at \$20,073,484.36 a year. The weighing showed that an average of 2,862 tons of mail was being carried each day in over 4,000 trains.

"The eager competition among the railroads to share in the mail pay is shown by the fact that they will receive annually

more than \$200,000 less than the maximum allowed by law, because certain lines between common points accept a lower rate of pay in order to retain the carriage of through mails. In such case the Department gives the companies operating the more expensive [longer] lines the opportunity of meeting the cheapest rate and retain the mails. This the railroads are always willing to do.

"A conspicuous instance of this is found between Chicago and Minneapolis. Between these cities the Chicago & North-Western is the cheaper on account of shorter distance and land-grant deductions. The Chicago, Milwaukee & St. Paul, which has carried the bulk of the mails for many years, accepts the lower rate of the North-Western on all through mails, and thereby its pay on this one route is reduced \$112,000 yearly. The New York Central carried competitive mails between New York and Chicago at the lower short-line rate, with a reduction of \$95,000 a year in its compensation.

"Postal officials think the alacrity with which the railroads agree to these reductions and their efforts before each weighing to secure additional mails by offering expedited or new train service as inducement are good evidence of the unjustness of the often-repeated assertion that the railroads are handling the mails at a loss. . . . No less than 793 train weighers, 321 station weighers, 59 verifiers at railway mail service division headquarters and 58 tabulators and computers in the Department at Washington were employed in the weighing this year, at a cost of \$381,948. This is more than \$97,000 less than the cost of the last weighing in the third section, an economy effected through the adoption of improved methods, supervision direct from the Department and tabulation of results in Washington instead of in the field, as formerly. The saving during the last four years has been over \$280,000."

The New Haven Trial

Charles S. Mellen was characterized as an adverse witness while testifying Thursday, November 11 for the government in the criminal suit against New Haven directors for violating the Sherman Law. The government attorney, R. L. Batts, expressed the opinion that Mr. Mellen "has shown a willingness to answer questions concerning every fact which we have proved by other testimony, but he has shown a different disposition where the defence of his own conduct is involved. I think I should have a certain latitude in asking him questions as if he were in a measure an adverse witness."

The remark was made in connection with Mr. Mellen's testimony concerning the New Haven's dealings with competing lines, and particularly with the Enterprise Line. The government brought out that the United States Transportation company was established to meet the competition of this steamship company, and that its affairs were wound up and its properties taken over by another New Haven company, immediately after the Enterprise Line became bankrupt and went out of business. The government attorney made a strong effort to show that the New Haven tried to conceal its activities in this and other cases.

Considerable attention was paid on Thursday and Friday to the New Haven's relations with Charles W. Morse. In 1907 Morse controlling extensive water traffic, offered the New Haven \$20,000,000 for its boat lines, or \$14,000,000 more than their cost to the railroad. Mr. Mellen, it appears, argued strongly in favor of accepting the offer but the board of directors was strongly against so doing, being influenced largely by a statement of ex-president Roosevelt's to the effect that he was fearful of the success of Morse's proposed steamship monopoly and preferred the present situation. The New Haven took steps to protect itself against Morse and in that connection secured an interest in the Merchants & Miners Transportation Company and the Windsor Line which had been amalgamated with it. Mr. Mellen in 1912 proposed to acquire the minority stock and secure majority control. He planned by this means to extend the New Haven's steamship lines to include a service from Boston to Galveston, and later from Boston via the Panama Canal to Pacific coast points. The scheme was to buy the minority stock of the Merchants & Miners Transportation company and to have that company inaugurate the additional service. He expected that the New Haven, for some time, would have a loss on this business, and did not want minority holders to suffer this loss. These ambitious plans to extend New Haven's steamship monopoly were suggested and

stimulated by directors of the port of Boston and other Boston interests who wanted cotton brought direct from Galveston to Boston by steamer; but they were not carried out because of the passage of the Panama Canal Act, divorcing water and railway lines.

The testimony then turned to the relations with the Metropolitan Line. The latter in 1905 operated freight boats on the outside route between New York and Boston. It later established a passenger service, using the Harvard and Yale. Thereupon the New Haven put in service in competition the freight steamers Old Colony, Bunker Hill and Massachusetts, these later being converted into passenger boats when the New Haven acquired control of the Metropolitan Line and transferred the Harvard and Yale to the Pacific coast. On Monday this was gone over in more detail, but so confused did matters become that Judge Hunt finally had to call a halt and ask the counsel to submit a written statement of the Metropolitan situation.

On Tuesday, November 15, Mr. Mellen was questioned about the acquisition of trolley lines. Judge Hunt ruled that the government could go ahead in its proof that the 65 trolley lines acquired by the New Haven, were taken over for the purpose of interstate commerce.

On Wednesday, H. W. Goodall, of San Francisco, testified concerning the Pacific Navigation Company, which leased from the Pacific Company, a subsidiary of the Metropolitan Steamship Company, of New Jersey, the steamers Harvard and Yale. Mr. Mellen was again on the stand in the afternoon.

June Mechanical Conventions

The meeting of the executive committee of the Master Car Builders' Association, the American Railway Master Mechanics' Association and the Railway Supply Manufacturers' Association was held in Chicago on November 15. It was decided that the next annual convention of the Master Car Builders' and the Master Mechanics' Associations would be held at Atlantic City, starting June 14, the Master Car Builders' convention being held first and the Master Mechanics' convention the following Monday. The city of Chicago would undoubtedly have been chosen as the convention meeting place had the Municipal Pier been ready for occupancy at that time. It is believed that in future years the June conventions will be held at that place.

Western Railway Club

At the November meeting of the Western Railway Club, which was held in the Fort Dearborn hotel, Chicago, November 16, a paper was presented on "The Prevention of Loss and Damage Freight Claims," by G. E. Whitlam, superintendent freight loss and damage claims, St. Louis & San Francisco Railroad, Springfield, Mo. Mr. Whitlam outlined the system followed by the Frisco for the prevention of loss and damage claims, giving a brief history of the organization from its inception, and showing the beneficial results accruing from the claim prevention campaign. A complete description of the work the Frisco has been doing along these lines was published in a series of articles in the *Railway Age Gazette* last spring, the first article appearing in the issue of April 9, 1915, page 779, the second article appearing April 16, 1915, page 817, and the third article appearing April 23, 1915, page 891.

Plans for March Convention Exhibits

A meeting of the board of directors of the National Railway Appliances Association was held at Chicago on November 12, to discuss plans for the annual exhibit of the association in connection with the convention of the American Railway Engineering Association, which is to be held on March 20 to 23, inclusive. C. W. Kelly, of the Kelly-Derby Company, Chicago, secretary, treasurer and director of the exhibits for the association, reported that over 80 per cent of the exhibit space has already been signed for. The exhibit will occupy the entire main floor of the Coliseum and Annex, a total of 36,600 sq. ft. of exhibit space, and the floor plan has been changed so that approximately 1,000 sq. ft. will be added to the available exhibit space as compared with previous years. A number of important improvements has also been decided upon for the arrangement of the exhibit space, especially in the Annex, and in the decoration and lighting system. In the Coliseum 27,026 sq. ft. of space has been allotted and in the Annex 2,885 sq. ft., leaving 3,625 sq. ft. in the Coliseum and 3,112 sq. ft. in the Annex unallotted.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, January, 1916, Atlanta, Ga.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, The Blackstone, Chicago.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3rd Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave. Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.
- GENERAL SUPERINTENDENT'S ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith, Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.—Hatty S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie, R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—F. M. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF SEPTEMBER, 1915

Name of Road.	Average mileage operated during period.	Operating revenues			Maintenance of			Operating expenses			Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.
		Freight.	Passenger.	Total (inc. misc.).	Way and structures.	Equipment.	Traffic.	Transportation.	Miscellaneous.					
Alabama & Vicksburg.....	143	\$88,618	\$34,003	\$132,621	\$15,704	\$32,943	\$3,488	\$45,756	\$2,114	\$5,630	\$105,636	\$7,850	\$19,837	\$6,899
Alabama Great Southern.....	309	293,872	85,748	408,058	45,355	40,058	11,449	126,172	3,774	8,757	288,705	15,171	104,183	5,699
Aun Arbor.....	294	130,624	51,578	182,202	26,082	35,811	5,304	66,993	645	8,520	143,355	12,800	40,302	—12,119
Atlanta, Birmingham & Atlantic.....	638	202,282	45,717	265,070	42,169	45,109	13,065	95,961	21	10,359	205,584	13,100	46,952	53,279
Atlantic & St. Lawrence.....	167	75,172	30,094	117,146	22,160	15,544	3,392	48,762	.....	4,271	94,009	11,505	11,628	14,135
Atlantic City.....	179	14,436	164,907	252,095	37,446	21,197	3,299	111,991	97	1,082	175,112	76,983	66,957	7,700
Baltimore & Ohio.....	4,535	7,535,474	1,402,909	9,617,819	1,122,287	2,025,353	162,801	2,882,999	51,645	180,454	6,424,145	284,150	2,908,610	544,685
Baltimore & Ohio Chicago Terminal.....	79	.....	599	599	17,386	16,450	760	55,802	1,824	5,030	94,007	7,654	30,649	6,183
Belt Ry. Co. of Chicago.....	26	.....	.....	.....	225,281	19,740	510	81,303	.....	4,468	133,516	10,758	81,007	—52,990
Boston & Maine.....	2,302	2,393,370	1,551,525	3,944,895	498,591	530,562	36,492	1,668,383	17,346	9,225	2,843,599	157,108	1,329,291	481,243
Canadian Pacific Lines in Maine.....	233	45,211	17,137	69,453	25,342	9,832	4,879	30,511	.....	3,482	74,046	12,000	—16,593	—8,295
Carolina, Clinchfield & Ohio.....	283	198,997	18,075	221,232	23,374	26,665	8,044	38,007	.....	9,164	103,975	14,250	102,979	9,474
Carolina, Clinchfield & Ohio of S. C.....	18	11,026	1,243	12,269	1,385	83	1,788	2,269	.....	740	6,169	750	5,662	1,034
Central New England.....	304	218,899	42,063	376,270	59,691	38,448	1,216	92,857	.....	4,610	192,650	12,800	170,816	63,315
Central Vermont.....	411	223,677	98,711	359,172	33,806	34,244	9,410	133,797	4,086	6,637	265,980	15,590	77,602	15,294
Chicago & Eastern Illinois.....	1,282	1,077,124	265,478	1,449,766	223,383	343,347	21,741	455,163	7,311	35,966	1,083,640	53,600	311,935	32,066
Chicago & Erie.....	270	594,191	56,041	697,120	72,179	72,342	16,460	228,253	1,508	12,972	402,063	20,500	274,557	—265,712
Chicago, Milwaukee & St. Paul.....	10,076	6,470,333	1,848,575	9,261,439	930,825	1,350,167	163,144	3,104,869	66,809	148,875	5,438,472	455,040	3,364,689	158,916
Chicago, Rock Island & Pacific.....	7,654	4,054,056	1,782,196	6,325,106	1,049,137	1,105,206	137,895	2,201,245	38,108	157,978	4,687,403	293,835	1,343,228	—362,180
Cincinnati, New Orleans & Tex. Pac.....	337	628,556	143,427	822,328	83,919	213,349	22,374	237,583	3,899	18,640	579,718	31,000	211,573	108,230
Colorado Midland.....	338	131,540	24,665	165,735	26,002	30,489	6,870	65,017	1,189	5,784	135,151	10,000	20,585	—20,270
Colorado & Southern.....	1,089	535,119	139,923	705,572	108,591	136,534	9,201	199,291	5,004	22,566	481,186	35,000	214,347	40,022
Cripple Creek & Colorado Springs.....	87	94,359	22,286	118,527	17,209	11,810	4,093	30,202	.....	3,112	66,426	6,863	45,238	.....
Denver & Rio Grande.....	2,577	1,617,139	650,762	2,443,638	279,284	337,268	42,618	589,161	49,576	47,660	1,345,566	1,098,072	1,007,748	290,434
Detroit & Toledo Shore Line.....	81	114,474	.....	114,474	115,185	11,954	1,544	30,188	.....	2,696	53,138	5,575	56,472	241
Detroit, Grand Haven & Milwaukee.....	191	165,000	56,000	257,301	25,748	24,549	5,395	101,403	747	4,157	161,063	3,770	91,487	80,913
Detroit, Toledo & Ironton.....	441	163,359	16,210	191,701	21,030	21,166	4,035	70,793	.....	5,925	122,950	68,751	5,500	63,251
Duluth, Winnipeg & Pacific.....	185	83,085	16,036	104,470	13,719	11,225	1,532	35,908	105	5,532	68,520	5,224	30,727	24,924
Erie.....	1,988	4,245,277	832,035	5,556,546	480,337	806,977	86,016	1,745,548	33,935	108,722	3,237,817	168,654	1,233,497	1,233,497
Fort Worth & Denver City.....	454	322,927	141,925	464,852	57,624	80,675	6,162	133,042	2,929	14,808	295,240	17,475	174,475	41,214
Galveston, Harrisburg & San Antonio.....	1,351	790,199	281,617	1,124,801	134,591	137,499	27,269	366,549	9,981	30,790	704,160	46,269	374,202	36,937
Georgia.....	307	202,987	59,278	262,265	18,111	43,058	12,744	98,666	20	6,730	170,329	53,225	46,362	14,267
Grand Trunk Western.....	347	462,000	150,000	669,916	66,916	107,356	14,981	132,962	5,793	11,894	430,766	18,870	220,276	148,379
Great Northern.....	8,102	5,885,370	1,310,302	7,862,037	566,813	736,460	93,793	1,821,067	75,296	111,637	3,774,421	48,818	4,039,537	—298,655
Gulf, Colorado & Santa Fe.....	1,938	1,011,535	269,978	1,344,235	333,344	212,203	29,685	462,484	.....	33,175	1,068,814	58,203	216,934	—162,996
Hocking Valley.....	351	547,907	31,324	679,716	68,723	117,228	8,050	172,252	.....	13,458	384,712	295,000	257,604	2,631
Houston, East & West Texas.....	191	78,302	25,322	103,624	20,884	17,421	1,927	36,363	618	3,133	79,334	5,810	25,671	49,278
Houston & Texas Central.....	895	448,083	125,943	615,411	76,525	90,647	16,131	189,424	5,820	19,213	388,130	22,883	197,215	151,878
Kansas City, Mexico & Orient.....	737	152,732	36,904	189,494	20,269	56,956	8,794	86,783	.....	11,252	209,075	10,000	—17,806	—65,445
Lake Erie & Western.....	900	515,799	69,639	616,508	73,803	117,487	11,298	178,774	.....	11,944	392,906	223,602	199,199	56,827
Lehigh & Hudson River.....	97	143,652	10,112	160,884	20,126	21,254	1,457	48,772	.....	3,785	95,395	4,200	61,289	11,364
Lehigh & New England.....	296	268,775	838	283,590	41,847	28,297	2,067	64,024	.....	4,593	140,829	6,200	136,561	19,371
Louisiana Ry. & Navigation Co.....	351	157,640	29,734	187,374	29,612	29,612	6,361	58,923	.....	4,713	129,455	9,500	65,195	40,778
Louisiana Western.....	208	122,289	54,887	189,494	22,692	37,875	6,890	50,424	1,677	5,095	125,539	10,025	53,911	—32,394
Louisville & Nashville.....	5,038	3,588,608	950,476	4,862,436	690,607	872,299	109,193	1,386,673	23,932	102,222	3,182,701	191,277	1,487,808	522,167
Louisville, Henderson & St. Louis.....	200	88,465	40,178	135,553	28,163	20,947	5,005	36,824	.....	3,232	93,271	42,282	38,481	6,016
Minneapolis & St. Louis.....	1,646	772,599	199,375	1,023,357	120,200	124,283	18,328	315,159	.....	23,152	601,331	30,059	391,674	77,125
Minn. St. Paul & S. S. Marie.....	4,229	2,291,969	582,343	3,100,086	310,798	324,517	57,422	854,091	18,196	57,514	1,619,434	148,652	1,322,417	138,615
Missouri, Kansas & Texas System.....	3,865	1,709,633	721,701	2,626,899	446,344	407,527	52,178	886,004	15,253	99,822	1,901,567	140,577	583,367	—35,575
Missouri, Oklahoma & Gulf of Texas.....	125	12,583	297	12,997	3,136	2,255	1,769	9,734	.....	1,278	18,173	141	—5,317	—2,241
Missouri Pacific.....	3,931	2,009,425	477,401	2,711,413	420,792	548,068	62,436	897,202	11,218	66,712	2,005,503	706,910	602,690	—278,432
Mobile & Ohio.....	1,122	811,814	100,455	912,269	108,399	216,928	32,507	332,285	2,436	30,666	722,771	24,218	121,736	121,736
Monongahela.....	75	132,339	21,102	153,441	12,220	7,480	626	27,743	.....	3,125	51,194	2,500	82,917	.....
Morgan's La. & Tex. R. R. & S. S. Co.....	405	237,449	81,359	359,106	50,595	61,636	11,552	214,688	2,113	11,509	262,093	97,013	75,806	59,110
Nevada Northern.....	165	125,310	11,290	140,724	19,288	11,783	612	25,169	88	4,282	61,222	8,505	70,997	48,938
New Orleans Great Northern.....	277	106,231	24,144	130,375	143,041	18,991	2,917	41,804	184	5,900	94,543	3,892	44,595	—721
New Orleans, Texas & Mexico.....	283	100,987	19,739	128,834	13,115	19,885	3,419	44,873	.....	9,968	91,260	1,501	36,073	20,211
New York Central Railroad.....	5,979	10,147,481	4,418,887	16,923,031	1,784,353	2,714,325	332,567	4,769,107	2					

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF SEPTEMBER, 1915—CONTINUED.

Name of Road.	Average mileage operated during period.	Operating revenues				Operating expenses				Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.
		Freight.	Passenger.	Total (inc. misc.)	Way and structures.	Equipment.	Traffic.	Trans- portation.	Miscellaneous.				
St. Louis, Brownsville & Mexico.....	548	\$194,897	\$77,620	\$272,517	\$41,895	\$36,989	\$5,409	\$73,549	\$10,304	\$121,584	\$6,500	\$115,083	\$55,240
St. Louis, Iron Mountain & Southern.....	3,363	1,872,283	457,847	2,330,130	467,462	501,900	58,532	689,276	60,282	1,783,325	110,935	614,721	91,539
St. Louis Merchants' Bridge Terminal.....	9	57,762	24,198	81,960	18,803	18,803	8,779	72,730	11,320	66,268	1,216	59,727	20,468
St. Louis, San Francisco & Texas.....	244	480,280	108,494	588,774	44,781	94,469	27,163	147,014	23,585	339,903	29,670	253,304	4,416
St. Louis Southwestern.....	943	82,981	346,060	429,041	50,579	10,822	130,144	727	16,594	279,022	15,033	51,873	86,863
St. Louis Southwestern of Texas.....	824	237,929	100,527	338,456	61,538	56,774	6,787	147,834	11,679	284,568	15,732	168,836	77,005
San Antonio & Aransas Pass.....	724	342,143	249,946	592,089	87,397	129,086	31,300	250,808	25,217	286,557	51,296	235,261	16,570
San Pedro, Los Angeles & Salt Lake.....	1,132	3,738,442	1,401,218	5,139,660	698,607	862,666	132,809	1,835,533	28,992	3,704,416	232,144	1,678,891	641,212
Southern.....	7,022	5,975,006	3,240,665	9,215,671	1,011,137	1,356,566	199,440	2,979,886	200,873	5,957,325	407,639	3,790,941	312,452
Southern Pacific.....	6,928	267,908	155,897	423,805	44,274	33,971	8,773	96,217	3,909	266,863	53,400	213,396	10,080
Spokane, Portland & Seattle.....	56	44,953	25,994	70,947	6,245	4,757	693	36,094	12,780	47,925	5,000	42,925	3,342
Staten Island Rapid Transit Co.....	294	102,277	37,361	139,638	17,098	17,098	5,128	50,714	6,379	108,182	4,684	35,757	26,349
Tennessee Central.....	35	.....	217	217	28,863	14,408	1,000	71,237	10,640	116,405	27,334	96,355	4,560
Terminal R. R. Assn. of St. Louis.....	468	261,611	90,263	351,874	71,894	71,894	7,186	132,068	11,565	114,907	18,335	96,484	148,362
Texas & New Orleans.....	1,944	1,045,505	364,922	1,410,427	215,246	291,936	37,173	558,871	11,915	1,153,861	76,000	287,770	121,880
Texas & Pacific.....	436	336,505	59,773	396,278	50,095	80,000	6,478	137,586	1,824	285,828	21,000	116,061	128,080
Toledo & Ohio Central.....	248	63,562	41,651	105,213	16,617	25,614	2,208	37,632	3,629	85,699	6,100	20,152	11,574
Toledo, Peoria & Western.....	451	392,069	34,204	426,273	70,259	72,481	16,058	147,620	7,742	306,962	17,400	133,006	43,648
Toledo, St. Louis & Western.....	129	43,518	31,812	75,330	13,557	9,168	870	37,630	51	27,366	3,500	23,861	13,361
Union Pacific.....	3,618	3,850,985	1,056,284	4,907,269	726,695	588,277	116,061	1,203,639	92,118	2,849,976	200,338	2,379,839	176,018
Union R. R. of Baltimore.....	9	113,216	26,674	139,890	15,356	.....	.....	.....	.....	119,371	5,806	113,566	14,667
Union R. R. of Pennsylvania.....	31	.....	.....	.....	86,287	100	156,235	.....	.....	216,011	7,500	208,511	70,548
Vandalia.....	910	720,284	223,391	943,675	149,064	178,482	22,262	377,482	9,690	825,063	38,252	297,934	56,930
Vicksburg, Shreveport & Pacific.....	171	88,178	35,802	123,980	23,536	25,208	3,504	40,331	2,154	99,485	8,100	29,288	17,745
Virginia & Southwestern.....	240	156,530	14,977	171,507	38,576	23,422	4,472	44,782	4,675	113,482	6,402	56,238	10,181
Virginian.....	504	528,731	41,690	570,421	98,258	62,305	5,038	114,477	12,561	304,273	29,000	283,666	26,699
Wabash.....	2,519	2,031,130	610,732	2,641,862	365,809	441,237	87,351	1,942,943	16,376	68,495	82,309	850,350	167,704
Washington Southern.....	36	37,225	48,105	85,330	15,877	13,249	1,281	33,892	1,216	68,502	3,540	38,577	17,799
West Jersey & Seashore.....	358	212,467	464,618	677,085	97,755	83,912	19,451	248,420	2,943	466,888	274,288	245,566	70,637
Western Maryland.....	664	997,832	227,066	1,224,898	105,263	148,752	21,047	302,228	6,114	601,782	27,000	301,462	140,785
Western Pacific.....	941	405,789	224,104	629,893	68,626	62,349	21,566	187,786	18,956	258,329	28,874	228,454	29,805
Western Ry. of Alabama.....	133	67,387	33,901	101,288	17,945	24,397	5,013	29,280	1,543	82,586	6,169	25,228	6,533
Wheeling & Lake Erie.....	312	648,712	83,901	732,613	107,427	125,307	5,945	196,968	1,330	450,863	34,700	420,933	110,617
Yazoo & Mississippi Valley.....	1,382	870,793	181,437	1,052,230	181,291	172,538	17,961	317,442	1,329	717,432	50,000	332,372	161,616

THREE MONTHS OF FISCAL YEAR ENDING JUNE 30, 1916.

Name of Road.	Average mileage operated during period.	Operating revenues				Operating expenses				Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.
		Freight.	Passenger.	Total (inc. misc.)	Way and structures.	Equipment.	Traffic.	Trans- portation.	Miscellaneous.				
Alabama & Vicksburg.....	143	\$241,082	\$105,452	\$346,534	\$380,146	\$89,483	\$10,186	\$132,971	\$6,428	\$306,983	\$23,536	\$283,447	\$15,770
Alabama Great Southern.....	309	841,806	227,107	1,068,913	1,08,002	115,101	38,577	377,014	10,358	371,081	38,400	332,681	89,880
Ann Arbor.....	294	378,777	168,704	547,481	590,225	73,163	14,949	212,827	1,860	425,028	34,476	126,591	40,329
Arizona Eastern.....	378	587,696	107,498	695,194	739,260	96,024	6,905	157,108	2,783	371,546	42,760	328,770	158,796
Atchison, Topeka & Santa Fe.....	8,620	16,403,861	8,423,657	24,827,518	3,791,378	4,164,903	605,916	7,161,126	.....	11,007,076	1,235,355	9,761,604	1,361,388
Atlanta, Birmingham & Atlantic.....	638	520,205	140,359	660,564	117,731	125,333	37,237	282,735	71	591,759	39,300	84,656	30,866
Atlanta & West Point.....	93	151,591	116,716	268,307	39,927	67,508	16,248	92,572	7,273	236,635	16,575	55,474	25,483
Average City.....	170	234,325	733,483	967,808	85,430	67,511	11,704	409,182	2,882	583,151	30,000	393,332	6,825
Atlantic Coast Line.....	4,699	4,371,060	1,678,784	6,049,844	1,103,332	1,373,840	157,381	2,503,989	19,416	5,364,159	422,000	761,323	254,276
Atlantic & St. Lawrence.....	167	209,847	93,894	303,741	69,441	54,821	10,362	151,562	.....	197,746	34,515	2,621	23,766
Baltimore, Chesapeake & Atlantic.....	88	228,964	165,547	394,511	32,808	92,899	5,478	190,298	9,408	330,891	6,798	72,934	45,438
Baltimore & Ohio.....	4,355	21,425,797	4,204,742	25,630,539	3,006,510	5,444,567	490,774	8,321,356	141,381	17,972,335	847,985	8,104,857	1,936,906
Baltimore & Ohio Chicago Terminal.....	632	506,138	2,352	508,490	56,429	48,106	2,640	163,617	6,367	283,225	52,961	57,523	1,047
Bangor & Aroostook.....	26	.....	.....	.....	147,530	148,920	8,368	217,837	9,977	173,657	38,025	135,632	18,419
Belt Ry. Co. of Chicago.....	26	.....	.....	.....	681,350	50,204	1,674	267,158	.....	15,769	234,585	134,514	.....
Bessemer & Lake Erie.....	205	3,527,885	127,221	3,655,106	243,341	489,213	27,005	697,679	.....	3,619,281	50,367	2,183,733	203,462
Bingham & Garfield.....	27	496,080	9,149	505,229	53,409	39,355	2,990	60,671	392	162,646	11,902	332,260	143,896
Boston & Maine.....	2,302	7,002,738	4,616,203	11,618,941	1,532,310	1,581,887	119,372	4,996,026	53,418	8,569,513	484,091	3,680,654	1,239,923
Buffalo & Susquehanna R. R. Corpora- tion.....	253	352,211	21,867	374,078	68,890	98,994	3,218	99,394	.....	282,205	7,800	84,938	36,824
Buffalo & Susquehanna Railway.....	91	48,557	20,730	69,287	14,692	15,497	1,356	34,722	88	73,384	4,800	1,330	18,384
Buffalo, Rochester & Pittsburgh.....	586	2,487,114	322,637	2,809,751	557,292	597,033	36,059	828,551	3,266	2,084,753	60,000	779,565	47,327
Canadian Pacific Lines in Maine.....	233	123,853	52,677	176,530	64,297	37,307	15,473	84,905	10,231	217,218	36,000	52,031	11,287
Carolina, Clinchfield & Ohio.....	283	567,205	59,585	626,790	64,833	79,100	23,864	109,071	.....	340,526	42,500	297,692	39,751
Central, Clinchfield & Ohio of S. C.....	18	28,343	3,872	32,215	3,999	242	5,120	6,654	1,774	17,682	2,360	13,214	926
Central of Georgia.....	1,924	1,909,835	790,779	2,700,614	416,453	500,209	104,079	1,001,632	3,437	1,619,984	154,104	684,902	103,601
Central New England.....	304	927,237	127,828	1,055,065	168,567	96,240	3,953	279,417	.....	561,487	38,400	490,729	268,382
Central of New Jersey.....	304	5,672,482	1,998,291	7,670,773	659,114	1,478,170	105,217	2,689,752	43,345	5,139,538	351,037	2,650,934	78,579
Central Vermont.....	411	641,177	292,015	933,192	153,101	164,580	28,257	403,826	6,228	776,107	46,770	198,106	35,828
Charleston & Western Carolina.....	343	284,527	80,913	365,440	80,184	51,638	9,762	140,294	.....	295,304	18,000	74,581	42,231

Traffic News

The Denver & Rio Grande no longer issues rebate checks to passengers paying cash fare on trains when they might have bought tickets; the extra ten cents collected is retained by the company.

It is announced at Ottawa that the Canadian Northern will begin running passenger trains through to the Pacific coast November 22, arrangements having been made with the Great Northern Railway for the use of that company's station at Vancouver.

The Southern Pacific is asking bids for two large freight steamships to be used in coastwise traffic between New York and the Gulf of Mexico. At present this company is using between Galveston and Atlantic ports eight extra steamships chartered from other lines.

"The Philadelphia Passenger Association" is the name of an organization which has been formed in that city by railway and steamship traffic men; president, S. B. Barnitz, Pennsylvania Railroad; secretary, J. M. Stuard, Pennsylvania Railroad. It is proposed to have luncheons every Tuesday at the Adelphi hotel.

The Baltimore & Ohio reports carrying over its line a shipment of rails for the Pacific coast which filled 1,900 cars. Cars are in demand just now, and so special agents of the company have gone west with the rails to make sure that they are moved promptly on their western trip and that the cars are returned as soon as possible after being unloaded.

The United States war department has announced a hearing to be held at Chicago on November 16, on the application of the governor of Illinois for approval by the war department of the plan for an 8-ft. waterway from the lower end of the Sanitary Canal to Utica, Ill., on the Illinois river, which was authorized by the Illinois legislature by act of May 27. The hearing will be held before W. B. Judson, Lieut. Col. Corps of Engineers, United States army, and shippers and others who are interested have been invited to attend and express their views at the hearing.

The damage done by the storm at Galveston last August, combined with the stoppage of freight at the Panama Canal, together with a great increase of shipments in all directions, has caused an unprecedented congestion of freight at Gulf ports. During the last two weeks 18 ships have cleared from Galveston for Atlantic ports, and the Southern Pacific is now sending out from there an average of one ship every day. At New Orleans the company has had to refuse all eastbound freight and may have to keep up the embargo for some little time longer.

The Georgia State Railroad Commission has refused to authorize the Southern Express Company to make increases in its charges for transportation of merchandise, which, according to the application of the company, would have amounted to about four per cent. The commission says that because of the abnormal conditions prevailing during the past year, it will be impossible to decide whether or not the increases granted in 1914 have been sufficient. It is suggested that after the end of the present fiscal year the express company make another application.

Representatives of the Chicago Association of Commerce, the Illinois Manufacturers' Association, the National Industrial Traffic League and a number of other commercial associations, as well as of the railroads in Central Freight Association territory, appeared at a hearing before the Treasury Department at Washington last week to protest against an order requiring exporters to prepare and forward with their freight an original export declaration and an abstract thereof, to accompany the same to the port of exportation, stating the actual cost and the market value, at the time and place of shipment, and the name, flag and motive power of the ship on which the shipment is to be carried. Representatives of the shippers declared that compliance with this order was impracticable, while the representatives of the carriers thought it would be their duty to refuse shipments unless the order was strictly complied with.

Traffic Club of New York

The annual meeting and election of officers of the Traffic Club of New York will be held at the Waldorf-Astoria Hotel on Tuesday evening, November 23. In connection with the meeting there will be an informal dinner at 7 o'clock.

Official Freight Classification Committee

The roads in official classification territory, comprising all the lines in the Central Freight Association, Trunk Line and New England territories, have organized the "Official Classification Committee," to begin operations December 1. This committee, of four members, will supersede the present arrangement, which calls for a committee of large membership, composed of active freight representatives of a number of lines. This new permanent committee will remain in continual session, and thereby avoid the difficulties incident to handling official classification matters at large general meetings.

The new committee consists of R. N. Collyer, chairman; J. W. Allison, now assistant general freight agent of the Baltimore & Ohio Southwestern; D. T. Lawrence, general freight agent of the Central Vermont, and F. W. Smith, of the Uniform Classification Committee. The office will be at Trunk Line headquarters, 143 Liberty street, New York.

It will now be possible for skippers interested in classification matters to get the questions they desire before the committee for immediate consideration, and delays incident to the former practice will be avoided.

New Florida Passenger Trains

Announcement is made that a new passenger train is to be put in service on November 21, between Chicago and Jacksonville, Fla., via Cincinnati and Atlanta, over the Pennsylvania Lines, Louisville & Nashville, Central of Georgia, Georgia Southern & Florida and Atlantic Coast Line. The new train is to be called "The Southland," and will leave Chicago at 12:01 a. m. daily. It will have through drawing-room sleeping cars and coaches between Chicago and Jacksonville with dining car and observation car south of Cincinnati. Sleeping cars will also be run daily between Indianapolis and Jacksonville via Louisville, and between Grand Rapids and Jacksonville semi-weekly. The train will arrive at Jacksonville at 8:45 the second morning. Northbound it will leave Jacksonville at 8:20 p. m., and arrive at Chicago at 7:45 the second morning. The "Royal Palm" train between Chicago and Jacksonville over the Cleveland, Cincinnati, Chicago & St. Louis, the Queen & Crescent and the Southern Railway, under its new winter schedule, effective November 1, leaves Chicago at 7:20 a. m. and arrives at Jacksonville at 8:40 the second evening. In addition to the "Royal Palm," the "Florida Special," between Cincinnati and Jacksonville, effective on November 21, will leave Cincinnati at 8:10 p. m., arriving at Jacksonville the next evening at 8:50, and northbound will leave Jacksonville at 7:10 a. m., arriving at Cincinnati the next morning at 8:10.

Hearing on Illinois Five Per Cent Rate Case

Representatives of the Illinois railroads at a hearing before the Illinois Public Utilities Commission last week, made the general presentation of their case for a 5 per cent general advance in intrastate freight rates in Illinois, with the exception of the rates on grain and those on coal. The coal rates it is proposed to advance 10 cents a ton. The railroads were represented by E. C. Kramer of the Southern Railway, and A. P. Humburg, commerce attorney for the Illinois Central. The tariffs were filed with the commission in October, 1914.

Mr. Kramer made an opening statement outlining the railroads' testimony, which was based largely on statistics for 26 roads operating 81 per cent of the mileage in the state, making comparisons between the years 1908 and 1914. These figures showed that the total operating revenues of the roads had increased from \$131,741,000 in 1908, to \$169,991,000 in 1914, but that the net railway operating income had decreased from \$33,414,000 to \$28,865,000, or 18.6 per cent, on Illinois business alone, whereas on the entire systems of the roads the net railway operating income had increased 3.85 per cent. The roads had separated their revenues and expenses between Illinois business and interstate business and between freight and passenger business. In 1908 the roads had earned a return of 5.66

per cent, and in 1914 of only 4.13 per cent on their valuation, taking the assessed valuation fixed by the board of equalization as 70 per cent of the real value. Capitalizing the net revenue at 7 per cent in 1908, this would include an investment of \$112,743,000 paying no returns in that year, and of \$286,940,000 paying no return in 1914. In 1908 the roads had earned 7 per cent on a valuation of \$50,844 a mile, and in 1914, on a valuation of only \$41,387 a mile. The increase in revenue from the rates asked is estimated at \$2,000,000 a year, or less than the increase in taxes. The increase in wages due to higher wage scales, from 1908 to 1914 was \$33,273,000, and in 1894 alone was \$10,800,000, or five times the amount of the increase in revenue asked. Mr. Kramer said that the statistics would probably show that the railroads ought to begin by advancing passenger rates, but that the commission could not help them in this respect, as the passenger rates are fixed by the legislature. He admitted that a showing might be made of some rates that are lower in adjoining states, but said that the roads intended to try to secure some advances on these rates in other states; that it would not be fair for the Illinois commission to withhold its decision of the case pending action in Indiana, nor for the Indiana commission to await the action in Illinois.

The witnesses for the railroads were S. M. Felton, president, Chicago Great Western; W. J. Jackson, receiver, Chicago & Eastern Illinois, and L. E. Wettling, statistician for all roads. Mr. Felton referred to the constantly narrowing margin between earnings and expenses and the increases in wages to employees, saying that the average rate per day had increased from \$2.27 in 1908 to \$2.55 in 1914, and that the increase per mile of line was \$2.251. Labor costs per train mile had increased from 98 cents to \$1.26. The expenses for maintenance of way and structures had increased from \$16,790,445 to \$22,037,869, or from \$1,788 to \$2,212 per mile. Maintenance of equipment expenses had increased from \$2,017 to \$3,303 per mile. Meanwhile the revenue per mile had decreased from 6.72 mills to 6.23 mills. Large reductions in freight rates were made by the legislature in 1906, and in passenger rates in 1907. Rigid economy in operation had enabled the roads to increase their average revenue per train mile from \$2.57 to \$3.13, but, he said, it is not reasonable to expect a much further increase in economy in operation. The average tonnage per train had been increased from 382 to 502, and the average tonnage per loaded car from 18.91 to 20.96. Operating expenses had increased from \$92,966,377 to \$131,227,505. Taxes had increased \$2,300,000. He also spoke of the increased difficulty of financing, saying that a railroad that does not pay a dividend cannot sell its bonds at a fair price. Mr. Jackson testified regarding increases in wages and in other operating expenses caused by legislation, and Mr. Wettling explained the detail statistics.

The advance was opposed by the Chicago Association of Commerce and a number of other shippers' organizations on the ground that the present Illinois rates are higher than the Central Freight Association rates for interstate traffic.

New Haven Football Traffic

On the occasion of the Yale-Princeton football game last Saturday the New York, New Haven & Hartford in less than four hours unloaded at New Haven 20,232 passengers, a record performance for a Yale-Princeton game. Of the total of 20,232 passengers 13,277 were carried in special and regular trains from New York and 6,955 from Boston and other points. It required the use of 23 special trains and 22 regular trains. Leaving New Haven after the game, 20 special and 22 regular trains carried 19,678 passengers, most of whom were on special trains leaving between 5 p. m. and 7 p. m. There were no mishaps of any kind. Of the 45 trains in the forenoon, regular and special, 32 were on time and the others were but a few minutes late. The total number of minutes late of all trains arriving in New Haven during the morning was 113, or an average of about 2½ minutes per train. All trains from New York City were drawn by electric motors. The first train left New York at 7.50 a. m. and the last at 11.25 a. m. The special instructions of the operating department filled a 20-page pamphlet. Special telephones were installed at various points in yards and terminals to facilitate the movement of trains, and officers of the traffic, operating, engineering and mechanical departments were stationed at different points on the route to be on hand in case their help were needed.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Examiner Watkins of the Interstate Commerce Commission will hold a hearing in St. Louis on November 29 on some additional advances in western freight rates proposed by the roads after the beginning of the general western rate advance case, on which hearings were held at Chicago in the spring.

A hearing was begun before an examiner of the Interstate Commerce Commission at St. Louis on November 15, on a complaint filed by the Business Men's League of St. Louis, charging discrimination against St. Louis and in favor of certain Illinois merchants because the interstate rates charged them from St. Louis are higher than the intrastate rates from Chicago and other points within the state. The commission is asked to remove the discrimination by advancing the Illinois rates. A large number of representatives of shippers and railroads and of the Illinois Public Utilities Commission attended the hearing, which has to do with both freight and passenger rates.

Increased Rates not Justified

J. G. Peppard Seed Company v. Atchison, Topeka & Santa Fe. Opinion by the Commission.

The commission finds that the carriers have not justified an increase in proportional rates on sorghum seed and cane seed in carloads from Kansas City, Mo., to destinations in Texas. (36, I. C. C. 311.)

Complaint Dismissed

New Jersey Zinc Company v. Central of New Jersey. Opinion by the Commission.

The commission finds that the assessment of demurrage on carload shipments of zinc ore forwarded to Jersey City, N. J., for export, but not exported on account of war conditions, was not unreasonable. (36, I. C. C. 289.)

Detention Charges on Heater Cars

Providence Fruit & Produce Exchange v. Maine Central et al. Opinion by the commission.

Effective November 1, 1914, the New England carriers established what are termed detention charges, applicable during the winter months, on cars provided with heating apparatus. These charges are assessed after the expiration of the two-day free demurrage period at the rate of \$1 per car per day for the first two days, and \$2 per car per day for each succeeding day, and are additional to the demurrage charge of \$1 per day.

The commission finds that these charges, on the whole, are not unreasonable. It has held uniformly that carriers may impose charges necessary to compel the removal of freight from the carriers' terminals and the prompt release of equipment, and in several cases has sanctioned detention charges equal to the charges assailed. The carriers will be expected, however, to modify their tariffs containing the detention charges to conform to the rules governing the waiver of demurrage charges because of weather interference or because of lurching in transit. (36, I. C. C. 307.)

STATE COMMISSIONS

J. Sergeant Cram, a member of the New York State Public Service Commission, First district, reporting on an investigation of safety at highway crossings on the Long Island Railroad, recommends that the commission issue an order requiring the railroad company to increase its supervision over the flagmen, especially during the late night and early morning hours; and he holds that the working day of 12 hours ought to be reduced to 8 hours, and the minimum pay of \$1.50 a day increased to at least \$2. The company employs 300 crossing flagmen within the limits of New York City, of whom 241 receive \$1.50 a day. There is only one supervisor or inspector of gatemen for the territory within New York City.

COURT NEWS

The United States District Court at Pittsburgh, Pa., in a case against the Pennsylvania Railroad, holds that a common carrier need not furnish special cars for shipments of oil. A decision of the Interstate Commerce Commission requiring the road to supply enough cars to move the output of the refineries of the Crew-Levick Company and the Pennsylvania Paraffine Works was suspended and ordered annulled. "The law," says the decision, "confers upon the Interstate Commerce Commission power to regulate the use of facilities possessed by the railroad; but there is nothing in it to compel a railroad to acquire facilities it does not possess, or to acquire better facilities than those it possesses. . . . The commission exceeded its statutory powers." Judge W. H. S. Thompson dissented from the majority opinion, holding that the decision would open the way for discrimination by railroads.

Mileage Ticket Good for Holder's Wife

The Supreme Court of the United States on Monday last, in a case which arose on the Southern Railway, held, in an opinion by Justice Hughes, that rules governing the use of mileage books are to be construed literally and that the provision forfeiting the book, or tickets issued in exchange therefor, if presented by other than the "original purchaser" means exactly what it says. But the court construes the rule as not working a forfeiture if the book is presented by the "original purchaser," even if presented for the fare of another passenger.

Samuel J. Campbell purchased two 1,000-mile tickets in North Carolina for an interstate journey. He exchanged the coupons from the book for the necessary mileage in tickets covering transportation for himself and wife. When he presented the tickets the conductor took up the coupon book, holding that Campbell had forfeited the book by presenting transportation for his wife.

The court held that so long as the tickets and mileage book were presented by the "original purchaser" the rule of forfeiture did not apply, no matter who rode on the transportation.

Walking Along Tracks Contributory Negligence Under Wisconsin Statute

In an action for damages for death caused by being knocked down by a switch engine while walking along the track, it was assumed by the Wisconsin Supreme Court that the deceased was a licensee and not a trespasser. A Wisconsin statute makes it unlawful for any person other than those connected with or employed upon the railroad to walk along the track of any railroad except when such track shall be laid along public streets. Assuming that this alone would not charge the deceased with contributory negligence, the court held that it went a long way in that direction. Taken along with the facts that it was a dark night, that warning notices were posted, and that it would be difficult or impossible to avoid passing trains, it was held to require a finding of contributory negligence. Where the act is manifestly dangerous and there is no overmastering necessity requiring that such act be done, the fact that others had the hardihood or the carelessness to take the same risk cannot be taken to authorize the injured party to voluntarily expose himself and yet recover for the injuries sustained by him in direct consequence of such exposure.—*Zemke v. C. & N. W. (Wis.)*, 154 N. W. 364.

Railroad's Right to Remove Switch

In 1897 a railroad, at the expense of the owner of a warehouse, built a track to the warehouse, under an agreement providing that on 10 days' notice it might discontinue it, on paying to the owner the value of the part removed. In 1907 the New York Public Service Commissions Law was enacted, section 27 of which empowered the commission, in case a railroad failed to install a switch upon due application, to investigate and order its establishment, and upon application of a railroad to order a discontinuance of any switch. In 1906 Interstate Commerce Act, section 1, was amended so as to give similar powers to that commission, without specifically providing for the discontinuance of sidings. The New York Appellate Division, in an action to enjoin the removal of the track, holds that even though, in the absence of statute, it was within the

railroad's discretion to build and discontinue sidings and to remove those built at its own expense, yet as the plaintiff's track was constructed at its expense, defendant could not deprive plaintiff of it without reserving the right to do so; that the intervention of the commission was not authorized, unless the parties were unable to agree, and that, as the reservation was a partial surrender of the railroad's right to remove the track at will, it was an agreement not nullified by the statutes.—*Adikes v. Long Island*, 151 N. Y. Supp. 49.

Injuries to Passengers—Contributory Negligence

A brakeman, when told that a passenger desired to alight at a station and go to a hotel there, informed him that the station was on one side of the track and the hotel on the other, and that when the train reached there he would show the passenger where to get off. The brakeman, on reaching the station, at or about the time he opened the door leading down to the steps of the car, said to the passenger, "There is your hotel." The passenger alighted while the train was in motion, and was injured. In an action for his injuries the federal district court of California, S. D., held that the railroad was not guilty of any negligence, for the conduct of the brakeman was not an invitation or instruction to the passenger to alight, nor an inducement to the passenger to get into a place of danger, causing him to fall from the car. The night was dark, the train was moving at a considerable speed, and the passenger, who was encumbered with a grip, was unfamiliar with the condition of the ground. It was held that he was guilty, as a matter of law, of contributory negligence, precluding a recovery for injuries sustained.—*Murray v. Southern Pacific*, 225 Fed. 297.

Libel in Letter by Passenger to Railroad Complaining of Conductor's Conduct

The California supreme court has affirmed a judgment of the district court of appeals, Third District (150 Pac. 1005), awarding \$5,000 damages to a railroad conductor who was thrown out of his employment, with little prospect of getting another position, as the result of a letter sent by the defendant, a passenger, to the company's general passenger agent, in which it was stated that the conductor had spoken roughly to a passenger who had boarded the train by mistake, and in reply to another passenger who spoke about the heat of the car had used loud and vulgar language, referring to the trainmen's reasons for having it hot. The letter also stated that on two former occasions within six months the writer had seen similar exhibitions of coarse and disagreeable deportment on the part of the conductor, and ascribed such conduct to the influence of liquor. The court of appeals held the letter to be libelous per se. The supreme court gives no reason for its decision beyond the statement that the jury evidently found that in the writing and publication of the letter the defendant was actuated by actual malice toward the plaintiff; but it did not agree with the opinion of the court of appeals that before libelous matter can be privileged it must appear that it was and is substantially true.

In commenting upon these decisions the California Law Review discusses the question whether one publishing a libel in response to a public notice will be accorded the same protection as one acting upon a personal request. In general, all instances of privilege have as a basis the making of a statement in the discharge of some public or private duty or interest, whether legal or moral. Development in this branch of the law has been marked by a widening of the interest or duty necessary to make a privileged occasion. The modern tendency is to apply the rule liberally, having regard for the general welfare of society; so that it is privileged not only to give a character to a former servant, at the request of a prospective employer, but even, as has been held, to volunteer information to a person interested where it is right in the interests of that person or of society that he should be informed. "In view of this development," the Review continues, "it would seem but natural to extend the rule of privilege to the new situation, where the request for information appears in the form of notices to the public at large. If information given at the request of the recipient is privileged and voluntary communications intended to benefit society are also being held privileged, it seems but just that the giving of information to one interested, at his public request, and for the benefit of himself and society, should also be privileged."—*Adams v. Cameron (Cal.)*, 151 Pac. 286.

Lessee to Pay Taxes

The Supreme Court of the United States, in an opinion by Justice McReynolds, decides in favor of the State of New Jersey in its suit to collect taxes from the Lehigh Valley as lessee of the right of way and property of the Morris Canal. The railroad company had resisted the payment of accumulated taxes amounting to about \$900,000 under exemption provided in the charter from the State of New Jersey to the Morris Canal & Banking Company. The Court of Errors and Appeals of New Jersey had held the railroad liable to taxes. The action of the Supreme Court affirms that judgment. The case has been before courts for many years. Under the original grant the canal and its appurtenances were exempted from taxation, provided it be maintained for navigation. In 1871 the company was allowed to sell or lease. The Supreme Court holds that the right to sell conferred on the company in 1871 did not carry exemption of taxes and that such an exemption only followed when the original company used the canal for navigation; and that, after leasing, the privilege of exemption lapsed. The case involved taxes amounting to about \$900,000 paid by the company to the state under protest.

Diamonds as "Baggage"

In an action for the loss of the contents of a passenger's trunk, among which was said to have been a diamond, it was contended that the diamond was not properly baggage, and that the railroad, therefore, would not be liable as an insurer. Articles of extraordinary value are not properly classed as baggage, as, for example, papers or memoranda of great and special importance in business, or jewelry of exceptional value. The question as to what is properly baggage for which the carrier is liable as an insurer is, the Nebraska Supreme Court holds, a mixed question of law and fact. If the evidence is without substantial conflict it is ordinarily one of law for the court, but if it depends on facts from which reasonable men might draw either conclusion, the question is for the jury under proper instructions. If the property is not properly baggage, the carrier would still be liable if its loss was caused by its own gross negligence, but not if it is caused by accident, or the act of some third party, or even by ordinary negligence of the carrier. A diamond is an article having market value, and it is error to instruct a jury that the measure of damages for its loss is to be determined by what it is worth to the owner and not by what it would bring on the market.—*Gibbons v. Chicago, B. & Q. (Neb.)*, 154 N. W. 226.

Crossing Accident—Signals, Gates or Flagman—Excessive Speed Not Necessarily Negligence

In an action for damages to an automobile in a crossing collision in a town it appeared that the driver of the automobile, as he approached the crossing, was looking down and listening to the engine of the automobile, while the other occupants of the car were joking and "kidding" those in another automobile which they had outspeeded. None of them gave any attention whatever to the fact that they were approaching a crossing. The Maine supreme court held that there was gross carelessness in the management of the automobile, and that all the people in the car were negligent.

The railroad did not maintain a flagman, gates or automatic signals at the crossing, but it was held that this did not constitute negligence on its part, as no request therefor had ever been made by the town authorities or by any public commission of the state; there were no deep cuts or embankments or high blocks of buildings to prevent a traveler hearing the whistle and bell and the noise of an approaching train, and the trains over the crossing were light and few in number. The train was running at ten to fifteen miles an hour, in violation of a Maine statute providing that no engine or train shall run across a highway near the compact part of a town at a speed greater than six miles an hour, unless a flagman, gates or automatic signals are maintained there. It was held that this fact, though competent evidence on the question whether the train was run at a dangerous rate of speed, was not conclusive of the railroad's negligence.

The evidence was held insufficient to warrant a finding of negligence on the part of the railroad. *Conant v. Grand Trunk (Me.)*, 95 Atl. 444.

Railway Officers

Executive, Financial, Legal and Accounting

H. U. Mudge has been elected president of the Denver & Rio Grande, succeeding Arthur Coppel, who was recently elected temporary president.

Elmer A. Howard, real estate and industrial agent for the Chicago, Burlington & Quincy, with headquarters at Chicago, Ill., has been elected vice-president, with jurisdiction over land and industrial departments, and will perform such other duties as may be assigned to him.

James E. Gorman, whose appointment as chief executive officer for the receiver of the Chicago, Rock Island & Pacific, with office at Chicago, has been announced in these columns, was born

December 3, 1863, in Chicago, and received his education at Holy Family school in that city. He began railway work in August 1877, as a car number taker on the Chicago, Burlington & Quincy, and during the following 16 years held various clerical positions with the Burlington, the Chicago, Rock Island & Pacific, the Chicago & North Western, the Chicago, Santa Fe & California, now a part of the Atchison, Topeka & Santa Fe; the Illinois Central and the Atchison, Topeka & Santa Fe, and also with the Chicago Lumber Company. He was appointed traffic



J. E. Gorman

manager of Joy Morton & Co., in December, 1893, and in March, 1895, was made chief clerk to the traffic manager of the Atchison, Topeka & Santa Fe. Six months later he was appointed assistant general freight agent, which position he held four years. He was then made general freight agent, and in April, 1904, was appointed assistant freight traffic manager. He was appointed freight traffic manager in March, 1905, which position he held until December 1, 1909, when he was elected first vice-president in charge of traffic of the Chicago, Rock Island & Pacific.

W. S. McChesney was re-elected president of the Wiggins Ferry Company at the annual stockholders' meeting on November 8. Charles E. Schaff, receiver of the Missouri, Kansas & Texas, was elected vice-president to succeed E. B. Pryor, resigned; C. A. Vinnedge was re-elected secretary and auditor, and F. C. Dabb was rechosen treasurer. E. F. Kearney, president of the Wabash, was elected a member of the board, succeeding E. B. Pryor; and T. C. Powell, vice-president of the Southern, and Alexander Robertson, chief operating officer of the Missouri Pacific-St. Louis, Iron Mountain & Southern, were named as the other directors.

Edward B. Pryor, receiver of the Wabash, retired from active railway service with the reorganization of the company on November 1. Mr. Pryor was born on March 8, 1854, at Fayetteville, W. Va., and entered the ranks of railroad employees in 1880. From that time until 1887, he held the consecutive positions of clerk, general bookkeeper, and chief clerk of general accounts for the Wabash, St. Louis & Pacific. From 1887 to January 1, 1903, he was assistant auditor of the same road, and its successor, the Wabash. From July 1, 1900, to January 1, 1903, he was also assistant to the vice president of the same railroad. From January 1, 1903, to October 18, 1905, he was assistant to the president, and from that time until his retirement vice-president in charge of the treasury and accounting departments. Since December 18, 1911, he has also been a receiver of the railroad. Mr. Pryor will devote his time to the presidency of

the State National Bank of St. Louis, Mo., to which he was elected last year.

Operating

G. A. Stokes has been appointed superintendent of terminals of the Grand Trunk, with office at Port Huron, Mich., vice F. J. McKee, promoted.

George E. Graham has been appointed general manager of the Dominion Atlantic, with office at Kentville, N. S., in place of P. Giffkins, retired.

Richard L. Malone has been appointed trainmaster of the Illinois Central at Fordham, Ill., vice Charles A. Phelan, transferred. Effective November 15.

E. E. Lillie, superintendent of the Spokane & Inland Empire, has been appointed assistant superintendent of telegraph of the Great Northern, with headquarters at St. Paul, Minn. Effective November 1.

Joseph W. Hevron, whose appointment as superintendent of the Springfield division of the Illinois Central has been announced, was born at Rockport, Ind., on February 23, 1880. After enjoying a common school education he entered railway service on April 1, 1894, on what is now the St. Louis division of the Southern. In August, 1898, he entered the employ of the St. Louis, Peoria & Northern, now a part of the Illinois Central, as an operator and yard clerk, and remained with this company until its absorption by the Illinois Central in 1899. On December 25, 1899, he became a telegrapher for the Illinois Central at Gilman, Ill. On March 17, 1900, he was promoted to operator in the despatcher's office at Kankakee, Ill., and on May 1, 1900, was appointed train despatcher in the same office. On January 16, 1907, he was promoted to chief train despatcher of the Chicago, Bloomington, Pontiac & Tracy district, and on July 15, 1913, was made trainmaster of the same district. On November 15, 1915, he was promoted to the superintendency of the Springfield division with office at Clinton, Ill.

Samuel R. Toucey, whose appointment as superintendent of the Wyoming division of the Union Pacific was recently announced, was born at Minneapolis, Minn., on January 24, 1878. In September, 1895, he became a clerk in the service of the Eastern Minnesota and the Northern Steamship Company — now the Great Northern. In December, 1895, he became a freight solicitor for the Lehigh Valley and continued in this position until August, 1896, when he returned to the Great Northern. He held various clerical positions with this company until November, 1898, when he entered the employ of the Chicago, Burlington & Quincy. He remained with this company as rate clerk and stenographer until November, 1900, when he again returned to the Great Northern. He served this road as stenographer, assistant chief clerk and chief clerk to the general superintendent until February, 1903. After taking the company's special student course and subsequently spending several months at Larimore, N. D., as clerk to the division superintendent, he entered the operating department of the Chicago, Rock Island & Pacific, in December, 1903. In February, 1904, he became stenographer and clerk to the general superintendent of the Union Pacific; from April, 1904, to March, 1906, he was private secretary to the president; from March, 1906, to February, 1907, he was trainmaster on the Colorado division, with office at Denver, Colo. From February, 1907, to April, 1907, he was assigned to special duty in connection with the train and enginemen's schedules, at Chicago, Ill. On April 1, 1907, he was appointed assistant superintendent of the Colorado division, with office at



S. R. Toucey

Denver, Colo. In October, 1914, he was transferred to the Wyoming division, and on November 1, 1915, was promoted to superintendent of that division, with headquarters at Cheyenne, Wyo.

T. J. Jones, whose appointment as superintendent of transportation for the Wabash has been announced, was born at Foristell, St. Charles county, Mo., on January 26, 1874. He received a common school education, and in 1888 entered railway service with the Wabash as a messenger. He has been continuously in the service of the same road ever since, and has held the following positions: telegraph operator, yard clerk, yardmaster, train despatcher and trainmaster. On December 1, 1910, he was promoted to division superintendent, at Moberly, Mo., where he remained until his appointment as superintendent of transportation, with headquarters at St. Louis, Mo., effective November 1.

The general manager of the Canadian Government Railways announces that the Grand Trunk Pacific Telegraph Company has been appointed supervisory agent of telegraphs on the Transcontinental between Moncton, N. B., and Winnipeg, Man., including the Lake Superior branch to Fort William. The telegraph company will have charge of all matters appertaining to the construction and maintenance of telegraphs and telephone lines and operation of railroad and commercial telegraphs. The officers of the Grand Trunk Pacific Telegraph Company having jurisdiction are: H. Hulatt, manager of telegraphs, Montreal, Que.; F. T. Caldwell, division superintendent of telegraphs, Winnipeg, Man., and Thomas Rodger, supervisor, Montreal. Mr. Hulatt is also manager of telegraph of the Grand Trunk and the Grand Trunk Pacific.

Traffic

Frank P. Eyman, who was promoted to freight traffic manager of the Chicago & North Western on November 10, was born on October 5, 1856. He was educated at Oberlin college. In 1873 he entered railway service as agent and operator of the Baltimore & Ohio, following which he was cashier and agent of the Denver & Rio Grande, at Antonito, Colo. From 1880 to 1882, he served as telegraph operator and agent for the North Western; from 1882 to 1887, he was traveling freight agent for the same railroad. From 1887 to 1896, he was stationed at Milwaukee, Wis., as contracting freight agent and local agent, and from 1896 to February 1, 1900, he was general agent, at Chicago, Ill. August 1, 1910, he was promoted to assistant general freight agent, with office in the same city; from August 1, 1910, until his recent promotion he has been assistant freight traffic manager.



F. P. Eyman

W. S. Cookson, assistant general passenger agent of the Grand Trunk at Montreal, Que., has been appointed general passenger agent, and C. W. Johnston, assistant to passenger traffic manager at Montreal, succeeds Mr. Cookson. The positions of assistant passenger traffic manager and assistant to passenger traffic manager have been abolished.

A. G. Reynolds has been appointed commercial agent of the San Antonio & Aransas Pass, with headquarters at Lockhart, Tex.

Frank F. Fouts, general agent of the Denver & Rio Grande at Ogden, Utah, has been appointed to a similar position on the Ogden, Logan & Idaho and hereafter will attend to the freight business of both roads in that city.

William P. Hinton, assistant passenger traffic manager of the

Grand Trunk and the Grand Trunk Pacific, with office at Montreal, Que., has been appointed traffic manager of the Grand Trunk Pacific and the National Transcontinental, with headquarters at Winnipeg, Man. G. A. McNicholl has been appointed assistant general freight and passenger agent of the Grand Trunk Pacific with jurisdiction west of Prince George, B. C., with headquarters at Prince Rupert, B. C. A photograph and sketch of Mr. Hinton were published on November 6, 1914, page 876.

Henry W. Beyers, who was appointed assistant freight traffic manager of the Chicago & North Western on November 10, was

born at Toledo, Ohio, on March 26, 1870. He entered the service of the Chicago & North Western in 1883 as clerk in the office of the commercial agent at Chicago, Ill. From 1892 to 1897 he was stationed at Cleveland, Ohio, as general agent, and from 1897 to 1900, held the same position at Philadelphia, Pa. From 1900 to 1906 he was general agent at Chicago, and from 1906 up to the time of his recent appointment, has been assistant general freight agent, with headquarters at Chicago, Ill. His entire career has been in the service of the Chicago & North Western.



H. W. Beyers

N. J. Lee, chief clerk of the passenger department of the New York, New Haven & Hartford, at New Haven, Conn., has been appointed general agent, with headquarters at New Haven.

Samuel L. Seymour, who has been appointed assistant to freight traffic manager of the Pennsylvania Railroad, with headquarters at Pittsburgh, Pa., was born on August 14, 1849,

at Cleveland, Ohio, and was educated in the common schools of Buffalo, N. Y. He began railway work on October 22, 1868, with the Pennsylvania Railroad, and until December, 1882, served on the Northern Central. He was chief clerk in the office of the general western freight agent at Buffalo, until May, 1876, and then to April, 1879, was western passenger agent. From April, 1879, to December, 1882, he was western passenger and freight agent. From December, 1882, to June, 1890, he was division freight agent of the Pennsylvania Railroad (Philadelphia & Erie division)



S. L. Seymour

and of the Northern Central (Susquehanna, Shamokin, Elkhira & Canadaigua divisions) at Williamsport, Pa. In June, 1890, he was transferred as division freight agent to Pittsburgh, Pa., which position he held at the time of his recent appointment as assistant to freight traffic manager of the same road, as above noted.

C. R. Phoenix, commercial agent of the Illinois Central at Pittsburgh, Pa., has been appointed general eastern agent with headquarters at New York, N. Y., vice W. E. Downing, deceased. W. B. Ryan, commercial agent at Little Rock, Ark.,

has been appointed to succeed Mr. Phoenix at Pittsburgh. Hugh Hardin, traveling freight agent at Dallas, Tex., has been promoted to commercial agent at Little Rock, Ark., vice Mr. Ryan.

Samuel L. Seymour, division freight agent of the Pennsylvania Railroad at Pittsburgh, Pa., has been appointed assistant to freight traffic manager, with headquarters at Pittsburgh; Vernon C. Williams, division freight agent of the New Jersey division at Philadelphia, has been appointed division freight agent of the Western Pennsylvania division, with office at Pittsburgh, succeeding Mr. Seymour; Harold A. Haines, division freight agent at Baltimore, has been appointed division freight agent at Philadelphia, succeeding Mr. Williams. Walter S. Franklin, Jr., southern freight agent of the Pennsylvania System at Atlanta, Ga., has been promoted to division freight agent at Baltimore, succeeding Mr. Haines.

Marvin Hughitt, Jr., who was appointed general traffic manager of the Chicago & North Western on November 10, was born on September 24, 1861, at Bloomington, Ill. He entered railway service in the general freight department of the North Western in 1881, and has remained continuously with the road since that time. From February 1, 1887, to January 1, 1893, he was division freight agent; from January 1, 1893, to October 1, 1896, he served as assistant general freight agent; and from October 1, 1896, to February 1, 1900, as general freight agent. From February 1, 1900, up to the time of his recent promotion he has been freight traffic manager of the road. His headquarters will continue to be in Chicago, Ill.

J. W. Allison, assistant general freight agent of the Baltimore & Ohio Southwestern, with office at Cincinnati, Ohio; D. T. Lawrence, general freight agent of the Central Vermont, with office at St. Albans, Vt., and F. W. Smith, a member of the Uniform Classification Committee, with office at Chicago, have been appointed members of the Official Classification Committee with office at 143 Liberty street, New York City. (See item in Traffic News.)

Engineering and Rolling Stock

A. E. Tripplett, assistant superintendent of the Galveston, Harrisburg & San Antonio, at Victoria, Tex., has been appointed division engineer of the Missouri, Kansas & Texas, at Parsons, Tex.

Purchasing

George G. Yeomans, whose appointment as purchasing agent of the New York, New Haven & Hartford, with headquarters at Boston, Mass., has already been announced in these columns, was born on January 11, 1860, at Trenton, N. J., and graduated from Princeton University. He began railway work in 1882, as rail inspector on the Chicago, Burlington & Quincy. From 1884 to 1886, he was a clerk in the purchasing department, and then to 1891, was chief clerk of the same department. From 1891 to March, 1898, he was assistant purchasing agent, and in March, 1898 was promoted to purchasing agent of the same system, remaining in that position until July, 1905. He served from July to October, 1905, as assistant to first vice-president of the Wabash Railroad and as assistant to president of the Wheeling & Lake Erie, the Wabash Pittsburgh Terminal, the Pittsburgh Terminal Railroad Coal Company and the West Side Belt. From October, 1905, to March, 1912, he was assistant to president of the same roads. Since March, 1912, he has made a specialty of investigating methods of purchasing and handling supplies on various large railroads.

OBITUARY

R. B. Salmons, master mechanic of the Louisville & Nashville at Covington, Ky., since July 1, 1913, died on November 3, at Covington.

C. L. Loop, vice-president of the Southern Express Company at Chattanooga, Tenn., died at his home in that city on November 17, at the age of 76.

C. C. Wentworth, principal assistant engineer of the Norfolk & Western since February, 1903, died on November 11 at his home in Roanoke, Va.

George L. Lang, who was superintendent of telegraph of the Cincinnati, New Orleans & Texas Pacific and the Alabama Great Southern previous to August, 1906, died at Chattanooga, Tenn., on November 13, at the age of 72.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE VIRGINIAN RAILWAY is in the market for one Mallet type locomotive.

THE LAKE SUPERIOR & ISHPEMING is inquiring for prices on two Mikado type locomotives.

THE ELGIN, JOLIET & EASTERN is inquiring for prices on 18 Mikado type and 9 switching locomotives.

THE DULUTH, MISSABE & NORTHERN is inquiring for prices on two Mallet and four Santa Fe type locomotives.

THE STANDARD OIL COMPANY, Whiting, Ind., has ordered one six-wheel switching locomotive from the American Locomotive Company, and has withdrawn its inquiry, mentioned last week, for an additional locomotive.

THE MISSOURI, KANSAS & TEXAS has ordered 5 superheater Pacific type locomotives from the American Locomotive Company. These locomotives will have 25 by 28 in. cylinders, 73 in. driving wheels, and a total weight in working order of 272,000 lb.

THE BOSTON & ALBANY has ordered 4 superheater Mallet (2-6-6-2) type locomotives from the American Locomotive Company. These locomotives will have 22½ and 34 by 32 in. cylinders, 57 in. driving wheels and a total weight in working order of 354,000 lb.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered 33 superheater Mikado type locomotives from the American Locomotive Company. Of these, 25 will have 25 by 30 in. cylinders, 63 in. driving wheels and a total weight in working order of 260,000 lb. The other 8 will have 26 by 32 in. cylinders, 63 in. driving wheels and a total weight in working order of 325,000 lb.

THE BIRMINGHAM SOUTHERN, reported in the issue of last week as being in the market for 3 locomotives, has ordered one Consolidation type and 2 six-wheel switching locomotives from the American Locomotive Company. All three locomotives will be equipped with superheaters. The Consolidation type locomotive will have 23 by 28 in. cylinders, 53 in. driving wheels, and a total weight in working order of 202,000 lb. The switching locomotives will have 22 by 26 in. cylinders, 52 in. driving wheels and a total weight in working order of 160,000 lb.

CAR BUILDING

THE ILLINOIS CENTRAL is inquiring for 40 air dump cars.

THE LEHIGH VALLEY is in the market for 15 caboose cars.

THE DENVER & RIO GRANDE is inquiring for 1,000 box cars.

THE LONG ISLAND RAILROAD is inquiring for 100 50-ton composite gondola cars.

THE NORTHERN PACIFIC has ordered 1,000 center constructions from the Western Steel Car & Foundry Company.

THE VIRGINIAN, reported in last week's issue as being in the market for 250 40-ton box cars, is in the market for box-car bodies only.

THE CINCINNATI, INDIANAPOLIS & WESTERN has ordered 450 box and 200 other freight cars from the Haskell & Barker Car Company.

THE WESTERN MARYLAND is reported to have increased its recent order with the Pullman Company for 2,000 hopper cars to 3,000. This item has not been confirmed.

THE COPPER RANGE, reported in the *Railway Age Gazette* of October 1, as being in the market for 40 ore cars, has ordered 50 ore cars from the Pressed Steel Car Company.

LAKE ERIE & NORTHERN.—Through an error in the printshop it was incorrectly reported in last week's issue that the Lake Erie & Western had ordered 8 steel frame coaches from the Preston Car & Coach Company, Inc. These cars were ordered

by the Lake Erie & Northern, a new road, whose main offices are at Brantford, Ont. William P. Kellett is general manager.

THE NEW YORK, CHICAGO & ST. LOUIS has ordered 600 center constructions from the Pressed Steel Car Company, and has also given the latter an order to repair 300 hopper cars.

THE CHESAPEAKE & OHIO, reported in the *Railway Age Gazette* of November 5, as having ordered 1,000 70-ton coal cars from the Standard Steel Car Company, is now reported to have increased that order to 2,000 cars. It is also reported as contemplating the purchase of 10 express cars.

THE CHICAGO, BURLINGTON & QUINCY, reported in an unconfirmed item in the issue of last week, as being in the market for 54 passenger cars, has issued inquiries for eight dining, five mail, 15 chair and nine passenger and baggage cars and 17 coaches, two of which will be provided with smoking compartments.

THE NEW YORK CENTRAL has ordered 1,000 55-ton self-clearing hopper cars from the Standard Steel Car Company for the Pittsburgh & Lake Erie, this order being additional to orders previously reported. It has also ordered 500 box cars from the Haskell & Barker Car Company, and 500 from the American Car & Foundry Company. These two orders for box cars were included in the original quota for these companies, but were later cut off and are now re-established. It is understood that the New York Central will also order more freight cars.

IRON AND STEEL

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA has ordered 10,000 tons of rails from the Lackawanna Steel Company.

THE OGDEN, LOGAN & IDAHO has ordered 184 tons of steel from the American Bridge Company for shops and car barns at Ogden, Utah.

THE PHILADELPHIA & READING has divided an order for 12,000 tons of rails among the Pennsylvania Steel Company, the Bethlehem Steel Company and the Carnegie Steel Company.

THE CHICAGO, ROCK ISLAND & PACIFIC has ordered 40,000 tons of 90 and 100 lb. rails from the Illinois Steel Company. Deliveries will begin next April and extend until October.

THE CHICAGO & NORTH WESTERN has ordered 30,000 tons of rails from the Illinois Steel Company and 1,000 tons from the Cambria Steel Company. This is the total order placed for next year's requirements and includes the order for 15,000 tons reported in these columns on October 8.

SIGNALING

THE IMPERIAL GOVERNMENT RAILWAYS OF JAPAN have given the Hall Switch & Signal Company an order for 42 two-arm signals with necessary relays, lightning arresters, etc.

WOMEN RAILWAY WORKERS IN ENGLAND.—Fred W. West, goods superintendent for the London district of the South-Eastern & Chatham Railway, has recently written informatively on the reorganization of the staff that was inevitable as the result of the large percentage of the experienced employees of all grades "loyally responding" to Lord Kitchener's call for more men. In regard to the employment of women, Mr. West says it would be unreasonable to expect either any young woman or any young man without previous experience adequately to replace men of experience in a business involving so much training and technical knowledge as the railway, consequently it was considered good, if not quite as economical, when it was found that three untrained girls could fairly undertake two trained men's duties. It seemed that what they lacked in experience they gained in enthusiasm, and there is no reason to doubt that if they apply themselves to the cult of the railway with the same pertinacity and thoroughness that they are showing at present they will quickly become very proficient. Mr. West adds:—"Women, as well as men, will learn after this war is over, if not before, that there is a dignity in what is known as 'manual labour,' never previously fully realized, and, further, that Nature no more intended woman to be inactive in winning the necessities of life than the lioness."—*Railway Gazette*, London.

Supply Trade News

Joseph G. Crane, eastern railway representative of the Lowe Brothers Company, Dayton, Ohio, has moved his office from 54 Hudson street, Jersey City, N. J., to 101 Park avenue, New York City.

The Sharon (Pa.) plant of the American Steel Foundries started molding this week. This is the last of the company's plants to reopen to meet the pressing demands of the present revival of business.

E. H. Poetler, assistant traffic manager of the Barrett Manufacturing Company, with office at Chicago, has been appointed to a new position in charge of the railway sales department, with office at New York, N. Y.

Frederic H. Poor, who since the incorporation in December, 1909, of the S. K. F. Ball Bearing Company, of New York, has been its general manager, has recently severed his connection with that organization, and has opened an office of his own at 30 Church street, New York.

L. J. Hotchkiss, recently with Bates & Rogers, contractors, Chicago, has opened an office as consulting civil engineer, Monadnock Block, Chicago, and will specialize in construction layouts. Mr. Hotchkiss was formerly assistant bridge engineer of the Chicago, Burlington & Quincy.

On November 16, Judge Hazel in the United States Court for the Western district of New York, signed an order fixing December 7, 1915, as the time for a hearing on the application of the Safety Car Heating & Lighting Company, New York, for an injunction against the ampere-hour meter control system of car lighting under the Creveling patent No. 747686.

The S. K. F. Ball Bearing Company, of Hartford, Conn., recently incorporated with a capital of \$2,000,000, to take over the business of the S. K. F. Ball Bearing Company, of New York, a house importing ball bearings made in Sweden, is about to erect a factory at Hartford, Conn. The new company has acquired the right to manufacture the S. K. F. ball bearings, formerly made in Sweden. Its directors are: Frank A. Vanderlip, of the National City Bank; B. M. W. Hanson, vice-president of Pratt & Whitney; Franklin B. Kirkbride, 7 Wall street, New York; A. Carlander and S. Wingust, directors of the Swedish S. K. F. Company, which is a large holder in the new American corporation, and B. G. Prytz, who will act as president.

J. Leonard Replogle, vice-president and general manager of sales of the American Vanadium Company since March 1, 1915, and prior to that vice-president and general manager of sales of the Cambria Steel Company, on November 12 purchased from the Pennsylvania company approximately 240,000 shares of stock in the Cambria Company at a price of almost \$15,000,000. He is acting, it is understood, for a syndicate, composed, among others, of E. T. Stotsbury of Drexel & Co., Philadelphia, and A. W. Mellon and R. B. Bellon of the Mellon National Bank of Pittsburgh, who are buying for purposes of investment. Mr. Replogle's holdings do not give him control of the Cambria Steel Company. The latter is capitalized at \$50,000,000, of which \$45,000,000 is outstanding in shares of \$50 par value. The Pennsylvania Company (Pennsylvania Lines west of Pittsburgh, a short time ago held \$22,504,000 of this, or slightly over 51 per cent. It later sold 98,000 shares in the open market and recently William H. Donner, president of the Pennsylvania and Cambria Steel Companies, exercised options for the purchase of 112,000 shares. Mr. Donner was negotiating for an option on or for the purchase of the remainder of the Pennsylvania Company's holds, when Mr. Replogle also made an offer. It is understood that the syndicate for which Mr. Replogle is acting controls more than the 240,000 shares acquired from the Pennsylvania Company, but it is not believed that they have a majority control. Mr. Donner and H. C. Frick had been taking action leading to a possible merger of the Pennsylvania and Cambria Steel Companies. Whether this will now be carried out is a question. The *Railway Age Gazette* printed a photograph and sketch of Mr. Replogle in the issue of February 5, 1915, page 249.

TRADE PUBLICATIONS

CONDENSERS.—The Mesta Machine Company, Pittsburgh, Pa., has recently issued Bulletin R, dealing with the Mesta barometric condensers made by that company.

FLORIDA EAST COAST.—The passenger department of the Florida East Coast has recently issued an especially attractive illustrated booklet, describing the hotels and resorts of the state of Florida.

STORAGE BATTERIES.—Bulletin No. 12, recently issued by the General Lead Batteries Company, Newark, N. J., deals with the use of the hydrometer syringe made by that company and tells how to recharge batteries.

CAR DOOR FASTENERS.—Circular No. 54, recently issued by the National Malleable Castings Company, Cleveland, Ohio, describes and illustrates the company's line of National safety car door fasteners, handles, stops and fittings.

FLOORING.—The Standard Asphalt & Rubber Company, Chicago, has issued a 24-page pamphlet containing 42 photographs showing installations of Sarco mineral rubber floors and waterproofing in buildings and other structures.

LUMBER.—The Gum Lumber Manufacturers' Association, Memphis, Tenn., has recently issued a booklet containing technical information about red gum. A number of illustrations are given, for the purpose of showing the graining and other characteristics.

BULB SECTIONS.—The Carnegie Steel Company, Pittsburgh, has issued a pamphlet containing tables and data on all the sections which they now roll in bulb angles and bulb beams. This is in response to an increased demand for this class of material for use in steel car construction and particularly for steel ship building in the United States and elsewhere.

WATERPROOFING EXPOSED WALLS.—The Minwax Company, New York City, has issued bulletin No. 2 of the series of pamphlets on the subject of waterproofing. This issue deals with the waterproofing of exposed walls, both with Minwax clear waterproofing for external use and Minwax damp-proofing for internal use. The bulletin also contains specifications for these materials and photographs of a number of buildings in which these materials have been used.

WATER LIFTED BY COMPRESSED AIR.—The Ingersoll-Rand Company, New York City, has published an 80-page pamphlet describing the air lift pump and its advantages for various purposes in connection with underground waters. The principles of the air lift system of pumping are explained and a description is given of the equipment required, including four pages cataloguing the Ingersoll-Rand standard steam-driven air compressors suitable in connection with this work. There are also eight pages of tables on friction of pipes and other data of value in connection with the handling of water by means of compressed air.

STEEL SHEET PILING, TENTH EDITION.—The Carnegie Steel Company, Pittsburgh, Pa., has just issued a pamphlet superseding a previous edition published in 1912, which describes steel sheet piling for use in cofferdam construction, retaining walls and similar work. The pamphlet contains the necessary data relative to the sections and much information concerning their various uses and the operations connected with the application of these plans. It also contains a general discussion of earth and water pressures and the computation of bracing systems for cofferdams, retaining walls, etc., and information on the weights of materials, strength of hoisting ropes, capacity of tackles, concrete, bearing power of piles, etc., which would be of value to foundation engineers.

DRILLS.—The Ingersoll-Rand Company, New York City, has issued a 128-page pamphlet on the subject of core drilling, which is a comprehensive treatise on the subject. It explains the value of cores in determining the character, order, thickness and extent of materials below the earth's surface, differentiates between diamond drill and the Calyx drill, and describes in detail the equipment necessary for this purpose, with particular reference to the bits. This is followed by a discussion of construction methods and results obtained. Thirty-one pages are devoted to descriptions of the complete core drill plants of various styles and sizes manufactured by the Ingersoll-Rand Company.

Railway Construction

BOYNE CITY, GAYLORD & ALPENA.—An extension is projected from a point east of Atlanta, Mich., towards Alpena, nine miles.

CAPE BRETON.—Surveys have been made to build an extension from St. Peters, N. S., northeast to Sydney, 60 miles. The company now operates a 31-mile line from St. Peters west to Point Tupper.

CENTRAL OF OREGON.—This company's plans call for building 77 miles between Union, Ore., and Walla Walla, Wash., also a branch from Union to Medical Springs, 22 miles. The company now operates 18 miles from Union Junction east to Union, thence north to Cove, also a branch from Union west to Hot Lake, eight miles.

CHAMPLAIN & SANFORD.—This company plans to build a line from Sanford Lake, N. Y., east to Fort Ticonderoga, about 60 miles. Most of the right of way has been secured, but actual work has not yet been started. E. Scharson, president, 71 Broadway, New York. (See New York Roads, March 26, p. 720.)

COLORADO, WYOMING & EASTERN.—Surveys have been made for building a new line from the existing line at North Gate, Colo., southwest to Hayden, 90 miles. The company now operates a line from Laramie, Wyo., west to Centennial, thence south via North Gate, Colo., to Coalmont, 111.1 miles.

GULF COAST RAILWAY.—Incorporated in Florida to build from Venice, Fla., southeast to Placida, 22 miles. This is the line proposed by the Southern Investment Company. The incorporators include L. M. Williams and S. H. Bemiss, Richmond, Va., and T. C. Williams, Sarasota, Fla. (See Florida Roads, July 16, p. 143.)

KENT NORTHERN.—This company plans to build a 42-mile line, from Kent Junction, N. B., southwest to Chipman, about 50 miles. Surveys are now being made. The company operates a 27-mile line from Kent Junction, where a connection is made with the Intercolonial east to Richibucto.

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, is asking for bids for the construction of two sections of the Dual System of rapid transit in the City of New York. Bids are to be opened on November 30 for Section No. 2 of Routes Nos. 19 and 22, being the elevated extension of the Southern boulevard and Westchester avenue branch of the Lexington avenue subway, extending northerly over Westchester avenue, the Bronx, from a point near the intersection of Whitlock avenue to Pelham Bay Park. Bids are to be opened on December 7 for the construction of Section No. 3 of Route No. 8, comprising the tunnel section under the East river from Fourteenth street in the borough of Manhattan to North Seventh street in the borough of Brooklyn. Route No. 8 will extend from Sixth avenue, Manhattan, to North Seventh street in the borough of Brooklyn, thence through various streets and private property to a connection with the Broadway elevated line.

The commission has given a contract to Murphy Brothers, Brooklyn, the lowest bidder at \$7,421, for the construction of the storm drain for the Queensboro subway in the borough of Queens. This subway is now being operated between the borough of Manhattan and Long Island City. It is to be extended on the Queens side to the Queensboro bridge plaza and to a connection with the Astoria and Corona elevated railroads. Bids have been received by the commission for the installation of tracks on the Queensboro subway extension, the Astoria elevated line and the Corona elevated line. George S. Bennett, who offered to do the work for \$204,000, was the lowest bidder.

PACIFIC GREAT EASTERN.—President J. W. Stewart of this company, which is building from Vancouver, B. C., north to Prince George, 480 miles, is quoted as saying that satisfactory progress has been made on the construction of the main line. The grading of the entire line is finished except on the Howe Sound section between Horseshoe Bay and Squamish, about 30 miles, and about 30 miles of light work near Horse Lake.

During the past year track has been extended north of Squamish to a point some miles beyond Lillooet, and the contractor is now operating train service between these towns under an agreement with the company. He is also maintaining train service on the North Vancouver-Horseshoe Bay section. Track-laying work is now under way. (July 16, p. 143.)

PIEDMONT & NORTHERN (ELECTRIC).—A contract has been given to the Charlotte Grading Company, Charlotte, N. C., and work is now under way on the branch line from Belmont Junction, N. C., to Belmont, about 4 miles. The work will be light and involves handling 10,000 cu. yd. to the mile. The maximum grade will be 3 per cent and the maximum curvature 13 deg. The company expects to develop on the branch a traffic in cotton factory products, cotton and coal. (November 12, p. 923.)

SALT LAKE & UTAH (ELECTRIC).—This railroad has awarded the contract for grading an extension from Spanish Fork, Utah, to Payson to the Wasatch Grading Company. The approximate fill per mile will be 10,000 cu. yd., the maximum grade about 1 per cent and the maximum curvature 4 deg. Grading has just been begun, and the track laying will be done by company forces. The company will also construct the three short ballast-deck timber trestles found necessary in the survey. The extension will be six miles long. W. R. Armstrong, general manager and chief engineer, Salt Lake City, Utah.

SPANISH PEAK LUMBER COMPANY, QUINCY, CAL.—This company has awarded a contract to the United States Steel Products Company for a tramway from Spanish Ranch to Gray's Flat, about six miles. The contract price is about \$36,000.

WILLIAMSPORT, NESSLE & MARTINSBURG.—Work is now under way on the section from Nessle, W. Va., to Cherry Hill, two miles. The work is being carried out with company forces. The plans call for a line from Williamsport to Martinsburg, 15 miles. Surveys have been made. John Carmichael, president, Hagerstown, Md. (August 27, p. 409.)

RAILWAY STRUCTURES

BELMONT, N. C.—The Piedmont & Northern will build a combined freight and passenger station, to be of brick construction, at Belmont. See this company under Railway Construction.

BROOKLYN, N. Y.—The New York Public Service Commission, First district, has given a contract to A. L. Guidone & Son, Incorporated, the lowest bidder at \$513,656, for the construction of station finish on Section No. 2 of Route No. 39. This work is on the New Utrecht avenue elevated railroad in the borough of Brooklyn. The steel structure for this section is nearing completion.

MACON, GA.—The general contract has been given to J. Henry Miller, Inc., Baltimore, Md., for building the union station at Macon. The new station is to be of stone, brick and steel construction and is to cost about \$500,000. It will be used jointly by the Central of Georgia, the Southern Railway and the Georgia Southern & Florida. (September 24, p. 586.)

MEXIA, TEX.—The Houston & Texas Central has begun work on a new station, one story in height, 25 ft. wide and 123 ft. long. It will be a brick structure with asbestos shingle roof, and will cost about \$9,500. About 5 per cent of the work has been completed. F. T. Jeans, superintendent bridges and buildings, Ennis, Tex.

MILWAUKEE, WIS.—The Chicago & Milwaukee Electric is building a bridge over the Chicago, Milwaukee & St. Paul tracks just south of the city. It will consist of a 185-ft. skew through girder span, a 140-ft. truss span and a 55-ft. skew deck girder span. Concrete abutments and piers have been built by company forces and the contract for the steel work has been let to the Wisconsin Bridge & Iron Company. (Noted under Iron and Steel, October 15.)

MOUNT VERNON, N. Y.—Plans have been agreed upon by all interested for a six-span concrete viaduct connecting Broad street, Mount Vernon, with Vermont avenue, Yonkers, over the tracks of the New York Central and over the Bronx river. The Public Service Commission is expected to issue the necessary order in the near future. This viaduct will cost about \$80,000.

Railway Financial News

ATCHISON, TOPEKA & SANTA FE.—Ogden Mills, of New York, has been elected a director, succeeding Thomas P. Fowler, deceased.

CINCINNATI, INDIANAPOLIS & WESTERN.—The Ohio Public Service Commission has approved of the issue of \$2,675,000 first mortgage 5 per cent 50-year bonds, \$5,350,000 6 per cent non-cumulative preferred stock and \$5,350,000 common stock by the new company, the Cincinnati, Indianapolis & Western Railroad, which bought at foreclosure sale the Cincinnati, Indianapolis & Western Railway, a subsidiary of the Cincinnati, Hamilton & Dayton. The old company operated 381 miles of road, of which 361 miles was owned.

CHICAGO, ROCK ISLAND & PACIFIC.—The following is a summary of the report of J. W. Kendrick, who has been employed to make an estimate of the needs of the property. His report is in regard to a period of five years:

The full amount of the savings or economies suggested will not be realized until the last year, that is the year ending June 30, 1921. The major part of the capital expenditures should be made during the first three years or up to June 30, 1919, and the money so required is estimated to be \$27,000,000, divided among the various accounts as follows:

ESTIMATED CAPITAL EXPENDITURES TO JUNE 30, 1919.

Grade revision, new lines, sidings and second track.....	\$ 6,008,000
New freight locomotives.....	1,000,000
Improvements to existing equipment—cars and engines..	3,442,000
Rails	750,000
Ballast and bank widening.....	3,587,000
Tie plates	3,000,000
Yards and terminals.....	2,207,000
Track motor cars.....	176,000
Bridges	280,000
Track elevation and grade separation.....	3,392,000
Fences	309,000
Telegraph and telephone.....	275,000
Signals	291,000
Miscellaneous	2,487,000
Total	\$27,204,000

It is believed that this amount of money, judiciously expended, will result in putting the Rock Island in good physical condition and by the exercise of close supervision it is estimated that the net annual saving in operating expenses for the fiscal year ending June 30, 1919, will amount to about \$5,050,000. Four thousand freight cars have been purchased by the receiver and by the expenditures recommended in connection with the equipment reinforcement and betterment, some 5,000 additional freight cars will be put into serviceable condition and will result in an estimated reduction in hire of equipment charges amounting to \$700,000 per annum. By the cancellation and modification of certain leases there should also be a reduction in rentals amounting to \$319,000. The expenditures will cause an increase in interest on funded and unfunded debt in 1919 over 1915 of \$1,588,000.

Applying these estimates to the year ending June 30, 1919, and assuming that the gross operating revenue increases at the same rate it has during the past five years, the income account for the year ending June 30, 1919, will be as follows:

INCOME ACCOUNT 1919.

Railway operating revenue.....	\$74,550,000
Operating expenses	50,918,000
Operating ratio, per cent.....	68.3%
Net revenue from railway operation.....	23,632,000
Taxes and uncollectible revenue.....	3,986,000
Total railway operating income.....	19,646,000
Other income	1,368,000
Total income	21,014,000
Hire of equipment, Dr.....	\$ 556,000
Rent of other equipment	453,000
Joint facilities and other rents.....	1,304,000
Rent for leased roads.....	332,000
Interest on funded and unfunded debt.....	13,224,000
Other income charges	342,000
Total deductions	16,711,000
Balance of income.....	\$ 4,303,000

During 1920 and 1921 \$4,000,000 should be expended annually for additions and betterments and by the end of the

fiscal year 1921 it is believed all of the estimated economies should be realized. On this basis the operating ratio for 1921 will be 64.1 per cent and the income account will be as follows:

INCOME ACCOUNT 1921.

Railway operating revenue.....	\$76,350,000
Operating expenses	48,940,000
Operating ratio, per cent.....	64.1%
Net revenue from railway operation.....	27,410,000
Taxes and uncollectible revenue.....	4,286,000
Total railway operating income.....	23,124,000
Other income	1,368,000
Total income	24,492,000
Hire of equipment, Dr.....	\$ 556,000
Rent of other equipment	453,000
Joint facilities and other rents.....	1,304,000
Rent for leased roads.....	332,000
Interest on funded and unfunded debt.....	14,124,000
Other income charges	342,000
Total deductions	17,111,000
Balance of income.....	\$ 7,381,000

See also Trinity & Brazos Valley.

COLORADO & SOUTHERN.—See Trinity & Brazos Valley.

KANSAS CITY, OZARK & SOUTHERN.—The receiver has fixed November 18 for the winding up of the receiver's affairs, some time after which a reorganized company will take over the property.

NEW ORLEANS, TEXAS & MEXICO.—This former subsidiary of the St. Louis & San Francisco was sold at public auction on November 15 to Walter L. Taylor, representing the bondholders' protective committee, for \$6,000,000.

NEW YORK, NEW HAVEN & HARTFORD.—F. T. Maxwell has been elected a member of the executive committee of the New York, New Haven & Hartford, succeeding H. K. McHarg.

PENNSYLVANIA.—It is announced that this company has sold the balance of its holdings, said to be about 240,000 shares, of Cambria steel stock. Cambria steel has been selling in the open market between \$65 and \$70 per share.

SOUTHERN PACIFIC.—F. D. Underwood, president of the Erie, has been elected a director of the Southern Pacific, succeeding C. N. Bliss, resigned. Announcement was made that this change had nothing to do with any traffic relations between the Erie and Southern Pacific but was the result of a desire on the part of the Southern Pacific to secure as a director one of the ablest operating officers in the country.

ST. LOUIS & SAN FRANCISCO.—Representatives of the reorganization committees under the receivers have submitted to the Missouri Public Service Commission an outline of the plan of reorganization of the St. Louis & San Francisco. The reorganization managers are Speyer & Co. and J. & W. Seligman & Co., both of New York. The mileage to be taken over by the new company totals 5,155; the total capitalization is to be \$327,211,188, as against the present total capitalization of \$356,890,056; the fixed and contingent charges of the new company will be \$13,524,119, or a reduction of 47.64 per cent as compared with the present fixed charges. An assessment of \$50 a share is to be made on stockholders of the old company, who have the privilege, however, of paying \$5 in cash and paying the remaining \$45 in 18 months. Stockholders are to receive for their assessment and surrender of old stock 85 per cent in new stock and \$50 in first mortgage bonds. See also New Orleans, Texas & Mexico.

TRINITY & BRAZOS VALLEY.—A correspondent at Houston, Tex., writes that Louis W. Hill and other officers of the Great Northern and the Chicago, Burlington & Quincy, which latter road controls the Colorado & Southern, made an inspection trip over the Trinity & Brazos Valley in the process of negotiations for taking over the half interest formerly held by the Chicago, Rock Island & Pacific (the other half interest now being held by the Colorado & Southern) in this property.

FORTY THOUSAND DOGS.—The Baltimore & Ohio reports that the transportation of hunting and pet dogs was a source of \$10,000 revenue to the road last year, according to the records of the baggage department; 40,000 dogs at 25 cents each; and all were handled without a claim for loss or injury.

ANNUAL REPORT

BALTIMORE AND OHIO RAILROAD COMPANY—EIGHTY-NINTH ANNUAL REPORT

Office of the Baltimore & Ohio Railroad Company.

BALTIMORE, Md., October 27, 1915.

To the Stockholders of the Baltimore & Ohio Railroad Company:

The president and directors of the company submit herewith report of the affairs of the company for the fiscal year ended June 30, 1915.

Except where otherwise indicated, the comparisons shown herein are with the figures for the preceding fiscal year. The income and capital accounts for the year are stated in accordance with the new accounting classifications as prescribed by the Interstate Commerce Commission, effective July 1, 1914, and in order that such comparisons may be properly made, the figures for the preceding year have been recast, so far as practicable, and consequently do not agree in detail with the figures published in the last annual report.

MILEAGE AND EQUIPMENT.

The statements in this report show the results of the operation of the lines directly controlled and operated by your company, embracing:

	First Main Track.	Total of All Tracks.
Miles (owned)	4,458.97	8,803.17
Miles (trackage rights).....	76.30	204.10
Total miles operated.....	<u>4,535.27</u>	<u>9,007.27</u>

as shown in Table 28.

There has been an increase during the year in total first main track mileage operated of 57.05 miles, which was occasioned by the acquisition of the Moorefield and Virginia Branch, 36.61 miles; the construction of the Magnolia Cut-off, 13.14 miles; the extension of branch lines, 5.34 miles, and certain other adjustments, 1.96 miles.

The equipment of the company at June 30, 1915, consisted of 2,399 locomotives, 1,261 passenger cars, 86,097 freight cars, 3,163 work cars and 144 pieces of floating equipment, as shown in detail in Table 27.

RESULTS FROM OPERATION.

The general income account of the company will be found in Table 1. The total railway operating revenues were \$91,815,797.34, a decrease of \$7,348,212.63, or 7.41 per cent.

The total railway operating expenses were \$63,925,507.74, a decrease of \$10,477,880.78, or 14.08 per cent.

The ratio of operating expenses to total revenues was 69.62 per cent., compared with 75.03 per cent. for the previous year.

The net revenue from railway operations was \$27,890,289.60, an increase of \$3,129,668.15, or 12.64 per cent.

The gross income from the year's operations was sufficient to enable your company to meet its fixed and other charges, to pay the established four per cent. dividend upon the preferred stock and five per cent. upon the common stock, and leave a surplus of \$771,473.86.

FREIGHT REVENUES AND STATISTICS.

Freight revenue was \$70,780,808.51, a decrease of \$5,617,908.11, or 7.35 per cent., and constituted 77.09 per cent. of total railway operating revenues, as against 77.04 per cent. last year.

The Interstate Commerce Commission has ordered, effective July 1, 1914, that all statistics, with respect to tons and tonnage, be adjusted to the basis of 2,000 pounds per ton, without regard to the customary weight of the ton as waybilled. The statistics heretofore published have been on the basis of the weight of the ton as waybilled, and as a large proportion of your company's tonnage is waybilled at 2,240 pounds to the ton, as prescribed by tariffs, the effect of the recent requirements of the commission is to materially increase the number of tons as reported. The traffic statistics, Table 12 and Table 13-A, for the years 1915 and 1914, are given on the new basis, but in order that comparisons for the ten-year period may be continued, the statistics given in Table 13-B are stated on the basis of the tons as waybilled.

The tons of revenue freight carried were 64,375,595, a decrease of 7,891,465 tons, or 10.92 per cent., and the tons carried one mile were 12,970,894,074, a decrease of 1,083,527,427 tons, or 7.71 per cent. As indicating the traffic density of the system the revenue ton miles per mile of road were 2,860,005 tons, a decrease of 252,534 tons., or 8.11 per cent. The average distance each ton was carried was 201 49-100 miles, a gain of 7 1-100 miles over the previous year. Freight revenue per mile of road was \$15,606.75, a decrease of \$1,312.77, or 7.76 per cent., and the revenue per freight train mile was \$3.77 81-100, an increase of 26 99-100 cents, or 7.69 per cent. The average earnings per ton per mile were 5 46-100 mills, an increase of 2-100 mills. The increase in the average rate per ton per mile, and in the average distance each ton was carried is mainly due to a larger proportion of the coal shipments being consigned to the ports of Baltimore and New York. Freight traffic statistics are given in Tables 12 and 13.

The statement of commodities carried, Table 14, shows a substantial increase in the grouping of products of agriculture of 668,164 tons, or 18.97 per cent. There was, however, a very large decrease in the items comprised in the grouping of products of mines, amounting to 7,520,045 tons, or 15.42 per cent. under the previous year. The decrease in Products of Mines and of Manufactures reflects the depression in the steel trade and allied industries throughout the greater part of the year.

PASSENGER REVENUES AND STATISTICS.

Passenger revenue amounted to \$14,059,940.41, a decrease of \$1,830,050.54, or 11.52 per cent. These earnings constitute 15.31 per cent. of total earnings, compared with 16.02 per cent. for last year.

The number of passengers carried was 20,581,992, a decrease of 2,166,078, or 9.52 per cent.; the number of passengers carried one mile was 714,368,423, a decrease of 112,910,193, or 13.65 per cent., and the average distance each passenger was carried was 34.71 miles, a decrease of 1 66-100 miles. Of the decrease in passenger earnings, approximately \$800,000 was due to the cessation of immigrant business occasioned by the disturbed conditions in Europe, and the remaining portion of the decrease reflects the general depression in business. The average rate per passenger per mile for the year was 1 968-1000 cents, an increase over the previous year of 47-1000 cents, due in part to the withdrawal of special rate features and the increase in certain fares. The average earnings from each passenger decreased 1 54-100 cents. These and other statistics relating to passenger traffic will be found in Tables 10 and 11.

MISCELLANEOUS REVENUES.

Mail revenue was \$1,236,076.68, an increase of \$21,733.61 over the preceding year.

Express revenue was \$1,818,452.68, a decrease of \$31,761.15. That this decrease was not greater in a year of general depression, is due largely to the earnest co-operation and great activity displayed by the Wells

Fargo Express Company in building up this branch of the service.

Other transportation revenue, in which is included earnings from switching and special train service, transportation of milk, excess baggage, water transfers, etc., shows a net decrease of \$44,338.20, mainly from excess baggage charges and water transfers.

Revenue from sources other than transportation, in which is included earnings from dining cars, station privileges, storage, grain elevators, joint facilities, etc., shows a net increase of \$154,111.76, principally occasioned by the increase in earnings from elevators, due to the larger movement of grain.

OPERATING EXPENSES.

The total operating expenses for the year were \$63,925,507.74, compared with \$74,403,388.52 for last year, a decrease of \$10,477,880.78, or 14.08 per cent.

The total maintenance of way and structures expenses were \$8,985,626.86, a decrease of \$3,432,808.11, or 27.64 per cent. It should be noted in this connection that maintenance of way expenses for the previous year included a charge of \$2,112,084.98 directly attributable to the disastrous floods of March, 1913, which had no counterpart in the operations of the present fiscal year. These expenses include \$556,452.15, covering replacement and revision of facilities incident to additions and betterments. The roadway and structures have been properly maintained.

The total maintenance of equipment expenses were \$16,002,588.53, a decrease of \$1,147,186.68, or 6.69 per cent. Included in these expenses is a charge for depreciation of equipment amounting to \$2,810,415.80.

The total of all maintenance expenses for the year was \$24,988,215.39, and compared with the same expenses for the preceding year shows a decrease of \$4,579,994.79, or 15.49 per cent. These expenses for the year represent 27.22 per cent. of total operating revenues, as compared with 29.82 per cent. the preceding year.

The total transportation expenses for the year were \$34,254,572.05 and, compared with last year \$39,985,496.44, show a decrease of \$5,730,924.39, or 14.33 per cent. These expenses were 37.31 per cent. of total operating revenues, as compared with 40.32 per cent. the preceding year. Co-incident with the decrease in transportation costs and directly contributing thereto was the heavier freight train load, which was 692.35 tons this year against 645.37 tons for the previous year, an increase of 46.98 tons, or 7.28 per cent. There was a decrease in revenue freight train miles of 3,042,622 miles, or 13.97 per cent., notwithstanding the revenue freight handled one mile decreased but 7.71 per cent.

The traffic expenses decreased \$247,329.82, or 11.49 per cent., due mainly to less expenditure for outside agencies and for printing tariffs, etc.

The Interstate Commerce Commission classification of outside operations was abolished, effective July 1, 1914. The greater portion of the expenses formerly charged to those accounts are now charged direct to other accounts; a minor portion, however, is still segregated and included in miscellaneous operations, and the fluctuations therein for the year were immaterial.

The general expenses increased \$92,664.23, due, principally, to increased expense of the relief department on account of increase in pension payments and to the difference in method of charging appropriations made to that department.

The credit item of transportation for investment is a new requirement of the Interstate Commerce Commission. The amount included therein represents the reasonable cost of transporting men and material for construction work and is charged to the cost of such work.

TAXES.

Railway tax accruals amounted to \$3,289,611.04, and taxes charged to miscellaneous tax accruals amounted to \$213,463.32, or a total of all taxes for the year of \$3,503,074.36, an increase of \$59,226.33. Taxes for the year were 3.82 per cent. of total operating revenues.

INCOME ACCOUNT.

Nonoperating income, in which is included rentals from property and equipment, dividends and interest on securities owned, etc., decreased \$872,569.82, due to the exclusion from the income of the year of any interest accruing on obligations of the Cincinnati, Hamilton & Dayton Railway Company now held by your company.

Deductions from gross income, in which is included rentals paid for the use of equipment and property, interest on funded and unfunded debt, etc., increased \$654,529.68, occasioned by increase in certain rentals paid and larger interest charges incident to increased capital obligations.

The net income for the year amounted to \$10,780,881.33, an increase of \$1,530,856.95 over the preceding year, out of which dividends at the rate of four per cent. per annum were paid on the preferred stock of the company, amounting to \$2,354,521.28. After deducting this amount and required appropriations for sinking and other reserve funds, the balance transferred to profit and loss was \$8,368,727.07.

PROFIT AND LOSS.

The amount to the credit of profit and loss at the beginning of the fiscal year was \$32,804,187.74, which amount was increased to \$41,172,914.81 by the addition of the surplus income earned during the year as shown above. Dividends at the rate of five per cent. per annum, amounting to \$7,597,253.21, were declared on the common stock of the company and charged to profit and loss, and there was also charged to this account during the year the net amount of \$1,000,147.69, included in which is \$897,970.95 for discount and expenses on securities sold during the same period. The balance to the credit of profit and loss, which represents the excess book value of assets over liabilities, at the close of the year is \$32,575,513.91.

THE FIVE PER CENT. RATE CASE.

Because of the steady and constant increase in the costs of operation due to matters of a continuing character, such as wage increases, legislative requirements, and the necessity of maintaining higher standards in maintenance and operation, there had been a marked decline in the rate of return in net operating income upon the property investment of the railroads generally during the past several years. Owing to the inadequacy, under these conditions, of the then existing rates, your company joined with other railroads serving official classification territory in proceedings before the Interstate Commerce Commission, seeking to secure approval of a uniform advance in freight rates of five per cent.

Following the original and supplemental petitions of the railroads in the matter, and after hearings and investigations extending over more than a year, the Interstate Commerce Commission, in December, 1914, approved an advance in the freight rates in the so-called official classification territory, which includes the territory served by your company, of approximately five per cent., except on certain commodities such as bituminous and anthracite coal, coke, iron ore, etc., and on traffic moving via lake and rail, which exceptions apply to about one-half of the freight traffic of your company. The Commission also approved of advances in certain passenger rates and some other miscellaneous charges. The revised

rates on interstate traffic became effective generally in March, 1915, but the application for authority to adjust interstate rates is still pending in some of the States; therefore, the full effect on your company's revenues cannot now be determined.

In that part of the decision devoted to their findings as to the adequacy of present revenues, the Commission, among other things, stated:

"In view of a tendency towards a diminishing net operating income as shown by the facts described we are of opinion that the net operating income of the railroads in official classification territory, taken as a whole, is smaller than is demanded in the interest of both the general public and the railroads; and it is our duty and our purpose to aid, so far as we legally may, in the solution of the problem as to the course that the carriers may pursue to meet the situation."

While granting approximately only one-half of the immediate relief asked for by the railroads, it should be encouraging to those interested in railroads and in the proper industrial development of this country to know that the Commission treated the question before it in a broad way, and recognized, unanimously, the necessities of the carriers for additional revenues and declared its purpose to aid, so far as it legally may, in the solution of the problem as to the course that the carriers may pursue to meet the situation. It is believed that the inquiry has also served to bring about a much better understanding of the railroad situation by all interested or concerned in that question, and that because of this clearer understanding the shippers, the railroads and the regulatory agencies of the public will all in the future be better able to satisfactorily work out the many problems incident to the governmental regulation of the public utilities.

CHANGES IN CORPORATE RELATIONS.

Continuing the programme begun in 1912 for the purpose of simplifying the title to properties underlying the several System mortgages and of reducing the number of corporate entities comprising the System, thereby affording a more comprehensive basis for future financing, The Baltimore and Ohio Railroad Company during the year acquired the fee title to the property of the following corporations owning railroads in the State of Ohio, the operations of which properties are included in the System's income account as heretofore, viz.:

The Central Ohio Railroad Company, as reorganized.	142.72 miles
Sandusky, Mansfield and Newark Railroad Company, as reorganized	116.25 "
The Columbus and Cincinnati Midland Railroad Company	69.80 "
The Ohio Midland Railroad Company	43.86 "
The Cleveland, Loraine and Wheeling Railway Company	191.14 "
The Pittsburgh, Painesville and Fairport Railway Company	49.86 "
The Trumbull and Mahoning Railroad Company	8.64 "
The Mahoning Valley Western Railway Company	43.07 "
The Eastern Ohio Railroad Company	16.90 "
The Akron and Chicago Junction Railroad Company	77.30 "
The Cleveland, Wooster and Muskingum Valley Railroad Company	35.73 "
The Pittsburgh, Cleveland and Toledo Railroad Company	36.81 "
	<u>832.08 miles.</u>

The fee of that portion of The Pittsburgh, Cleveland and Toledo Railroad Company, lying wholly within the State of Pennsylvania, 9.85 miles, was acquired by The Pittsburgh and Western Railroad Company, the entire capital stock of the latter being owned by your Company.

The Baltimore and Ohio Railroad Company also acquired the fee title to the property formerly owned by the Moorefield and Virginia Railroad Company, 36.61 miles, which had heretofore been operated separately, but was included in the operations of the System for the fiscal year.

The purchase price of these properties represented the investment of your Company in the securities of, and capital advances to, the corporations mentioned above at the time of acquisition. The total amount of your investment has not been changed by reason of such purchases, the effect being merely to alter the form of the investment and to simplify the accounts on the general books of the Company.

The purchase of these properties, except in the case of the Moorefields and Virginia Railroad Company, did not increase or change the miles of road of the System, but did, however, increase the miles of road owned in fee by The Baltimore and Ohio Railroad Company to the extent of 868.69 miles. The length of road now owned in fee is 2,188.75 miles, or 49.13 per cent. of the mileage comprising the System.

GENERAL BALANCE SHEET.

The general balance sheet, stated generally in the form now prescribed by the Interstate Commerce Commission, is shown in Table 2, and the principal differences in the assets and liabilities of the Company, as compared with the previous year, are as follows:

ASSETS.

The grouping of investments, in which is included the capital assets of the Company, shows an increase for the year of..... \$9,195,985.07 made up as follows, viz.:

Net charge to road	\$6,538,144.22
Net charge to equipment	2,082,090.69
Miscellaneous investments (net)	575,750.16
	<u>\$9,195,985.07</u>

The grouping of current assets shows a decrease of..... \$24,734,033.96. Of this decrease \$17,751,244.53 is in cash and is due to the inclusion last year of \$20,000,000.00 in this item to pay a like amount of one-year secured notes, which matured and were paid July 1, 1914. There was a decrease in special deposits of \$1,900,947.53, due to payments for additional equipment acquired for the equipment trust of 1913, and a decrease in material and supplies of \$1,935,412.98. The increases in groupings of deferred assets and unadjusted debits are normal fluctuations incident to the business.

LIABILITIES.

There were no additional issues of capital stock during the year. The grouping of long term debt, i. e., funded debt shows an increase of..... \$3,991,833.34 accounted for as follows:

Obligations issued during the year—	
Four and one-half per cent. secured gold notes—	
Series "A," maturing June 1, 1917	\$20,000,000.00
Series "B," maturing June 1, 1918	20,000,000.00
	<u>\$40,000,000.00</u>
Issued to retire \$35,000,000.00 one-year notes, matured June 1, 1915, and for other corporate purposes.	

First mortgage bonds	\$1,000,000.00
Issued under provision of the mortgage, in recoupment of construction expenditures.	
Hampshire Southern R. R. Co. (Moorefield & Virginia R. R. Co.) first mortgage bonds, assumed	5,000.00
	<u>\$41,005,000.00</u>

Obligations retired during the year—

Baltimore & Ohio equipment trust of 1912	\$1,000,000.00
Series "C," paid at maturity.	
Baltimore & Ohio equipment trust of 1913	1,000,000.00
Series "B," paid at maturity.	
Baltimore & Ohio R. R. Co., Loan No. 6 of 1853	6,000.00
Purchased and retired.	
Real estate mortgages and ground liens, liquidated	7,166.66
Baltimore & Ohio R. R. Co., one-year secured notes	35,000,000
	<u>37,013,166.66</u>
Paid at maturity—June 1, 1915.	
Net increase	<u>\$3,991,833.34</u>

Current liabilities show a decrease of..... \$21,484,875.37 due, principally to the payment at maturity, July 1, 1914, of \$20,000,000.00 of one-year secured notes, the balance of the decrease being in the accounts interest matured unpaid, unmatured dividends unpaid, etc.

Deferred liabilities decreased \$470,620.68, resulting from the operations of the relief department and smaller aggregate amounts withheld from contractor's estimates. Unadjusted credits increased \$1,407,635.80, the major portion of which represents the net increase in accrued depreciation on equipment.

Incident to the acquisition of the fee of certain properties in Ohio, there was restored to the investment account of road \$2,793,197.90 of capital expenditures for additions and betterments, which had heretofore been charged to income or surplus, and this change accounts for the increase in the item additions to property through income and surplus.

EQUIPMENT TRUSTS.

The status of the equipment trusts at June 30, 1915, follows:

Baltimore & Ohio equipment trust of February, 1912:	
Total outstanding June 30, 1914	\$8,000,000.00
Matured and paid during the year—	
Series "C"—paid February 1, 1915	1,000,000.00
Outstanding June 30, 1915	<u>\$7,000,000.00</u>
Baltimore & Ohio equipment trust of 1913:	
Total outstanding June 30, 1914	\$9,000,000.00
Matured and paid during the year—	
Series "B"—paid April 1, 1915	1,000,000.00
Outstanding June 30, 1915	<u>8,000,000.00</u>
Total equipment trust obligations outstanding June 30, 1915	<u>\$15,000,000.00</u>

Each of these trust was issued in ten series of \$1,000,000.00, one series of each trust maturing annually.

ADDITIONS TO ROAD AND EQUIPMENT.

The total expenditures charged to road account were \$3,744,946.32. These charges are shown in Table 6, where they are grouped under the more important accounts of the road and equipment classification.

The total capital expenditures for equipment during the year aggregated \$4,231,882.19, as shown on page 12. Table 27 shows the equipment in service and the various changes occurring therein during the year.

ROAD.

The work of constructing the roadway for new double track line and relocation of parts of the old line between Okonoko and Orleans Road, W. Va., known as the Magnolia Cut-off improvement, has been completed. One track has been laid and was put in operation December 6, 1914. The laying of the second track has been held in abeyance. With the use of this improvement it has been possible to increase the eastbound slow freight train load to 6,180 gross tons, an increase of 36.36 per cent. The operations in this territory have been greatly facilitated by this improvement, the distance has been shortened 5.78 miles and the helper station at Hansrote has been eliminated, which latter constituted a serious interference with the movement of traffic by reason of eastbound trains requiring assistance over a section of the road where traffic is of the greatest density. While the new line has been opened but a little more than six months, substantial economies in transportation costs have already been effected and the movement of traffic much facilitated. With the handling of a greater volume of business the benefits derived will be proportionately larger. This improvement, together with others heretofore made, gives a continuous three-track line between Patterson Creek and Cherry Run, W. Va., a distance of 57 miles, which section has the greatest traffic density of the system, at times in excess of 24,000,000 ton miles per mile of road per annum.

No new construction work of any magnitude is now under way, but miscellaneous expenditures, as shown in detail in Table 6, were made during the year for the betterment and improvement of the property, some of the more important items were as follows:

An electric transformer station, to enable the utilization of purchased power, was erected at Camden Station, Baltimore, Md.

A new passenger station was constructed at Berkeley Springs, W. Va., and a new combination station and office building was completed at Strasburg Junction, Va.

During the year three new interlocking plants were built, and four were reconstructed and rearranged.

Automatic signals were installed over seven miles of double track, and 10.6 miles of westbound track between Orleans Road and Magnolia, W. Va. Controlled manual block signals were provided for 14.7 miles of single track, and a large number of safety devices were installed for the protection of switches, grade crossings, etc.

The alignment near Seventy-fifth street, Chicago, Ill., was corrected, eliminating 194 degrees of curvature, making it possible to operate the heaviest power on this part of the line and dispensing with a slow order over six miles of road.

The work of eliminating the grade crossing of Concord Pike, near Concord, Del., was completed, as was also the Washington Road crossing at Elkridge, Md.

The Ludlow Avenue Viaduct, Cincinnati, Ohio, which was opened for traffic on June 15, 1914, has now been entirely completed, and substantial progress has also been made in constructing the Hopple Street Viaduct in the same city.

The undergrade crossing at Twenty-eighth street, Lorain, Ohio, was completed.

Important bridges were constructed during the year over the Monongahela River at Wheeling Junction, Pa.; over Central avenue, Madisonville, Ohio, and over the Potomac River at Magnolia and Kessler, W. Va., the latter two being incident to the Magnolia Cut-off.

To permit the operation of heavier locomotives the bridges between Akron Junction and Cleveland, Ohio, have been rebuilt or strengthened so as to carry engines weighing over 220,000 pounds.

EQUIPMENT.

Total book value of equipment June 30, 1914, was.....\$107,756,046.72
During the year the following additions to equipment were made:

34 locomotives, 6 passenger cars, 1,781 freight cars, and 9 work cars, and payments were made amounting to.....	\$2,749,194.06
And 5 passenger cars, 7,564 freight cars and 1 work car were reconstructed, involving a net charge to the equipment account of.....	1,482,688.13
	<u>4,231,882.19</u>

During the year the following equipment was put out of service and credited to investment in equipment: 7 passenger cars, 3,603 freight cars, 419 work cars, 1 car float, and 1 lighter, having a book value of.....

	2,149,791.50
Making the gross book value of equipment.....	<u>\$109,838,137.41</u>

From this should be deducted:

Accrued depreciation on equipment in service as follows:	
Amount at credit, June 30, 1914.....	\$15,025,071.35
Amount charged to expenses for depreciation, year ended June 30, 1915.....	2,810,415.80
	<u>\$17,835,487.15</u>

Less: Charges against this account for depreciation accrued on equipment put out of service during the year.....	1,705,733.07
Balance to credit of accrued depreciation on equipment in service, June 30, 1915.....	16,129,754.08

Making net value of equipment June 30, 1915.....\$93,708,383.33

In continuation of the policy inaugurated several years ago of strengthening certain classes of equipment, during the year 7,564 freight cars were rebuilt with steel underframes and bolsters and equipped with heavy draft gear to better fit them for present operating requirements.

At the end of the year 203 locomotives, that had undergone thorough repairs, were in storage awaiting traffic development.

The percentage of steel freight cars, including cars with steel underframes and steel center sills, to the total revenue freight equipment at June 30, 1915, was 81.38 per cent., as compared with 72.77 per cent. last year and 38.83 per cent. at June 30, 1909.

Of the new equipment acquired during the year, 31 locomotives and 1,195 steel freight cars were purchased under the provisions of the Baltimore & Ohio equipment trust of 1913.

Contracts have been entered into for the purchase of 50 steel passenger cars and 2,000 all steel freight cars, to be delivered during the coming fiscal year.

RELIEF DEPARTMENT.

The railroad company assumes general charge of the relief department; furnishes office room and furniture, gives the service of its officers and employees and the use of its facilities; becomes the custodian of its funds with full responsibility therefor, and guarantees the true and faithful performance of the obligations of the department.

RELIEF FEATURE.

The total number of members of this feature is 50,591. The total payments for all benefits since the inauguration of this feature, May 1, 1880, to June 30, 1915, amount to \$20,096,882.93. A statement of the operations of this feature, which provides accident, sick, and death benefits for employees, is shown on the first page of Table 26.

SAVINGS FEATURE.

This feature combines the advantages of a savings and loan association, through which employees and their immediate dependents may invest their accumulated savings, and from which they may obtain funds for the purchase of homes to be repaid through easy monthly instalments. As an incentive to employees to save the railroad company guarantees four per cent. interest on all such deposits. During the past year this feature paid to depositors \$416,295.91, being five per cent. on deposits, after which there was a balance of \$48,178.18 carried to the surplus account. On June 30, 1915, there were 8,937 depositors, with total deposits of \$8,787,816.22, an average of \$982.21. During the year 1,394 new loans were made and 541 loans were paid off, leaving in force and effect at June 30, 1915, a total of 6,114 loans, amounting to \$5,536,842.22. Since the inauguration of this feature, August 1, 1882, loans to the aggregate amount of \$16,326,128.72 have been made, assisting employees in acquiring real estate to this extent. A statement of the operations of this feature will be found in Table 26.

PENSION FEATURE.

Pension payments to superannuated and infirm employees constitute a special payroll and are charged to operating expenses, the total amount so charged during the year being \$287,835.99.

During the year 200 names were added to the pension roll and 87 were removed by reason of death, leaving 1,036 as the total number of pensioners on June 30, 1915. The average age of pensioners at June 30, 1915, was over seventy years.

A report of the operations of the department will be distributed to members.

INDUSTRIAL DEPARTMENT.

One hundred and thirty-eight new industries, manufacturing and commercial, were located on or immediately adjacent to the line during the year, from which the company expects to derive substantial freight revenues. One hundred and thirteen side tracks were constructed; eighty-seven to newly located industries and twenty-six to industries previously located, but without side track facilities.

INSURANCE FUND.

A summary of the operations of this feature for the year ended June 30, 1915, and a statement of the assets and liabilities are shown in Table 25. The surplus in this reserve fund at June 30, 1915, was \$1,503,680.30.

SUBSIDIARY LINES.

The income accounts of the following lines, the capital stock of which is owned by your company, but which are operated separately, are shown in the following exhibits, viz.:

	Miles.	Net Income.
"A" The Staten Island Railway Company.....	12.65	\$3,180.08
"B" The Staten Island Rapid Transit Railway Company.....	10.89	288,044.25
"C" The Sandy Valley and Elkhorn Railway Company.....	30.57	77,689.92
"D" The Baltimore and Ohio Chicago Terminal Railroad Company.....	79.42	131,783.29
	<u>133.53</u>	<u>\$500,697.54</u>

The net income of the Sandy Valley and Elkhorn Railway Company was transferred and included in the income account of The Baltimore and Ohio Railroad Company, and the balance, \$423,007.62, was credited to the profit and loss accounts of the respective companies.

THE CINCINNATI, HAMILTON AND DAYTON RAILWAY CO.

This property is still in the hands of Receivers, and while plans for its reorganization are now being considered, the subject has not progressed sufficiently to justify any conclusion at this time as to the ultimate effect of the reorganization upon your Company; consequently, there is nothing to add to the full statement made in this connection in the previous annual report, except that your Company has made no further advances to or on account of the Cincinnati Company other than to pay the interest accruing during the year on the \$7,500,000.00 First and Refunding Mortgage Four Per Cent Bonds outstanding and bearing the guarantee of your Company. As previously noted, there was excluded from the income account of The Baltimore and Ohio Railroad Company for the year all interest accruing on obligations of the Cincinnati Company now held by your Company, aggregating \$22,695,144, so that the full weight of any income losses from this source has been met. The capital losses cannot yet be determined and adjusted.

The President and Directors renew their acknowledgment of the loyal and efficient services of the officers and employees during the past year.

By order of the Board,
DANIEL WILLARD,
President.

CONDENSED INCOME ACCOUNT FOR YEAR.

Total railway operating revenues, rail lines.....	\$91,815,797.34	\$7,348,212.63 Dec.
Total railway operating expenses, rail lines.....	63,925,507.74	10,477,880.78 Dec.
Net revenue from railway operations.....	<u>\$27,890,289.60</u>	<u>\$3,129,668.15 Inc.</u>
Percentage of expenses to earnings.....	69.62%	5.41% Dec.
Railway tax accruals.....	\$3,289,611.04	\$52,730.32 Inc.
Uncollectible railway revenues.....	18,981.38	18,981.28 Inc.
	<u>\$3,308,592.42</u>	<u>\$71,711.70 Inc.</u>
Railway operating income.....	\$24,581,697.18	\$3,057,956.45 Inc.
Total non-operating income.....	5,260,847.77	872,569.82 Dec.
Gross income.....	\$29,842,544.95	\$2,185,386.63 Inc.
Deductions from gross income.....	19,119,296.60	662,705.38 Inc.
Net income.....	<u>10,723,248.35</u>	<u>1,522,681.25 Inc.</u>
Net corporate income.....		\$10,723,248.35
Dividend payments on preferred stock, 4%.....		2,354,521.23
Income Balance Transferred to Profit and Loss.....		\$8,368,727.07
Amount to Credit of Profit and Loss, June 30, 1914.....	\$32,804,187.74	
Less Sundry Adjustments—Net Debit Bal..	1,000,147.69	31,804,040.05
		<u>\$40,172,767.12</u>
Dividends on Common Stock 5%.....		7,597,253.21
Amount to Credit of Profit and Loss, June 30, 1915.....		<u>\$32,575,513.91</u>

CONDENSED GENERAL BALANCE SHEET FOR YEAR.

ASSETS:	1915	INCREASE OR DECREASE
Investments in Road and Equipment.....	\$316,483,508.43	
Investment in Constituent Companies.....	235,067,238.24	
Other Investments.....	97,485,553.71	
Total Investments.....	\$649,036,300.38	\$9,195,985.07 Inc.
Current Assets—Cash, Materials and Supplies, etc.....	35,347,085.15	24,734,033.96 Dec.
Other Assets—Insurance Fund, Securities of our issue, etc.....	9,261,783.99	994,687.94 Inc.
Unadjusted Debits.....	1,502,953.03	551,858.11 Inc.
	<u>\$695,148,122.55</u>	<u>\$13,991,502.84 Dec.</u>
LIABILITIES:		
Common Stock.....	\$152,317,468.00	
Preferred Stock.....	60,000,000.00	
Total Stock Issues.....	\$212,317,468.00	
Funded Debt.....	\$406,325,609.81	\$3,991,833.34 Inc.
Total Capital Obligations.....	\$618,643,077.81	3,991,833.34 Inc.
Current Liabilities.....	17,809,857.39	21,484,875.37 Dec.
Deferred Liabilities.....	2,811,783.17	470,620.68 Dec.
Unadjusted Credits—Accrued Depreciation, etc.....	19,286,933.31	1,407,635.80 Inc.
CORPORATE SURPLUS:		
Additions to Property through Surplus.....	4,020,956.96	2,793,107.90 Inc.
Profit and Loss—Balance.....	32,575,513.91	228,673.83 Dec.
	<u>\$695,148,122.55</u>	<u>\$13,991,502.84 Dec.</u>

Railway Age Gazette

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*Illustrated.

for the entire contents of the car. The grain was shipped about August 5, and should have reached Galveston about August 9, but as a matter of fact, owing to an error in the billing, the car was held up at Ft. Worth, over 300 miles away, and did not leave that point en route to Galveston until several days after the storm was over. After investigation the railroad advised the claimant that the car was nowhere near Galveston during the storm, and the latter explained that he had merely assumed that his freight had been damaged and had placed his claim promptly in order to be sure to get it in within the time limit. The incident clearly illustrates the entire willingness of some of the shippers of this country to sell their product to the railway carriers at a price including their regular profit!

The San Francisco Examiner contends in a recent editorial that the 82 railroads which the *Railway Age Gazette* has shown were on October 1 in the hands of receivers deserve no pity. It computes their average capitalization per mile at \$54,000. It adds: "Now, the average railroad capitalized at \$54,000 a mile is on the way to

the receiver when the first rail is laid and the first spike is driven. That means at least \$20,000 a mile of dishonest capitalization—of wind and water—and a railroad cannot run on either of those elements. It is just such dishonestly capitalized corporations that induce and require regulation. In order to keep going they have to charge more than the traffic will bear." The answers to such foolish statements as these are so numerous it is difficult to choose which to use. Their implication is that the "average railroad" should not be capitalized for over \$34,000 a mile. There is not a system of standard gage railways on earth which is not capitalized for much more than this. The Examiner is an ardent advocate of government ownership. Let us test the intelligence and fairness of its statement by the average costs of construction per mile reported by typical systems of railways owned entirely, or practically entirely, by governments. The following are the average costs of construction per mile reported for the state railways of certain countries: New Zealand, \$53,789; Denmark, \$62,763; Victoria, \$63,519; New South Wales, \$75,200; Japan, \$89,102; Italy, \$158,185. In Germany, where most of the railways are owned by the government, the average cost of construction is reported as \$116,365; and in Belgium, to which the same statement applies, it is reported as \$216,143. The average cost of construction of the National Transcontinental Railway, which has recently been built by the government of Canada, was about \$99,000, without equipment or adequate terminals. The government of the United States, in connection with the building of the Panama Canal, reconstructed the Panama Railroad. Colonel Goethals testified that up to November 1, 1911, this reconstruction work had cost \$167,000 a mile, and that it would reach \$226,190 a mile. From these statistics of state railways scattered all over the world the reader will be obliged to draw one of two conclusions. He will probably conclude that since it costs the average government a great deal more than \$54,000 a mile to build an "average railroad" a policy of regulation which contributes toward the bankruptcy of private railways having only this average capitalization is of very doubtful fairness or wisdom. On the other hand, if he agrees with the San Francisco Examiner that a capitalization of \$54,000 a mile "means at least \$20,000 a mile of dishonest capitalization," and that a railroad with such a capitalization must "charge more than the traffic will bear in order to keep going," what must he conclude as to the intelligence or consistency of a paper which denounces private railways with a capitalization of only \$54,000 and defends a policy of regulation, and at the same time advocates a policy of government ownership which results in capitalizations varying from \$54,000 to over \$200,000?

A number of Oklahoma grain dealers are pressing the railroads to pay for grain damaged by the recent storm at Galveston.

An Early Bird That Started Too Soon

But whatever may be decided as to the liability of the railroads, one claim that has been brought to our attention will never have to be paid. This claim was filed with one of the roads for some \$1,400 for damage to a shipment of grain by salt water, and was based, not on the invoice value, but on the Galveston price,

PREPAREDNESS FOR PROSPERITY

AT a time when the press is filled with pleas for adequate measures for national defense, a more pressing and immediate need is being overlooked, namely preparedness for prosperity. In passing from a cycle of depression to a period of renewed enterprise and business activity, the railroads are facing a critical time in their history. Already roads are experiencing difficulty in handling increased freight traffic; the surplus of cars has been reduced to a negligible figure and car shortages are rapidly assuming alarming proportions.

We have already pointed out that the car shortage is partly due to the congestion of freight at the ports caused by a shortage of vessel capacity, but a review of the orders for cars during the past two years is illuminating. In 1914, the railways contracted for 80,000 cars, or approximately one-half as many as in 1913, one-third the number ordered in 1912 and decidedly less than the total ordered in any previous year since 1901, except 1908. Up to November 19 of the present year, our reports show that 85,000 freight cars have been ordered for domestic service, which is not a marked improvement over the record of 1914. When one considers that approximately 150,000 cars are required annually to replace wornout equipment alone, it is evident that the railroads are not fully prepared to carry the traffic of a normal year.

Unusual conditions in the steel industry emphasize the necessity for ordering more rolling stock, and at once. A prominent car builder estimates that less than two-thirds of the steel required for car contracts now placed will be delivered before July 1, 1916, delaying the completion of cars until late in the summer, and states, further, that little or no equipment ordered after January 1 can be completed before the close of the year. The present demand for steel is unprecedented; plants are working to capacity and contracts now under way will keep them busy for many months to come.

Conditions in the steel market have been changing so rapidly of late that it has been difficult for railroad men to keep fully informed concerning them. Up to a short time ago the railroads and other purchasers were out of the market to such an extent that the mills were running on a greatly decreased production and prompt deliveries could be secured for any order given. Almost overnight conditions changed. The unfilled tonnage of the United States Steel Corporation and other steel companies has risen rapidly and orders are still being taken far in excess of the current output. Because of this the Steel Corporation withdrew quotations in the foreign markets a few days ago. This condition has developed at a time when the production has increased rapidly. Less than a month ago the new plant of the Minnesota Steel Company, a subsidiary of the Steel Corporation at Duluth, was opened. The Cambria Steel Company made a new high record for output on October and other mills have established similar records.

The immediate effect of this condition on the railroads has been to make it practically impossible for them to secure early deliveries. This has led to the placing of orders for rails and similar products considerably earlier than in previous years, until at the present time, most of the large orders for rails for next year have been placed and those still unplaced are being accepted only for late delivery. As an instance, the Rock Island was unable to secure early delivery on its order of 40,000 tons of rails placed two weeks ago.

The situation in the steel market has affected the railways in another way. Many of their materials are purchased from supply concerns, which in turn buy their steel from the mills. After long periods of slack business, these concerns are sharing in the revival of purchases, but are being confronted with the same conditions in the steel market as the railways, and are now finding difficulty in securing the steel to fill their orders. This is true of such specialties as tie plates and other track fastenings, as well as of car and bridge materials. Some supply concerns are now practically out of the market, not because they are running to full capacity, but because they are unable to secure the neces-

sary steel. This condition makes it necessary for the railways to follow up their heavy rail and equipment purchases with those for the specialties which they will require to secure even delayed 1916 delivery.

The prices for cars have risen from 15 to 20 per cent in the past six months, and there is no hope of an early decline. But with the prospect of increasingly slow deliveries and serious shortages of cars, price no longer remains a prime consideration. The railroads are not only struggling for long deferred and deserved profits, but for public favor; after years of misguided abuse and destructive interference they have gradually gained adherents to their point of view and broken popular prejudice against them. Much of the difficulty the railroads have experienced in the way of hostile regulation can be traced to the car shortage of 1906-1907. Failure on the part of the carriers to cope with the traffic of 1916 will wipe out much that has been gained in this direction and will revive "down with the railroads" as an effective slogan for ranting muckrakers and demagogues.

The reasons why the railroads have not been adding to their equipment as rapidly as in former years should be self-evident by this time. They have not been in a financial condition to do so until it became certain that the equipment would be needed. It is easy enough to say that the railroads should have bought cars a while ago when prices were low, but if the railroads generally had been able to place orders the prices would not have been low and only a few strong roads were in a position to take advantage of the opportunity.

THE REAL L. C. L. PROBLEM

LARGELY because of the relatively small tonnage included in the l.c.l. business, this class of railway traffic has not received the attention of operating officers that it has deserved. It is primarily for this reason that there has been so little change in the methods of handling it in recent years in the average freight house. But many of the men directly engaged in this branch of railway operation are fully alive to its importance and to the opportunities for improvement. The attention which many of them are giving to the subject is indicated by the interest shown in the contest conducted by the *Railway Age Gazette* on the Handling of L. C. L. Freight which closed recently, and in the number of contributions received. The two prize-winning papers are published elsewhere in this issue and others will be published from time to time in later issues.

In common with other terminal facilities, those for the handling of l.c.l. freight are generally inadequate for the present volume of business and are unsuited in design for the most modern and economical methods of operation. But, unlike the case of classification yards, where the best means of securing improved facilities is to move further out of the city, where larger space can be obtained at more reasonable rates, l.c.l. freight houses must remain close to the industrial centers if they are to perform their functions properly. This means that expansion of the facilities is possible only at heavy expense; and, therefore, expansion is deferred longer than would otherwise be the case. As a result the problem in most freight houses is not the inauguration of methods adapted for the operation of new and modern facilities, but the utilization of the existing facilities to the best advantage.

This problem may be attacked from a number of standpoints—the installation of improved equipment, the rearrangement of methods to eliminate lost motion, increasing the capacity of the men by securing their interested co-operation, etc. A few years ago the hand truck was the universal instrument for freight house operation. Since that time the four-wheel platform truck has appeared, followed by the motor truck. Each type of equipment has its particular field and much care should be exercised in so arranging the work and instructing the men that the combined equipment shall be used to the best advantage. It is no more economical to use a motor truck for a very short haul than it is to use a hand truck for a long haul.

However much practical railway men may and do criticize time and motion studies, an elementary study of this kind will reveal many sources of lost motion in freight house operation, the removal of which will increase the efficiency of the house without adding to the burden of the laborers. Theoretically, every freight house foreman is watching for opportunities for making such improvements; practically, in the rush of his regular duties, he often fails to observe and remove cross trucking and other causes of inefficiency.

A great opportunity for improvement and one quite generally realized is in the best utilization of the labor employed. In the average freight house operating on a flat rate wage basis there is a certain "professional" pace, generally set by the slowest trucker, which is followed by all truckers and which therefore regulates the speed of operation of the house. Any means to increase this speed will decrease the time required for trucking and increase the tonnage of freight handled per man. The bonus system is the common incentive for this purpose. By its use the men share in any increased production on their part, and it is interesting to note that nearly all the contributions to this contest have favored its use.

As we said before, the problem in freight house operation is not to determine what would be most advisable under ideal conditions, but rather what can be done under the conditions which actually exist. A dollar saved in the operation of a freight house is just as large and just as valuable to the railroad as one saved by any other operating economy.

LOSS AND DAMAGE PAYMENTS

AFTER having conducted a "safety first" campaign for the prevention of accidents to persons for several years with remarkable success, the railroads have recently achieved some very good results by applying "safety first" principles to the handling of freight. The Committee on Packing, Marking and Handling of Freight, in its recent report to the American Railway Association, submitted statistics showing that 99 roads had saved \$3,500,000 by the reduction of their payments for loss and damage to freight during the first six months of 1915 as compared with a similar period in 1914. This reduction is about 22 per cent and as the freight revenues for this period indicate a much smaller decrease, the statistics mean not only an absolute saving, but an improvement in relation to the volume of the traffic. "It would appear from these figures," the committee says, "that the railroads have checked the tide in payments for loss and damage, which has been rising, and rising rapidly, since the fiscal year 1909."

This represents only one of the ways in which the railroads have been increasing their efficiency, but that it is an exceedingly important one is indicated by the fact that the freight loss and damage payments of the railways of the United States and Canada for the fiscal year 1914 amounted to \$36,000,000. This is one-tenth of Mr. Brandeis' million dollars a day, but a reduction of 22 per cent in this account, if continued for a year, would probably result in a greater actual saving than could be accomplished by the adoption of most of his suggestions.

The dimensions of the problem are shown in the following table giving the amounts paid on account of loss of, and damage to, freight by the railways of the United States for the last 10 years for which the figures are available, in comparison with the freight revenues for each year:

	Loss and damage payments	Freight revenue	Percentage of freight revenues
1905.....	\$19,782,692	\$1,450,772,838	1.35
1906.....	21,086,219	1,640,386,655	1.28
1907.....	25,796,083	1,823,651,998	1.41
1908.....	27,368,664	1,655,419,108	1.65
1909.....	24,754,508	1,677,614,678	1.48
1910.....	21,756,671	1,925,553,036	1.13
1911.....	24,589,215	1,925,950,887	1.27
1912.....	25,031,181	1,968,598,630	1.27
1913.....	30,885,454	2,198,930,565	1.40
1914.....	33,279,957	2,114,698,000	1.57

It will be noted that the loss and damage payments bear a very close relation to the volume of traffic as indicated by the

earnings, and that they increased in the years 1906, 1907 and 1908, not only absolutely, but in proportion to the freight revenues. Probably this was because of the increases in traffic in the preceding years, since, of course, claims are paid after the occurrence of the loss or damage. This explains the increase from 1907 to 1908 in spite of the decrease in earnings, and the decrease from 1908 to 1909 in spite of the increase in earnings. From 1909 until 1914 there was a steady gain in freight business and we would therefore naturally expect to find that the loss and damage payments increased from 1910 on. The percentages indicate, however, that the increases in loss and damage were usually more pronounced than the increases in earnings, and that the reductions have been more marked than the corresponding decreases in the volume of business. This would seem to mean that much of the loss and damage is caused by the haste that naturally accompanies the handling of a rush of business.

Some of the principal causes usually ascribed for the rapid increase in loss and damage are the greater shocks to cars and contests due to the use of larger cars and longer trains, the increasing use of hump yards, carelessness in marking, packing and loading, and the use of flimsy packing containers by shippers.

The very gratifying improvement shown recently has been achieved by unremitting effort both on the part of many individual railroads and on the part of many railroad associations in which the National Industrial Traffic League, representing the shippers, has co-operated. Especial credit is due to the Committee on Packing, Marking and Handling of Freight, which is a sub-committee of the Committee on Relations Between Railroads of the American Railway Association. The committee calls attention to the fact that these savings "took place at the period when the railroads had secured very nearly uniform instructions for packing and marking, when an improved inspection of shipments had been generally inaugurated through the individual railroads and inspection bureaus, when more railroads than ever before had organized departments to supervise loss and damage, and when general interest in this important subject had been spread more widely than ever before." It is also the belief of members of the committee that the shippers are assisting by giving more care to the preparation of goods for shipment, and the committee expresses the opinion that the economies will be continued so that next spring a further reduction will be shown.

The *Railway Age Gazette* has described at length the loss and damage campaigns which have been waged for several years on the Atchison, Topeka & Santa Fe, and the St. Louis & San Francisco, and some very successful results have recently been shown also by many other roads, either with or without a special organization for the purpose of educating their employees in proper methods and habits of carefulness and shippers in proper packing. The Santa Fe has reduced its loss and damage payments from 1.92 per cent of gross freight receipts in 1909 to .96 per cent in 1915. The Frisco, in the fiscal year 1915, reduced its loss payments on this account by 42.4 per cent as compared with the year before, while the gross freight revenue decreased only 1.7 per cent. In 1914 the claim payments were 1.68 per cent of the freight revenue and in 1915 only .98 per cent. The Illinois Central reduced its payments for loss and damage to freight in the fiscal year 1915 by 27.48 per cent, while the freight earnings decreased 6 per cent, and the Chicago & North Western in the same year reduced its loss and damage payments by 20 per cent, whereas the freight revenue decreased only 3.8 per cent.

Payments for loss and damage represent an economic waste that adds to the cost of transportation without benefit to anyone. Most shippers would greatly prefer to sell their goods to their customers than to a railroad, while the railroad that pays a claim suffers an absolute loss. The entire subject suggests a large field for improvement by active co-operation between the two parties most directly interested.

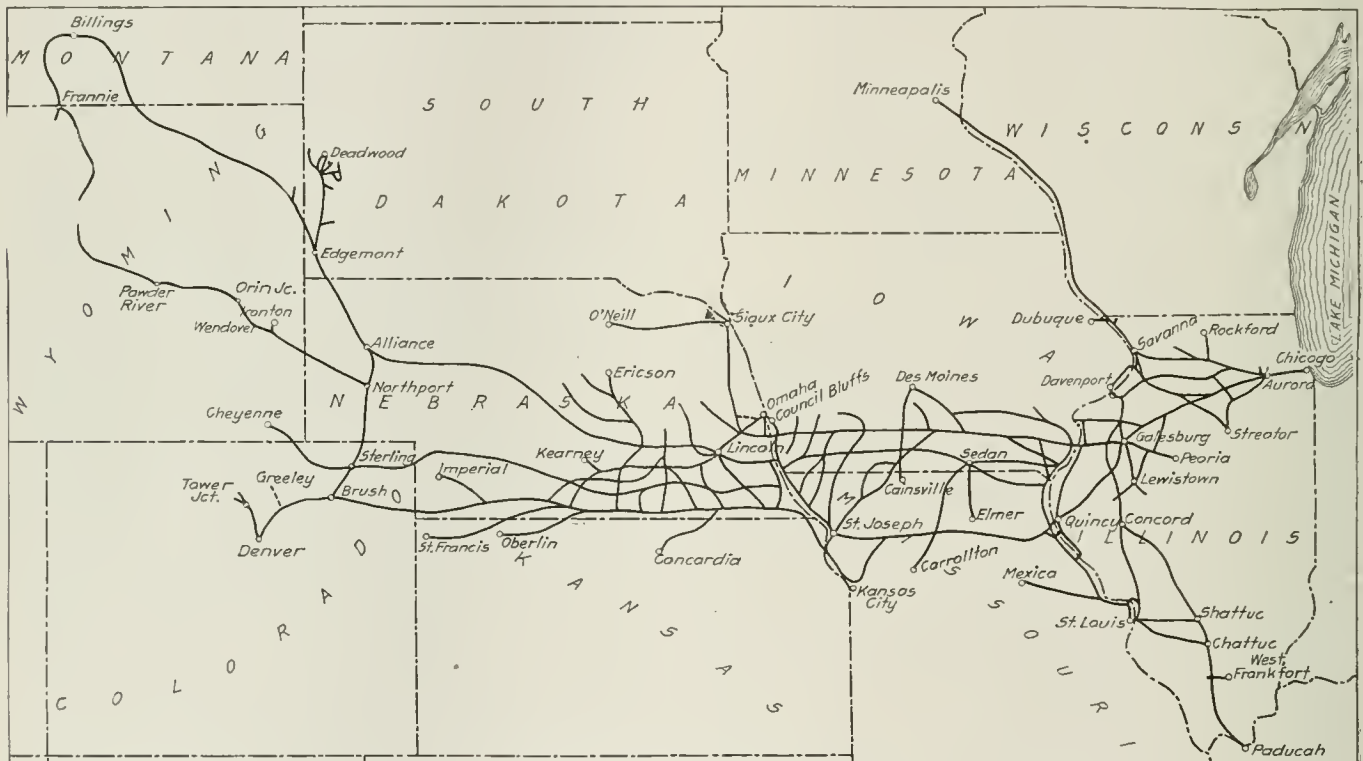
CHICAGO, BURLINGTON & QUINCY

THE commercial reviews this week are more optimistic in regard to buying by all classes of people than they have been at any time in the past few years. It is a rather interesting fact that this activity in buying by consumers, retailers and jobbers could have been, insofar as actual conditions of buying power are concerned, manifested last fall in many of the corn-raising states just as well as this year. The corn crop this year is a bumper one, but so was last year's crop. The farmers in Iowa, Kansas and Nebraska had the money to spend last fall, but they were almost as conservative, apparently, in their expenditures as were the people in the East or New England, where the European war had actually cut into the income of large classes of wage earners and business men.

This is particularly well illustrated by the experience of the Chicago, Burlington & Quincy in the fiscal year ended June 30, 1915. The Burlington runs through the very heart of the corn-

tons, and in 1914 to 223,000 tons; the tonnage of agricultural implements to 209,000 tons in 1915, comparing with 237,000 tons in 1914; of cement, brick and lime to 1,773,000 tons in 1915, comparing with 1,820,000 tons in 1914. The tonnage of bituminous coal carried in 1915 amounted to 9,413,000 tons; in 1914 to 10,069,000 tons. The present prosperity, therefore, of the corn-raising states at any rate, is founded on the savings of one very profitable year, added to the receipts which are now coming in from a second extraordinarily large crop.

The Burlington more than made up the loss of \$2,562,000 in revenue by a saving of \$2,783,000 in expenses, total operating expenses amounting to \$60,441,000 in 1915 as compared with \$63,225,000 in 1914. Of the saving in expenses \$817,000 was in maintenance of way, \$785,000 in maintenance of equipment and \$1,182,000 in transportation expenses. Probably nearly all of the saving in maintenance of way was because of cheaper track labor and a more efficient use of this labor. The showing in maintenance of equipment expenses is accounted for by the fact



The Chicago, Burlington & Quincy

raising belt and from 12 to 15 per cent of its total tonnage is made up of grain. In 1915 the road handled 4,635,000 tons of grain as against 4,309,000 tons in 1914; but the volume of grain raised and shipped in the states served by the road is only one of the factors in the prosperity of the farmers. The farmer not only had an extraordinarily large crop of corn, but he got very high prices for it. We would expect to find, therefore, that with this extraordinarily large buying power of the farmers and with the passenger business created by the expositions in California, a road like the Burlington would have shown greatly increased earnings. Just the opposite was true, however.

Total operating revenues amounted to \$91,125,000 in 1915, a decrease as compared with 1914 of \$2,562,000. Passenger revenue amounted to \$20,186,000, a decrease of \$1,558,000, and freight revenue to \$62,509,000, a decrease of \$290,000. The falling off in passenger revenue is probably directly attributable to conservatism in expenditures by eastern people who would under ordinary circumstances go to California in the winter, and also probably to conservatism on the part of the people living in the territory served by the Burlington. Further evidence of this conservatism in expenditures is shown by the fact that the tonnage of household goods carried by the Burlington in 1915 amounted to 213,000

that whereas the freight-train car renewals—original cost of cars scrapped less depreciation and salvage—was \$855,000 in 1914, there was a credit to this account of \$39,000 in 1915. The saving in transportation expenses was much more than proportionate to the falling off in business handled. The total passenger mileage in 1915 was 1,079,000,000, a decrease of 73,000,000, or between 6 and 7 per cent. The ton mileage handled totaled 8,527,000,000 in 1915, a decrease of 85,000,000, or less than 1 per cent. The average trainload of freight was 492 tons in 1915 as against 479 tons in 1914. The average number of empty cars per train was 12.44 as against 11.80 in 1914; of loaded cars per train 25.56 as against 25.09. The average number of tons per loaded car mile was 19.23 as against 19.08. The increase in gross trainload, therefore, was considerably larger than the increase shown in trainload of freight.

The Burlington retired 71 locomotives during the year and added 35, which changes made the average tractive power 30,808 lb. in 1915 as against 29,549 lb. in 1914. The fact that the Burlington made no charge for freight-train car renewals has been previously mentioned. The table showing equipment added and retired, however, shows that the company added 2,647 freight cars to its equipment and retired 2,289.

The total expenditure for additions and betterments during the year was \$7,509,000, of which \$942,000 was for equipment, while of the remaining \$6,566,000, \$2,357,000 was for land for transportation purposes, \$789,000 for grading, \$631,000 for rails and \$541,000 for bridges, trestles and culverts. All of the expenditure for equipment was charged to income, and of the additions and betterments, \$2,399,000 was charged to income, and of the remainder \$1,769,000 was for new lines. The total outstanding funded debt at the end of 1915 was \$181,690,000, comparing with \$182,568,600 outstanding at the beginning of the year. Cash on hand at the end of the year amounted to \$7,123,000, comparing with \$6,516,000 on hand at the beginning of the year. There were at the beginning of the year \$1,900,000 loans and bills payable, which were paid off during the year, leaving no loans and bills payable on June 30, 1915. It is interesting to note that the audited vouchers and wages unpaid at the beginning of the year was \$9,204,000, and at the end of the year \$6,047,000.

The new form of balance sheet prescribed by the Interstate Commerce Commission when applied to the Burlington's accounts brings out in a striking way the investment that has been made in that property since the Hill interests took it over. The total corporate surplus amounts to \$168,859,000. Of this, \$30,487,000 is additions to property since June 30, 1907, through income; \$14,642,000 funded debt retired through income, and \$22,109,000 sinking fund reserves. The total long-term debt of the Burlington is only \$181,690,000.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated.....	9,339	9,140
Freight revenue	\$62,509,484	\$62,799,188
Passenger revenue	20,185,564	21,743,507
Total operating revenues.....	91,125,061	93,687,141
Maintenance of way and structures.....	11,360,210	12,010,977
Maintenance of equipment.....	15,415,123	16,035,205
Traffic expenses	1,629,676	1,634,672
Transportation expenses	29,117,164	30,224,524
Miscellaneous expenses	832,154	921,586
General expenses	2,087,041	2,397,888
Total operating expenses.....	60,441,367	63,224,853
Taxes	4,081,508	4,016,658
Operating income	26,578,028	26,445,631
Gross income	27,802,098	27,739,989
Net income	19,041,919	18,807,202
Sinking funds	1,753,007	1,692,795
Dividends	8,867,128	8,867,128
Appropriation for additions and betterments.....	3,340,669	5,715,875
Surplus	5,081,115	2,531,404

CHICAGO GREAT WESTERN

IT has been six years since the Chicago Great Western was taken out of the hands of receivers. The reorganization was under the auspices of J. P. Morgan & Co. and the new company was given every opportunity to make of the property a profitable railroad. Stockholders of the old company had been assessed \$15 a share and \$10,000,000 cash was provided for immediate expenditure for betterments; fixed charges were unusually conservative—the funded debt in 1915 being only at the rate of \$26,866 per mile, and carrying only 4 per cent interest charges. A very careful plan of rehabilitation had been drawn up calling for the expenditure of between fifteen and eighteen million dollars during the first three years of the new company's management of the property. As a matter of fact, in the first three years up to June 30, 1912, a total of \$14,284,000 had been spent for additions and betterments to road and equipment.

While the fiscal year ended June 30, 1915, was one of business depression, crops were unusually good in the corn belt and in 1914 about 27 per cent of the total tonnage of freight carried by the Chicago Great Western was grain.

Total operating revenues of the Chicago Great Western, however, in 1915 amounted to \$13,921,000, or \$429,000 less than in 1914. Operating expenses amounted to \$10,447,000, a decrease as compared with the previous year of \$477,000. After the payment of rentals and fixed charges the company had \$868,000 net income, comparing with \$896,000 in 1914. There is a total of \$89,150,000 outstanding stock, so that this net income would have been less than one per cent on the total stock, and since

the stock is divided into about equal parts of preferred and common, the net income would have been less than two per cent on the preferred stock. Something is obviously wrong.

The company's operating ratio in 1915 was about 75 per cent. The average ton-mile rate was 7 mills and the average rate per passenger per mile was 1.95 cents. When compared with the average freight and passenger rates on eastern roads these rates do not seem low, but for the character of traffic handled by the Chicago Great Western they are entirely too low. It is the character of traffic handled and the rate received per ton-mile and per passenger-mile which explains probably in large part the high operating ratio. The average trainload of all freight was 574 tons in 1915, an increase of 62 tons, or 12.16 per cent as compared with 1914. This is a particularly good showing, especially in view of the fact that Mr. Felton points out that the movement of traffic in 1915 was most irregular, "so much so that no estimates could be made in advance so as to secure its most economical handling."

The loss in revenue from freight was entirely due to a lower ton-mile rate, the total ton mileage handled amounting to 1,378,500,000 in 1915 as compared with 1,364,000,000 in 1914. The passenger mileage handled totaled 157,642,000 as compared with



The Chicago Great Western

160,199,000 in 1914. The ton-mile rate in 1915 was 7.0 mills, and in 1914 7.3 mills; the rate per passenger per mile was 1.95 cents in 1915 and 2.00 cents in 1914.

The reorganization plan of 1909 called attention to the fact that gross earnings per mile on the 818 miles of the Chicago Great Western proper, exclusive of the 657 additional miles which the company leases and operates, were at the rate of \$10,202 in 1906 and \$10,830 in 1907. As a matter of fact, however, the average earnings per mile of road operated, including all of the mileage operated, were \$7,283 in 1906, and \$7,727 in 1907, and \$9,749 in 1915. The freight density in 1915 was 965,400 tons one mile per mile of road.

One other factor should be mentioned. The interest charges are very low, but the company has to pay a large sum for joint facility rents. This amounted to \$694,000 in 1915 and was an increase as compared with the previous year of \$133,000, or nearly 24 per cent. Taxes are also an undue burden. In 1915 they amounted to \$580,000, an increase over the previous year of \$81,000, and over 1909 of \$351,000, or 65.42 per cent. In 1915 \$498,000 was spent for additions and betterments to road and \$691,000 for additions to equipment. No new securities were issued during the year and the company had on hand at the end of the year \$2,776,000 cash, with no bills payable, comparing with \$2,577,000 cash on hand at the end of the previous year, with no bills payable.

President Felton, in his annual report to stockholders, says: "The average net income for the past six years has amounted to \$2,243,205. The decisions of the courts have indicated 7 per cent as a reasonable return on railroad property. If this amount is capitalized at 7 per cent, it would mean the value of the road and its equipment is but \$22,726 per mile. A physical valuation of the property, when completed by the Interstate Commerce Commission, in accordance with the present law, in all probability will disclose a value of at least double that amount. The 41 railroads in the western rate case showed a return at 7 per cent on but \$28,048 per mile in 1914. It would seem, therefore, that the efforts of the officers of this company and others in the western territory to secure increased rates were fully warranted. This situation has been placed before the various commissions and taxing bodies, and yet no substantial relief has been secured."

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated.....	1,428	1,496
Freight revenue.....	\$9,645,527	\$9,956,308
Passenger revenue.....	3,074,050	3,205,992
Total operating revenues.....	13,920,685	14,349,739
Maintenance of way and structures.....	1,876,924	2,033,781
Maintenance of equipment.....	2,398,216	2,390,863
Traffic expenses.....	561,526	577,769
Transportation expenses.....	5,150,730	5,431,829
Miscellaneous expenses.....	85,868	79,354
General expenses.....	384,092	410,038
Transportation for investment—Cr.....	10,789	.....
Total operating expenses.....	10,446,567	10,923,634
Taxes.....	580,026	498,764
Operating income.....	2,889,931	2,927,341
Gross income.....	3,136,149	3,073,480
Net income.....	868,194	895,970

CHICAGO & EASTERN ILLINOIS

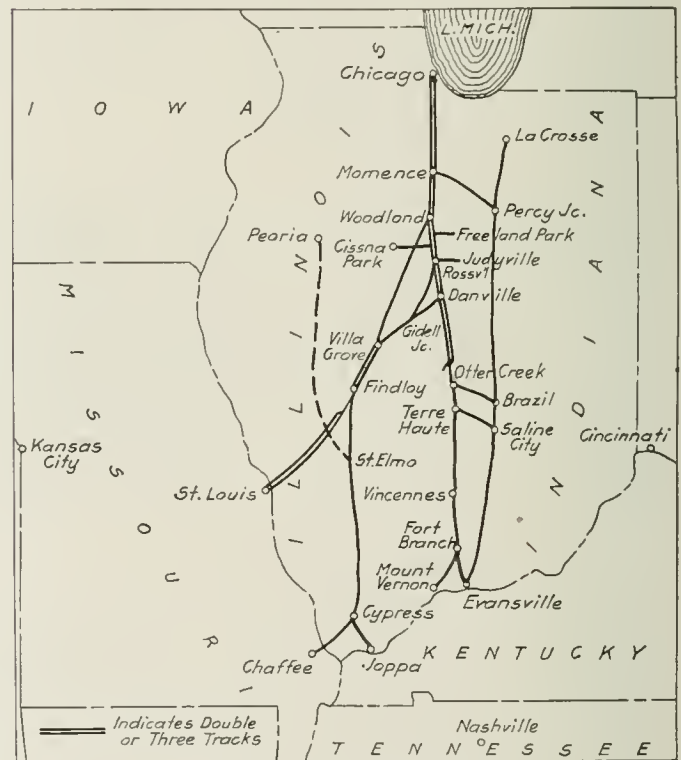
IT is hard to see why the St. Louis & San Francisco should have ever been willing to guarantee 6 per cent on the Chicago & Eastern Illinois preferred stock and 10 per cent on the common stock. In the fiscal year ended June 30, 1915, the Chicago & Eastern Illinois, which is being operated by a receiver, had a deficit, after providing for all fixed charges exclusive of anything on the stock, of \$1,844,000. Even so it did slightly better, insofar as operating income is concerned, than in 1914. The operating income, which is the amount available for rentals, interest charges and dividends, was \$1,967,000 in 1915, and \$1,917,000 in 1914.

The Chicago & Eastern Illinois operates 1,282 miles of road. This includes the Evansville & Indianapolis, which was taken over in 1911. In May, 1913, both the St. Louis & San Francisco and the Chicago & Eastern Illinois went in the hands of receivers. Previously the Chicago & Eastern Illinois was controlled by and operated in connection with the St. Louis & San Francisco, the Frisco having issued its own certificates of deposit for preferred and common stock of the Chicago & Eastern Illinois and guaranteed 6 per cent on the certificates issued for the preferred, and 10 per cent on the certificates issued for the common. In the fiscal year ended June 30, 1912—the first in which the Evansville & Indianapolis was included with the Chicago & Eastern Illinois—there was \$3,889,000 operating income, and the company paid 6 per cent on its preferred and 5 per cent on its common, leaving the remaining 5 per cent on the common to be made up by the Frisco. Operating revenues in 1912 amounted to \$15,216,000, comparing with \$14,211,000 in the fiscal year ended June 30, 1915. Expenses, on the other hand, amounted to \$10,900,000 in 1912, and to \$11,606,000 in 1915, but nearly all the difference was in the amount spent for maintenance. In 1915 \$2,253,000 was spent for maintenance of way, and \$3,172,000 for maintenance of equipment; in 1912 \$1,463,000 for maintenance of way, and \$2,778,000 for maintenance of equipment. Time has apparently proved that the maintenance charges in 1912 and the years following up to the receivership were not adequate for the upkeep of the property to the most economical standard. Transportation expenses in 1912 amounted to \$5,811,000, and in 1915 to \$5,375,000.

The Chicago & Eastern Illinois handles a large volume of

bituminous coal traffic, and also a large business of merchandise and manufactures originating in Chicago and other middle western cities destined for the South. The business depression, and especially the very severe depression in the South, caused a loss of revenue in 1915 as compared with 1914 of 9.1 per cent. The total tonnage of freight handled amounted to 12,733,000 in 1915, as against 13,804,000 tons in 1914. The tonnage of bituminous coal in 1915 was 6,587,000, or 51.73 per cent of the total tonnage, and in 1914 bituminous coal tonnage amounted to 7,477,000 tons, or 54.17 per cent of the total tonnage handled in that year. There was a falling off of 890,000 tons, or 11.90 per cent, in 1915 as compared with 1914. Total passengers carried amounted to 4,441,000 in 1915 as against 5,149,000 in 1914.

With a loss of 9.1 per cent in operating revenue there was a saving of 11.3 per cent in operating expenses, the total in 1915 being \$11,606,000. Transportation expenses amounted to \$5,375,000, which was \$541,000, or 9.1 per cent, less than in 1914. This was just commensurate, therefore, with the loss in revenue. The greater part of the saving was therefore through smaller expenditures for maintenance, and particularly maintenance of equipment. In 1915 \$3,172,000 was spent on this account, or 22.6 per cent less than in 1914. Undoubtedly 1914



The Chicago & Eastern Illinois

was an abnormal year for maintenance of equipment expenses, the receiver finding it necessary, probably, to spend large sums for deferred maintenance. The following table shows the percentage of each class of expenses to total operating revenues in 1915 and 1914:

	1915	1914
Maintenance of way and structures.....	15.85	14.41
Maintenance of equipment.....	22.32	26.22
Traffic expenses.....	1.94	1.83
Transportation expenses.....	37.82	37.84
Miscellaneous expenses.....	0.67	0.71
General expenses.....	3.12	2.70
Transportation for investment—Cr.....	0.10	....
Total.....	81.67	83.71

It will be seen that the maintenance of equipment expenses still take an unusually large proportion of operating revenues, notwithstanding the big cut in 1915 as compared with 1914.

The Chicago & Eastern Illinois received an average ton-mile rate on its revenue freight of 5.3 mills in 1915, and a passenger-mile rate of 1.84 cents. Both rates are very low, and this is

an important factor in the high operating ratio—81.67 per cent.

The court ordered the receiver, beginning March 25, 1915, to pay no interest on mortgage indebtedness, and further ordered in November, 1914, that no interest be paid on bills payable.



The Colorado & Southern

Of the \$4,395,000 interest and rentals accrued during the year, \$2,262,000 was not paid, and the receivers, therefore, had a surplus from operation of \$418,000. An extensive program of maintenance was undertaken on April 1, which included the laying of 10,000 tons of 90-lb. rail and the relaying of worn rail in light traffic lines, and this program was completed late this fall. With the improvement in condition of equipment, which was brought about by the taking up of deferred maintenance in 1914, and also to some extent in 1915, and with the improvement in the condition of roadbed and track, which has now been completed, the Chicago & Eastern Illinois ought to be in shape to handle traffic more economically than it did in the year ended June 30, 1915.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated.....	1,282	1,283
Freight revenue	\$10,295,909	\$11,324,292
Passenger revenue.....	2,755,021	2,963,222
Total operating revenues.....	14,210,602	15,633,625
Maintenance of way and structures.....	2,252,547	2,252,846
Maintenance of equipment.....	3,171,644	4,099,023
Traffic expenses	282,201	286,468
Transportation expenses	5,374,796	5,915,407
Miscellaneous expenses	95,756	105,956
General expenses	442,643	442,789
Transportation for investment—Cr.....	13,682	.....
Total operating expenses.....	11,605,905	13,086,489
Taxes	636,000	630,500
Operating income.....	1,967,224	1,916,636
Gross income	2,550,591	3,035,966
Deficit	*1,844,497	*1,525,892

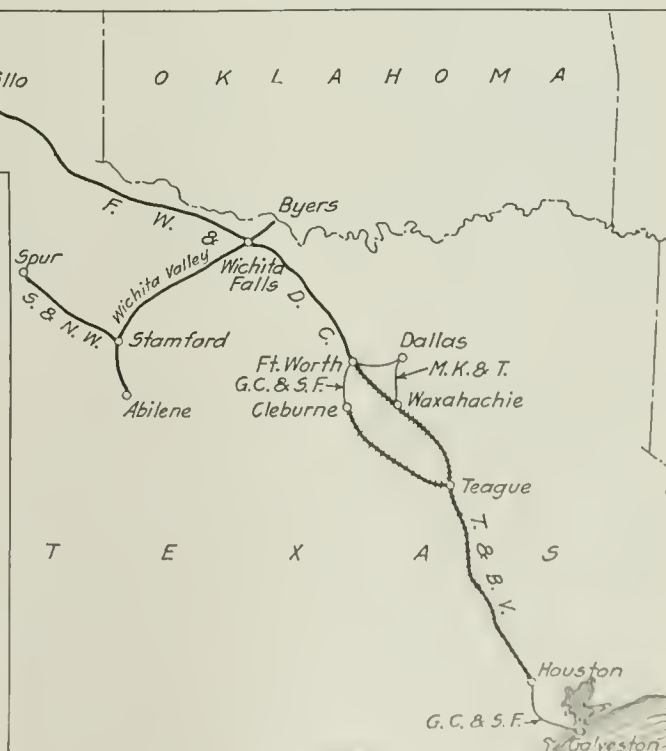
* This deficit is arrived at after subtracting interest and rentals due. As a matter of fact, in 1915 the receivers did not pay \$2,262,000 interest due and in 1914 \$517,000 interest due.

COLORADO & SOUTHERN

THE Colorado & Southern's operating revenues for the fiscal year ended June 30, 1915, compared favorably with 1914 partly because that year was adversely affected by the Colorado Fuel & Iron Company's miners' strike and partly because of the large export grain movement which took place in 1915 via the gulf ports. The total operating revenues of \$13,223,000 in 1914 were the smallest in any year since 1906. In 1915 total operating revenues amounted to \$14,091,000; operating expenses amounted to \$10,011,000, comparing with \$9,746,000 in the previous year, and after the payment of taxes there was a net operating income available for interest charges, rentals, dividends, etc., of \$3,446,000 as compared with \$2,821,000 in 1914. This would be 7 per cent on \$26,700 per mile operated.

The Colorado & Southern owns a half interest in the Trinity & Brazos Valley, which runs from Ft. Worth, Tex., to Houston. The Chicago, Rock Island & Pacific owns the other half interest and the Trinity & Brazos Valley was put into the hands of a receiver in June, 1914. The Colorado & Southern received no interest on its investment in this property during the 1915 fiscal year, so that there was a loss of income from sources other than operation of \$455,000. The net corporate income available for dividends, after the payment of rentals and interest charges, was \$554,000. No dividends were paid and this amount was carried to the credit of profit and loss.

The increase in revenue was entirely from freight. In 1915 71 per cent of total revenues were from freight and 23 per cent from passengers. The total ton mileage in 1915 was 983,465,000, an increase as compared with the previous year of 107,337,000. Of the total in 1915 937,171,000 ton miles was on the standard gage lines and 10,294,000 on the narrow gage lines. The Colorado & Southern operates 1,522 miles of standard gage track and 318 miles of narrow gage. The freight density



on the standard gage is 639,000 tons one mile per mile of road, and on the narrow gage 32,000. The revenue per ton per mile from freight was 1.013 cents in 1915 and 1.033 cents in 1914. Of the total 6,450,000 tons of freight carried by the Colorado & Southern in 1915, 65 per cent originated on this system and 35 per cent was delivered to it from other roads. Of the total tonnage carried 23 per cent was furnished by bitu-

minous coal and 10 per cent by lignite. Either the ton-mile rate is very low or the average haul very short for lignite coal, since the tonnage was 10 per cent of the total tonnage, whereas the revenue was but 4 per cent of the total freight revenue. On the other hand, while the tonnage of bituminous coal was 23 per cent of the total tonnage, the revenue from it was 19.62 per cent. Of the total tonnage carried in 1915 24.84 per cent was agricultural products, and of this, approximately 60 per cent originated on the Colorado & Southern.

With an increase of over 12 per cent in the ton mileage, transportation expenses amounted to \$4,881,000 as against \$5,055,000 in 1914. The trainload of revenue freight on the standard gage averaged 318 tons in 1915 as against 302 tons in 1914. On narrow gage the average trainload was 75 tons in 1915 and 84 tons in 1914. The average for the entire system was 308 in 1915 and 291 in 1914. Carloading was very slightly better on the standard gage lines, but the principal gain in trainloading was made through longer trains. The average number of freight cars per train for standard gage was 25.55 in 1915 as against 24.46 in 1914. It is interesting to note that the passenger-train miles in 1915 were 2,550,000, a decrease as compared with the previous year of 272,000, comparing with a decrease of but 2.5 per cent in passengers carried one mile. The saving in transportation expenses was fairly evenly distributed among the primary accounts.

The company increased its outstanding debt by the issue of \$1,120,000 Fort Worth & Denver City equipment trust notes and the retirement of certain bonds under sinking funds, making the net increase in debt \$789,000. A total of \$1,111,000 was spent for additions and betterments, of which \$955,000 was for equipment. The principal items of new equipment were five Santa Fe type superheater locomotives with mechanical stokers and 10 Mikado superheater oil-burning locomotives and 1,200 steel center sill box cars. At the end of the year there was \$1,562,000 cash on hand, with no loans and bills payable.

The table shows the figures for operation in 1915 and 1914:

	1915	1914
Average mileage operated.....	1,840	1,866
Freight revenue.....	\$9,960,044	\$9,053,885
Passenger revenue.....	3,294,688	3,345,489
Total operating revenues.....	14,090,516	13,222,737
Maintenance of way and structures.....	1,728,254	1,818,146
Maintenance of equipment.....	2,691,585	2,184,784
Traffic expenses.....	215,446	216,445
Transportation expenses.....	4,881,074	5,055,016
General expenses.....	494,489	471,611
Total operating expenses.....	10,010,848	9,746,003
Taxes.....	616,053	638,450
Operating income.....	3,445,566	2,821,328
Gross income.....	3,903,442	3,711,731
Net income.....	553,767	406,151
Dividends.....		340,266
Surplus.....	553,767	65,885

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These volumes are arranged and printed to the same high standards governing previous proceedings of this society.

Letters to the Editor

CHEMICAL FIRE EXTINGUISHERS

MOBILE, Ala.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to pages 691, 692, 693 and 694 of your issue of October 15, 1915, giving an account of the second annual meeting of the Railway Fire Protection Association in Chicago, October 5-7, 1915, I beg to direct your attention to comments on the report of the committee on hand fire extinguishing apparatus shown on page 692, reading in part as follows:

"From data secured in reply to questions sent out, it was found that all roads agree on the value of the chemical extinguisher and barrels and buckets, 55 per cent of those reporting stating that they do not use this apparatus and 50 per cent of those who do use them state that they are not recommended."

The percentages referred to above had reference to the hand grenades and the dry powder type and not to the chemical extinguishers or barrels and buckets. For your information I quote the following from the committee's report:

"From data, secured from members of the association in reply to questions sent out, it is determined that all the roads agree on the value of the chemical extinguisher and barrels and buckets as standard forms of first-aid apparatus, and that nearly all of them agree on the undesirability of the hand grenades and dry powder type, 65 per cent of those reporting stating that they do not use this form of apparatus and 50 per cent of those who do use them state that they are not recommended."

C. B. EDWARDS

Secretary, Railway Fire Protection Association.

THE CAB SIGNALS AND AUTOMATIC STOPS AT OROVILLE

SAN FRANCISCO.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Your issue of October 29 contains a letter under the heading, "Oroville Signalling Criticized," signed "M. Tainer." The letter contains so many incorrect and unwarranted statements that without desire for controversy, some reply is needed. Criticism is expected, but it is only right also to expect it to be made in a spirit of fairness and based on thorough knowledge of all details of the system and of its operation, tests and records. The letter in question does not show that spirit of fair play to which we are justly entitled, nor is its writer competent to pass judgment without much greater familiarity with the system and its appliances than he has had opportunity to acquire. The latter part of his first paragraph condemns expenditure in the effort to improve conditions for safety in railway operation and is indicative of the narrowness of his criticisms following. The few who have joined in financing this particular effort are not of small caliber and are well satisfied with the success already attained.

"M. Tainer" states that our devices are arranged on the open circuit plan and implies that they will not detect their own failures. Both statement and implication are entirely wrong. The system is *not* arranged on the open circuit plan. The description published in your issue of October 8 does not disclose in detail the methods of protection used. Complete information on this point was not given on account of certain pending patent applications. All of the circuits used, on engine and roadside, are arranged entirely as closed circuits. The apparently normally open contact at signal locations is thoroughly protected against failure in operation by a protective relay positively connected across the point into normally closed circuits. Two prominent signal engineers, after examination of our circuits and inspection and tests of our relays, have been satisfied that our protective features are effective and reliable and free us from any danger in the use of the contact point in question. The open circuit practically does not exist in this system.

The apparatus on the engine is far from being complicated

and we have been unable to detect any point in it where any weather conditions can have detrimental effect upon operation. The energization or action of the magnets cannot be affected by the severest cold or frost, nor can the magnetic current induced be scattered or interfered with by snow, ice, water or mud lying in its path. The engine signal-valve and the train-stop appliance are not subject to moisture or lubricatory troubles through extreme cold. The air system is less liable to troubles than much of the Westinghouse. All circuits and instruments are fully equal to the best in use under extreme climatic conditions.

The line circuits, except in overlap, require less wires than for semaphore signals, two wires for the three signals and the automatic stop, as against three wires for the three-position semaphore. As to cost of an installation, we are in better position than "M. Tainer" to make comparisons and can state that the complete system, including all road and locomotive equipment, can be installed per railroad district or division at the same or lower cost than a good semaphore system covering the same conditions.

Current consumption is not in excess of that required for semaphore signals. It is to be noted that the setting of signals ahead of and behind a moving train requires no extra current consumption, such setting being obtained simply by the opening or closing of the line relay circuits. Practically no current is consumed by track magnets except for the very brief interval of actual delivery of a signal, a period of ten to fifteen seconds for delivery of current of five amperes at ten volts.

Failure of contact 35 to close when it should, or failure of relay 9 to pick up its armature through exhaustion of battery 26, have been absolutely covered in our protective system earlier referred to. The working of the back-contact has been made more certain and secure than the front-contact of any type of relay now in service. The wiring of the engine equipment is so arranged as to effectually guard against any failure of the apparatus through cross connections and this has been amply demonstrated in actual practice. Also the air system is so arranged that the breaking or leaking of any pipe or connection will cause instant and positive indication of the leak.

As to overlap, we make no argument for or against its use. That is beside the question since the one overlap of the Oroville installation is provided solely to meet certain conditions and limitations which would similarly control in a semaphore system under the same conditions and space limits. This overlap has no bearing whatever on the location of automatic stops, a fact not grasped by "M. Tainer." In a cab-signal system the locations for giving signals are of necessity quite different from those used for giving roadside signals. The cab-signal must be given at the point where the semaphore signal ordinarily comes first into clear view. In either system the spacing between signals is the same, giving the engineer equal time in each to act on one signal before receiving another. In this installation the stop signal is received in the cab at braking distance in advance [rear] of the usual semaphore stop signal location and the automatic stop is given *at* this semaphore, provided the train is run past this point, the block end being at braking distance beyond. The overlap, whether good, bad or indifferent, is no more an essential part of this system than it is of the roadside signal system. We do not claim that the Oroville installation is an ideal one. It is too limited in extent and too hampered by present unusual district terminal conditions to be held as a model. Its chief purpose is to demonstrate that signals and brake applications can be successfully and reliably transmitted to moving trains without the use of mechanical or electrical contacts with roadbed apparatus and operated without disarrangement or improper delay of traffic. We are prepared to successfully demonstrate these essential points and with greatly increased safety in railway operation; also to show that the system can be so arranged and operated as to give complete protection everywhere.

In this installation the upper surface of track-magnets is 14½ in. above the top of rails and the lower face of receiving-coils is 3 in. above the upper surface of track-magnets, giving the receiving-coils a height slightly above the maximum height of pilot above

rails as used on this road. The clearance between track-magnets and receiving-coils may be materially increased by lowering the track-magnets, with reliable transmission operation still assured. Also track-magnets may be placed with their upper surfaces even somewhat below the rails' upper level and the receiving-coils considerably lowered before reaching a level where reasonable plow protection cannot ensure their safety.

The action of the dashpots of the time-limit relay has been proved perfectly regular and reliable. Humidity and temperature have no effect upon them and no lubrication or packing of any kind is used in them. They consist simply of a graphite piston running true in a polished bronze cylinder. After long use no wear is perceptible.

The liability of non-operation of armature 14 of relay 9 and contact 35 has been fully guarded and covered in the protective features previously noted.

The use of time-limit relays is essential for economical battery consumption in the case of roads using energy supplied from any form of battery, but this form of relay may be dispensed with when current is derived from a power plant, as the increased current consumption occasioned by its non-use is then not sufficient to greatly affect the economy of the system. This particular relay has, however, been developed to the point of entire reliability under heavy use. They very closely resemble the ordinary free-acting type and particular care has been taken in design and construction to make all parts of this instrument extremely free working, to guard against any possible chance of sticking.

The use of the local track circuit where one rail is common to two circuits has, under our provisions, proved perfectly reliable. We have been able to completely guard against failure from the varying condition due to poor insulation, broken or loose connections, broken rails, etc. This short track section is not expensive in installation or maintenance. Under our arrangements it does not introduce complications or interference with connected track-circuits.

The attention of the engineer need not be at all diverted from his watch ahead, in order to observe the cab-signals. He cannot well escape noting the light signal given above or beside his forward window and he cannot fail to hear and recognize the signal also given by the whistles of distinctly different tone. The single act needed to stop both light and whistle is performed without taking his eyes from track or gauges.

The substitution of cab-signals for wayside ones does not make difficult a check of the display of signals. The use of a very simple and inexpensive recording device not only makes such a check possible, but establishes an indisputable record.

We have had no trouble in obtaining satisfactory maintenance. In our experience with this system, the maintainer of average ability has no difficulty in locating troubles and in determining, when the trouble has been located, whether or not it has been removed.

It would be unwise to place sole dependence on cab-signals and we do not do so. "M. Tainer" has overlooked the two-light marker placed at each automatic-stop location. This marker displays continuously the clear signal when the block ahead is clear, or a stop signal if the block ahead is occupied. More than braking distance is provided from the distant point at which these marker lights are clearly visible, before the block end can be reached. Even were the entire signal apparatus disabled, the engineer still has the marker at each automatic-stop location to guide him. Only by a serious accident to the locomotive could all the signal-indicating apparatus and the automatic-stop appliance be rendered non-operative. Means have been provided for readily cutting out any section where trouble develops without interfering with other sections. The locomotive apparatus has proved more reliable in operation than semaphore arms, according to the records of semaphore performance.

The statement made that the automatic stop should not be applied when speed is being reduced to bring the train to a stop before the home signal is reached is correct. As has been stated, in the Oroville installation, the automatic stop is placed at the home signal and the stop operated there should attempt be made

to pass that point with the home signal set at stop. If desired, however, an automatic stop can be located at any point in advance [rear] of the home signal and its action regulated to pass a train running at such reducing speed as will bring the train to a stop at the home signal. Further, in this system, when brakes are applied by the stopping device, their release is impossible until the train has been brought to a stop. The stopping device gives only the service application and the engineer is not prevented from increasing the application; but he cannot decrease it. This automatic stop feature may separately—that is, without the cab-signals—be applied as an auxiliary device to any existing semaphore installation and be non-operative unless the attempt is made to run past a semaphore stop signal or be made operative only at a predetermined rate of speed.

In conclusion, we desire to go on record as fully recognizing the vital importance of heeding the final judgment of practical and conservative signal experts in the fundamental principles governing design, construction and operation of circuits and apparatus. It is our constant effort to fully meet and cover all such established rules and principles. This we believe we have accomplished and on this basis we claim the right of fair and unprejudiced consideration, an element entirely foreign to the letter signed "M. Tainer."

F. F. BOSTWICK

President, The National Safety Appliance Company.

AN ANSWER TO "A CLERK'S PLEA"

CHICAGO, ILL.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Having been employed for some 12 or 14 years in various clerical capacities and in different departments by several of the more important transportation interests, I am keenly interested in the subject discussed in the letter published in your issue of September 10, page 459, and fully agree with the statement that the inefficiency of railroad employees is an issue that warrants the serious consideration of executives and officers.

The indictment in this plea is puerile, and leads one to believe that the author has grossly exaggerated his lack of knowledge of certain movements designed to develop efficiency. Surely no one, unless he has spent his time at some lonely whistle station in the West, would be uninformed as to the mediums existing for this purpose.

Railroad employees may be divided into two classes; so may all other employees, so are bees in the hive—workers and drones. There are those employees who place their employers' interests (even though it be a corporation) above their own, realizing that their success is contingent to a great extent on the success of operation and cherishing the hope that their efforts will be recognized and rewarded; and they frequently are. There is also that class who regard their position as a place "in out of the wet" and are incapable of diverting their minds from their pleasures, the clock and pay-day.

To my mind it is inconceivable that the efforts of various educational institutions, publishing houses, railroad journals and others have fallen on barren ground, and I am positive that the public at large is well informed with respect thereto and that this clerk may be the exception that there is to all rules.

In regard to the matter of schools, there is hardly a university in the country that does not have a course covering some phase of transportation and commerce. There are also several correspondence schools devoting their activity to the development of efficiency in certain of the many branches of railroading. The fees charged are nominal and the item of expense is not sufficient to deter an ambitious railroad man from acquiring knowledge that will stand him in good stead.

As to books, there are so many that every phase of railroading from the clipping of coupons to the destruction of weeds has been well covered. Many of these books are to be found on the shelves of the public libraries of even the smaller municipalities. There are also excellent addresses given by prominent men in transportation work, from time to time, which are reported through the medium of the daily press, periodicals, etc.

To my mind, the solution of this question rests primarily on three things: The elevation of the educational and moral qualifications for admission to the service, the pursuit of a special educational plan with regard to those now in the service designed to promote their greater efficiency and familiarize them with the practical and economic questions concerning their vocation, and a fair and impartial basis of reward for their efficiency.

Two barriers to rapid advancement that I have noted are the observance of seniority in filling vacancies and the fact that certain desks are paid rather than their incumbents. As to the former, the mere fact that a man may have served 10, 20 or 40 years in a given office or department is not conclusive evidence as to his efficiency. Indeed, it is sometimes stated that this in itself is proof of inefficiency and lack of ambition. Be that as it may, if the higher positions are filled by men of this sort of avenues of progress are effectively closed to the ambitious employee.

Under the desk payment plan, the management may decide that the maximum figure for tariff clerks will be \$100, for rate quotation clerks \$75, for stenographers \$60 and so on. Irrespective of how efficient an employee may be who occupies a position in one of these classes, the possibility of his securing additional money in that particular position is precluded by this policy, the wisdom of which is open to question. It is not surprising, therefore, that an employee, finding his advance hard and being unable to obtain any additional remuneration or broaden his experience in connection with the duties he is now efficiently performing, begins to lose interest and may finally cast his lot with the incompetents.

The business of the railroad is manufacturing and selling transportation, and the lowliest employee to some degree assists in the sale of that product, and his inefficiency is frequently responsible for a loss which has no place in a well-organized and a well-regulated business.

Through the medium of the universities, the correspondence school, etc., a quantity of desirable timber is placed in the field annually, and seemingly the man who has bought, paid for and completed a vocational course should be given the preference over others who are not so equipped. Most all companies are engaged in some way or another in an educational plan to develop employees. For the most part this has been confined to machine shop practice and operating department employees by the apprenticing of student employees. Several lines, however, have a well-developed course in transportation embracing varied subjects, which is at the disposal of such employees as are inclined to take up the work.

In conclusion, I offer a suggestion which comes from the clerks themselves through a publication of theirs: "During the dull or ordinary times clerks should be shifted from one position to another, so that they may become familiar with the various tasks necessary to the running of the office. In busy seasons such training may make comparatively easy an increase of the force in some departments and a decrease of the force in others, thus reducing and eliminating the necessity of discharging experienced workers. When new workers are added only minor positions will be affected, and the net results will be the lessening of the total yearly mistakes." This plan also has its advantages in that it may uncover a man who is not particularly fitted for the position he may be occupying but is an exceptionally efficient employee on some other work in the same department.

The writer is convinced that the efficiency of the office rank and file may be greatly enhanced by the utilization of effective educational methods and mediums now available, and from the progress made in the past it is probable that the transportation interests will not fail to place their approval on these methods and thereby elevate the railroad job to the dignity of a profession.

L. E. RILEY

La Salle Extension University.

Transverse Fissures the Result of Rail Gaggling

Intergranular and Coalescent Types Caused by Local Application of Gag to Base and Head of Rail Respectively

By P. H. DUDLEY

Consulting Engineer, New York Central Lines.

The cold straightening of rails after they leave the hotbeds is an important subject. The value of smoothness and stability of track has been recognized by railroad officials for many years, as indicated by the large outlays for stiffer rails, sufficient ballast, and efficient labor to maintain the surface of the track.

To make the present steel rails with large mechanical properties as girders is a series of theoretical and practical problems, and the old adage, "strike when the iron is hot," is true of each

transitory deflection to their position in the equilibrium depression under the passing wheel loads, but the undulations decrease with the increased stiffness and smoothness of the rails on the same roadbed.

Fig. 9 is a track indicator diagram of the surface undulations of the N. Y. C. & H. R. 4½-in. 65-lb. rail used in 1881. This had a narrow deep head, made from the recommendations of a committee of the American Society of Civil Engineers in 1873.

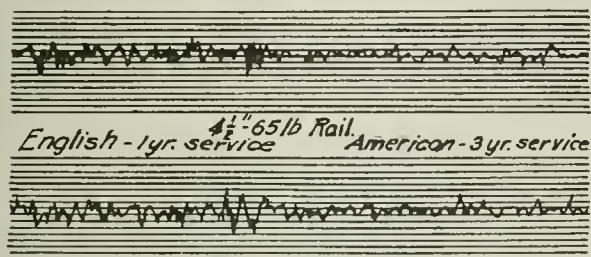


Fig. 9.

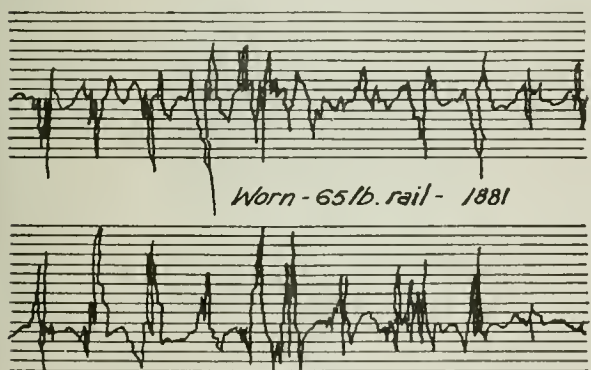
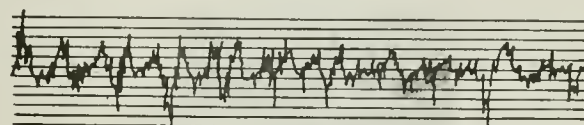


Fig. 10.

stage in its logical order—selecting the ores, smelting them in the blast furnace, making the steel in the open hearth furnace, teeming the ingots, stripping, then promptly charging them into the reheating furnaces, blooming the ingots, reheating the blooms, rolling the blooms into bars at suitable temperatures, hot sawing the rails, cambering, cooling and recalcene on the hotbeds, then cold straightening, inspecting, drilling the rails and loading on cars for shipment. The rails are then laid in the tracks where the metal of the section receives the "Twentieth Century" or other trains through the individual wheel loads, carries and distributes the strains in ample length of the section to the cross-ties, ballast and roadbed at 60 or more miles per hour, which can be repeated many times daily for years of service.

The raising of the standards of the track and the introduction of stiffer rails to accomplish this, is interesting history which can be illustrated by diagrams of my track inspection for a number of years. These will be limited to the indications of the surface undulations and joints of the two lines of rails which have been copied from my report in the Proceedings of the International Railway Congress, Sixth Session, Paris, 1900, where more complete diagrams of track inspections are reproduced.

These show the effect of the flexible roadbed inaugurated by John B. Jervis in 1832 after he opened the Mohawk & Hudson Railroad, Aug. 9, 1831, constructed with rigid supports for his strap iron rails. This is in the sense that, from the trackman's surface, the rails, crossties, ballast and roadbed undergo a



Worn 65 lb rail - 1881

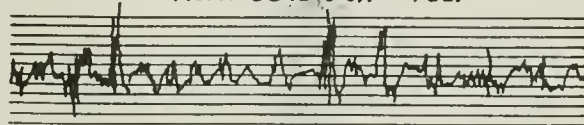
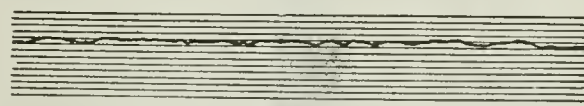


Fig. 11.



6"-100 lb. Dudley Section - 3 Tie Joints.

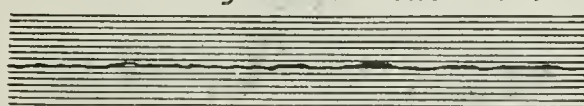
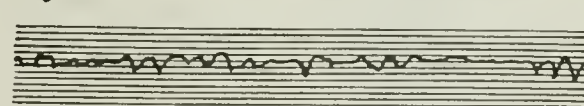


Fig. 16



Pioneer 5"-80 lb. Section - 3 Tie Joints.

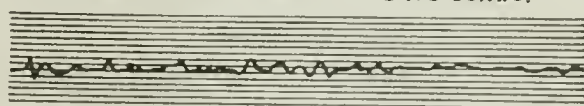


Fig. 17

Track Indicator Diagrams of Various Rail Sections Showing Their Surface Undulations

The spacing of the horizontal lines for the vertical undulations of the rails by the track indicator was 1/10 in., and the scale for length, 1 in. of paper to 50 ft. of track. These have been reduced about one-half in the illustrations.

The first part of Fig. 9 is a diagram of English rails, hot straightened, while the smoother part is of American rails which had been in service three years. The American rails were all cambered as they came from the rolls, and the general surface was smoother than that of the English rails.

Fig. 10 shows rails which had been in the track for several years; the joints were low and the receiving ends cut out, while a few of the rails were rough originally. The diagram was representative of the condition of tracks of light rails from 1878 to 1884 on the trunk lines, after about 8 to 10 years' service. Then the rails were taken up, the receiving ends cut off and redrilled, and the rails were relaid.

Fig. 11 shows rails with some receiving ends cut out at the

joints, though the rails themselves had a wavy surface. The crossties under all of these 4½-in. rails cut out under the seats and were destroyed by mechanical abrasion rather than decay. The generated dynamic wheel effects were large for moderate speeds. There was a general opinion among operating officials between 1870 and 1885 that the dynamic shocks on the iron and early light steel sections were nearly in proportion to the square of the speeds, and freight trains were limited to 12 and 15 miles per hour. Freight train crews which exceeded 16 miles per hour were disciplined on some roads.

We are unable to appreciate the difficulties of operation of the railroads on the early tracks, from our present standards. My track indicator ran over a few rail 4½-ft. lengths of the early fish-bellied rails with mitre chair joints, in a siding of the B. & A., and the average undulations were at the rate of 41 ft. per mile instead of 2 ft. in our best tracks. I ran over



Fig. 18—Intergranular Type. This Illustrates the General Type of the Intergranular Nucleus and Is the More Common from the Fact That Rails Are Cambered as a Rule to Cool Low on the Hotbeds and Then Gagged Upon the Base

a few miles of 12 to 18-ft. iron rails, with chair joints, on the poorest track, and the undulations average 27 ft. per mile. Each joint gave severe shocks and the speed was limited to 12 miles per hour for the light equipment.

Fig. 17 shows the diagram of the N. Y. C. & H. R. pioneer 5-in. 80-lb. section, rolled by Capt. Hunt at Troy, in April, 1884—a short period for the present development. These rails Capt. Hunt was obliged to straighten upon short span supports, the same as had been used for the limber 4½-in. 65-lb. rails. The surface was "kinky" and the trackmen were never able to surface those rails to the value which was expected from their stiffness. They were removed from the high speed tracks as soon as smoother rails were obtained at the mills. When a sufficient mileage of the 5-in. 80-lb. rails was laid—over 60 per cent stiffer than the former 4½-in. 65-lb. section—the "Empire State Express" was installed on October 26, 1891.

I estimated and stated upon the condensed diagrams of the track inspection of the Boston & Albany in 1883 that with the stiff, smooth rails and good ballast they could reduce the undulations in their tracks to between the 15th and 16th lines on my condensed diagrams. This was after I had designed the N. Y. C. & H. R. 5-in. 80-lb. rail, but before it was rolled.

I distributed the metal in the B. & A. 95-lb. section in 1890, commenced rolling it in 1891, and completed the entire line in 1897. The undulations for the 400 miles of track were nearly uniform on the heavy gradients and averaged 15.42 lines on the condensed diagrams, confirming my estimate of 1883.

When I rolled the B. & A. 95-lb. section in 1891 and the

stiffer sections of the 5⅞-in. 80-lb. and the 6-in. 100-lb. rail, with several others, in 1892, I had stipulated in the specifications that the supports in the straightening presses should be widened from 24 or 30 in. to 40 or 44 in. This resulted in a smoother finished surface and line of the rails than previously secured. The knowledge of what could and should be done was an important factor in securing the desired results.

Fig. 16 is the track indicator diagram of the 6-in. 100-lb. Dudley section in which the vertical undulations of the track were less than 1/10 in. The surface of the rails in the track was comparatively smooth, and the joints are not even indicated. The undulations in the track, which averaged 8 ft. per mile on the light rails in 1881, were reduced to 2 ft. per mile in 1892 by the use of the 6-in. 100-lb. rails on the same roadbed, with an added threefold capacity and stability of the track.

The determinations of the stremmatograph of the unit stresses in stiff rails under the subdivided wheel loads of the present heavier equipment show their favorable distribution through the metal of the section to the crossties and roadbed. These determinations furnish the explanation of the increased capacity and stability of the track of the 6-in. 100-lb. rail on the same roadbed over the former light sections as a more efficient engineering structure to distribute the effect of the wheel loads to the roadbed.

The knowledge acquired in the past 31 years in the design and use of stiff sections of steel rails to develop the high standards of track shows that the rails which are not smooth in the bearing surface of the head cannot be laid and maintained in surface by the trackmen as desired and expected from the stiffness and weight of the section. This is a condition of



Fig. 19—Coalescent Type of Interior Transverse Fissure. Transverse View Showing the Nucleus—a Crack Under the Bearing Surface. Rail Gagged on the Head

the steel beyond the ability of the trackmen to correct, which is intensified yearly by wear and deformation of section until the rails require renewal for smooth riding track.

To maintain the present rate of progress secured in transportation for the past quarter of a century improved methods are now required to finish the stiff rails without surface irregularities or injury to the metal. The hot stiff rails should be cambered to cool uniformly on the hotbeds, and these should be provided with automatic mechanism to space and move forward one rail at a time so that each can bend back and forth during the recalcence of the base, and then the head, without contact with adjacent rails. This needed improvement in the finish of the rails must be done through the study and co-operation of the manufacturers and consumers to produce the definite effect of smooth rails without unduly stressed metal. Each party to make and use a rail must know and be familiar with what has and can be done and the limitations, or misunderstandings will replace what should be mutual work and confidence. The consumers use and make the service tests, while the results of the past trials must be returned to the manufacturers with analysis of the facts and the reason why the conditions of service tests were not fulfilled as required for the progress of transportation.

The design of rail sections of large mechanical properties for the necessary girder stiffness and strength, involves an increase of metal, and therefore requires a higher degree of perfection of the mechanism to finish properly the stiff rails, essential for present and future transportation. Those with even heavy bases when spaced, do not cool sufficiently straight on the hotbeds to be used without correction, while the irregularities of cooling nearly straight are increased when the rails are bunched on the hotbeds.

To straighten either low or high rails from the hotbeds, of any section, the principle involved is that the metal of the neutral surface of the section does not change its length, while that above or below it must; that when the metal of the head requires to be lengthened, the base must be shortened, and that when the head requires to be shortened, the base must be lengthened. The present method is to apply the gag locally to put a permanent set in the metal, but it concentrates its effect in two or three inches of the head or base, and therefore puts and leaves internal strains in the metal where the gag is applied. These, when severe, often develop in service into half-moon breaks in the base, sometimes resulting in the complete fracture of the rail. The gag applied locally is one of the contributory causes for the development of the interior trans-

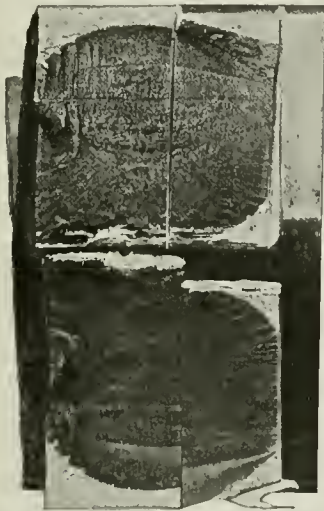


Fig. 20—Top View of Rail, Shown in Fig. 19, Uncapped and Sawed Twice to Uncap the Full Imprint of the Gag

verse fissures, the intergranular type when applied to the base (Fig. 18), and the coalescent type, when applied to the head (Figs. 19, 20, 21 and 22).

The improved method desired is, more efficient hotbed control, then mechanism to distribute its work to straighten the rails equally to each inch of length respectively of the head and base.

The gag applied locally on the head of the rail to straighten it, must produce longitudinal shearing strains under the bearing surface to upset and shorten the metal. When there are delayed transformations in the head of a rail from the higher metallographic entities to those of the lower temperatures as the hot rail cools, the gag subsequently in cold straightening may leave its imprint and uncap the nonductile metal.

There is still confusion in the minds of engineers of maintenance of way in reference to the interior transverse fissures, for they often designate those as "transverse fissures," which are of an entirely different character and origin. The interior transverse fissures develop from an injury or defect in the interior of the head, while a "transverse fissure" in the rail head develops from metal hardened in the bearing surface under slipping drivers, which becomes checked, and then by slow detail develops downward through the head and web, until the entire section may be fractured.

The development of "transverse fissures" in pneumatic tamping bars and drills, usually occurs from a slight defect in the exterior of the metal. Drills made from steel cast around a

central core to make them hollow sometimes develop an interior transverse fissure from a slightly serrated surface on the wall of the hole in the drill. Pneumatic tamping bars of high grades of steel which have been broken and then repaired by "V" welds, the entire surface not being completely united, have also developed interior transverse fissures from the imperfect portions of the weld, and fractured the rods.

The coalescent type of interior transverse fissures develops



Fig. 21—Coalescent Type of Interior Transverse Fissure, Gagged upon the Head. The Crack or Nucleus Shows Beneath the Bearing Surface

from a longitudinal imprint of the gag or uncapping of the nonductile metal. The metal of the edge of the crack, $\frac{3}{8}$ to $\frac{1}{2}$ -in. under the bearing surface, checks and becomes the nucleus, and by its coalescence starts the development of the vertical interior transverse fissure, which finally fractures the rail. It is characteristic of the coalescent type that the development of the verti-

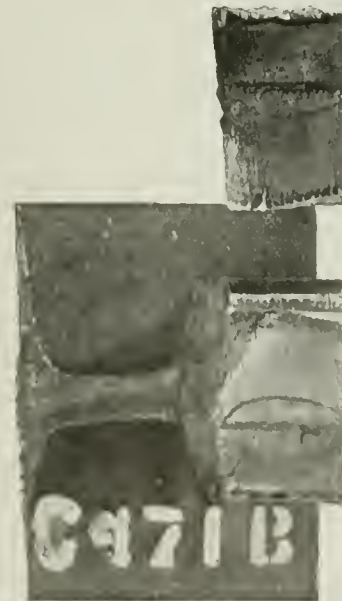


Fig. 22—Top View of Fig. 21, Showing Imprint of the Gag on the Rail Head, with Cap Above

cal interior transverse fissure follows the internal shearing strains of the edge of the gag nearest to the supports of the straightening presses. Therefore, while we find a similarity of effect, we must expect slightly different traces of its manner of coalescence and subsequent development.

I have, for the New York Central Lines, sent several

assistant supervisors of track who are technical graduates, to the steel mills to take a short course in the manufacture and inspection of rails, which is of great service to them in their maintenance work. They become familiar with the successive steps of manufacture and their significance to the service of the rail as a girder in the track to carry the moving equipment, and when they see the rust spots on the new rails in the track, they know they are the local permanent sets in the metal, produced by the gag to straighten the rails by the present method. This enables them to follow and criticize and understand my investigation of the contributory causes and classification of the intergranular and coalescent types of interior transverse fissures.

The education of 25 years with locomotives with increased total loads subdivided by more wheels and similarly constructed equipment running over the smooth rails, proves that lessening the undulations of the track, reduced the generated wheel effects, therefore train resistance, and rendered possible the increase of more than an equivalent percentage of paying loads on the same roadbed, essential to reduce the cost of transportation per pound or ton, the revenues of which are restricted by law.

It has taken years of service to realize what was indicated by theory and calculation, and then secured only by attention to every detail of manufacture of rails, equipment and their use, which must still be continued.

NATIONAL INDUSTRIAL TRAFFIC LEAGUE

The annual meeting of the National Industrial Traffic League was held at Chicago on November 17 and 18. A special committee, of which F. B. Montgomery, traffic manager of the International Harvester Company, was chairman, presented a report and a resolution, which was adopted, declaring the league to be in favor of the upbuilding of the American merchant marine under the authority of Congress. The report expressed the opinion that the United States should have a merchant marine comparable with that of other large maritime nations, in time of war to be subsidiary to the navy, and that there is little or no prospect of such a merchant marine being constructed and operated within the next several years by private capital. Therefore, the committee felt that the only apparent method at this time of securing a merchant marine of any appreciable number of boats is to support the administration in its recommendation that the government either construct, maintain and operate a merchant marine or furnish sufficient capital to build a reasonable number of boats to be leased to private individuals or corporations.

A special committee was appointed to consider the question of the liability clause in sidetrack leases and agreements. It was stated that the railroads are inserting in their new leases a clause which imposes liability upon the shippers for almost anything that may happen on the property.

On the recommendation of the Legislative Committee the league went on record in favor of the proposal to reorganize the Interstate Commerce Commission by the appointment of two additional members and the organization of the commission into divisions or departments. On the subject of the right of appeal from negative orders of the Interstate Commerce Commission, which had been on the association's docket at several meetings, after a general discussion it was agreed that apparently the shipper has an equal right in this respect with the carrier, and it was decided to take no action. At the recommendation of the committee, the president of the league was authorized to communicate with the Interstate Commerce Commission to see if there is any objection to a plan for amending the law or rules of practice of the commission to give litigants the right to review findings of examiners, and file exceptions and objections prior to the decision by the commission. The Legislative Committee was also instructed to follow the proposed legislation to increase the liability of ocean carriers. It was decided to lay on the table the subject of a uniform code of track storage rules, it being the sense of the meeting that such rules should give consideration to local questions.

In connection with the report of the Bill of Lading Committee, the previous action of the league in favoring a clean bill of lading, a simple common law receipt for freight, was reaffirmed and the committee was instructed to endeavor to secure a consolidation of the proposed hearings on export and domestic bills of lading.

The Freight Claim Committee reported that the Freight Claim Association of the carriers had called a conference to consider the entire subject of concealed loss and damage to freight, to be held on December 15, to which representatives of the shippers were invited, and a special committee of seven was appointed for this purpose. The committee reported progress on its compilation of a manual of instructions for shipping clerks and the committee was authorized to proceed with its publication, with the approval of the executive committee. Several letters had been received from representatives of the carriers, expressing a willingness to co-operate in the work.

The Classification Committee reported concerning the reorganization of the Official Classification Committee as a permanent standing committee, and expressed the approval of the league, which had advocated such a plan and has urged the Southern Classification Committee to adopt a similar plan. A report of the committee opposing the unit basis for establishing classification ratings was adopted.

J. M. Belleville, who attended the recent meeting of the National Association of Railway Commissioners as a special representative of the league, made a report suggesting greater co-operation between the league and the association, and between the chairmen of committees of the two associations on subjects in which the league was interested. At the San Francisco meeting he had been given the privilege of the floor and had participated in the discussion of all subjects in which the league is interested. It was proposed to send the chairmen of all of the league committees to attend the next meeting of the association.

A special committee on the handling of l.c.l. freight at transfer points reported that it had found many cases of delay due to operating conditions, in which cars were not handled in the order of arrival. It was decided that this was a question pertaining to the operating department, and the subject was referred to the executive committee to take up with the American Railway Association or other representatives of the carriers.

The Committee on Uniform Classification reported regarding the progress of the Uniform Classification Committee of the carriers, saying that it was proceeding as fast as the territorial classification committees can assimilate its work.

The Committee on Weighing submitted a report on the code of rules for the weighing of l.c.l. freight proposed by the American Railway Association, recommending that they be adopted with two minor changes. The report was adopted with instructions to the committee to continue its negotiations with the American Railway Association.

On the recommendation of the Legislative Committee, the Executive Committee was instructed to bring the subject of reparation to the attention of the Interstate Commerce Commission, with the representation that in every case where a rate is found unreasonable, complainant should be awarded reparation from the date of his complaint, at least, and that in every case involving the question of reasonableness of rates where reparation is asked the Interstate Commerce Commission shall be asked to fix the point of time at which the rates became unreasonable.

The annual dinner of the association was held at the Congress hotel on Wednesday evening. E. J. McVann, manager traffic bureau, Commercial Club of Omaha, spoke on the work of the league, and Col. George T. Buckingham, president, Chicago branch, National Security League, spoke on the subject of Preparedness.

Officers for the ensuing year were elected as follows: President, G. M. Freer, manager traffic department, Cincinnati Chamber of Commerce; vice-president, W. H. Chandler, manager transportation department, Boston Chamber of Commerce; secretary and treasurer, O. F. Bell, traffic manager, Crane Company, Chicago.

The Economical Handling of L. C. L. Freight Traffic

The Two Prize-Winning Papers Received in the Contest
Which Closed August 1. Practical Plans Described

Thirty-seven contributions were received in the contest on the Handling of L. C. L. Freight, which closed August 1. These papers were turned over to T. J. Foley, general manager, Illinois Central; E. H. Lee, vice-president and chief engineer, Chicago & Western Indiana, and C. B. Rodgers, assistant to vice-president, Chicago, Burlington & Quincy, who awarded the first prize to C. B. Anderson, agent, C. & E. I., Chicago, and second prize to C. G. Johnson, supervisor of station service, M., St. P. & S. S. M., Minneapolis, Minn.

Other contributors to this contest included: W. J. Northup, agent, D., L. & W., Secaucus, N. J.; A. E. Aumiller, chief clerk to agent, P. R. R., Harrisburg, Pa.; William L. Burt, assistant freight trainmaster, P. R. R., Jersey City, N. J.; William J. Collins, freight agent, D., L. & W., Syracuse, N. Y.; J. C. Goodsell, assistant agent, C., St. P., M. & O., Minneapolis, Minn.; W. F. Hebard, The Buda Company, Chicago; W. H. Gatchell, superintendent of agencies, Southern, Washington, D. C.; Henry A. Goetz, Chicago; Don M. Neiswanger, traveling agent, N. Y., N. H. & H., Boston; D. A. Tomlinson, assistant engineer, C. & W. I., Chicago; M. R. Sutherland, United States civil engineer, Cleveland, Ohio; H. W. Davies, Cent. of Ga., Savannah, Ga.; W. L. Campbell, B. & O., Baltimore; T. Russell, general foreman, I. C., Chicago; J. R. Jackson, assistant engineer tests, A., T. & S. F., Chicago; H. F. Kaho, district agent, M. P., Kansas City, Mo.; J. R. Ness, agent, A., T. & S. F., Wichita, Kan.; J. W. Lawhead, agent, C. R. I. & P., Blue Island, Ill.; J. H. Torney, assistant manager, S. P., New York City; C. I. Heckman, lake freight agent, L. V., New York City; H. M. Gain, trainmaster, G. T., Belleville, Ont.; C. A. Pennington, superintendent of terminals, C., C. & St. L. and C. & O., Louisville, Ky.; H. S. Jaynes, St. Paul, Minn.; Thomas F. Maher, general foreman, M., St. P. & S. S. M., Chicago; S. E. Miller, inspector of transportation, B. & M., Boston; F. G. Schultz, soliciting freight agent, N. Y. C., Pittsburgh; J. Mifflin, freight agent, P. R. R., New York City; Charles W. Brown, assistant superintendent, L. & N. E., South Bethlehem, Pa.; Frank Robinson, general agent, B. & M., Nashua, N. H.; C. H. Brown, agent, N. & W., Columbus, Ohio; F. H. Garner, transportation inspector, U. P., Omaha, Neb.; J. L. Coss, despatcher, C., R. I. & P., Haileyville, Okla.; Leland Wadsworth, agent, Troy, N. Y.; M. S. Wise, assistant to general manager, M. & O., Mobile, Ala., and James P. O'Connor, Great Notch, N. J.

The two prize winning papers are published here and others will follow in early issues.

FIRST PRIZE—HOW THE OPERATION OF ONE LOCAL FREIGHT STATION WAS IMPROVED

By C. B. ANDERSON

Agent, Chicago & Eastern Illinois; Chicago, Ill.

What can be done to increase the capacity of the present freight station? Can this be accomplished without increasing the cost of operation? These questions, paramount in the minds of many local freight agents to-day, have been solved to a large extent by the innovations which have been introduced in the operation of the Chicago freight station of the Chicago & Eastern Illinois.

In different localities somewhat different methods are employed in handling l.c.l. freight, dependent on the facilities, the class of freight handled and local practices. The station layout consists of freight houses or platforms varying in dimensions and served by certain adjacent tracks, which have in most cases been enlarged or extended from time to time in an effort to accommodate the increasing requirements, but, as a result, have become expensive to operate under old methods. In some of the larger terminals, additional space cannot be obtained for de-

velopment, pending a complete rearrangement of the terminals. The future may provide for the double-decking of freight houses to obtain better and greater use of the space occupied, but this is something beyond the agent's control and he must deal with the conditions as they now exist.

The two-wheel hand truck is still the principal tool used, although four-wheel trucks and low dollies are used in some houses for handling certain commodities. At many points those in charge of such terminals have been endeavoring to relieve congestion and increase the efficiency by developing new methods and introducing new tools. The Chicago & Eastern Illinois has made considerable progress along these lines during the last three years; first, by adopting the individual bonus system; and, second, by the use of four-wheel trucks and motors.

An individual bonus system, similar to that in use on the Atchison, Topeka & Santa Fe, was put into effect in October, 1912. Separate schedules were made for checkers, callers, truckers, stowers and delivery men, also for the general foreman and his assistants. To prepare these schedules it was necessary to make a time study of each of the different classes of work performed and obtain accurate information as to the tonnage handled per hour by the different groups in handling the different classes of freight. It is generally conceded that past performances will indicate about 67 per cent efficiency, and from the figures obtained in this study the 100 per cent basis was established. The men are paid a graduated bonus for all work performed above 67 per cent efficiency, and at 90 per cent efficiency are given a bonus equal to 10 per cent of their wages. With each per cent of efficiency over 90 per cent the bonus is increased 1 per cent.

As the outbound house is operated under the no-gang drop-truck system, the schedule for the truckers and motormen is based on pooling all the tonnage handled through that house. All of the other schedules, however, are based on the individual tonnage handled. The schedules for the foremen are based on the efficiency obtained on the work under their supervision. In order to compile the bonus data, additional clerical expense was incurred amounting to \$110 per month, which is charged to the freight handling cost.

Under this plan, our men have increased their earnings 8 per cent to 12 per cent, and in some cases exceptionally good men earn a bonus equal to 25 per cent or 30 per cent of their wages. The increase in efficiency due to this bonus plan has effected a net saving in our cost of at least four cents per ton.

Co-operation is essential to the success of an organization, and any plan that provides for a division of the profits insures that co-operation. In my judgment, the individual bonus plan is an improvement on the pool bonus, in that it recognizes individual effort and places the reward where it belongs. It also enables a foreman to weed out the drones and build up a force of competent men.

It has been our experience that as the men are satisfied, they seldom leave the service voluntarily, and we are not required to train new men constantly. As they become more familiar with our work they are able to perform their duties with more speed and accuracy; consequently, the quality of the work performed has improved rather than deteriorated.

From July, 1912, to June, 1913, various storage-battery motor trucks were experimented with at the outbound freight house in an effort to determine the practicability of using them for freight handling. The truck makers advocated their use as a single unit, loading the freight on the motors at the receiving door and running them into the cars in which the freight was to be unloaded. While it was found that the trucking cost could be reduced more than one-half on the tonnage handled in this way,

two or three power trucks would haul but a small percentage of the total tonnage, as too much time was lost in loading and unloading. It was conceived that better results could be obtained by loading the freight on four-wheel trucks or dollies and using the motors as tractors to move the trucks in trains to the cars. As we had 12 four-wheel trucks and 6 dollies at this time, we equipped them with chains for coupling and continued our investigations along these lines. The results obtained from this system convinced us that this was the practical line on which motor trucks could be developed.

Finally, in June, 1913, we purchased three motor trucks and 36 four-wheel trucks of the "Reynolds" type, equipped with chains for coupling, and set to work in earnest to develop the tractor system of handling freight. Since then we have added to our equipment so that at the present time we have a total of 125 four-wheel trucks and 20 low dollies, and have practically eliminated the use of the two-wheel hand truck in the outbound freight house. Recently we have replaced the chain couplings with automatic couplers, which overcome the delay in coupling and uncoupling, and put a finishing touch to the system. This equipment is handling in the neighborhood of 750 tons of freight per day, which was formerly handled with 300 hand trucks; and 40 less truckers are required to handle the same tonnage. From this it will be readily seen that we have relieved congestion and increased our capacity. Since the installation of motors in our house, two other railroads in Chicago have adopted this tractor system of freight handling and a third road will soon put it in.

I am of the opinion that a large saving can be made in any outbound freight house with the use of four-wheel trucks, even where the trucking distance will not justify the use of the motors. A four-wheel truck occupies practically the same floor space as a loaded two-wheel truck and will carry from three to five times as much tonnage. If a good trucking floor is provided, one man can move as much tonnage with a four-wheel truck as four men with hand trucks, and with less effort. Where the trucking distance is more than 500 ft., I believe a further saving can be accomplished by the use of the motor trucks. Our records show that the four-wheel trucks and motors have enabled us to reduce our trucking cost about 8 cents a ton.

The original cost of the four-wheel trucks, dollies and motor trucks called for an expenditure of approximately \$8,000. The main item of expense for maintenance is for batteries, which, with proper care, should give two or three years' service. A charging panel has been installed in the outbound house and the motor trucks are given a five-hour charge during the night. The cost of current will not exceed \$20 per truck per month. A competent battery man is employed who is also capable of looking after the mechanical features of the motor trucks. His salary is also charged to the freight handling cost.

In order to outline briefly our system of handling outbound freight (which, with the exception of the trucking system, does not differ materially from the methods used by other lines in Chicago) it will be necessary to describe our house and track layout. The house proper is 844 ft. in length with a covered platform extending 890 ft. south, or a total maximum trucking distance of 1,734 ft. The house has a width of 21 ft. inside, with the exception of a distance of about 250 ft., occupied by the tunnel shaft and tracks, where the width is 28 ft. The platform is 20 to 25 ft. in width for a distance of 200 ft., the balance being about 11 ft. wide. Four tracks furnish a spotting of 75 cars adjacent to the house proper, while from one to three tracks located at the platform permit an additional setting of about 50 cars.

Freight is received from teams and tunnel and by car; an average of about 50 carloads of transfer and trap car freight being received daily, which must be unloaded and the cars used for outbound loading. The checkers' booths have been torn out and dial scales placed between two receiving doors. The checker's table is also located in this space, and to eliminate lost motion teams are allowed to back up to both doors at the same time. The checker and his caller, after taking off and checking

one load, immediately turn to the other door and commence to check the second load while the driver of the empty wagon is tying up his ropes and preparing to leave the yard. No delay occurs in handling the second load, by waiting for the teamster to back in and loosen his ropes, as is caused where a single door is operated.

After the freight is weighed and marked by the caller, who chalks the block number on the packages, it is pushed out on the floor to be taken to the designated car by the motors making regular trips through the house. Two men are located on the floor, who sort the trains in set-out order at different points in the house. The loads are set out by the motors and taken into the car by the stower, who is furnished with lists of the stations loading in the four cars under his supervision, and is held responsible for misloading. He is required to check the destination of each package (without regard to chalk marks) as it is placed in the car, and in the event of freight being sent to the wrong car, he notifies the foreman or loading inspector and holds the freight on the platform adjacent to his runway. He also confers with the loading inspector in regard to any freight for points regarding which he is in doubt. On account of the stower's importance under our system, his wages were increased about two years ago from the Chicago rate of 23 cents to 25 cents an hour.

The loading inspector is provided with a loading schedule. He goes among the cars throughout the day, inspecting the loading and instructing the stowmen, and has proved very useful in preventing errors in loading. Another inspector is employed to revise the loading from the shipping tickets. In case he develops that a checker has sent freight to the wrong car, the ticket is sent to the inspector in the house, who arranges to get the freight into the proper car.

Freight from the tunnel is handled very much the same way as that received by team, except that more men are used. The freight is all weighed on portable automatic scales, then marked up and loaded on four-wheel trucks and is sent to the cars.

In handling freight from the cars, a truck loader is used in addition to the caller. Tickets covering mail order business are sorted in alphabetical order according to destination, and the block numbers are put on such tickets before they are turned over to the checkers. This enables them to turn to the tickets and check the item readily as it is called, and the freight is then loaded on four-wheel trucks in peddler loads. It is customary to make several peddler loads to take freight for certain divisions of the house, each package being marked with chalk. This enables the motor to handle the mixed loads to a break-bulk point and from there they are handled by truckers, who distribute the packages at the proper runways. Peddler loads are also made in connection with the door and tunnel freight whenever it is found impracticable to attempt to get straight truck loads.

Our trucking distance has been increased approximately 600 ft. since 1911 on account of additional package cars added to our schedule during this period. We have also assumed several additional items of overhead expense on account of the new system adopted, and an increase in rate given the stowmen, as already stated. Regardless of this, a comparison of the cost of handling practically the same tonnage of l.c.l. outbound freight for June, 1911 and 1915, shows a decrease of 7.8 cents per ton.

OUT-BOUND FREIGHT HOUSE COST			
	1911.		1915.
Supervision	\$.018		\$.021
Overhead .....	.053		.071
Receiving clerks.....	.072		.052
Callers .....	.073		.071
Truckers .....	.185		.088
Stowers .....	.085		.105
Total cost per ton.....	\$.486		\$.408

In an exhaustive analysis of hand-trucking prepared by experts about a year ago, it was found that the average trucking cost increased approximately 3 cents a ton with every increase of 100 ft. in the length of the house. Particular attention is, therefore, directed to the remarkable showing made in our trucking cost, which clearly indicates that with the tractor system the trucking distance is material only to a limited extent.

Our inbound house at Chicago is 800 ft. in length and 60 ft. wide, with a covered platform 150 ft. long of the same width, making a total length of 950 ft. This house is served by two tracks with a capacity of 50 cars. The house is divided into three sections, the two end ones being used for city freight and the center section for transfer freight. The freight for city delivery is taken to the nearest city section and the transfer freight unloaded at any point is taken to the center section. This minimizes our trucking on all freight handled.

The unloading force is organized in gangs consisting of a checker, a caller and three truckers. Two-wheel hand trucks are used. Prior to adopting the bonus system, each delivery clerk used a trucker. Since that time the truckers on the delivery side of the house have been dispensed with and the deliverymen now handle the freight. One or two men are furnished to assist in loading pianos and other heavy or bulky freight, when required.

Prior to January, 1913, the blind tally system was used, which required that practically all transfer freight be unloaded in the house and later rechecked and handled to team, tunnel car or railroad car, as the case might be. At that time, we changed to the present system of handling all freight with the freight bills. We do not receive all of the billing ahead of the cars, by any means, but obtain a sufficient quantity to get the men started in the morning and by special effort are able to supply the balance without interfering with the work.

This method enables the checkers unloading cars to dispose of most of the transfer shipments with one handling by sending the freight direct to the teams or tunnel, or to cars marked up for other roads to which we make delivery by car. Only the smaller shipments to be delivered by team are unloaded in the house and they are placed at designated locations in the transfer section by the unloading gangs; freight for each road being kept together for convenience in making delivery. The location of each line in the transfer section is indicated by a wooden sign. With this arrangement in effect, we rehandle less than 50 per cent of our transfer freight, require fewer delivery clerks, relieve congestion and effect more prompt deliveries.

In making a comparison of the cost of handling l.c.l. freight inbound for the months of June, 1911 and 1915, we show a decrease of 8.8 cents per ton, about one-half of which we attribute to increased effort on the part of the men, due to the bonus incentive, and the other half to various changes in system.

IN-BOUND FREIGHT HOUSE COST

	1911.	1915.
Supervision	\$.041	\$.038
Overhead .....	.055	.061
Check clerks .....	.06	.057
Callers .....	.046	.038
Truckers .....	.207	.144
Delivery clerks .....	.104	.087
Total cost per ton.....	\$.513	\$.425

SECOND PRIZE—IMPORTANT PRINCIPLES IN THE HANDLING OF L. C. L. FREIGHT

By C. G. JOHNSON

Supervisor of Station Service, Minneapolis, St. Paul & Sault Ste. Marie, Minneapolis, Minn.

The figures used in the compilation of the cost of handling less than carload freight at the larger warehouses of the majority of the railways of the United States are arrived at by so many different methods, both as regards the tonnage handled and the expense of handling, as to make them very unreliable for a comparison of the handling cost per ton at one warehouse with that at another. Car load freight handled through the house by the warehouse force is often included and credit taken on the same basis as for l.c.l., while freight handled at industries and team tracks, moving as l.c.l. and unloaded or loaded by the consignee or shipper, is often included in the tonnage of the warehouse. Credit is sometimes taken twice for freight received, forwarded or transferred and sometimes for all of these divisions, when one handling is all to which they are entitled. The figures covering the tonnage are often obtained

from the monthly abstracts of the waybills, from the daily tonnage report or from the freight received and freight forwarded registers of waybills, all of which are, in a great measure, inaccurate for tonnage statistics.

There are, in my opinion, only three divisions of freight that may be used consistently in computing the cost of the handling of less than carload freight; freight received (covering that freight unloaded from cars for delivery); freight forwarded (covering that freight received at warehouse doors for outbound movement); and freight transferred (covering that freight handled from car to car. One handling of each of these divisions may be used consistently, if we are to establish a reliable cost figure.

The proper method of determining the actual tonnage handled, in, out and transferred, is as follows: For freight received, figures should be taken from the station record of the expense bill, the document used in checking the inbound freight, using only that tonnage covering articles actually checked. For freight forwarded, figures should be taken from the shipping tickets, using tonnage shown thereon as actually checked. For freight transferred, figures should be taken from the transfer record, using tonnage shown thereon as actually checked. This information should be compiled daily.

Although all of the above suggestions may be observed and the cost of handling as shown be slight, it does not necessarily follow that the freight has been handled economically. It may be handled at a low figure, in so far as the initial cost is concerned, but it may have been loaded without regard to intelligent handling; it may have been loaded in the wrong car, or station order may not have been observed; it may not have been trucked or stowed safely, or after it is in the cars it may not have been handled carefully in the switching service, in trains or in the unloading. When we speak of the economical handling of l.c.l. freight we must consider that it must be received, loaded, unloaded and delivered in good condition, or it has lost its economical feature.

In a great measure, the unintelligent handling of l.c.l. freight is due to lack of supervision and a lack of the proper education of check clerks, callers and stowmen as to their duties. It is to be deplored, but it is true, that check clerks, callers and stowmen are generally ignorant of the rules of the classification under which they work, especially as regards the proper marking and packing of freight shipments. There seems to me to be only one remedy, and that is to educate the check clerks along the lines of intelligent handling, pay them well and insist upon their observance of the instructions issued by the railway and the rules of the classification. Agents, as a rule, do not work closely with check clerks, stowmen and callers, but leave the entire handling of the warehouse to the foreman. In my opinion, this is improper. Agents should call the foremen, check clerks, stowmen and delivery clerks into conference at intervals and make them realize that they are an integral part of the organization and that it is within their power to solve the problem of economical freight handling.

THE OUT-BOUND FREIGHT HOUSE

A first-class floor is necessary, maple being preferred. Freight can be handled on a good maple floor approximately 16 per cent faster than on an ordinary rough board floor or on a rough concrete floor. Check clerks should be on their feet near the freight to observe marks and the condition of packages. It is a mistake to provide check clerks with closed booths, as they are not in a position while in these booths to see the freight they are checking, but depend on the caller entirely. Callers being lower salaried employees, should not be depended on to any great extent.

Check clerks should see that sufficient trucks, preferably four-wheel, are provided on the floor near the door. If two-wheel trucks are used, wooden racks should be provided to fit on the shoes of the trucks. The most satisfactory rack is 32 in. high, 24 in. wide at the bottom, 30 in. wide at the top and concave at top. This rack will fit between the handles on the front of

truck as well as on the shoe, and when properly used, will increase the tonnage capacity of the trucks 100 per cent. A strict drop-truck system should be maintained, no freight being allowed to go to the floor, but all loaded on trucks when received.

A line running the entire length of the warehouse on the car side should be painted on the floor, denoting the dead line behind which all loaded trucks should be placed to avoid congestion in the warehouse, leaving a runway open and allowing trucks to be placed conveniently for handling by truckers and stowmen.

Check clerks should be provided with a copy of the current freight classification in order that they may know what freight should be accepted. They should also be provided with an accommodation list, showing all firms entitled to credit, in order to protect prepaid collections on outbound shipments.

Each receiving door should be provided with an automatic scale for the rapid weighing of freight. Weighing of freight is an important factor in the protection of revenue, and as freight is generally received in a rush, rapid weighing is necessary. A door should be reserved for the receipt of small packages in order that the congestion may be relieved at the regular receiving doors.

Each check clerk should be supplied with a caller. When freight is presented, the check clerk should separate the shipping order from the balance of the tickets and enter on it the block or symbol number of the car into which the freight is to be loaded, lining up the shipping orders in alphabetical order as to stations, for convenient checking. What is known as blocking the tickets—that is, placing the symbol number of the car thereon—is sometimes done in the foreman's office of the outbound house, and when it is possible to handle it in this manner it is best, as it places the responsibility on one man. A caller should call the consignee's name and destination and should use the greatest care to see that the calling agrees with the marks upon packages. The check clerk should not depend on the caller, but should be on his feet near the freight, and should closely observe all marks on packages, seeing that all old marks are effaced and that no shipment is received that is improperly marked or packed, or that does not comply in every way with the rules of the classification.

Check clerks should keep an accurate record of freight checked by them and render a report daily to the warehouse foreman covering. Immediately after freight has been checked and the shipping orders blocked with symbol numbers of the car they should be sent to the tonnage clerk for the preparation of tonnage statistics.

All freight should be plainly marked with the symbol number of the car into which it is to be loaded. Truckmen should not be permitted to enter the outbound cars without permission, and then only in cases of emergency, in order that loitering in cars may be eliminated and that the delays caused by the unloading of trucks or waiting for the stowmen may be avoided and that the truck haul may be shortened with only a slight increase in the work of stowmen. Truckmen should move freight from behind the dead line to a point near the door of car runs to which the freight is to be loaded. Trucks should be placed with the shoe near the wall with handles outward, where they will be readily accessible to stowmen.

The number of cars that may be properly stowed by one man depends on the tonnage of the cars and their location on tracks. If all cars are in one run, as high as eleven may be stowed by one man successfully. Stowmen should understand the intelligent stowing of freight, the importance of loading the freight into the proper car, of pulling nails from the sides and floors of cars, and of removing old placards and train cards from cars. They should handle all freight from behind the dead line in the warehouse near the cars, into the cars, stow the freight and return the empty trucks to the opposite side of the warehouse near the receiving doors.

A skeleton loading along the sides and end of car should be observed and freight piled high, temporarily. At the close of the day's loading they should break down all freight in the cars and satisfy themselves that it will ride safely.

When freight is erroneously marked to a car, a report should be made by the stowmen to the foreman in order that the responsibility may be located and action taken to avoid a recurrence. Forms should be provided stowmen for this purpose.

Waybills should be mailed to destination agents in order that they may be expensed prior to the arrival of the freight and the station record of the expense bill used as a checking tally, the cars moving on slip way bills. These bills should be compiled in the foreman's office.

All shipping tickets should be sent from the foreman's office, direct to the waybilling department, and there separated into car order, the symbol numbers being used in the distribution. Waybilling clerks should be furnished with a copy of the daily loading schedule, from which they should obtain the car numbers. The shipping ticket bearing only the symbol number makes it necessary that they use care in the waybilling of car numbers and as a result few errors are made.

Waybill clerks should be prohibited from waybilling any item that does not show as having been checked on the shipping ticket and the ticket should be returned to the warehouse for a verification of the check. All shipping tickets should be completely revised against the waybills as soon as waybilled and a check made on the original waybill. This insures correct waybilling. Waybills should be numbered with a numbering machine and thrown into a distributing case, all waybills covering less than carload freight being distributed under the block or symbol number, and afterward, if covering a way car, in station order for the convenience of the conductor. The waybill pouching clerk should be impressed with the importance of proper pouching, as a waybill incorrectly pouches means that the freight covered thereby will check over at one point and short at another.

As all waybills for one car are distributed together, they should be mailed in that order, to facilitate the expensing at destination. All waybills mailed should be covered by a register and care should be taken to see that they move on the first available train. Envelopes in which waybills are enclosed should be marked with large type, "RUSH—WAYBILLS," in order that the receiving agent may readily separate them from other registered material.

HANDLING THE INBOUND FREIGHT

The inbound cars should be placed at night, if possible, and be ready for unloading at 7 a. m. The house should be subdivided into sections, alphabetically arranged for the handling of miscellaneous shipments. Boards 14 in. by 14 in. in size should be provided for each section, placed in a conspicuous position on posts in the warehouse or on the wall of the house and lettered in large-sized letters. Shipments for large concerns, connecting lines of railways or steamships, transfer companies, hold pile and over pile, should be each allotted a space sufficient to accommodate the ordinary run, and these sections should be indicated by symbol numbers conspicuously placed.

A loose leaf record should be provided for the register of all through waybills covering freight transferred or passing. The expense desk will furnish the house with a station record of expense bills arranged in car order for a checking tally. Check clerks should arrange the station records furnished by the expense desk in alphabetical order as to consignment for each car, using an alphabetical index between the station records for rapid handling.

All freight apparently damaged or recoopered should be sent to the hold pile to be handled by the O. S. & D. department, and the disposition should be shown on the station record. The shipment should remain there until a complete inventory is made, and the extent of the damage ascertained, and should not be delivered until released by the O. S. & D. department. Local freight checking over should be run to the over pile and be held there until cleared by the O. S. & D. department for delivery.

Arrival notices should be served by messenger when possible, and by mail otherwise, immediately on the unloading of the freight. Subsequent notices should be issued each week thereafter, and after a second notice, if still unclaimed, the shipper should be notified and asked to furnish disposition. Perishable

shipments that are refused or uncalled for should be sold to the best advantage without delay. Delivery clerks should see that teamsters and other parties receiving freight are not permitted to enter cars or allowed to move freight from the warehouse without their permission.

Storage should be assessed on all shipments remaining in the house over the free time regardless of the fact that bills have been paid, to keep the warehouse clean of freight and to give the consignees first-class service. The waiving of storage charges congests warehouses and cripples the service.

A blind check should be made of the warehouse at least twice a month and the check compared with the expense bills in the cashier's office. This will keep the house free from irregularities, and in many instances effect delivery of shipments that otherwise might remain on hand indefinitely, causing dissatisfaction on the part of the consignee. Street addresses are sometimes left off the expense bills or are not waybilled, although the packages bear the address, and a notice is issued without it. A warehouse check detects these errors. Over freight run to the wrong section is also detected and promptly forwarded to destination.

If a freight warehouse exceeds 600 ft. in length the use of electric trucks for the handling of the outbound business, especially, will save money, provided the trucks are four-wheel and large dollies are used with them, as trailers. One man should be assigned to handle the motor truck and one man to act as a switchman to make couplings, set out the trailers, etc. Where electric trucks, four-wheel trailers and dollies are used, what is known as "peddler" trucks may be successfully loaded and trucked. The longer the truck haul the more economical electric trucks prove. A good motor truck will take five and six fully loaded four-wheel trailer trucks per trip. Sufficient low dollies, especially constructed for the handling of barrel oil, sugar, heavy cases of dry goods, heavy machinery, gasoline engines, etc., should be provided, as these commodities cannot be loaded to advantage on regular four-wheel trucks.

There is now being manufactured a low four-wheel truck that is being used very successfully at a large transfer point recently visited by the writer, in the handling of less than carload freight. All freight is trucked by hand and moved on these trucks, two-wheel trucks being used only for the loading of freight on the four-wheelers, and by the stowmen. At warehouses and transfers where the truck haul is short, freight can be handled by this method at a cost of, approximately, 15 per cent less than by the use of two-wheel trucks fitted with racks. As increased train tonnage decreases the transportation cost per ton-mile, so will the use of four-wheel trucks increase the tonnage of freight handled per truck haul and correspondingly decrease the cost per ton of handling less than carload freight.

There is no more important subject in connection with the handling of less than carload freight than the proper marking and packing of freight shipments, nor is there any greater contributing cause toward loss and damage claims than the failure on the part of railway employees to observe the exceedingly simple rules governing. All employees should be made to realize the fact that a shipment bearing only one marked destination will invariably reach that destination with despatch, while if allowed to move forward bearing two or more marked destinations, it will probably be forwarded to the wrong destination, delayed or possibly lost.

Freight should not be received unless packages are marked in accordance with the rules of the railway and the classification, nor should any package be received that is unfit for transportation. It is an injustice not only to the railways to receive freight improperly marked or packed, but to the shipper and consignee as well.

INVESTIGATION OF IRREGULARITIES

Over, short, or damage reports should be made covering all irregularities, no matter how trivial. Unless the agent at the loading station is advised of the irregularities found against the loading, he will not know of them and will assume that his loading is good. O. S. & D. reports should be investigated by the operating department, and a bureau should be provided for

the exclusive handling of these investigations, either in the superintendent's office of each division, or in the office of the general superintendent of each district. All irregularities should be investigated thoroughly, the responsibility determined, and the proper party charged with the error. A sufficient number of men who are experienced in the handling of less than carload freight should investigate personally the actual handling of the freight and see that rules are complied with, that methods are installed that will increase the efficiency of the service, that the warehouse organizations are efficient and that proper supervision is exercised, not only in the loading and unloading of freight at the warehouses, but in the handling of freight by trainmen.

A bulletin should be issued by the bureau monthly, showing the irregularities charged to the various stations, in order that agents may know just how freight is being handled at their stations. This bulletin should include irregularities chargeable to train crews in order that division superintendents, conductors and trainmasters may take the necessary steps to improve the handling by the crews.

A bonus should be allowed to all classes of warehouse employees for services performed in excess of their regular duties. Employees should be compensated according to their individual efforts. This will act as an incentive to them to put forth their best efforts, in order that they may exceed the work required for the regular wage, and receive the additional compensation. A penalty should be imposed for all irregularities chargeable to the employees. As penalties will reduce the bonus earned, it necessarily follows that employees will endeavor to avoid errors.

THE RAILROADS AND THE PEOPLE*

By WILLIAM SPROULE
President, Southern Pacific Company

The primary relation of the railroads and the people is that the railroads sell transportation to the people. To many minds this relation disposes of the subject. The common notion is that the people have nothing more to do with it than may be necessary to obtain their transportation at the lowest price. If the buyers of bread had a voice in the fixing of its price, bread would be cheaper, indeed. If the buyers of meat had a voice in the price of meat, it would not be long before the price would drop so low that the farmer would find it without profit to grow livestock. But the people have a voice in the fixing of rates for transportation and the buyer of transportation concerns himself little with the question as to what effect the price has upon the railroads. The price is seldom low enough to satisfy the purchaser. If he is satisfied, his satisfaction with any given transportation rate or rate condition is only temporary. The mere lapse of time suffices to create further demands that the service be rendered for less money. This follows the impulse of self-interest. We all know that this impulse is not always safe or sound.

There is an epigram that in a kingdom of the blind a one-eyed man is king. A hard task before the railroads is on the one hand to correct the impressions which serve for opinions among people blinded by what appears to be their self-interest, and on the other hand to contend against that kind of one-eyed domination of the railroads which keeps one eye upon popular opinion without an eye of vision for what is necessary to bring the greatest good to the greatest number. Yet there is a conjunction of interest which so far has hardly been perceived, but which is sufficient to warrant the railroads and the people in taking counsel together for promotion of the common safety.

THE PUBLIC AS INVESTORS

There are in the United States over 250,000 miles of steam railroad, which have about 600,000 shareholders and about 1,750,000 employees. This figures, roughly, one shareholder to three employees. If you will average the railroad shareholders they will stand within 700 yards of each other along every mile of steam railroad in the nation. This means that throughout the United

*Abstract of an address presented at the Annual Convention of the American Bankers Association, at Seattle, Wash., Sept. 7, 1915.

States each shareholder would be in plain sight of two other shareholders along the right of way. Yet because of the free and easy way in which the public has attached to the railroad properties the names of well-known men, the people generally have a vague belief that the railroads are owned by a very few wealthy people. The facts run to the contrary. The railroads are owned by a great army of the people; people who have put all their savings into railroad shares until 600,000 of them are direct owners. It requires no argument, unless we argue the obvious, to show that if the savings the people have had thus entered into railroad ownership prove to be secure, and the returns to them, as the owners of the money, prove to be attractive, there will be little trouble in obtaining from them and others like them more money for improving the railroads which now serve the people, and for extending them into sections whose development is standing still because of the lack of railroad service. As a question of public policy is it not fundamentally sound that the rights of these hundreds of thousands of saving and prudent people should be given as serious consideration as any other factor in the railroad question? Is it not obvious that there should be accorded to them the same full measure of solicitude which is extended to other human factors prominently before us in all industrial discussions?

But there are still other hundreds of thousands of people who have a personal interest in the railroads. Those whom our political saviors call the common people (why they are called common I do not know) are the chief users of the savings banks of this nation. These savings banks have for their depositors about 11,000,000 of the people. These savings banks carry between eight hundred and nine hundred millions of dollars in railroad bonds and stocks.

It is hardly necessary to refer to state and other banks and trust companies, whose holdings in protection of their depositors and in the conduct of their business count up to several hundred millions of dollars more. This aspect of the subject carries us into still wider fields. Among the large holders of railroad securities the life insurance companies are of vast importance to the people. In the United States there are over 34,000,000 life insurance policies.

THE INTEREST OF THE EMPLOYEES

As already stated, there are over 250,000 miles of steam railroad in the United States, with a roster of about 1,750,000 men. This is a vast army, even in these days of vast armies that affect us with awe. This army of the people relies directly upon the railroads for its livelihood. It has the right to adequate consideration by the government. This consideration it has only in part received.

There has been no recognition of the fact that working hours may be shortened, conditions of labor may be made ideal, safety may be attained, crews may be stuffed full to overflowing and yet the prosperity of this army of people fails simply because the railroads lack the ability to earn enough to keep the men at work, much less to expand, improve and extend the lines and the service. It is to the direct interest of the employees and those dependent directly upon them for their subsistence that the railroads have prosperous earnings.

It is to the further interest of the employees that shareholders also have prosperous returns, for the employees cannot safely forget that, averaged over the American system of railroads, one shareholder means three employees. To maintain and operate the railroads takes not the shareholder alone or the employee alone; it requires them both, and they stand as numbers only in the ratio of three to one. Theirs is in reality a common interest in obtaining adequate earnings.

One blade cannot for long cut into gross earnings without bringing into activity the other blade which cuts expenses. Of expenses over 45 per cent are for wages. In fact, 70 per cent of all the disbursements of the railroads, even when taxes, interest and dividends are included, are for three items of wages, fuel and supplies. The railroads give good wages ungrudgingly. The con-

tentions are rarely upon the wage schedule itself, but upon need-less and embarrassing and complicated incidentals. What the railroads have to contend and urge, notwithstanding their desire to pay their employees well, is the plain fact that the railroads have not adequate income out of which to pay these wages. In the two decades from 1894 to 1914 the revenues from operations of the steam railroads increased 183 per cent, but expenses of operation increased 200 per cent. The numbers of employees increased 118 per cent., while the compensation of employees increased 213 per cent. I will state it in another way: with the rates of 1904 as a unit, the railroads would have earned about \$160,000,000 more than the earnings in 1914. While the railroad revenues were thus reduced in the sum of \$160,000,000, the compensation paid to employees was in the same time increased by something over \$100,000,000.

This process cannot keep up indefinitely. As an economic question it is impossible that the compensation of employees can continue to increase while the compensation of employers continues to decline.

So we could move along into the various phases of human activity, only to find that the railroads and the people have interests in common to an extent the people do not yet realize, but when they do realize they will wake up in their might to the fact that the railroads' prosperity is their prosperity. The people will rise to acknowledge that it is the function of the government to be watchful of their interests as a whole, and then the one-eyed man no longer can be king.

They will insist, in the interests of all the people, that the railroads be maintained in a condition of physical and financial strength and that they be released from "the tyranny of prejudice" and relieved from the paralysis of uncertainty. Whether it be the shareholder, the bank depositor, the holder of insurance policies, the railroad employees and their people, or the public generally, all will do well to remember that amid the loose and casual talk about watered stock and over-capitalization it is no longer seriously contended that the railroad properties of the United States are worth less than the amount of their capital. Yet the earning power of the railroads upon the capital employed has so declined that at the present time out of every \$100 of gross earnings which comes into the treasury \$14 has to be set aside to pay interest upon bonds, although the bonds bear but a moderate rate of interest. These bonds were taken up, on faith in the earning power of the properties, and were issued in compliance with the laws of the land. They are held in this country and abroad, and this young and great nation can well see to it that the earning power of its railroad activities is maintained. Especially is this so since it is known throughout the world that the railroads have been under government scrutiny and control for more than a generation. It is true that railroad financial administration may be criticized in spots, and just criticism is wise, but they are like certain dramatic points in a picture; they catch the attention, but they do not tell the story. The people, instead, may be invited to survey the whole history of American railroading, from its pioneer beginnings; through unmapped difficulties and through periods of crisis when great administrators pledged their personal fortunes to save the properties, down to the present moment, and in a wide survey of 50 years it will be acknowledged that as a bank may fail without imperiling the banking system, so the long ordeal through which the American railroads have passed still finds the moral basis of railroad management upon a very high plane in which the American people may take becoming pride.

It is time for the railroads and the people to take counsel together, for the uncertainty which touched the railroads first has reached to the people. This nation needs prosperity more than it needs anything else. No business prospers by repression. The effect and influences of government should be stimulating or they are a failure. The American people prosper together. When we prosper we are all prosperous. The pursuit of life, liberty and happiness has prosperity for its reward, the railroads and the people in conjunction and alike.

Locomotives Ordered in America for Foreign Countries

Engines Built by American Locomotive Co. for Greece,
Serbia, Belgium and Russia Have Many Unique Features

The past year has seen an enormous increase in the exports from the United States, brought about by conditions incident to the war in Europe. The railway equipment building industry is one of those affected by these conditions, large foreign orders for both locomotives and cars having been placed from time to time. During the past few months the American Locomotive Company has delivered a total of 177 locomotives on foreign orders, in most of which early delivery was an important factor. It is of interest to note the extent to which American practice has been followed in the design of these locomotives.

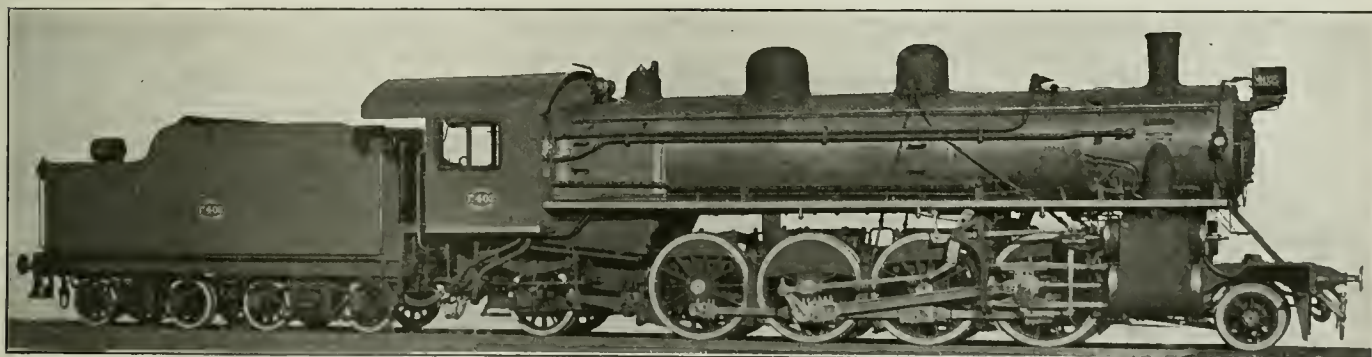
The largest single order was that of the Russian government for 100 locomotives of the 2-10-0 type, which were described and illustrated in the *Railway Age Gazette* for September 10, 1915, page 474. The other orders were for 20 2-8-2 type locomotives for the Greek government railways, 10 locomotives of the 2-6-6-2 and 12 of the 2-8-0 type for the Serbian government, 20 0-6-0 type tank locomotives for the Belgian state railways and 15 locomotives of the 2-6-0 type for the Russian government.

The 2-8-2 type locomotives delivered to the Greek government will be tested on a section of road 43 kilometers (26.72 miles) long, having a gage of 4 ft. 8 11/16 in. Most of the curves are 300 meters (984.3 ft.) radius and for a distance of 2.17 miles the grades vary from .45 per cent to 2 per cent; then for a dis-

458 sq. ft. The grate area is 34.7 sq. ft. While the heating and grate surfaces are smaller than would be considered good practice in this country, they are as large as could be obtained within the imposed limitations of weight, and in comparison with continental locomotives they represent liberal proportions.

Among the details of special interest are the cylinder safety valves, by-pass valves and water gage cocks. The cylinder safety valves are similar to the builder's standard cylinder head relief valve with the exception of the alteration necessary to permit attachment to the ends of the cylinder barrel. Provision was made in the alteration, for the cylinder cock connection, thus avoiding any additional holes in the cylinder barrel. The by-pass valve differs from practice in the United States in that it is operated from the cab by a system of levers. The water gage cocks are designed to close automatically in case the glass breaks.

The design of these locomotives follows American practice with the exception of bolt threads. All outside connections and parts subject to interchange have international threads. Metric threads were used on all bolts, boiler studs and staybolts. The engines are provided with steam heat equipment, electric headlights on both ends, self-centering valve stem guides, the latest Cole trailing trucks, screw reverse gears, Le Chatelaier water brakes, speed recorders and pyrometers. The engines and tenders



Locomotive of the 2-8-2 Type for the Greek Government

tance of 18.64 miles there is a continuous grade of 2 per cent. This is followed by a down grade of 2 per cent about 4 miles long and the remainder of the section is level. A guarantee was given that the locomotives would haul over this line a train of 250 metric tons (275.6 short tons) back of the tender at a speed of 25 kilometers (15.53 miles) per hour on the continuous 2 per cent grade and at 60 kilometers (37.28 miles) per hour on the level, or a train of 190 metric tons (209.5 short tons) back of the tender at 40 kilometers (24.86 miles) per hour on the 2 per cent grade and at least 80 kilometers (49.71 miles) per hour on the level. Having a specified axle weight limit of 15 metric tons (33,080 lb.), these engines, with a weight on drivers of 131,800 lb. and a total weight of 187,500 lb., are as large as it was possible to build. With 23-in. by 26-in. cylinders, a boiler pressure of 170 lb. and 60-in. drivers, they have a tractive effort of 33,200 lb.

The boiler is of the straight top radial stay type. It is 61 in. inside diameter at the front end and is fitted with 134 2-in. tubes, 19 ft. long, a 21-unit Schmidt superheater and a brick arch supported on tubes. The firebox is of copper and is 83 3/4 in. long by 59 3/4 in. wide. The tubes are steel, but have copper ends 6 in. long at the firebox end and all water-space stays are copper, with tell-tale holes drilled in both ends. There is a total evaporating heating surface of 2,031 sq. ft., of which 1,881 sq. ft. is in the tubes and flues, and a superheater heating surface of

are equipped with vacuum automatic brakes, which are now in use on the Greek roads. The use of air brakes is contemplated and the engines are arranged so that they may be applied with the least possible trouble.

On February 9 an order was received from the Serbian government for 10 2-6-6-2 Mallet locomotives of new design. All drawing room work was done in 19 working days; the first engine had been designed, built, tested, knocked down and shipped on April 8.

These 10 Mallets and the 12 Consolidation locomotives have outside frames, which were necessitated by a gage of only 30 in. As many details as possible were made interchangeable between the two classes. The Mallet engines have a total weight of 126,000 lb. and cylinders 13 in. and 20 1/2 in. in diameter by 20 in. stroke. The driving wheels are 36 in. in diameter and boiler pressure is 200 lb. They are fitted with the builder's system of compounding and have a tractive effort working compound of 24,300 lb. Working simple the tractive effort is 29,200 lb. The boiler is of the straight top type, 52 in. in diameter at the front end and has 157 2-in. tubes, 15 ft. 1 1/4 in. in length. By means of a brick wall, a grate 85 in. long by 39 1/4 in. wide is installed in a firebox 114 1/8 in. long by 39 1/4 in. wide.

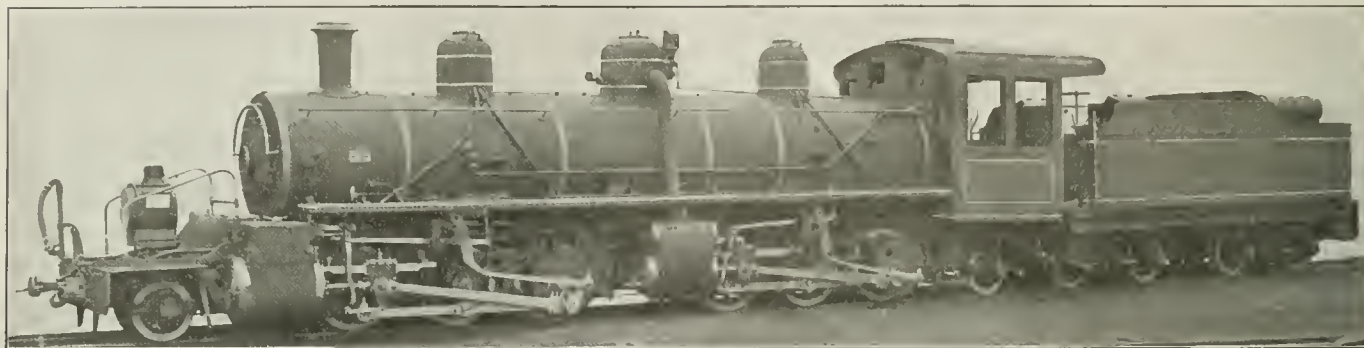
An order for seven Consolidation engines was received from the Serbian government on January 12, which was increased to 12 on January 28. Five of the engines were shipped on March

11 and the remaining seven on March 18. The Consolidation locomotives have a total weight of 80,500 lb., cylinders 15 in. in diameter by 20-in. stroke, carry a steam pressure of 160 lb. and have a tractive effort of 17,000 lb. The boiler is of the straight top type, 47 $\frac{7}{8}$ in. in diameter at the front end and is fitted with 126 2-in. tubes 15 ft. 1 $\frac{1}{2}$ in. in length; the firebox is 48 3/16 in. long by 39 $\frac{1}{4}$ in. wide. The builder's standard methods of construction were followed in these engines throughout.

In Belgium the use of overhead trolley wires is prohibited and, although electric traction is used in the cities, all interurban

sheets extend from the bottom of the frames to the bottom of the side tanks. Five swinging doors on each side allow access to the moving parts. The engines are arranged for operation from either end. The throttle and reverse lever handles are fitted with steel links which hold the latch levers open when the engine is being operated from the opposite end. A hand-operated automobile horn is installed on each end.

Early delivery being an important consideration in the order for 100 locomotives of the 2-10-0 type for the Russian government, it is of interest to note the time spent in the design and

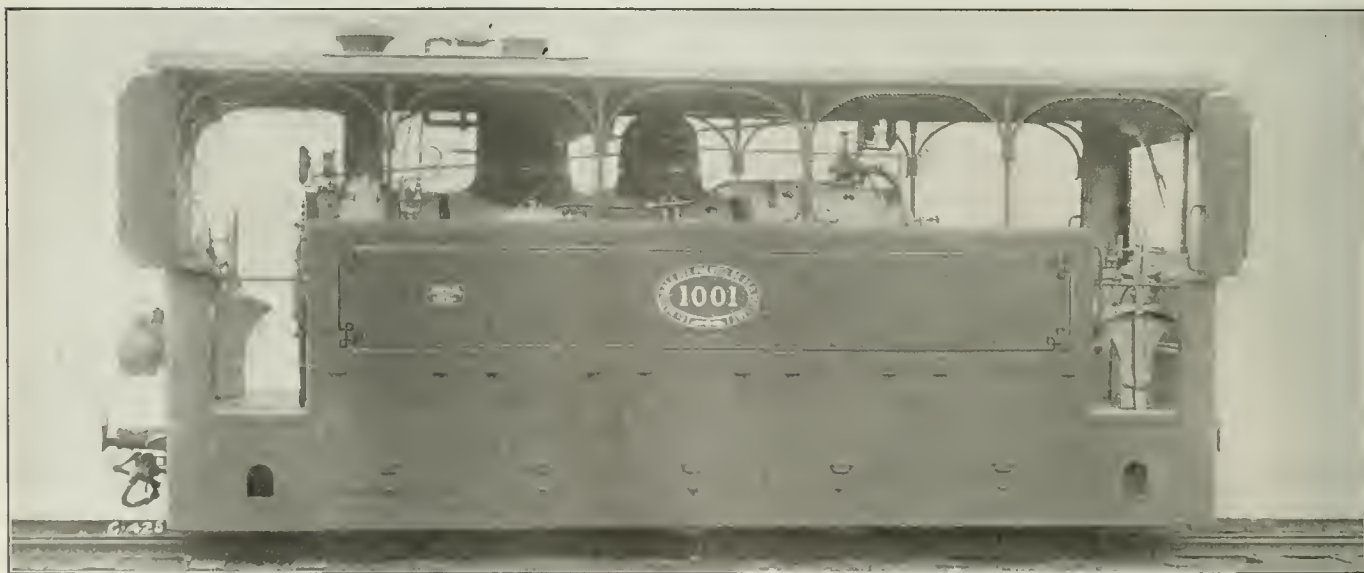


Narrow-Gage Mallet Locomotive with Outside Frames for the Serbian Government

traffic is handled by small steam locomotives of unique design. These engines haul passengers and produce to the distributing centers in the large cities, the tracks connecting with the electric lines. An order for 20 tank locomotives for this purpose was placed by the Belgian state railways on June 2, the first engine being shipped on August 19. The gage of the track on which they operate is 39 $\frac{3}{8}$ in. and the total weight in running order is 58,900 lb. Having cylinders 11 $\frac{1}{2}$ in. in diameter by 16 in.-stroke, driving wheels 34 in. in diameter and a steam pressure of 180 lb., they have a tractive effort of 9,520 lb. The boiler is of the Belpaire type, 42 in. in diameter at the front end, and is designed to burn coal briquettes. It is fitted with 144 tubes 1 $\frac{1}{2}$ in. in

construction of these engines. Drawing room work was started on June 19. The design was an entirely new one and was completed and the material ordered by July 15. The first locomotive had been built, tested under its own steam, knocked down, boxed and shipped by August 18.

The cylinders of these engines are provided with by-pass valves, a unique feature of which is an arrangement whereby they are controlled by superheater damper cylinder. Ordinarily the damper cylinder receives steam from the steam pipe and therefore does not operate until a short time after the throttle has opened. But the by-pass valves must close immediately when the throttle is opened. This necessitated changing the



Double-End Narrow-Gage Locomotive for the Belgian State Railways

diameter and 6 ft. 4 in. long. The firebox is 42 in. long by 28 $\frac{1}{4}$ in. wide and is designed to drop down between the frames for repairs. Ten engines have steel tubes and steel fireboxes and the other 10 have brass tubes, copper fireboxes and copper stay-bolts.

As the soil is of a very sandy nature, all running gear is enclosed to exclude dust. Having outside frames, the enclosing

steam connection for the damper cylinder from the cylinder steam pipe to the turret, with an intervening control valve connected to the throttle. By this change steam is instantaneously admitted to the damper cylinder when the throttle is opened and the by-pass valves are immediately closed. In a similar way the by-pass valves are immediately opened when the throttle is closed.

On July 2 the Russian government ordered 15 2-6-0 type locomotives for the Peter and Great Fortress Revel. This was an entirely new design, American practice being followed, and the first engine was shipped on September 10. These engines are built for 750-m.m. (29.53-in.) gage track and weigh but 37,265 lb. in working order. The cylinders are 11 in. by 16 in., the boilers carry 165 lb. pressure and, with wheels 33½ in. in diameter, the tractive effort is 8,100 lb. The boiler is of the straight top type and has 504 sq. ft. of heating surface. Soft coal is burned on a grate of 9.3 sq. ft. area. The tender is of the four-wheel rigid pedestal type and has a water capacity of 700 gal. and carries 1½ tons of coal.

REPORT OF COMMITTEE ON RELATIONS BETWEEN RAILROADS

The report of the Committee on Relations between Railroads, presented at the meeting of the American Railway Association, held in Chicago on November 17, was briefly referred to in our account of the meeting published in the issue of November 19. We are now able to present more fully some of the more important features of the report, together with the action taken by the association on some of the committee's recommendations.

LOSS AND DAMAGE TO FREIGHT

The report of the Sub-Committee on Packing, Marking and Handling of Freight, showing a reduction of about 22 per cent, or over \$3,500,000, in loss and damage payments during the first six months of 1915, as compared to a similar period in 1914, by 99 roads, was mentioned in last week's issue. As the operating revenues for this period indicate a smaller percentage of decrease, not only is an absolute saving indicated, but also a saving as compared with the freight revenue. It would appear from these figures that the railroads have checked the tide in payments for loss and damage which has been rising rapidly since the fiscal year 1909, and it is hoped that next spring a further reduction will be shown. It should be noted, the committee says, that these savings took place in a period when the railroads had secured very nearly uniform instructions for packing and marking, when an improved inspection of shipments had been generally inaugurated through individual railroads and inspection bureaus, when more railroads than ever before had organized departments to supervise loss and damage, and when general interest in this important subject had been spread more widely than ever before. It is the belief of members of the committee that the shippers are assisting by giving more care to the preparation of goods for shipment. The committee believes that these economies will be continued, but this can only be secured by strict enforcement of the rules.

The committee reported that the code of l.c.l. rules approved by the association a year ago has been endorsed by the Freight Claim Association and the American Association of Freight Agents, and has been adopted by a very considerable number of railroads. As a new edition is necessary, a number of changes proposed by the committee were adopted. The committee believes that its adoption and enforcement by any railroad will inevitably result in economy in the matter of loss and damage. The report also stated that a number of members have materially reduced their claims for loss and damage by introducing what is termed an affirmative check or double check system in loading their cars with l.c.l. freight.

The committee stated that the point has been made that some of the systems mentioned are not, strictly speaking, affirmative or double-check systems. While the committee recognizes that this may be the case, these systems have had good results on the roads that have adopted them, and the committee thought it best to print them, as well as the others, without specific recommendations in regard to any of the systems, but in the hope that the railroads generally will experiment with them and give the committee their suggestions. It is hoped that with further experience in this important matter it may be possible for the com-

mittee to recommend for adoption one system for checking l.c.l. freight into cars. The description given by the committee is as follows:

DOUBLE-CHECK SYSTEMS FOR LOADING L. C. L. FREIGHT

The object of a double-check system is to establish an affirmative loading record which will show conclusively each step in the handling of freight from the time it is received until deposited in the proper car, and that all packages are in safe condition for transportation, properly marked and carefully stowed.

I

At way stations all freight received should be carefully checked against shipping order, this check to include inspection for classification, weight, packing and marking, and should also be in accordance with the code of L. C. L. Rules, as approved by the American Railway Association. Waybill should be prepared leaving car number blank, and freight then moved to loading platform, where, upon arrival of the local freight train, it must be stowed under the supervision of the agent and the local conductor, who will check each piece of freight against the waybill and see that the correct car number is inserted. The agent should also insert car number on shipping order or on office copy of waybill.

II

At stations where only a few cars are loaded daily the responsibility for proper loading and stowing rests entirely with the agent. Cars placed for loading at these stations must be inspected as prescribed in the "Rules for the Inspection and Certification of Box Cars, Before Loading with Freight Subject to Damage," as approved by the American Railway Association. The best results can be obtained where two or three men are employed if one checks the freight on receipt against the shipping order and another checks the freight into the car against the waybill or shipping order. If waybill is used for checking, loading record will be inserted in office copy.

III

At large stations it may be possible to adopt one of the several systems hereinafter described without any additional cost and frequently by rearrangement of the warehouse force, which will result in a reduction in the cost of handling freight. Any of these plans may be used regardless of whether the freight house force is employed on a tonnage, bonus or daily pay basis.

All cars placed for loading l.c.l. freight must be inspected as prescribed by the "Rules for the Inspection and Certification of Box Cars, Before Loading with Freight Subject to Damage," as approved by the American Railway Association.

Each car is given a loading number. Cars bearing the same loading numbers are placed in the same position each day, when practicable.

Each package is checked against the shipping order when received.

A double check can be obtained by having receiving clerks stationed at warehouse doors check freight into the warehouse from the dray onto the truck, and a stowman or loading clerk, located at the car, check from the truck into the car.

The double-check systems in use may be described as follows:

(a) The loading number is indorsed upon the shipping order. After freight is loaded on the truck, the loading number of the car is marked on the top package and the shipping order is sent with the truck to the car, where a re-checker checks each package into the car, tallying it on the shipping order.

(b) The loading number is indorsed upon the shipping order and is marked on each package. The trucker takes the load to the car designated by the number on the top package. The shipping order is sent direct to the office. An assistant foreman inspects each package after it is actually in the car and puts a distinguishing check mark thereon before it is stowed.

(c) Receiving clerks are furnished with a supply of consecutively numbered ballots. When freight is received serial number of the ballot is shown on the shipping order and the loading number of the car marked on the ballot, which is handed

to the trucker, who takes freight to the car designated. In each car there is a supply of ballots bearing the loading number. The trucker returns both ballots for verification. Ballots are checked against the shipping orders to ascertain if freight was sent to the right car.

(d) Each shipping order is given a consecutive number as received. The loading number is indorsed on the shipping order and marked on the top package of the truck, except in cases where the truck carries freight for more than one car, when each package should be marked. Receiving clerks are furnished with a supply of ballots provided with space for loading number, number of pieces, consecutive number on shipping order, check clerk's initials and the date. This ballot is sent with the truck to the car. Stowman removes ballot and checks the number of pieces and loading number. After the freight is stowed, ballot is checked against the billing and filed.

IV

At transfer stations each car is given a loading number and placed in the same position each day when practicable.

(a) Waybills are abstracted as received with destinations in alphabetical order. Consecutively numbered ballots with stub attached bearing the same number are furnished check clerks. As freight is brought from car being transferred, ballot is given to the trucker showing the loading number of the car into which freight is to be loaded and the same information is also shown on the stub, with letter designating the trucker who deposits ballot in the car. Stubs are examined frequently to see that freight is in the right car. Stubs of the ballots are checked against the abstract sheet, which also shows loading number of the car into which freight is to be loaded and consecutive number of the ballots.

(b) With each truckload of freight the trucker is given a ballot which shows the loading number of the car. When freight is deposited in the car a ballot is taken therefrom which bears the loading number and also the initials and number of the car. Both ballots are returned and an indorsement is made upon the billing showing the initials and number of the car into which the freight was loaded. Waybills are then examined to see if freight was loaded into the proper car.

(c) The loading number is marked on waybills covering cars to be transferred and in the space provided for is shown the initials and the number of the car into which freight is to be loaded. Each waybill is given a Veri-check number. If more than one shipment is on the same waybill, each consignment is numbered. With each truckload of freight the trucker is given a Veri-check slip on which is shown the loading number, check clerk's initials, Veri-check number and number of pieces on the truck. This is deposited in the car and checked throughout the day to see that the freight is properly loaded. When loading is completed the Veri-check slips are checked against the waybills.

VARIOUS RECOMMENDATIONS

The committee also recommended a number of amendments in the rules governing methods for loading carload shipments of flour, and a code of rules governing methods for handling carload shipments of cement and plaster, which were adopted by the association. The committee also recommended a resolution, which was adopted, that at large flour loading centers cars furnished to mills should be inspected by a joint representative for all lines, and a certificate of inspection be attached to each car, to be filed by the agent at loading points for future reference.

The committee is still urging upon the American Association of Accounting Officers the advantages of through interline billing and is furnishing that association with cases where loss and damage has resulted from errors in rebilling. This matter is also under consideration by the Southeastern Freight Association. The committee has made a number of recommendations for the various classification committees, tending to the improvement of containers, and especially to the strapping or sealing of boxes of boots and shoes, dry goods and other high-class commodities especially subject to pilfering. Representa-

tives of the committee have attended recent hearings of the classifications committees, and will be represented at all subsequent hearings which involve questions of marking or packing freight.

The committee is considering, among other subjects, the following questions: Sealing of freight cars, robbery of cars without breaking seals, loading rules for carloads of various commodities, packing and loading of news print paper, containers and loading of palm oil, cocoanut oil, linseed oil, etc., pulpboard and fibreboard containers, packing of l.c.l. stoves, elimination of the "one in ten" marking rule, and loss of gas tubes and other metal containers.

WEIGHING

The report of the Committee on Weighing, announcing arrangements for the free testing of railway master scales by the government scale testing equipment, was noted in the report published in last week's issue. The committee reported that the railways are confronted with a new difficulty in the matter of weighing. The industries of the country, as represented by the Committee on Weighing of the National Industrial Traffic League, are taking the position that the marked tares on railway freight cars are generally inaccurate, and are making this a basis for claiming that every shipper shall have the right to require railways to light-weight every freight car, before it is loaded, free of charge. The committee does not believe that the expense of such an arrangement is justified, but stated that to prove this it will be necessary for the railways to take still further action in promptly re-weighing and re-marking their own cars, as well as foreign cars upon their lines. The Master Car Builders' Association has increased the fee for re-light-weighting and re-marking of foreign freight cars, but the amount provided does not appear to be sufficient to pay the per diem on the foreign car while it is being held out of service. The committee, therefore, recommended the adoption of a new per diem rule, providing for a two-days' reclaim on freight cars which are re-light-weighted and re-marked.

The National Code of Weighing Rules applying to carload freight has been generally adopted by all roads west of the Alleghenies. The adoption by eastern roads has been postponed, pending the result of negotiations regarding certain questions involving the weighing of empty cars for shippers and consignees. The need of a set of rules for the weighing of l.c.l. freight is apparent, the committee says, and it has formulated a set of l.c.l. weighing rules which is being considered by the National Industrial Traffic League. The proposed code was approved. On the recommendation of the committee a request was made upon the Association of American Railway Accounting Officers for some slight changes in billing forms to facilitate the giving of the necessary information as to weighing.

CAR SERVICE

On the recommendation of the Association of Transportation and Car Accounting Officers a revision of Form H, summary of per diem and passenger car mileage, and Rules 13 and 14 of the code of per diem rules were approved. Amendments were also approved in per diem Rules 15, 19 and 20, eliminating all reference to the transmission of embargo notices, to provide that the Commission on Car Service enforce the observance of car service Rules 1 to 4 on the complaint of any party, and to provide a two-days' reclaim against the owning road on freight cars which are re-weighted and re-marked. A new form T, on which cars held for delivery may be properly reported, in accordance with per diem Rule 14, was adopted.

The committee has taken part in the meetings of the Committee on Movement of Empty Freight Cars, and in its opinion the most fruitful cause for unnecessary empty mileage has been the practice of returning foreign cars empty and loading home cars in the same direction. To remove this cause the committee recommended changes in car service Rules 2 and 3, which were adopted. Car service Rule 2 authorizes the loading of foreign cars "in the direction of the home road." This expression has never been defined, and under the proposed changes, to deter-

mine the direction of the home road, the continent is divided into 17 groups, which are numbered, as shown on a map accompanying the report. The group number of the point at which the car is standing should be first ascertained on the map, and the group number or numbers of the home road should then be ascertained from an alphabetical list compiled for this purpose. When the number of the group in which the car is standing is ascertained the groups which are in the direction of the home road may be found on a chart prepared for this purpose, in the intersecting square to the right of the location of the car and below the home group.

The committee concurs with the Committee on Movement of Empty Cars in recommending a thorough enforcement of the home route card system, as indicated in car service Rules 5 and 19, and attention was called to the fact that this system was made obligatory upon all subscribers to the per diem rules agreement after December 31, 1915. The effective date for the use of the continuous home route card was postponed until July 1, 1916.

On the recommendation of the committee interpretations of car service Rules 16 and 18 were adopted.

DEMURRAGE

In view of the amendments to the car demurrage rules which have recently gone into effect the committee did not recommend any changes in the rules. The committee stated that one cause of delay to box cars has been that it has not usually been practicable to charge demurrage on cars loaded with export grain consigned to elevators located at the seaboard. The committee has represented to the traffic associations that the greatest congestions have occurred when the export elevators are filled with grain, and it is therefore impossible to unload the cars consigned to them. The point has further been made that this situation would be improved if the storage rates applicable to grain in the elevators should also apply to the grain in cars which cannot be unloaded into the elevators. The traffic associations have taken up this suggestion and the committee had hoped that the arrangement could go into effect on December 1 at all Atlantic and Gulf ports. The chairman reported, however, that he regretted that the hope had not been well founded.

The committee has received reports showing extreme delays to cars loaded with automobiles, and has represented to the National Industrial Traffic League and to the automobile trade generally, the necessity of an increased rate on certain cars similar to the increased rate recently approved for refrigerator cars, which has had such a good effect. The committee has been unable to convince the trade that an increase in the demurrage rate is necessary, but the automobile manufacturers are using all the influence they can to secure prompt unloading. The committee is continuing the collection of information, and if the efforts of the manufacturers to secure prompt unloading of cars are ineffective, the committee will again press the question of an increased rate.

Changes in the definitions and in Rule 2 of the code of switching reclaim rules were adopted. An amendment was also approved in storage Rule 4, and it was decided that the storage rule should not apply on tank cars of crude petroleum during process of loading in or on railroad premises between October 1 and March 31, inclusive, when the cars are loaded north of parallel 35.

A form of rubber stamps to be used in connection with claim papers forwarded by railroad business mail was adopted on the recommendation of the committee.

SIAM-FEDERATED MALAY STATES RAILWAYS.—With regard to the proposed linking-up of the Siamese Southern Railway with the Federated Malay States system, it is stated that a point at Kampong Rantan Panjang has been fixed up as the place at which the two systems will be connected, the new survey of the Siamese line to the Kelantan boundary having been completed, while the Federated Malay States Railways Administration has completed its line to the Golok River, the frontier between Siam and Kelantan.

FRENCH RAILWAY ACCIDENTS IN WAR-TIME

By WALTER S. HIATT

Our Special European Correspondent

While no statistics are yet available to give a comparison of the number of passenger train accidents in time of war and peace, it is certain that the French railways have until the present been remarkably free from accidents involving fatalities to passengers.

But two accidents of importance from the French point of view, and in France railway accidents are closely watched by the public, have occurred during the past eight months. One of these was that at Rochefort on the State Railway Lines, May 17 last, when seven employees were injured, and the other that at Saint-Cyr-de-Favieres, October 9, on the line of the Paris-Lyon-Mediterranee, when 17 soldiers were killed and more than 30 injured.

Although death is an everyday affair now, with thousands of men killed or wounded each day at the front, both of these accidents were widely recorded in the newspapers, and this goes to show how seriously a railway accident is regarded in France.

The accident in May consisted of the derailment of the Nantes-Bordeaux express in the early hours of the morning. The investigation held concerning it developed the fact that a steamship smokestack, improperly loaded, had dropped off a freight train preceding the express and remained on the track. The locomotive and tender of the express train were derailed while the baggage and mail cars were telescoped. The seven employees in these two cars were injured. The passengers in the other cars escaped with a bad shaking up.

The second accident referred to resulted in the largest number of fatalities of any accident that has taken place in France for many years. It occurred at 6:50 a. m., October 10. The train was a special, loaded with soldiers on leave from the front. Just after the train left Saint-Cyr-de-Favieres, a way station below Lyons in the south of France, it broke in two on an up-grade and six passenger coaches running wild returned to the station which the train had just left and there jumped the track and rolled into a ravine. Only a dozen of the soldiers in the six cars were able to continue their journey. The rest were taken to hospitals in Saint-Etienne and Roanne. The investigation into the accident has not yet determined whether it was due primarily to an old and worn coupling or to improper handling of the train by the engineer.

The whole subject of railway accidents has in past years interested France as much as it has the United States and according to carefully compiled statistics in normal years there is but one passenger killed to 32,000,000 carried, and but one injured to 1,300,000 carried.

The growing safety of railroad travel was strikingly pointed out by M. Sartiaux, in the *Annales des Ponts et Chaussées*, who showed that between the years 1835 and 1875, a period of 40 years, 1,781,403,687 passengers were carried in France and that of this number one was killed to 5,178,490 carried and one injured to 580,450 carried. In the 40-year period since 1875 railroad travel has tripled in safety.

M. Sartiaux developed the curious fact that stage-coach travel of olden times was far more dangerous, one passenger being killed to 335,000 carried and one injured to 50,000 carried.

There is no doubt, however, that during this year while the war is on, the number of fatalities in other than train accidents and not to passengers, but to soldiers acting as track guards, will be strikingly large. Every railway station and mile of track is now under guard, day and night, and these soldier guards, not being railroad men, have yet to learn to protect themselves from passing trains. The accidents to soldiers have been particularly frequent at night and about guarded tunnels.

Otherwise, owing to the careful manner in which railway stations and tracks all over France are fenced in and the highway grade crossings are protected by gates, there are rarely any fatalities to trespassers or to persons not actually on board trains.

Passenger train accidents are generally due to derailments and the proportion of passenger train accidents to freight accidents is as one to 12. Thus, in an average of 12 derailments there are eight of road freight trains, one of passenger trains and three derailments in freight yard trains.

Taking an average of 20 derailments, two are caused by track conditions, seven by defective car or locomotive material, nine by the lack of care of trainmen and two by unknown causes.

The most prolific season for train accidents in France is the autumn. Thus, of eight derailments, three occur then, in part because of fogs, rain and colder weather; two occur in the spring, two in winter and one in summer.

RAILROAD BROTHERHOODS BUSY

By W. L. STODDARD

WASHINGTON, D. C., November 24.

The railroad brotherhoods have a new and possibly a powerful ally in Washington in the Industrial Relations Committee, which has just opened its offices here. This committee, as has been announced in the daily press, is a lineal descendant of the U. S. Commission on Industrial Relations, whose existence automatically terminated by law in August. The chairman of the commission, Frank Walsh, becomes chairman of the committee; the three labor members of the commission remain with Walsh, and to this group are added eight others, six men and two women, all more or less well known as sympathetic with the program and purposes of labor. Of particular significance to the readers of this correspondence is the fact that one of the three labor members of the committee is Austin B. Garrettson, president of the Order of Railway Conductors.

Basil M. Manly and George P. West, Mr. Walsh's most active lieutenants on the commission, have charge of the Washington office of the committee. The following paragraphs are based, in part, upon a talk with these gentlemen:

Exactly what the Industrial Relations Committee can do is, very naturally, an open question at this time. Judging, however, by its intentions it has an active, if brief, future before it. The general plan is to agitate, lobby and work for the recommendations of the Manly report to the Commission on Industrial Relations, and to serve labor, organized and unorganized, as a kind of field campaign staff. Back of the committee is the support of the most powerful unions in the country. The American Federation of Labor has offered its sympathy and co-operation; the United Mine Workers are understood to have subscribed to its war chest; the industrial unionists and their friends are looking to the committee for help; and many unattached "radicals" and labor people see in it a tool or weapon to be used in the various movements in which they are involved.

At its hearings in Chicago the Industrial Relations Commission collected a large mass of testimony on craft organization and industrial organization. In its files also is said to be testimony, admirable at least for the purposes of agitation, bearing on the attitude of railroads toward labor, railroad police, the use of arms in railroad strikes, and so forth. This material the committee apparently plans to utilize whenever it sees fit. The personnel of the committee as a whole probably endorses the industrial union idea as against the plan of craft organization, and a clever use of what has been gathered on this subject would unquestionably tend to stimulate discussion and action.

In the Manly report of the Industrial Relations Commission it was recommended that Congress prohibit tipping of employees of public service corporations engaged in interstate commerce; that employees engaged in the Pullman service be included in the hours of service law; that the Public Health Service should devise a code of sanitary regulations for railroad construction camps; that Congress should prohibit railroads from inducing their employees to sign releases of liability for accidents; that Congress should prohibit the railroads from requiring employees to contribute to benefit funds and allow them to participate in

the management of all benefit funds and other funds; that the employment of private police on railroads should be regulated by federal statute; and that the states should assume full responsibility for protecting railroad property and preventing trespass. In addition, both the Manly report and the so-called Commons report recommended that the Newlands act be extended in several directions.

These legislative recommendations the Industrial Committee declares that it will urge upon Congress by every means in its power. This means that bills will be introduced, possibly in both chambers, by sympathetic senators and representatives; that hearings will be demanded and perhaps granted; that agitation along new lines for new labor legislation will be started, with all that this entails. Publicity was the keynote of the now extinct commission. Publicity will be the keynote of the new committee, and such publicity as can be turned out on the questions at issue are certain to complicate an already complex situation. If this lobby actually proves to be a fraction as efficient as its predecessor, overburdened statesmen may well groan under the new loads placed on their shoulders through its agency.

In this connection the recently announced movement of the four railroad brotherhoods looking toward demanding an eight-hour day is interesting thoughtful men in Washington profoundly. Members of Congress and government officials unite in regarding this as one of the most significant and serious announcements in the railroad world for many months. The firemen and engineers of the southern associations met here early this week in order to discuss this matter in its various phases. This concerted movement of the four organizations is apparently in line with the tendency of labor, railroad and non-railroad, to get together for its own ends and to secure help and assistance by co-operating with other elements bound in the same general direction—elements well represented by the Industrial Committee.

* * * * *

The Labor Gazette presents this month comparative figures on unemployment on railroads, drawn from the annual reports of the various railways filed with the Interstate Commerce Commission:

"For 55 leading transportation systems which up to the close of October had submitted their reports, it was found that 12 per cent more were employed in 1914 than in 1915, and that 10 per cent more was paid in wages by these companies in 1915 than in 1914. The comparative totals for the 55 railroads considered as one system are as follows:

	Total Compensation of Employees on 55 Railroads		Increase over 1915
	1914	1915	
Number of employees.....	278,248	245,209	33,039
Total compensation.....	\$220,605,085	\$198,633,390	\$21,971,695

"The 55 railroads, as can be seen above, employed 33,039 more men, and paid \$21,971,695 more in wages in 1914 than in 1915."

THE URUGUAYAN RAILWAYS.—The operating details given by the general manager of the Central Uruguay Railway of Monte Video in the report for the year ending June 30 last show that the management did its best to cope with the very unfavorable situation created by the European war, coming on the top of a commercial crisis in the Uruguayan republic. With the decrease of 14.18 per cent in the gross earnings of the "combined system" it was possible to reduce the train-mileage by 16 per cent, but owing to the exceptionally heavy traffic the car mileage was only 6.08 per cent less than in the preceding year. The average number of cars per train was 24.37 as against 21.80, an increase of 2.57, due to the return to a mixed train service, and to the heavy cattle traffic which is always hauled in complete train loads. There was an increase in receipts per train-mile. Working expenses were reduced by 9.64 per cent, all expenditure being reduced to a minimum.

The Country's Railroads and National Defense*

The Use Made of Our Railways in the Civil and Spanish Wars and a Discussion of What Should Be Done Today

BY GEORGE D. SNYDER

Deputy Chief Engineer, Hudson & Manhattan

Military men were somewhat slow to realize the great use that could be made of railroads and the influence they would have on their campaigns, until our Civil War. The tremendous use of railroads in that conflict demonstrated what a great assistance they were to armies, and since then all nations make great use of railways in their war plans. Germany studied the railroad problem prior to the Franco-German war, and in that conflict made extensive use of the railways in mobilizing and concentrating its troops. The French, not having sufficiently studied the problem and not contemplating the loss of Paris, were seriously handicapped. The railroad system, being built to accommodate civil commerce only, radiated from Paris to the provinces, and, when Paris was invested, many of the provinces not occupied by the Germans were cut off from each other, as the only transfer junctions were in this beleaguered city. Since then, to obviate this difficulty, France has built numerous connecting links to join these radiating lines outside of Paris.

Most European nations have a staff of officers studying the railroad problems in time of peace, who are prepared to take over and operate the railroads for military purposes in time of war. These nations also have bodies of troops trained as railway construction corps, for use in construction, repair and maintenance of railroads in the zone of military activity. As these nations mostly have state-owned railways, the training of the officers and troops in time of peace can be readily arranged.

It would seem that the United States is behindhand in this matter, as the only officers of the army who have relations with the railroads in time of peace are those of the quartermaster's department, who arrange for army transportation, but these relations are purely on a commercial basis, and our army has no corps of officers skilled in railroad operation, maintenance and construction, nor a body of troops, in either the regular service or the militia, trained in the construction and repair of railways. These elements in our army would have to be recruited, organized and equipped after the beginning of a war. Our general staff has studied this matter and has prepared regulations governing the use of railways, both within the theatre of war and without. These regulations are partly based on the practice during the civil war and partly on the studies of the general staff. They are embodied in Field Service Regulations, United States Army, 1914, Part III, Article V and Article VII, and place the operation, maintenance and construction of all military railroads in advance of the base, under the corps of engineers, which would be assisted by such other officers and civilians as would be necessary. The army has also issued various manuals on this subject. One of these is "Professional Paper No. 32, Corps of Engineers, U. S. Army, Military Railways, by Major William D. Connor, Corps of Engineers, U. S. Army," which contains much valuable information as to railroads and military railroads. Part IV of the Engineers' Field Manual is devoted to railroads and includes information and regulations as to location, construction, operation and maintenance in the theatre of war.

Apparently we are not deficient in literature on this subject, but evidently need to devise means to utilize the wonderful resources in organization, men and material, of the railroads of the country.

The engineer officers of our army have no opportunity to practice the art of railroad operation, construction and maintenance in time of peace; neither have our railroad officers any opportunity to acquire the military knowledge they should have in order to perform their railroad duties efficiently in the zone of military hostilities.

It is believed that by the co-operation of our army officers and our leading railway officials, much good would result. The nation can count in the future, as in the past, on the railroads doing their share in any emergency, but by getting together in time of peace, much needless friction and misunderstanding can be prevented.

Much light can be obtained on this problem by a study of the way it was handled during the civil war, and in this case the government had to rely on practical railroad men from civil life as there was no department of the army competent to handle it.

In the early days of the war a conference of the officials of the loyal roads was held with the government officials, and rates for the transportation of troops and supplies were agreed on, which were adhered to throughout the war in spite of a depreciated currency and rising prices.

At the very outbreak of the war, Thomas A. Scott, then vice-president of the Pennsylvania Railroad, was called to the government's assistance and succeeded in reopening railway communication between Philadelphia and Washington, opening a line by way of Annapolis and Perryville. On May 23, 1861, Mr. Scott was appointed general manager, government railways and telegraphs, and immediately proceeded to place the army transportation on a business basis. On August 1, 1861, he was appointed assistant secretary of war, being the first to hold this office, but he resigned June 1, 1862, resumed his duties with the Pennsylvania, and soon afterwards became its president.

By an act of Congress of January 31, 1862, the president was authorized to take charge of the railways and telegraph lines in the United States, and on May 25, 1862, the president issued an order, taking possession of all railways in the United States, but outside the zone of hostilities this possession was only nominal, and as long as preference was given to military transportation, the operation of the railroads was not interfered with. Within the theater of war, however, the railroads were actually operated by the war department. David Craig McCallum, on February 11, 1862, was appointed colonel and additional aide-de-camp, and assigned as military director and superintendent of railroads in the United States, a position which he held until the close of the war; and he was later promoted to the grade of brevet brigadier general, and still later to brevet major general.

McCallum was a practical railroad man. He was at first an architect and builder, but was afterwards a constructor of railroad bridges, and then became general superintendent of the Erie Railroad. He seems to have managed the military railroads in a thoroughly efficient manner. Numerous other experienced railroad men entered this department of the government service and it seems to have been administered with unusual efficiency. The principal trouble with the department was the tendency of the military commanders to interfere with railway operation. In endeavoring to operate single-track railways by the telegraphic train order system, the wires would often be pre-empted by military messages, so that train orders could not be sent. Trains had then to be operated by flagging ahead—a very slow and uneconomical method. Drastic orders had to be issued to prevent this interference. The military officers at times did more to interrupt the smooth operation of the railroads than the raids of the enemy. Finally special order No. 337 was issued by the war department under date of November 10, 1862, one paragraph of which was as follows:

"No officer, whatever his rank, will interfere with the running of the cars or engines as directed by the director of military railways or of his agents. Anyone who so interferes will be dismissed from the service for disobedience of orders."

The promulgation and enforcement of this order permitted the successful operation of the military railways by those trained in this work.

*A paper read before the New York Railroad Club, November 19.

Another railroad man who also did notable work with the military railroads was Colonel E. C. Smeed, afterwards chief engineer of the Union Pacific. Before the war he had extensive experience with high, wooden, railway trestle bridges, having been employed on the construction of the first Portage viaduct of the Erie Railroad, and also on the numerous high trestles on the Catawissa Railroad. He was placed in charge of bridge construction and performed some notable feats, one of which was the construction of the Potomac Creek bridge, 400 ft. long, 100 ft. high, and containing over two million feet of lumber cut in the woods nearby, in nine working days with common soldier labor. This is the bridge that Lincoln passed over and said "There is nothing in it but bean poles and corn stalks."

The bridge department became so efficient that the negroes said "The Yanks could build bridges in less time than the Reds could burn them down."

On the conclusion of the war this military railway organization was disbanded with the rest of the volunteer army, and the army was reduced to its peace proportions without any organization or corps of officers to continue this railroad work. The Spanish war found us no better prepared or organized to handle our railroad problems than we were in 1861; only the problems were much simpler and easier. Our railroads were not well prepared to deliver troops at mobilization camps located at points without proper terminal facilities, nor did proper facilities exist for the concentration of troops, supplies and baggage at points of embarkation, but the railroads made every effort to remedy these defects and to create the necessary facilities.

The engineer troops of the regular army were augmented by three regiments of volunteer engineers, but no engineer railway troops were formed and, as it turned out, none were seriously needed.

The above facts and the use of railways in the civil war, fade into insignificance compared with the use of these agents in the present European war.

As this country is now considering the state of its defense, and as its railways form such an important element in this problem, it would seem to be a fitting time for the railroad men and the army officials to get together. A board of eminent civilian inventors, scientists and engineers are assisting the sea soldiers in their problems, and it is believed that the railroad men could perform equally valuable services for our land soldiers. There should be a railway section of the general staff of the army which should be assisted by an advisory board of railway operating officials, engineers and contractors, including representatives of the railway supply houses.

Some of the things that could be accomplished by discussion between the railroad and army men are as follows: the preparation of regulations governing the military railways within and outside the zone of hostilities; the ascertaining of the best means of recruiting, organizing and training engineer railway troops; discussion of the best means of affording opportunity for officers of the army to obtain practical experience in railway operation, maintenance and construction; the arranging of means for railroad men to obtain some military training by instruction camps similar to the business men's training camps held during the past year, etc.; discussion of the proper railroad facilities to be provided at mobilization and concentration camps for the rapid entraining and detraining of troops, their equipment and supplies.

Those who wish to study this subject further will find valuable matter in "The Operation and Maintenance of a Railroad in a Theatre of War" by Major W. D. Connor, Corps of Engineers, United States Army. Journal of the Military Service Institution, volume xxxvii, page 234 and page 445, 1905.

DISCUSSION

Col. B. W. Dunn, chief inspector, Bureau of Explosives, opened the discussion, giving it as his opinion that the American Railway Association should keep in close touch with the general staff of the United States Army and make such preliminary arrangements as would provide smooth working of the railways in the moving of troops and supplies in the case of war. He suggested that

army officers be appointed temporarily to railway positions such as assistant to the general manager in order that they might obtain some knowledge of actual railway operating conditions.

Major-Gen. Leonard Wood, commander of the Department of the East, U. S. Army, stated that the one word before all others on this question is organization. This applies to the army, but beyond that it applies to the system of handling the forces of the country back of the army. He emphasized the remarks of Colonel Dunn and advocated the formation of a railway brigade which would be experienced in quick repair work, as army engineers are not capable of doing this class of work quickly, and efficiently. The organization should be thought out well in advance and should be such that the country's railway systems would be turned over to government use under its own management. Such a railway organization is vital to the success of placing of railroads in a proper position in case of war and also in the case of its being necessary to invade other countries. In the latter case, the repair organization would be required to rebuild and repair railways in the invaded district.

Colonel McClellan, of the Quartermasters' branch of the war department, spoke of the mistakes made in the movement of troops to Tampa in 1898, stating that many of these were entirely unnecessary. He considered the suggestions of Mr. Snyder's paper fundamental and gave as his opinion that something must be done at once in preparing and working out a plan for using the railroads in wartime. It should be remembered that the movement of troops in large numbers practically puts a railroad out of business for other purposes.

Colonel Baker, of the Quartermasters' branch of the war department, emphasized the remarks made by some of the previous speakers and stated that the war department has been in touch with all the passenger associations of the country and is perfecting plans for the movement of troops and also making arrangements as to the expeditious movement of the impedimenta which necessarily accompany them. Arrangements have also been perfected for the marking of cars as to what branch of the army the contents are intended for. This saves much time and will avoid much of the trouble experienced in 1898. There should also be a close arrangement between the war department and the railroads for providing extra side tracks wherever needed and all railroad departments should be brought into close alliance with the officers of the army. Colonel Baker stated that it is probable that the proposed new army bill will provide for a reserve corps which will include railroad men of all branches who can be used in a directing capacity.

Others who took part in the discussion and advocated similar arrangements between the government and the railways were: F. E. Herriman, Col. Charles McKinstry, William Barclay Parsons, Capt. A. R. Piper, Lieut. Col. E. W. V. C. Lucas, and F. Stanwood Menken, president of the National Security League.

ALTAI RAILWAY IN SIBERIA OPENED.—Traffic on the Altai Railway in Central Asia opened on Wednesday, 14 months earlier than the date contemplated. The railway has a total length of 501 miles. The new line opens up a huge and wealthy region of Siberia which has hitherto been deprived of means of communication.

BRITISH RAIL EXPORT.—The war is still exerting an exceedingly depressing influence upon British rail exports, which amounted in September only to 15,800 tons, as compared with 39,185 tons in September, 1914, and 26,283 tons in September, 1913. The aggregate shipments to September 30, this year, were 205,952 tons, as compared with 365,939 tons in the first nine months of 1914 and 379,105 tons in the first nine months of 1913. The colonial demand, which is still the mainstay of the export rail trade, was as follows during the first three-quarters of the last three years:

	1915. Tons.	1914. Tons.	1913. Tons.
South Africa	33,980	47,564	48,330
British India	37,714	123,342	103,527
Australia	55,973	107,115	96,185
New Zealand	17,932	15,259	26,275
Canada	9	122	300

USING TIME-TABLES TO APPEAL TO SHIPPERS

The Southern Railway is using space in its time-table folders to urge shippers to co-operate with the road in its campaign to reduce the number of claims for loss and damage to freight. In the October folder a page is devoted to the following appeal to shippers, signed by W. H. Gatchell, superintendent of agencies:

"Did it ever occur to you to take a look every now and then through your shipping department to see how your people are boxing, crating, barreling, sacking or bailing your goods for transportation, to satisfy yourself that they are giving the necessary protection to the property you are shipping out to your customers and to see that your shipments are properly marked, with old marks erased and the bills of lading carefully and legibly made. If not, try it—you will find it interesting.

"Many shippers have thanked us for bringing to their attention instances of bad packing, use of inferior containers, illegible marking and poorly written bills of lading, of which they were not cognizant.

"You appreciate, we are sure, what all of this means to you and to the carrier in making a safe and accurate delivery of your property to the consignee.

"Your co-operation is necessary. We need your assistance. We want to help you. Won't you help us?

"Freight properly packed and correctly marked is already half-way to destination.

"There is no section of the South that the Southern does not serve. Please help us to do it effectively."

One prominent shipper on the line wrote to Mr. Gatchell that after reading this article he had ordered the expenditure of \$10,000 a year for better packing of his company's freight shipments.

SULLIVAN METALLIC PACKING

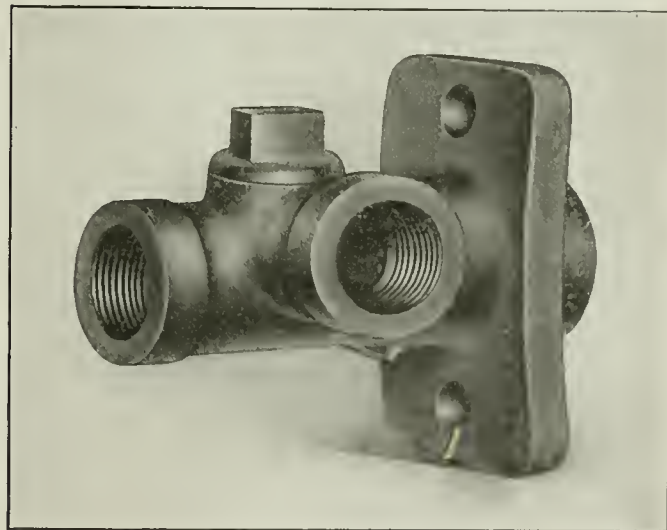
The process of applying packing to the pistons and valve rods of locomotives presents very little difficulty. It is only necessary that the packing be of a material that will not melt at the temperature of steam, and will still be soft enough not to injure the rod. If this packing is bored out to an exact fit on the rod it will be tight. As the engine continues in service, however, the ring will become worn. A packing is thus desirable that will permit of continued wear until the packing rings are worn out. A packing ring that is cut square across the ring is believed to

of the segments come in contact, when the ends should be filed to give the proper clearance. Another desirable feature is to have the packing rings maintain a uniform bearing on the rods so that the ring will wear evenly throughout its bearing surface.

To meet these conditions the Jerome-Edwards Metallic Packing Company, Chicago, has placed on the market the improved Sullivan piston and valve stem packing. In the illustration, *A* is the piston rod; *B*, the swab cup; *C*, the gland; *E*, the vibrating cup; *F*, the brass ring; *H*, a combined spring case and follower; *I*, the spring; *J*, the cone packing ring with a double bevel; *K*, the second packing ring; and *X*, the stuffing box. From this construction it will be seen that the spring *I* presses the packing ring *K* against the packing ring *J* (with the double bevel), forcing it onto the rod and at the same time against the vibrating cup *E*, which, being beveled, also forces it against the rod. With this construction steam leaks between the rod and the packing ring, or between the outside of the packing ring and the inside of the vibrating cup, are eliminated; in addition, the double bevel on the cone ring, *J*, tends to keep it central and the wear will thus be uniform.

SMOKEBOX BLOWER FITTING

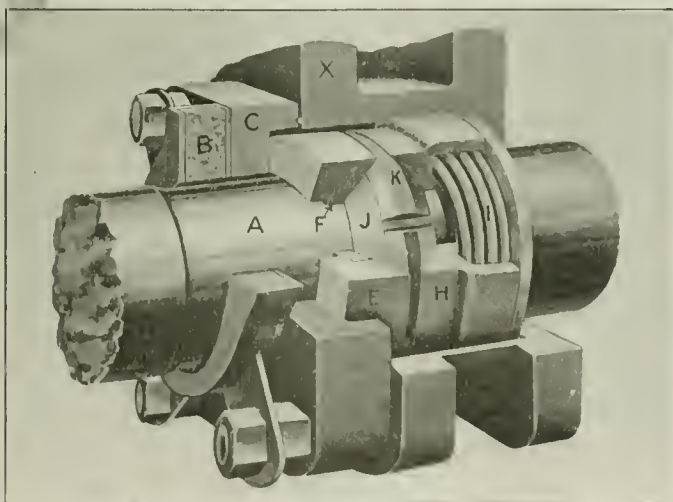
The illustration shows a locomotive blower fitting which is provided with a flange for direct attachment to the side of the smokebox. It has three pipe connections, the inside connection leading to the blower nozzle, the right angle connection



Smokebox Blower Connection

to the blower pipe in the cab, and the other to the roundhouse blower connection. A check valve, readily accessible through the cap shown in the illustration, automatically closes the roundhouse blower connection when the engine blower is in operation. It raises when the roundhouse blower is in operation and allows steam to pass into the smokebox. All passages are made for 1¼-in. pipe. It is manufactured by the Barco Brass & Joint Company, Chicago.

A NEW PORT FOR RUSSIAN PRODUCE.—The new railway from the Russian capital to Ekaterina, a port in the Arctic which is free from ice throughout the year, was to have been open for war traffic at the beginning of November. This new line has been built under the direction of American engineers, an army of 10,000 men, mostly prisoners, having been employed upon it. The terminus on the edge of the Arctic is Ekaterina, on the northern coast of the Gulf of Kola, where large docks and sheds have been constructed. This new railway is double tracked, 1,220 miles long, and has been built in six months. Boats unable to reach Archangel will be able to go to Ekaterina at all seasons of the year.



Sullivan Piston and Valve Stem Packing

be preferable to one which is cut tangentially, as in the latter case the short ends are liable to become broken, thus permitting blows. Where the square cut ring is used there must be a clearance between the segments of each ring, and in order to make the packing tight two rings must be used, having the parting of their segments staggered. These rings will wear until the ends

General News Department

The shops of the Norfolk Southern at Newbern, N. C., were destroyed by fire on November 16; loss, \$200,000. Two locomotives were damaged and several freight cars were burnt up.

The American Railway Association has abolished the office of general agent held by Arthur Hale. Mr. Hale will retain the office of Chairman of the Committee on Relations between Railroads.

The Nashville, Chattanooga & St. Louis reports that its expenses for clearing wrecks in the last fiscal year amounted to only \$6,521, which is equal to 59 cents out of every \$1,000 revenue received. Taking the records of all the railroads in the southern group, it appears that the average cost of clearing wrecks was \$2.40 to every \$1,000 gross revenue.

Martin H. Conroy, a contractor, of Brooklyn, N. Y., has been convicted of manslaughter in the second degree for causing the death of John H. Joyce, a special officer of the Long Island Railroad, by running against him with his automobile on September 9 last at a highway grade crossing; and has been sentenced to three months' imprisonment. Conroy started to run around other automobiles which had been stopped at the crossing; witnesses testified that he ran down Joyce at 40 miles an hour.

In the United States district court at Cleveland, Ohio, November 18, the Delaware & Hudson Company and F. D. Underwood, president of the Erie Railroad, were fined \$1,000 and \$2,500 respectively for violation of law in allowing passengers to ride in a private car without exacting the extra charge prescribed for such accommodation. President Underwood carried the passengers in his car from a point in Ohio to Binghamton, N. Y., and the car was taken east from Binghamton by the Delaware & Hudson. This action of the court follows indictments found last May.

The eastern associations of general chairmen of the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Firemen and Enginemen, in a joint session at Cleveland on November 17, decided to join the Brotherhood of Railroad Trainmen and the Order of Railway Conductors in their campaign for an 8-hour day and time and a half for overtime. It is said that formal action on this movement is to be taken at a meeting of the executive committee of the four brotherhoods at Chicago on December 15, when the formal ballot for a referendum vote of all of the members of the organization will be prepared.

Disastrous Collision Near Columbus, Ga.

In a butting collision between a northbound passenger train and a southbound special carrying a show, on the Central of Georgia, four miles east of Columbus, Ga., on Monday of this week, 7 or more persons were killed and a large number injured. The engines of both trains were wrecked; the cars of the passenger train were of steel and were not badly damaged. Of the 28 cars in the show train, 10 or more were wrecked and destroyed by fire and large numbers of wild animals as well as many tame ones were killed. A number of wild animals escaped.

Tribute to Memory of W. F. Allen

The American Railway Association at its meeting in Chicago on November 17, adopted the following resolution:

"In memory of William Frederick Allen, secretary of The American Railway Association from the date of its organization, April, 1886, to November 9, 1915; general secretary and treasurer from June, 1909, to November 9, 1915, secretary of the General Time Convention from April, 1875, and secretary of the Southern Railway Time Convention from October, 1877, until their consolidation in 1886 at which time The American Railway Association was created; originator of the idea of Standard Time, a system by which all the railways of the United States are operated.

"Mr. Allen's industry and loyal co-operation with his associates during a period of 40 years were always most helpful and welcome to them, and they record with profound sorrow his death at his home in South Orange, New Jersey, on the afternoon of November 9, 1915, in the seventieth year of his age.

"His great ability, high character and forceful and amiable personality endeared him to all who knew him, and inspired their admiration, friendship and esteem. In his death the association has lost an able and resourceful officer, and his friends and associates deeply mourn the loss of a friend and counsellor.

"Resolved, That this tribute to his memory be inscribed on the minutes of this association, and that an engrossed copy be delivered to his family, to whom The American Railway Association tenders its sympathy in their great sorrow."

Demands of St. Louis Switchmen

The Brotherhood of Railroad Trainmen has presented to the Terminal Railroad Association of St. Louis a demand for an 8-hour day, time and one-half for overtime, and increases in rates of pay for the switchmen employed by that road; but it is proposed to include in the eight hours 30 minutes for lunch, so that the men would actually work only 7½ hours, instead of 10, as at present. The rates of pay demanded are in some cases higher than those now paid for 10 hours. The proposed rates are \$4 a day or 50 cents an hour for foremen, in place of the present rates of 40 cents an hour for night foremen and 38 cents for day foremen, and for helpers \$3.70 a day, or 46¼ cents an hour in place of the present rates of 37 cents for night men and 35 cents for day men. The increases asked, therefore, are more than 25 per cent per hour. After having in the past secured higher rates for night work the men now propose to apply the higher rates for day work also.

The demand for time and one-half for all overtime in excess of 8 hours is based on the present rates and would result in overtime rates of 60 cents an hour for night foremen, or one and a half times the regular hourly rate, 57 cents for day foremen, or 1.43 times the regular hourly rate, 55½ cents for night helpers, or 1.18 times the regular rate and 52½ cents for day helpers, or only 1.11 times the regular hourly rate.

The standard meal hour rules on this and other roads now provide for one full hour off about the middle of the day, and if for any reason the time is not allowed within the limits fixed, the men are paid for the hour and given 30 minutes under pay in which to eat the meal. Now they propose to be given only 30 minutes for lunch, but to include that time in the 8 hours for which they are to be paid, and if the 30-minute lunch period is not allowed in the fifth hour after starting work they demand double-time pay for each minute the lunch time is delayed after 4½ hours. They further demand that they be not required to take meals in the yards of other roads; so that if a man is working in another yard when his meal time arrives he will collect extra pay for the time required to take him back to his own yard.

The demands also contain other provisions restricting the amount and character of the work to be required of switchmen, etc., and provide that at least 95 per cent of the switchmen employed shall be members of the B. R. T.

Reunion of B. C. R. & N. Men

A reunion of 1,483 old employees and officers of the Burlington, Cedar Rapids & Northern Railway, which is now a part of the Rock Island system, was held at Cedar Rapids, on October 1 and 2, and was attended by men who had worked on the road previous to its absorption 13 years ago, who had come from all parts of the country, many of them now being prominent railway officers on other roads, and including 200 now employed on the Rock Island. The program included the reception and registration, a picnic and dinner at Bever Park,

and a fellowship meeting in the evening of October 1, at which speeches were made by George A. Merrill, division superintendent of the Chicago, Rock Island & Pacific; James E. Hannigan, chairman of the Southwestern Passenger Association, formerly general passenger and ticket agent of the B. C. R. & N.; Gerrit Fort, passenger traffic manager, Union Pacific system, formerly a clerk on the B. C. R. & N., and others. On the following day the party visited the old general office building of the road, decorated the graves of deceased employees at the local cemeteries, and enjoyed a ride on an original B. C. R. & N. train, made up of the first engine and cars used on the road. Those who attended the reunion agreed that it was one of the most successful affairs of the kind ever held, and it was decided to have more reunions in future of the same kind.

The New Haven Trial

Mr. Mellen, testifying on Monday for the government in the action against the former directors of the New Haven to show conspiracy to violate the Sherman Anti-Trust law, said that Mr. Roosevelt, then president, in 1907 advised him to buy the Boston & Maine. "But he told me," Mr. Mellen said, "that he could not do anything to help me out if the New Haven got into trouble over the deal. Roosevelt said, 'If you do anything, you do it at your own risk, and you must not come back to me; but I would advise you to buy.'"

The stock of the Boston & Maine was acquired by the New Haven on July 13, 1907, through the exchange of 109,948 shares of one company for a like quantity of stock of the other. The Massachusetts legislature, however, by the Cole act, passed on June 27, 1907, forbade the New Haven to purchase more stock or to vote the stock of the Boston & Maine already held, and this condition lasted until in the summer of 1908 a bill was passed permitting the New Haven to acquire the Boston & Maine.

When Mr. Mellen spoke to Mr. Roosevelt the latter first sent him to Franklin K. Lane, then an Interstate Commerce Commissioner. There had been a suspicion at the time that the Boston & Maine might be acquired by the Canadian Pacific or the Grand Trunk. Mr. Lane was particularly appreciative of the danger of permitting the railroads of the country to fall under alien control and was chiefly interested, according to Mr. Mellen in the military aspect.

On Monday when the government attempted to put in evidence showing that New Haven had used improper means to promote legislation in Massachusetts, relating to the Boston Railroad Holding Company, the court on objections by the defense ruled that the defendants could not be tried on any offense not included in the indictment. The court said the indictment did not charge that the defendants had used bribery.

On Tuesday, R. L. Batts, counsel of the government, took up the transaction whereby John L. Billard, the Meriden, Conn., coal dealer, about June, 1908, paid the New Haven \$13,742,500 for 109,948 shares of the Boston & Maine, after the Massachusetts legislature had passed an act requiring the New Haven road to divest itself of its Boston & Maine interests. In response to questions, Mr. Mellen said:

"About the time we had decided to sell the New Haven's shares of Boston & Maine stock, Mr. Billard, whom I had known about fifteen years as a reputable coal dealer in Meriden, came to my office by appointment. He said that he would like to buy our Boston & Maine stock. He said frankly that he did not have enough money to buy the stock. I told him that we had to get rid of it and we would be glad to help anybody who would step into our shoes and take the Boston & Maine stock off our hands at \$125 a share. As a result of our negotiations I made arrangements with Mr. James Stillman of the National City Bank to lend Mr. Billard \$11,000,000 upon the Boston & Maine stock. Then in addition to the \$11,000,000 which Mr. Billard was able to pay us in cash he gave us his note for \$2,742,500, making a total of \$13,742,500 for the stock." Mr. Billard was later loaned various sums of money all of which he returned with interest. In connection with these loans Mr. Mellen consulted nobody, merely authorizing the treasurer of the New England Navigation Company to pay the needed amounts. A letter to the house of representatives of Massachusetts was read showing that the transactions with Billard were bona fide and that there was no understanding or agreement affecting the contract or ultimate destination of the Boston & Maine stock turned over to him.

Monday De Lancey Nicoll, of counsel for the defense, filed a

brief in support of a motion to have the court and jury taken on an extended trip over the New Haven.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, January, 1916, Atlanta, Ga.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3rd Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.
- GENERAL SUPERINTENDENT'S ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brishane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith, Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Booddy House, Toledo.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, 1st Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie, R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Koh, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—E. M. Layheld, 1715 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

THREE MONTHS OF FISCAL YEAR ENDING JUNE 30, 1916

Name of Road.	Average mileage operated during period.	Operating revenues			Maintenance of			Operating expenses			Net railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) last year.
		Freight.	Passenger	Total (inc. misc.).	Way and structures.	Equipment.	Traffic.	Trans- portation.	Miscellaneous.	General.					Total.
Chesapeake & Ohio Lines.....	2,374	\$9,287,497	\$1,707,978	\$11,600,951	\$1,324,194	\$2,376,297	\$158,484	\$3,274,648	\$7,839	\$218,624	\$7,406,368	\$345,360	\$3,008,712	\$1,024,418
Chicago & Alton.....	1,052	2,565,176	1,107,707	3,978,968	503,498	866,180	106,675	1,279,859	28,404	91,255	2,851,186	129,218	8,097,163	40,180
Chicago, Burlington & Quincy.....	9,366	15,806,071	6,279,000	24,428,638	3,331,810	3,819,859	415,592	7,032,368	225,530	153,129	15,121,937	1,060,226	8,053,518	600,310
Chicago & Eastern Illinois.....	1,282	2,860,506	798,004	3,675,490	685,453	967,497	64,823	1,325,247	22,175	114,570	3,171,122	160,000	641,751	384,099
Chicago & Erie.....	270	1,509,667	171,454	1,821,509	218,219	180,708	50,481	663,466	5,660	40,279	1,153,332	608,767	606,677	86,093
Chicago Great Western.....	1,427	2,372,583	498,379	3,613,995	566,127	638,754	37,972	1,197,193	25,308	99,517	2,660,860	953,130	128,856	123,061
Chicago, Indianapolis & Louisville.....	622	1,233,343	498,575	1,878,001	216,187	318,980	57,994	598,624	339	1,246,109	631,892	81,197	550,557	105,965
Chicago, Milwaukee & St. Paul.....	13	127,533	534,006	661,539	65,415	47,899	3,800	263,678	.....	17,683	401,677	132,328	125,910	32,205
Chicago & Northwestern.....	10,076	7,546,750	5,499,748	25,765,897	2,813,478	3,822,314	482,991	8,743,694	205,699	470,625	15,719,342	1,357,196	8,683,629	946,764
Chicago & Western.....	8,108	14,108,432	6,173,361	22,717,897	3,510,293	3,683,887	345,112	7,441,639	168,035	451,545	15,531,953	7,185,944	1,155,000	284,361
Chicago, Peoria & St. Louis.....	255	322,989	84,425	432,607	77,630	77,630	16,885	165,827	.....	16,329	358,597	74,011	60,313	23,751
Chicago, Rock Island & Gulf.....	477	496,018	170,426	723,745	142,680	102,287	29,337	262,002	5,530	22,854	563,606	162,139	31,775	19,107
Chicago, Rock Island & Pacific.....	7,655	11,187,105	5,330,934	17,500,174	3,036,548	4,387,347	43,737	6,515,833	155,821	442,995	13,866,226	4,033,948	3,198,299	1,033,115
Chicago, St. Paul, Minn. & Omaha.....	1,753	2,703,412	1,483,120	4,538,933	805,501	600,196	89,034	1,350,553	50,726	110,732	3,200,089	1,358,844	1,106,855	306,975
Chicago, Terre Haute & Dayton.....	374	468,669	48,988	533,124	91,305	106,243	10,833	149,604	1,437	24,935	385,278	17,847	1,106,855	20,283
Cincinnati, Hamilton & Dayton.....	1,003	2,201,879	456,955	2,973,469	444,004	486,580	56,891	1,059,499	10,642	63,046	2,118,470	102,327	751,622	158,568
Cincinnati Northern.....	246	359,359	66,524	444,304	87,819	69,948	7,784	135,338	.....	10,781	311,671	132,633	1,606,93	11,647
Cincinnati, New Orleans & Tex. Pac.....	337	1,795,267	425,502	2,368,960	258,110	572,457	68,937	710,883	14,270	55,204	1,679,801	689,158	506,000	135,002
Cleveland, Cincinnati, Chic. & St. Louis.....	2,381	6,961,213	2,484,047	10,340,833	1,259,069	1,881,750	219,526	3,333,895	77,242	14,875	6,957,456	384,000	2,997,628	556,823
Colorado Midland.....	338	1,151,311	82,947	1,234,258	84,795	94,299	22,838	174,382	5,350	16,394	398,058	26,775	30,000	3,000
Colorado & Southern.....	1,089	1,438,837	450,200	2,033,245	324,444	435,548	28,988	571,807	15,405	73,587	1,450,778	582,467	105,000	477,363
Colorado & Western.....	164	600,698	197,821	821,030	90,089	88,145	12,586	240,376	1,333	23,850	457,379	17,383	346,267	111,581
Cumby Creek & Colorado Springs.....	87	280,799	109,599	396,432	58,773	41,051	15,340	94,374	.....	10,552	220,094	17,338	157,248	15,728
Delaware, Lackawanna & Western.....	950	7,644,459	2,418,145	11,194,582	1,398,763	1,668,089	214,570	3,226,962	97,554	230,501	6,915,272	4,279,310	559,800	3,719,112
Denver & Rio Grande.....	2,577	4,302,002	1,826,856	6,689,249	1,025,723	983,081	119,274	1,678,741	184,585	146,248	4,137,652	2,551,597	2,281,197	626,510
Detroit & Mackinac.....	393	161,273	90,365	273,807	33,924	96,962	6,592	96,962	892	8,026	195,246	78,561	56,996	14,282
Detroit & Toledo Shore Line.....	81	327,673	230,019	551,692	38,633	21,759	4,520	309,450	.....	12,073	163,441	167,668	150,343	17,768
Detroit, Grand Haven & Milwaukee.....	191	513,000	161,500	674,500	63,638	62,601	16,980	309,450	2,384	8,024	487,395	286,647	275,246	201,865
Detroit, Toledo & Ironton.....	441	406,803	48,715	455,518	60,368	48,411	11,405	194,040	.....	17,703	348,794	140,136	150,000	13,127
Duluth & Iron Range.....	273	502,517	54,125	556,642	183,320	236,589	1,405	478,042	2,102	27,103	311,086	1,692,262	1,556,365	521,727
Duluth, Missabe & Northern.....	370	4,344,251	80,938	4,566,375	303,097	373,133	6,477	378,572	15,302	28,764	1,305,345	3,261,030	250,799	3,010,231
Duluth, South Shore & Atlantic.....	128	576,938	266,357	937,157	172,035	104,537	22,167	292,795	11,573	26,954	630,061	307,096	51,000	256,096
Duluth, Winnipeg & Pacific.....	685	2,669,935	48,580	3,275,544	38,314	35,494	4,837	103,275	306	17,416	196,642	127,097	71,597	103,881
El Paso & Southwestern Co.....	1,027	1,882,601	356,878	2,383,289	413,534	316,081	53,659	597,213	19,437	102,474	1,502,370	880,191	104,668	711,507
Elgin, Joliet & Eastern.....	776	2,726,047	2,906,904	5,642,951	258,578	460,697	18,882	722,996	.....	58,517	1,519,649	1,387,255	1,282,030	293,336
Erie.....	1,988	11,970,924	2,683,442	16,051,951	1,412,605	2,344,666	262,962	5,082,763	104,003	515,186	9,470,437	6,580,563	505,962	2,351,167
Florida East Coast.....	745	603,902	280,721	1,034,898	201,787	172,604	17,694	447,291	7,609	52,836	895,078	139,820	55,519	84,168
Fort Worth & Denver City.....	454	862,607	421,812	1,356,253	194,287	249,112	20,856	392,416	9,367	45,043	911,080	443,173	50,149	23,780
Galveston, Harrisburg & San Antonio.....	1,351	2,031,092	762,607	2,923,215	375,938	394,562	83,429	1,042,336	31,734	94,550	2,018,296	904,191	138,808	765,151
Galveston Wharf.....	13	.....	307,588	307,588	22,676	7,840	1,253	83,056	158,808	1,172	274,804	32,784	5,130	80,612
Georgia.....	307	461,998	102,516	544,514	65,321	119,497	38,256	280,540	213	21,228	525,064	178,848	59,675	119,155
Georgia, Southern & Florida.....	595	321,027	157,595	478,622	67,667	95,457	20,004	201,117	53,125	29,407	423,733	129,430	30,365	31,190
Grand Rapids & Indiana.....	375	765,452	562,399	1,327,851	169,707	195,985	33,456	540,116	10,332	42,204	987,760	471,327	64,954	40,622
Grand Trunk Western.....	347	1,414,000	422,000	1,836,000	174,701	321,014	50,390	679,310	18,108	37,356	1,285,883	692,273	84,810	607,456
Great Northern.....	8,102	13,930,566	3,957,231	19,887,788	2,033,417	1,938,597	299,507	4,871,546	236,079	335,206	9,651,878	10,230,910	9,028,678	333,098
Gulf & Ship Island.....	308	322,774	90,044	439,025	45,659	76,835	7,752	107,508	773	18,910	257,436	181,589	158,320	31,000
Gulf, Colorado & Santa Fe.....	1,938	2,631,984	850,581	3,686,954	901,865	606,320	87,964	1,328,129	.....	101,575	3,018,580	668,374	174,609	492,663
Hocking Valley.....	351	1,476,187	237,732	1,872,926	179,288	288,189	24,825	503,097	.....	44,343	1,039,743	83,183	112,200	720,983
Houston, East & West Texas.....	195	219,482	83,627	324,453	73,776	57,211	6,056	105,397	1,936	9,331	253,449	17,445	53,943	53,943
Houston & Texas Central.....	895	1,146,885	399,680	1,669,075	233,002	272,885	47,814	549,521	17,284	38,298	1,177,251	491,824	88,777	402,400
Illinois Central.....	4,767	11,282,735	3,325,664	16,165,253	2,634,442	3,845,732	300,981	5,107,581	88,352	431,535	12,369,332	3,795,920	809,100	2,982,190
Indiana Harbor Belt.....	110	.....	823,612	107,322	107,322	77,864	8,500	303,125	.....	22,993	519,804	303,808	281,075	31,249
International & Great Northern.....	1,160	1,517,459	446,574	2,129,646	335,426	392,476	60,178	875,469	11,202	85,691	1,732,072	373,955	93,795	220,085
Kanawha & Michigan.....	177	750,532	98,367	871,638	121,789	171,716	9,391	220,549	26	21,169	546,641	324,997	36,535	2

REVENUES AND EXPENSES OF RAILWAYS

THREE MONTHS OF FISCAL YEAR ENDING JUNE 30, 1916 CONTINUED

Name of Road.	Average mileage operated during period.	Operating revenues				Maintenance of		Operating expenses				Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.	
		Freight.	Passenger.	Total.	(inc. misc.)	Way and structures.	Equipment.	Traffic.	Trans- portation.	Miscel- laneous.	General.					Total.
Missouri, Kansas & Texas System.....	3,865	\$5,081,800	\$2,160,272	\$7,242,072	\$7,242,072	\$1,290,745	\$1,203,917	\$164,059	\$2,701,661	\$49,299	\$261,877	\$5,649,499	\$2,147,947	\$413,595	\$1,731,480	-\$208,858
Missouri, Oklahoma & Gulf.....	334	217,679	57,856	275,535	275,535	89,338	55,062	12,441	135,994	332	22,273	314,541	27,134	15,387	42,565	42,565
Missouri, Oklahoma & Gulf of Texas.....	125	28,703	1,067	30,184	30,184	6,019	5,562	3,449	18,561	.....	2,341	5,788,286	1,738,218	298,254	6,167	6,167
Missouri, Pacific.....	3,931	5,938,562	1,496,719	7,435,281	7,435,281	1,127,036	1,604,079	193,095	2,604,090	.....	225,711	5,788,286	1,738,218	298,254	1,451,179	691,473
Mobile & Ohio.....	1,122	2,291,555	314,277	2,605,832	2,605,832	311,004	616,264	102,264	999,731	6,905	9,031	2,126,199	631,223	93,658	537,100	34,694
Monongahela.....	75	379,435	6,689	386,124	386,124	46,923	26,000	2,359	76,968	.....	9,369	161,619	230,824	7,500	223,324	34,694
Morgan's La. & Tex. F. & S. Co.....	405	827,697	245,597	1,073,294	1,073,294	158,907	177,174	37,718	375,707	7,227	7,227	787,257	182,437	62,642	119,152	15,527
Nashville, Chattanooga & St. Louis.....	1,231	1,976,861	712,075	2,688,936	2,688,936	354,809	561,849	138,444	1,029,630	27,836	100,168	2,212,553	710,138	78,000	631,586	178,927
Nevada Northern.....	165	389,201	35,495	424,696	424,696	58,851	35,026	2,028	78,879	.....	12,435	187,439	247,541	26,042	231,500	108,449
New Orleans, Mobile & Chicago.....	402	344,566	11,265	355,831	355,831	69,109	72,328	12,323	142,296	.....	20,720	316,745	120,211	20,159	99,758	15,092
New Orleans & North Eastern.....	196	641,643	139,145	780,788	780,788	95,724	167,784	30,121	265,354	16,981	34,149	610,314	248,180	45,151	203,028	33,917
New Orleans Great Northern.....	724	725,823	292,099	1,017,922	1,017,922	53,143	71,183	8,440	124,105	525	18,031	275,427	157,304	11,707	145,555	6,354
New Orleans, Texas & Mexico.....	286	289,951	69,740	359,691	359,691	54,680	63,612	11,436	126,417	.....	28,766	284,910	99,631	4,504	95,075	16,957
New York Central Railroad.....	5,979	27,955,065	13,468,333	41,423,398	41,423,398	5,400,435	7,942,184	735,745	13,966,907	687,464	1,088,244	29,820,979	18,483,610	2,320,343	16,157,337	.....
New York, Chicago & St. Louis.....	569	2,592,524	440,511	3,033,035	3,033,035	308,396	449,168	145,090	1,217,786	9,449	63,570	2,193,458	966,897	126,000	840,727	281,498
New York, New Haven & Hartford.....	2,005	8,916,397	7,963,799	16,880,196	16,880,196	2,216,502	2,683,687	115,304	6,096,989	155,599	389,220	11,648,538	7,176,336	705,000	6,470,689	1,497,216
New York, Ontario & Western.....	568	1,409,971	814,666	2,224,637	2,224,637	366,866	348,039	23,750	835,357	.....	48,131	1,622,143	978,969	62,950	915,988	4,050
New York, Philadelphia & Norfolk.....	112	990,006	131,614	1,121,620	1,121,620	115,132	234,185	14,835	434,769	12,255	17,483	844,400	363,031	29,000	333,987	56,920
New York, Susquehanna & Western.....	140	568,076	150,482	718,558	718,558	66,866	90,123	5,340	342,865	.....	32,287	522,570	282,427	39,625	242,788	51,722
Norfolk & Western.....	2,042	12,015,451	1,525,316	13,540,767	13,540,767	1,960,971	2,387,766	163,287	3,302,948	25,697	205,230	8,084,167	5,902,296	504,000	5,396,434	1,649,286
Norfolk Southern.....	908	654,065	299,846	953,911	953,911	138,070	137,631	23,84	357,538	.....	81,242	718,583	310,153	36,833	273,300	65,009
Northern Pacific.....	6,483	12,204,546	4,253,578	16,458,124	16,458,124	2,438,979	1,957,811	317,931	4,785,934	296,589	73,782	10,868,188	8,008,114	1,131,296	6,876,062	985,962
Northwestern Pacific.....	507	482,485	721,172	1,203,657	1,203,657	179,287	124,781	17,637	375,064	.....	22,239	714,413	620,984	51,405	569,535	119,003
Oahu Railway & Land Co.....	504	365,861	64,350	430,211	430,211	30,456	27,352	2,023	80,102	.....	11,219	151,152	304,839	21,730	283,089	27,457
Oregon Short Line.....	2,259	4,060,720	1,549,204	5,609,924	5,609,924	836,909	645,172	111,637	1,328,018	105,662	162,031	3,186,081	2,909,664	364,264	2,545,399	336,022
Oregon-Washington R. R. & Nav. Co.....	2,027	2,662,244	1,425,196	4,087,440	4,087,440	495,963	454,481	138,337	1,235,262	41,932	176,533	2,535,043	1,927,773	281,676	1,645,771	44,354
Panhandle & Santa Fe.....	670	868,262	273,598	1,141,860	1,141,860	201,144	206,685	12,214	285,494	.....	345,609	832,003	367,271	33,325	333,681	94,573
Pennsylvania Company.....	1,757	13,164,174	2,992,342	16,156,516	16,156,516	2,778,012	2,551,929	220,503	5,159,962	95,707	35,609	10,511,721	7,101,003	756,362	6,344,850	1,971,096
Pennsylvania Railroad.....	4,528	37,037,503	11,045,886	48,083,389	48,083,389	6,566,889	9,113,773	568,435	16,804,884	701,180	14,888	34,989,927	17,592,063	1,873,232	15,693,767	3,271,540
Pennsylvania, Reading & Pottsville.....	2,262	3,136,837	1,313,374	4,450,211	4,450,211	593,172	873,058	94,115	1,411,100	.....	1,627,501	120,884	3,322,005	1,613,603	139,366	1,474,196
Philadelphia & Reading.....	1,020	10,248,495	1,733,095	12,981,590	12,981,590	1,997,824	2,289,259	135,035	3,436,68	.....	34,368	7,886,967	4,713,497	401,822	4,410,420	651,265
Philadelphia, Baltimore & Washington.....	717	3,058,731	2,188,711	5,247,442	5,247,442	792,233	1,015,986	77,462	2,114,012	.....	144,839	4,144,595	1,605,623	163,659	1,441,733	350,735
Pittsburgh & Lake Erie.....	225	4,621,102	472,766	5,093,868	5,093,868	418,012	728,365	38,908	1,015,867	.....	82,628	2,323,979	3,054,943	478,812	2,906,441	1,383,952
Pittsburgh, Cincinnati, Chic. & St. Louis.....	1,479	7,516,912	2,333,476	9,850,388	9,850,388	1,401,452	1,903,105	188,506	3,518,191	79,586	244,995	7,575,805	3,450,842	148,500	2,906,441	99,983
Pittsburgh, Shawmut & Northern.....	294	471,737	30,342	502,079	502,079	43,591	37,639	4,925	142,304	.....	13,591	376,639	135,674	5,338	135,674	137,784
Port Reading.....	21	311,275	22,741	334,016	334,016	30,441	30,441	1,115	120,765	.....	13,578	194,133	196,288	30,000	166,288	44,440
Richmond, Fredericksburg & Potomac.....	88	366,990	226,741	593,731	593,731	683,813	56,507	90,861	238,864	8,348	20,833	425,479	258,339	22,738	235,472	18,271
Rtland.....	468	489,753	374,280	864,033	864,033	136,358	146,329	28,937	314,765	3,305	16,995	645,989	339,171	50,868	288,303	75,954
St. Joseph & Grand Island.....	258	273,288	83,453	356,741	356,741	85,078	73,403	12,793	135,465	.....	14,888	321,625	66,009	22,860	43,070	62,035
St. Louis & San Francisco.....	4,750	7,163,375	2,855,271	10,018,646	10,018,646	1,826,062	1,621,273	189,845	3,320,485	.....	7,757	7,175,943	3,519,843	368,222	3,146,703	123,910
St. Louis, Brownsville & Mexico.....	548	450,198	210,772	660,970	660,970	108,474	93,351	15,691	201,624	.....	30,771	450,468	263,481	19,500	242,939	82,070
St. Louis, Iron Mountain & Southern.....	3,363	5,607,724	1,395,809	7,003,533	7,003,533	1,184,219	1,631,710	187,727	2,148,835	20,466	23,490	5,354,172	2,201,688	332,805	1,858,237	385,949
St. Louis Merchants' Bridge Terminal.....	9	.....	556	556	556	53,665	23,617	2,387	120,636	.....	13,038	260,171	26,485	3,649	22,734	10,328
St. Louis, San Francisco & Texas.....	244	183,548	68,969	252,517	252,517	73,521	47,361	5,759	120,492	.....	13,038	260,171	26,485	3,649	22,734	10,328
St. Louis, Southwestern.....	943	1,906,368	332,286	2,238,654	2,238,654	134,876	291,013	78,207	453,234	10,638	70,914	1,037,853	709,158	89,973	618,205	62,635
St. Louis Southern.....	811	663,953	248,276	912,229	912,229	158,909	228,554	37,521	402,064	1,984	49,976	845,326	140,618	45,090	95,148	185,949
San Antonio & Aransas Pass.....	724	725,823	292,099	1,017,922	1,017,922	189,860	174,799	19,688	429,700	.....	34,781	848,692	240,130	47,197	192,854	19,863
San Antonio & Aransas Pass.....	724	725,823	292,099	1,017,922	1,017,922	189,860	174,799	19,688	429,700	.....	34,781	848,692	240,130	47,197	192,854	1

Traffic News

In an address before the Traffic Club of Chicago on November 17, Gov. E. L. Phillipp, of Wisconsin, advocated an extension of the powers of the Interstate Commerce Commission over railroad regulation in the interest of centralized regulation and a reduction of the powers of the state commissions.

The Merchants' Association of New York has adopted a report recommending an amendment of the Cummins law regulating agreements between carriers and shippers in regard to liability for loss of freight or baggage. The proposed amendment clarifies the language relating to declarations of value by owners and shippers and stipulates that it shall not be unlawful for persons tendering property for transportation by express or as baggage to declare less than the actual value.

Dr. J. Y. Porter, chief of the Florida State Health Department, is preparing a health instruction display which is to fill three passenger cars and is to be taken around to all of the principal cities and towns in the state, the railroads having promised to co-operate in the enterprise and to transport the cars free. One of the cars will have a gasoline engine and electric apparatus and will show motion pictures; another will be equipped as a model sanitary home, and the third will contain instructive placards dealing with drugs, patent medicines and other things.

The movement of freight through the open ports of entry on the Rio Grande border into those parts of Mexico that are under control of the de facto government, is so great that the connecting lines are wholly unable to handle it promptly. The closing of the El Paso gateway to shipment destined for the region where Carranza authority exists has caused the Southern Pacific to divert all of its Mexican traffic to Eagle Pass. This has caused a blockade of freight there. The Mexican railroads are so short of cars that they can handle the traffic only in comparatively small lots. Large shipments of grain, machinery and other goods are also passing through the Laredo and the Brownsville gateways. The train movement on the Mexican lines is expected to materially improve within a short time. The shops are busy repairing old cars and engines and in building new freight cars. It is announced that all the divisions in Carranza territory are now open for regular passenger traffic, though the trains do not seem to run on any prescribed schedule.

Missouri Passenger Fare Advance Inconsiderable

The executive officers of the Missouri railroads have issued a statement calling attention to the fact that the increase in passenger fares allowed by the Missouri Public Service Commission is very small. The statement says that the impression prevails throughout the state that the railroads have been given the privilege of advancing their rates from 2 to 2½ cents a mile, and that this is a misconception, "as the conditions under which the advance is permitted prevent the railroads from getting it." The statement continues:

"The advance to 2½ cents cannot be made except upon the condition that round-trip tickets be sold at 2¼ cents a mile, and that 500 and 1,000 mile tickets, good for bearer and any number of persons for one year, be sold at 2 cents a mile.

"The sale of round-trip tickets at 2¼ cents is equivalent to a reduction of 10 per cent from the rate of 2½ cents.

"The sale of a mileage ticket at 2 cents that can be used by any number of persons is equivalent to a reduction of 20 per cent from the rate of 2½ cents and brings the purchase of these tickets within the reach of the great majority of travelers.

"The order of the commission further provides that the same facilities in travel shall be extended to the passenger purchasing transportation at 2 cents a mile as are extended to the passenger paying the higher rate.

"These conditions will make the present confiscatory rate of 2 cents a mile the prevailing rate for transportation under the order of the commission.

"Passengers would buy these mileage tickets to such an extent as to prevent the railroads, for at least one year, from getting the benefit from any substantial raise in passenger fare under the order of the commission.

"The opinion is advanced by the commission that the sale

of mileage tickets under the conditions outlined will increase travel. This theory is refuted by the actual experience of the Missouri railroads under the present 2-cent rate, which the commission admits has not increased travel sufficiently to offset the loss in revenue.

"Our opinion with respect to the effect of the changes permitted in freight rates will require more time and study, but in the meantime we are forced to the conclusion that the order, as applied to passenger rates, will result in a very small increase in revenue."

Governor Major of Missouri has criticized the decision of the commission, the members of which he appointed, declaring that he does not believe the railroads are entitled to increased rates.

Exports and Imports in September

A new record of \$300,000,000 as the value of the exports from the United States in September, 1915, gives especial interest to the statistics of foreign trade for that month just published. The Bureau of Foreign and Domestic Commerce, complying with numerous requests for advance information as to the articles making up that trade, has prepared condensed tables giving the value of the various articles and classes of articles exported. The total for September was \$300,700,000, as compared with \$156,100,000 in September, 1914. For the nine months ending with September, 1915, the total was \$2,532,500,000 as compared with \$1,467,400,000 for 1914. The largest item on the list is breadstuffs, of which \$423,400,000 was exported in the nine months as compared with \$172,800,000 in a similar period in 1914. Increased arrivals of raw materials and diminished purchases of manufacturers are the leading facts disclosed by the import statistics for September, 1915. The total was \$151,200,000, as compared with \$139,700,000 in 1914. For the nine months ending with September, 1915, the total was \$1,302,100,000 as compared with \$1,410,100,000 in 1914.

New York Export Traffic

A steamship chartering agent, quoted in a New York paper, says that much of the delay suffered by export freight at the present time is due to slow movements on the Great Lakes, especially in connection with wheat.

"We haven't had any boats delayed in New York on account of congestion here. Grain comes through from Buffalo in forty-eight hours. We have had some of our boats delayed as long as a week, however, on account of the condition of lake traffic. One of our boats was delayed five days at the Erie elevator. Last week we had a boat leave that had been delayed seven days.

"The owner of such a boat loses about \$1,000 every day that it is delayed. He can not charge demurrage, however, unless it takes more than five days, not including Sundays, to load the vessel. Demurrage is now \$750 a day on a ship, while before the war it was only \$150. The average rate on grain to England is now 17 shillings a quarter (480 pounds), while before the war it was 3 shillings 6 pence. The grain congestion here in New York now is not a flea bite to what it was in Baltimore and Newport News after the fire at the grain elevators a couple of months ago.

"The railroad people say that there is a shortage of ships. Well, we could use more if we could get them, but there were never before so many ships entering and leaving the port of New York. About a week ago we had twenty-two steamers to our consignment loading in this port. As I remember, in times of peace we seldom had more than thirteen or fourteen steamers here at once."

New York grain men say that some shippers are diverting their freight to other ports—Baltimore, Philadelphia, Boston and Portland. The volume of business shipped through New York exceeds all records.

Railroad men say that the congestion of freight is rapidly reaching the point where there is no money in the traffic for the railroads. Every day it costs more to handle the business on account of the additional cost of switching and the cost of delay to tied-up cars.

On the West Shore road last week loaded cars were standing on practically every side track from New York to Buffalo, 7,000 cars in all. Nevertheless, 4,500 cars a day are moved in and out of New York.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has changed from December 1 to January 1 the date on which anthracite coal rates shall be reduced in accordance with its recent order. This is the second postponement in the anthracite case. Coal operators in the Wyoming region of Pennsylvania asked for a rehearing in relation to the proposed rates on the smaller sizes, alleging that the new orders were unjust when the rates were compared with those for the large sizes.

The Excelsior and Flax Tow Cases

Opinion by the commission.

The commission in *Keogh v. Chicago, Burlington & Quincy* (24 I. C. C., 606) decided in 1912 that the carrier's rates on excelsior, which were then higher than the flax-tow rates, from St. Paul to Chicago and points taking the same rates, St. Louis, Kansas City and Omaha were unreasonable to the extent that they exceeded the rates on flax-tow to the same points. Some of the carriers lowered the rates on excelsior to the flax-tow rates, but later proposed increases in the latter rates instead. The commission found that the increases were justified to Chicago and Peoria. It now finds that increased rates may be established as follows: From St. Paul, Minneapolis, and Minnesota Transfer, to Sioux City, 17 cents per 100 pounds; to Omaha and other Missouri River cities, to and including Kansas City, 20 cents per 100 pounds; from Dubuque, Iowa, to the Missouri River cities, Omaha to Kansas City, inclusive, 17 cents per 100 pounds. Increased rates to Des Moines are not allowed. (I. C. C., 349.)

Hearing on Illinois-Missouri Interstate Rates

A hearing on the complaint of the Business Men's League of St. Louis, charging discrimination in the interstate rates, both freight and passenger, from St. Louis to Illinois points as compared with the intrastate rates applicable from Chicago to the same points, was held before an examiner of the Interstate Commerce Commission at St. Louis last week. S. G. Hatch, passenger traffic manager of the Illinois Central, testified that many Illinois people who formerly went to St. Louis for business or pleasure are now going to Chicago because of the lower passenger fare at the state rate of two cents a mile, as compared with the interstate rate of 2½ cents. J. H. Cherry, assistant general freight agent of the Illinois Central, presented numerous statistical exhibits on the freight rates and traffic from St. Louis and Chicago to Illinois points, showing that St. Louis shippers are required to pay the five per cent increase allowed by the Interstate Commerce Commission, while the intrastate rates remain as before. Other railroad officers who testified expressed the opinion that the situation discriminates against St. Louis and in favor of Chicago.

J. D. McNamara, general passenger agent of the Wabash, testified that at Granite City, Ill., the sale of tickets to Chicago had increased 879 per cent since the situation became known generally. At East St. Louis the increase had been 170 per cent, and at Chicago the sales of tickets to Granite City increased 561 per cent and to East St. Louis 222 per cent, as passengers could buy tickets to those points at two cents a mile and then buy separate tickets to St. Louis. E. E. MacLeod, chairman of the Western Passenger Association, told of the efforts made by the railroads to obtain an increase in the rates in Illinois. Others who testified were George J. Charlton, passenger traffic manager of the Chicago & Alton, F. E. Webster, chief of Tariff Bureau, Chicago & Eastern Illinois, and F. L. Thompson, assistant chief engineer, Illinois Central.

Fourth Section Applications

In re class and commodity rates from Louisville, Ky., and Cincinnati, Ohio, to Alexandria, Va. Opinion by the Commission.

The commission grants the application of the Southern Railway for authority to continue to charge class and commodity rates from Cincinnati, Ohio, to Alexandria, Va., in connection with

the Cincinnati, New Orleans & Texas Pacific via Harriman Junction, Tenn., lower than rates on like traffic to intermediate points on the Southern Railway between Alexandria and Orange, Va.

It denies the authority to continue to charge class and commodity rates from Louisville, Ky., and Cincinnati, Ohio, to Alexandria, Va., in connection with the Chesapeake & Ohio via Orange, Va., lower than rates to intermediate points on the Southern Railway between Alexandria and Orange, Va. (36 I. C. C., 317.)

In re through rates from Buffalo, Pittsburgh and Central freight association territories. Opinion by the Commission.

The rates applied on through shipments from points in central freight association and Buffalo-Pittsburgh territories to points south of the Ohio and east of the Mississippi rivers exceed in some instances the aggregates of the intermediate rates. The commission holds that carriers have not justified the continuance of such rates and fourth section relief is denied; effective February 1, 1916.

One of the principal objections of the carriers north of the Ohio river to the construction of rates on combination of the intermediate rates is the present method of dividing such rates, which they allege is inequitable. They assert that the divisions demanded by the southern lines are excessive, and that they are forced in some cases to accept less than their local rates to the river. The commission has frequently held that the failure of carriers to agree upon divisions of joint rates does not justify the imposition of unreasonable rates. It would still less justify rates specifically violative of the statute. (36 I. C. C., 325.)

STATE COMMISSIONS

The Massachusetts Public Service Commission has dismissed a petition from the town of Revere for an order to compel the Boston & Maine to move the present or build a new station in Revere at a cost of about \$34,000 to \$47,000. The petition has been pending since 1913.

The Railroad Commission of Louisiana has cancelled its order, issued in June, 1914, requiring the Illinois Central to stop trains numbers 1 and 2 on flag, at Amite City, and the order issued in July, 1914, requiring the New Orleans, Texas & Mexico to stop trains 1 and 2 at Lottie. These cancellations are made because the courts have declared the orders unlawful. The present notice says:

"The Lottie case was heard before three federal judges and it was held that the order was void because it interfered with interstate commerce. * * * The Supreme Court of the United States has handed down several decisions involving orders adopted by the railroad commission of various states holding that where there was adequate service otherwise afforded, the requiring of interstate trains to stop at such stations amounts to an unlawful burden upon interstate commerce. * * * Our counsel has carefully examined this and other decisions and we consider that further litigation over the order in question would be useless. * * *

In addition to its decision allowing general increases in freight and passenger rates in Missouri, which was reported in last week's issue, the Missouri Public Service Commission at the same time issued its decision in a number of other cases. In one of these it ordered the restoration of Pullman sleeping cars by the Missouri Pacific on trains running between St. Louis and Joplin. These cars were taken off last spring on the ground that it did not pay to run them, the bulk of the through travel between the points named being carried by a shorter line. In view of the fact that the road will be able now to charge a higher passenger fare, the commission has ordered the service restored for a period of one year. The commission also granted the application of the roads for permission to put into effect as to Missouri intrastate traffic, the rule of the national car demurrage code increasing the demurrage charge for refrigerator cars. The commission also granted permission to the Missouri Southern to increase its passenger fare from two to three cents a mile, and also to increase its carload freight rates by approximately seven per cent. Officers of the passenger departments of a number of St. Louis roads, at an informal conference in that city last week expressed the opinion that the passenger fare increase will be largely neutralized by the more general use of mileage tickets at 2 cents a mile. The commission requires these to be made transferable and they are interchangeable as between the different roads.

PERSONNEL OF COMMISSIONS

Charles R. Russell has been appointed the fifth member of the Massachusetts Public Service Commission, succeeding Clinton White.

COURT NEWS

The hearing before Judge Youmans, of the United States District Court, at Oklahoma City, on the application of the railroads for an injunction restraining the enforcement of the Oklahoma two-cent fare law, was resumed on November 17, and is expected to last several weeks.

The Supreme Court of Massachusetts has declared unconstitutional the law of the state which provided that employees in and about steam railroad stations "shall not be employed for more than nine hours in ten hours' time, the additional hour to be allowed as a lay-off." It is held that the question was governed by a decision of the United States Supreme Court, which decided that a statute prohibiting labor for more than ten hours a day in an ordinarily healthy occupation was an "illegal interference with the rights of the individuals, both employers and employees, to make contracts regarding labor upon such terms as they think best."

Federal Safety Appliances Act Supersedes State Laws

The Indiana supreme court holds that the federal safety appliances act supersedes and invalidates the state safety appliances act, requiring railroads to provide grabirons and handholds on the side and ends of every car, so that no action for the penalty under the state law can be maintained.—*Southern Ry. Co. v. Railroad Commission (Ind.)*, 109 N. E. 759.

Liability for Loss at Sea by Connecting Carrier

The North Carolina supreme court holds that the Carmack amendment to the interstate commerce act allows the initial carrier, on being sued, to avail itself of defenses or of limitations of liability open under the federal statutes to the carrier causing the loss, although the shipment was lost at sea by a connecting carrier.—*Brinson & Kramer v. Norfolk Southern (N. Car.)* 86 S. E. 371.

Employment Contracts—Half Wages During Disability

The Kansas supreme court holds that while a railroad company could not enter into a general business of writing accident insurance policies, it has the incidental power to embody in its contracts of employment a provision that it will pay partial wages in case of disablement, in consideration of a deduction to be made from each pay check.—*McAdow v. Kansas City Western (Kan.)* 151 Pac. 1113.

Liability of Injury to Freight

The South Carolina supreme court holds that, where fruit was shipped over several connecting lines, and injured by delay in transit, the terminal carrier was liable only for such proportion of the total loss as occurred while the fruit was in its custody; and it was not liable for such proportion of the injury as resulted from the temporizing of the shipper before receiving the fruit.—*Trakas v. Southern Ry. Co. (S. Car.)* 86 S. E. 492.

Johnson Grass—Proof of Source

In an action for damages for the defendant railroad's act in allowing Johnson grass to go to seed on its right of way, there was evidence that Johnson grass on the plaintiff's property might have come from other sources. The Texas Court of Civil Appeals held that the jury was properly charged that the plaintiff was bound to show the amount of his damage caused solely by the defendant's act.—*Missouri, K. & T. v. Forrest (Tex.)*, 179 S. W. 273.

Waiver of Stipulation as to Claims for Damages

A shipper did not present his claim in the form stipulated in the bill of lading, but notified the railroad's general freight agent of the damages to the goods. Negotiations followed without the railroad objecting that the shipper had lost his right because the claim was not made in the proper way. In an action for

damages the Arkansas supreme court holds the railroad had waived its right to object to the manner of presentation of the claim.—*St. Louis, I. M. & S. v. Laser Grain Co. (Ark.)*, 179 S. W. 189.

Notice and Time for Bringing Suit

The Arkansas supreme court holds that where a railroad has established two rates for live stock, one under an unrestricted contract, and the other a lower rate, limiting liability, and the shipper accepts without inquiring the lower rate, it is not necessary, to bind the shipper to the contract, that the agent should call his attention to the higher rate and to expressly offer it to him; and stipulations as to notice and time of bringing suit are not thereby rendered void.—*St. Louis S. W. v. I. W. Haynie & Co. (Ark.)*, 175 S. W. 170.

Assumption of Risk by Employee

The Massachusetts supreme court holds that an experienced foreman of an emergency crew in charge of an electric zone on a railroad, whose contract of employment was to repair defects in the electric wire system, and who knew and appreciated the manifestly dangerous character of the work as well as the company, assumed the risk, and the company owed him no duty, and could not be guilty of negligence or liable for his death while working among the feed wires without first having the power shut off.—*Ashton v. B. & M. (Mass.)*, 109 N. E. 820.

Remedy Under Carmack Amendment Exclusive

The Georgia court of appeals holds that a suit for damages based on the provisions of a Georgia statute cannot be maintained against the last of several connecting carriers, if the loss or damage to the shipment occurred in the course of interstate transportation; for under the provisions of the Carmack amendment the initial carrier alone is liable for damages for interstate shipments, and under the federal regulations of interstate commerce (which supersedes all state regulation upon the same subject) the remedy against the initial carrier is exclusive.—*Southern Ry. Co. v. Bennett (Ga.)* 86 S. E. 418.

Flooding Land—Limitation of Damages

A railroad, by allowing the ditch along its roadbed to become filled up, periodically inundated the adjacent farming lands, depositing gravel and cinders. In an action by the owners of the land the Tennessee Supreme Court holds that the only damages recoverable were those caused by the deposit of gravel within the period of the statute of limitations, taking the value of the land at the beginning of the period as normal, although it was then covered with gravel deposited by previous floodings, as to which the plaintiffs' causes of action were barred.—*Cincinnati, N. O. & T. P. v. Roddy (Tenn.)*, 179 S. W. 143.

Flooding Caused by Construction of Line—Right of Way Purchased from Injured Party

Action was brought for damages for the washing away of a piece of the plaintiff's land and certain fences by the diversion of water from a creek as the result of the construction of a railroad. The railroad had bought the right of way from the plaintiff. The Kentucky Court of Appeals holds that when a right of way is bought by a railroad company, and on this right of way it builds its line, it is only liable to the party from whom it purchased the right of way for negligence in the construction or operation of the road.—*Roberts v. Sandy Valley & Elkhorn (Ky.)*, 179 S. W. 228.

Children as Trespassers in Yards

The switching yards of a railroad were close to a large public school and young children had been in the habit of playing on or near the tracks. One of the children was attracted by some machinery on a car, and climbed up to see it. A string of cars without any lookout on the front was run against the car, and the boy was thrown to the ground, and died from injuries received. In an action for his death the railroad's main contention was that as the boy was a trespasser it was not bound to anticipate his presence, or to use more than ordinary care in the transaction of its business. The Nebraska Supreme Court held

that, ordinarily, this was the proper principle of law; but it held that the circumstance of the proximity of the school took the case out of this rule; ordinary care demands that in switching cars due regard be paid to such conditions. Failure to inclose the tracks and neglect on the part of the switchmen to observe whether children are on the cars or tracks when a train is being backed in, may constitute actionable negligence.—*Krummack v. Missouri Pacific* (Neb.) 154 N. W. 541.

Limitation of Time for Bringing Suit

Live stock was damaged while being held by a railroad company at destination to compel payment of freight charges. In an action for damages the Arkansas supreme court holds that the company had the right to insist that suit for such damages be brought within six months in accordance with a stipulation to that effect in the bill of lading. If the company was entitled to charge the freight demanded it had the right to hold the shipment until it was paid; if it was not, and wrongfully held the shipment, it was still liable for such refusal to deliver as a common carrier, and answerable therefor only in accordance with the stipulation.—*Kansas City Southern v. Bull* (Ark.), 179 S. W. 172.

Grazing Land—"Speculative Value"

Suit in equity was brought by the Northern Pacific in the Washington courts to compel Benton county to cancel as excessive certain taxes levied on railroad lands. The evidence showed that, as the land is now, it is unfit for any use other than grazing. It is arid land covered with sagebrush, and in part covered with rocks and sand. It has no present sale value other than as spring grazing land for sheep, being too dry to pasture cattle. It was admitted that the land could have no other value, unless something that no one could see, or even define as a probability, existed. It was held by the Washington Supreme Court that the assessment, which appeared to be based on the probable value of the land in the event of a successful system of irrigation, was based on a figure grossly in excess of the value of the land, not at its fair cash value, as the law requires, but at a value not arising even to the dignity of a speculative value; "speculative value" being based on a probability of value within at least the span of a lifetime.—*Northern Pacific v. Benton County* (Wash.) 151 Pac. 1123.

New York Workmen's Compensation Law Sustained

The New York State Court of Appeals, in a suit against the New York Central & Hudson River, decided, this week, that until the Federal government passes a workmen's compensation law, the New York State Workmen's Compensation law applies to railroad employees engaged in interstate commerce.

While tamping ties, plaintiff was struck in the eye by a stone which flew up from the roadbed. The railroad company contended that at the time the man was engaged in interstate commerce and that therefore the Federal employers' liability act measured his right, insisting that there could be no recovery under the Federal law because the injury was a mere accident and not the result of negligence. The contention of the attorney-general was that the compensation law and the Federal statute cannot reasonably be said to cover the same subject matter in view of the different principles that underlie the two statutes, the different purpose sought to be accomplished by them, the restriction of the application of the Federal statute to negligence cases and the broad scope of the state's statute, taking in all industrial accidents, regardless of fault and the different method by which redress is obtained under the two statutes. This view is sustained in the present decision.

The Court of Appeals, Judge Seabury writing the opinion, holds that congress has recognized the differences between these two kinds of statutes and has limited its act to negligence cases and did not intend to enter the field of compensation for industrial accidents, but left that field open for occupancy by the state. Whenever congress shall enter upon this field, all state regulations in conflict with federal authority will be abrogated. The court also holds that the compensation law does not impose any unreasonable condition upon interstate commerce.

A large number of other cases will be affected by this decision. The case will undoubtedly be taken to the United States Supreme Court.

Railway Officers

Executive, Financial, Legal and Accounting

E. A. Merrill, chief clerk in the secretary's office of the Southern Railway, at New York, has been appointed assistant secretary, with office at New York.

F. B. Grier, general solicitor of the Charleston & Western Carolina with office at Greenwood, S. C., has been elected president, succeeding J. B. Cleveland, A. W. Anderson, general manager, Augusta, Ga., has been elected also second vice-president, succeeding J. Kenly.

Elmer A. Howard, whose election as vice-president of the Chicago, Burlington & Quincy, with jurisdiction over the land and industrial departments, was announced last week, was born at Fairfield, Iowa, on July 18, 1858. He was educated in the public schools and attended the University of Iowa for one year. At the age of 18 he entered the employ of the Burlington as telegrapher and station agent at Fairfield, Iowa, and remained in that position for eight years. In 1885, he entered the Indian service under the Cleveland administration. He resigned as Indian agent in 1887, to go into the banking business at Fairfield, Iowa, and in 1900 was appointed national bank examiner for the state of Iowa. In 1903



E. A. Howard

he returned to the service of the Burlington, and for the past seven years has been real estate and industrial commissioner. Mr. Howard is also chairman of the executive committee of the Chicago Union Station Company.

C. R. Capps, vice-president of the Seaboard Air Line at Norfolk, Va., has been elected first vice-president; W. L. Seddon, first assistant to president, at Norfolk, has been elected vice-president, and W. R. Bonsal, president of the Carolina, Atlantic & Western, also the Charlotte, Monroe & Columbia, has been elected vice-president of the Seaboard Air Line.

J. E. Taussig, whose appointment as assistant to the president of the Wabash has been announced, was born on May 4, 1865, at St. Louis, Mo. He was educated in private schools at London, England; Brussels, Belgium, and Darmstadt, Germany. He entered railway service in 1882 as clerk in the freight office of the St. Louis Bridge & Tunnel Railroad. From 1885 to 1886 he was agent for the Ft. Scott, Wichita & Western; from 1886 to 1887, chief clerk to the general manager of the New York, Providence & Boston; from 1887 to 1888, chief clerk in the office of the trainmaster of the Missouri Pacific, at Wichita, Kan.; from 1888 to 1891, chief train dispatcher of the same road, at Winfield, Kan.; from 1891 to 1892, agent of the Wheeling Bridge & Terminal Railway, at Wheeling, W. Va.; from 1892 to May, 1900, superintendent of the same road. From May, 1900, to May, 1901, he held the position of assistant to the general manager of the Wheeling & Lake Erie, at Cleveland, Ohio; from May, 1901, to December, 1904, he was superintendent of telegraph of the same road, at Canton, Ohio; from December, 1904, to February, 1911, superintendent of terminals of the Wabash, at St. Louis, Mo.; from February, 1911, to July, 1912, superintendent of terminals of the Houston & Texas Central and the Galveston, Harrisburg & San Antonio, at Houston, Tex.; and from July, 1912, to July, 1913, superintendent of the Houston division of the latter road. On August 3, 1913, he was appointed special represen-

tative on the staff of E. F. Kearney, first vice-president of the Texas & Pacific, and in September, 1913, was appointed superintendent of transportation for the same road. From July, 1914, to July, 1915, he was general superintendent of the Texas & Pacific, at Dallas, Tex.

Operating

C. S. Lake, general superintendent of the Seaboard Air Line at Norfolk, Va., has been appointed general manager.

H. E. Barber has been appointed chief despatcher of the East St. Louis & Suburban and the Alton, Granite & St. Louis Traction, vice Mr. Hume, resigned, effective November 15.

F. J. DeGrief, trainmaster of the Lake Erie & Western, with headquarters at Lafayette, Ind., has been appointed superintendent of the Peoria division, with headquarters at the same place, succeeding C. C. Arnold, deceased. The office of trainmaster has been abolished.

P. R. Albright, assistant general manager of the Atlantic Coast Line at Wilmington, N. C., has been elected general manager, vice W. N. Royall, resigned on account of ill health; J. N. Brand, general superintendent at Jacksonville, Fla., has been appointed assistant general manager with headquarters at Wilmington; J. C. Murchison, superintendent at Charleston, S. C., has been appointed general superintendent of the Third division with headquarters at Jacksonville; J. P. Walker, assistant superintendent at Charleston, has been appointed superintendent with headquarters at Charleston and T. W. Hansell, assistant superintendent at Sanford, Fla., has been appointed superintendent with headquarters at Sanford.

Traffic

C. E. Emerson has been appointed district freight and passenger agent of the San Pedro, Los Angeles & Salt Lake, with headquarters at Cincinnati, Ohio.

F. D. Hammer, traveling passenger agent of the Wabash at Kansas City, Mo., has been promoted to district passenger agent, with headquarters at Houston, Texas, effective December 1.

Benton M. Bukey has been appointed assistant general passenger agent of the Atchison, Topeka & Santa Fe, with headquarters in Washington, D. C., on November 6, 1879. He received a high school education, and entered railroading, W. Va., on Norway service in that city on November 18, 1899, in the accounting department of the Southern Railway at Chicago, Ill. Mr. Bukey was born at Williamstown, W. Va. He remained in Washington until July, 1903, when he entered the employ of the Chicago, Burlington & Quincy, in the office of the auditor of ticket accounts, at Chicago, Ill. In November, 1905, he became a rate clerk in the passenger department of the same road, and in April, 1906, he was promoted to chief rate clerk, and in September, 1909, was appointed chief clerk to the passenger traffic manager, the position which he held up to the time of his recent promotion.

J. S. Houston, assistant general freight and passenger agent

of the Texas & Pacific and the International & Great Northern, announces the removal of the freight and passenger offices in Chicago, Ill., to suite 415, Marquette building, 140 South Dearborn street.

L. A. Ripley, commercial agent of the Georgia Railroad at Cincinnati, Ohio, has been promoted to general agent, and W. C. Bewley, commercial agent at Jacksonville, Fla., has been transferred to Cincinnati as an assistant to Mr. Ripley.

Frank G. Smith has been appointed district passenger agent of the Chicago Great Western, with headquarters at Cleveland, Ohio, vice Harry L. Wyand, resigned, to engage in other business. Effective November 22.

Albert Kelling, chief clerk in the traffic department of the Oregon-Washington Railroad & Navigation Company, has been appointed assistant general freight agent to succeed J. R. Stein, who resigned a few months ago.

J. C. Ewing, commercial agent of the Ft. Dodge, Des Moines & Southern, at Minneapolis, Minn., has been promoted to assistant general freight and passenger agent, with office in the same city. The office of commercial agent has been abolished.

J. L. Park, general freight agent of the St. Louis Southwestern, has assumed the duties formerly discharged by the vice-president in charge of freight traffic, the latter office having been abolished. H. E. Farrell has been vice-president in charge of freight traffic since April 22, 1912. The title of J. D. Watson, heretofore assistant freight traffic manager, has been changed to assistant general freight agent.

Edwin A. Dawson, manager of the Union Line, will be retired from active work on December 1, under the pension rules of the company, after 53 years of active service with the Pennsylvania system. Mr. Dawson was born at Pittsburgh, Pa., November 22, 1845. He entered the service of the Pittsburgh, Fort Wayne & Chicago in 1862, as a yard clerk at Pennsylvania station, Pittsburgh, and later occupied various clerical positions with that company. In 1864 he became a member of Company B of the 193d Pennsylvania Volunteers. This regiment was detailed for duty along the lines of the Northern Central and Philadelphia, Baltimore & Washington Railways immediately after the Earley raid.

Mr. Dawson re-entered railway service with the Allegheny Valley in 1865, and remained with that line three years, at the end of which time he was made local agent at Pittsburgh. In 1868 he entered the service of the Union Line, then the Union Railroad & Transportation Company, at Pittsburgh. In 1878 he was transferred to Columbus as assistant to D. S. Gray, then western manager of the Union Line. He received his appointment as assistant to western manager on October 1, 1883, and on April 1, 1886, he became western superintendent, with headquarters at Columbus, Ohio. On April 1, 1888, his office was removed to Chicago. On January 1, 1896, Mr. Dawson was appointed acting manager, and on July 15, 1896, he was made manager of the Union Line, with headquarters at Chicago.

Engineering and Rolling Stock

Claude E. Cox, who has been appointed engineer of estimates of the Chicago Union Station Company, was born at Brownstown, Ind., on December 28, 1878. He graduated from high school at Worthington, Ind., and entered railway service in January, 1901. His first position was rodman on the



B. M. Bukey



E. A. Dawson

Indianapolis & Vincennes division of the Pennsylvania Lines West; later he was appointed senior of the corps for the Indianapolis terminals, at Indianapolis, Ind. In November, 1904, he was appointed engineer in charge of location and construction for the Duluth, St. Cloud, Glencoe & Mankato, now a subsidiary of the Chicago, Milwaukee & St. Paul, in southern Minnesota. In December, 1905, he was appointed assistant engineer in the office of the district engineer of the St. Paul, at Minneapolis, Minn. In January, 1910, he was transferred to Aberdeen, S. D., where he was assistant engineer in charge of the construction of engine and passenger terminals. He came to the Chicago office of the St. Paul in January, 1912, where he was assigned to valuation work, and shortly afterward appointed assistant valuation engineer, a position which he held up to the time of his recent appointment as engineer of estimates for the Union Station Company.

J. H. Weed, maintenance of way inspector of the St. Louis & San Francisco, has been appointed roadmaster of the River and Cape division. C. R. Gray, Jr., maintenance of way inspector, has been appointed roadmaster of the Western division. H. R. Irvine, inspector maintenance of way, has also been appointed roadmaster for the Western division.

Purchasing

James L. Woods, whose appointment to the position of purchasing agent of the Nashville, Chattanooga & St. Louis with



J. L. Woods

headquarters at Nashville, Tenn., has been announced in these columns, was born at Belfast, Tenn., December 9, 1875. He was educated in the common schools at that place and later attended the Haynes McLean school at Lewisburg, Tenn., and the Winchester Normal School at Winchester, Tenn. In the spring of 1897 he entered the service of the Nashville, Chattanooga & St. Louis as a clerk in the general passenger department. From the early part of 1898 to October 1 of that year he was a clerk in the division superintendent's office at Tullahoma, Tenn. From October, 1898, to

February 12, 1914, he served in various clerical capacities in the Atlanta freight agency at Atlanta, becoming chief clerk. From that position he was promoted to the position of assistant purchasing agent at Nashville.

A. J. Sweing, chief clerk to the purchasing agent of the Wabash, has been appointed general storekeeper, with headquarters at St. Louis, Mo. This is a newly-created office.

C. H. Rothgary, assistant storekeeper of the Baltimore & Ohio at Cleveland, Ohio, has been appointed storekeeper at Lorain, Ohio, vice H. J. Cobb, resigned. W. D. Francis has been appointed assistant storekeeper at Cleveland to succeed Mr. Rothgary.

OBITUARY

C. C. Arnold, superintendent of the Peoria division of the Lake Erie & Western, at Lafayette, Ind., died at his home in that city on November 15.

RAILWAY ACCIDENTS IN THE UNITED KINGDOM.—If the number of passengers killed in the Quintinshill accident be accepted as 225, the number killed in train accidents during the present year is 252: Ilford, January 1, 10; Kinsale, January 28, 2; Smithly Bridge, March 18, 3; Quintinshill, May 22, 225; Pollokshaws, August 14, 1; Weedon, August 14, 10; Newark, September 6, 1. In 1889, 88 passengers were killed, including 80 in the Armagh accident.—*The Engineer, London.*

Equipment and Supplies

LOCOMOTIVE BUILDING

THE SOUTHERN is in the market for a number of locomotives.

THE TAVARES & GULF is in the market for 2 ten-wheel locomotives.

THE WAYNESBURG & WASHINGTON is contemplating the purchase of one freight locomotive.

THE ST. PAUL UNION DEPOT has ordered 2 switching locomotives from the Lima Locomotive Corporation.

THE CINCINNATI, INDIANAPOLIS & WESTERN which recently ordered 35 locomotives has issued inquiries for 5 ten-wheel locomotives.

THE OAHU RAILWAY & LAND COMPANY, Honolulu, Hawaii, has ordered one ten-wheel, one Consolidation type and one six-wheel switching locomotives from the American Locomotive Company.

THE ARTHUR IRON MINING COMPANY, St. Paul, Minn., reported in the issue of October 22 as being in the market for 8 locomotives, has ordered 8 switching locomotives from the Lima Locomotive Corporation.

NEW YORK, NEW HAVEN & HARTFORD.—President Howard Elliott, in an address before the Boston Art Club on November 20, outlined needed betterments to the road to cost \$32,000,000, including \$9,100,000 for 300 all-steel passenger train cars, 100 steam locomotives and 3,000 freight cars. Just when this equipment apparently would be acquired by the New Haven, however, was not apparent.

THE ELGIN, JOLIET & EASTERN has ordered 18 superheater Mikado and 9 eight-wheel superheater switching locomotives from the American Locomotive Company. The Mikado locomotives will have 28 by 30-in. cylinders, 63-in. driving wheels and a total weight in working order of 307,000 lb. The switching locomotives will have 24 by 28-in. cylinders, 51-in. driving wheels and a total weight in working order of 217,000 lb.

THE PENNSYLVANIA LINES WEST, reported in the *Railway Age Gazette* of November 12 as being in the market for 50 freight locomotives, has ordered 48 superheater Consolidation locomotives from the American Locomotive Company and 15 of the same type from the Lima Locomotive Corporation. Of these 63 locomotives, 50 will be used by the Pennsylvania Company, 10 by the Vandalia and 3 by the Grand Rapids & Indiana. The locomotives ordered from the American Locomotive Company will have 26 by 28-in. cylinders, 62-in. driving wheels and a total weight in working order of 253,000 lb. each. The report in the issue of November 12 that the Pennsylvania Lines West had ordered 53 locomotives from the Lima Locomotive Corporation and 10 from the American Locomotive Company was incorrect.

CAR BUILDING

NEW YORK, NEW HAVEN & HARTFORD.—See item under Locomotive Building.

THE KANSAS CITY SOUTHERN is inquiring for prices on 200 gondola car bodies.

THE SOUTHERN RAILWAY is reported to be in the market for a large number of cars.

THE CANADIAN PACIFIC will build 250 refrigerator cars in its own shops at Montreal.

THE ERIE has ordered 13 all-steel suburban coaches from the Pressed Steel Car Company.

THE LONG ISLAND has issued inquiries for 6 parlor cars, 10 baggage cars and 25 trailer coaches.

THE CHICAGO & ALTON has ordered 150 composite gondola car bodies from the Haskell & Barker Car Company.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE RAILWAY

has ordered 200 50-ton ore cars from the American Car & Foundry Company.

THE BUTTE, ANACONDA & PACIFIC has ordered one combination mail and baggage car from the American Car & Foundry Company.

THE CALUMET & ARIZONA MINING COMPANY is inquiring for one caboose car, 2 box cars, 4 flat cars, one coach and one combination coach.

DENVER & RIO GRANDE. The report in last week's issue to the effect that this company is in the market for 1,000 box cars has been denied.

THE DELAWARE, LACKAWANNA & WESTERN has ordered two dining cars from the Pullman Company and 500 hopper cars from the American Car & Foundry Company.

THE MONONGAHELA CONNECTING is inquiring for prices on 65 120-ton drop bottom gondola cars, 10 100-ton flat cars and 25 to 50 40-ton coke cars.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS will build 500 40-ton box cars in its own shops in addition to the 500 reported in the *Railway Age Gazette* of October 15.

THE MISSOURI, KANSAS & TEXAS is inquiring for prices on 500 general service cars in addition to the 2,000 composite gondola cars reported in the *Railway Age Gazette* of November 12.

THE MONTGOMERY RAILROAD reported in an unconfirmed item in the issue of November 12 as having ordered 800 steel car bodies from the Standard Steel Car Company ordered but 400 steel car bodies from that company.

THE WESTERN MARYLAND was reported in an unconfirmed item in last week's issue as having increased its order for hopper cars recently given the Pullman Company from 2,000 to 3,000. This item has since been confirmed.

THE INTERBOROUGH RAPID TRANSIT, reported in the *Railway Age Gazette* of November 12, as being in the market for 311 all-steel subway cars, has ordered 234 motor car bodies and 77 trailer car bodies from the Pullman Company.

THE CINCINNATI, INDIANAPOLIS & WESTERN, reported in last week's issue as having ordered 650 freight cars from the Haskell & Barker Car Company, ordered 450 40-ton box cars; 50 40-ton stock cars; 40 40-ton flat cars; 50 50-ton gondola cars; 50 50-ton hopper cars and 20 caboose cars from that company.

THE NEW YORK MUNICIPAL will soon place orders for an additional 100 subway cars for the Sea Beach Line. These cars will bring the total number of cars ordered by this company to 400, the 300 cars previously ordered having been obtained from the American Car & Foundry Company on three different orders.

IRON AND STEEL

THE NORFOLK & WESTERN has ordered 12,000 tons of rails from the Carnegie Steel Company.

THE CINCINNATI, INDIANAPOLIS & WESTERN has ordered 1,500 tons of bridge material from the American Bridge Company.

THE NORTHERN PACIFIC has ordered 20,000 tons of rails from the Illinois Steel Company, the Lackawanna Steel Company and the Bethlehem Steel Company.

NEW YORK SUBWAYS. Bids for the supply of special work for the Lexington avenue subway from its junction with the existing subway at the Grand Central Station, New York, to One Hundred and Thirty-eighth street, in the borough of the Bronx, will be received by the Public Service Commission for the First district on December 7. The special work called for includes all frogs, switches and cross-overs for the line, comprising 19 separate pieces.

SIGNALING

THE CHICAGO, INDIANAPOLIS & LOUISVILLE is to install mechanical interlocking at the crossing of its line with the Grand Trunk at Haskells, Ind. The machine will have 24 levers and the distant signals will be power operated.

Supply Trade News

Harry D. Rohman, who was recently appointed chief electrical engineer of the Franklin Railway Supply Company, New York, was born in Switzerland in 1883. Upon his graduation



Harry D. Rohman

as an electrical engineer from the technical schools of Zurich, he entered the works of the Oerlikon Electrical Construction Company. There he was afforded an opportunity of combining a practical training with the theory of engineering, and in 1903 qualified as an electrical engineer, with experience in high and low tension and A. C. and D. C. work, especially electrical traction. Later he entered the service of J. Stone & Co., London, and gradually worked up through its various departments until in 1910 he was appointed chief of the testing and experimental

departments. In April, 1914, he was appointed chief assistant electrical engineer, and held that position until October 1, 1915, when he entered the service of the Franklin Railway Supply Company as noted above. Mr. Rohman speaks several languages and has had an extensive experience in all European countries, including the Balkan states, and in South Africa and the Belgian Congo.

L. T. Burwell, formerly with the M. W. Supply Company, Philadelphia, Pa., has become associated with the Q & C Company, New York.

J. M. Spangler, formerly with the Railroad Supply Company, Chicago, has recently entered the service of the National Carbon Company, Cleveland, Ohio.

W. H. Crawford has been appointed Pacific coast representative of the Simmen Automatic Railway Signal Company, Buffalo, N. Y. Mr. Crawford will have offices at 609 Spalding building, Portland, Ore.

G. C. Pool, formerly with Guilford S. Wood, Chicago, and previous to that with the Acme Supply Company, Chicago, has become connected with the Q & C Company, New York. His attention will be given particularly to Q & C devices for locomotives and cars.

James Forgie, a consulting engineer of New York has been awarded the Telford gold medal by the Institution of Civil Engineers ((Great Britain) in recognition of his paper on "The Laxaxalpan Aqueduct Tunnels in Mexico" and his achievements in engineering. Mr. Forgie has been prominently identified with the solution of rapid transit problems in cities, having been engaged on the Pennsylvania and Hudson & Manhattan tubes in New York, the underground railways of London and other tunneling and subaqueous construction work.

The Roberts & Schaefer Company has been awarded a contract by the Oregon-Washington Railroad & Navigation Company for the immediate installation of a 250-ton two-track reinforced concrete standard counterbalanced bucket locomotive coaling plant at Pilot Rock Junction, Ore. This plant will have automatic coal handling machinery, and will be arranged with equipment to weigh all coal passing to locomotives. The contract price is \$17,500. The company has also been authorized by the Chicago Great Western to build at Council Bluffs, Iowa, a duplicate of

the fireproof standard counterbalanced locomotive bucket coal-plant with automatic operation, which has been installed at Clarion, Iowa, making the fifth plant of this type installed by the Roberts & Schaefer Company for this road. The contract price of the latter is \$10,300.

Isaac M. Cate, a large stockholder, has renewed his attack on the organization and management of the American Locomotive Company by sending first to the directors and now to the other stockholders a 58-page printed letter reciting the findings of his accountants and other details. Mr. Cate first attacked the management of the company in February, 1912, directing his efforts against Waldo H. Marshall, president, and a number of other officers particularly. The board authorized an inquiry of Mr. Cate's charges of mismanagement, waste and misconduct, but the report of the committee of inquiry did not support Mr. Cate. In September, 1914, Sylvanus L. Schoonmaker was elected chairman of the board. This appeased Mr. Cate for a time, but not for long. Mr. Cate in his present letter seeks to discount the ability of the present management of the company. Concerning its war orders, he says: "Those in your company who did not make automobiles at a profit or develop the superheater or build locomotives in competition with the Baldwins are not the men to extract profits from shrapnel shells. The contract for shells was taken on April 15, with everything laid out for speedy preparations. There have been nearly six months of preparation. If the production of shells is subject to such prodigious cost as my accountant finds pervades the organization it will not be possible to compete with other institutions."

TRADE PUBLICATIONS

SIMPLEX LETTERING TEMPLATES.—The Keuffel & Esser Company, New York, has issued a leaflet describing its transparent dylonite templates for lettering, engineering and architectural drawing, etc. The template contains two holes with perforations of different sizes by means of which the letters of the alphabet and numerals may be spaced correctly and outlined. Glass and Payzant pens suitable for use with these templates are also described.

TWO NEW REELS.—Keuffel & Esser Company, New York, has issued a leaflet describing a four-arm folding reel for use with tapes or flat chains $\frac{1}{4}$ in. wide and from 100 to 500 ft. long. Its advantage lies in the fact that it may be folded when not in use, and carried in the pocket. The Colorado steel reel is also described and is intended for tapes from 100 to 600 ft. long, up to 5/16 in. wide. It has a long folding handle, which locks into an opening at either end of the frame, and thus prevents the tape from unwinding.

LUBRICATING DEVICES.—The Richardson-Phenix Company, Milwaukee, Wis., has recently issued bulletins Nos. 50 and 60 dealing, respectively, with the Phenix force feed lubricator and the Richardson Model "M" sight feed oil pump. The former booklet contains a complete description of the Phenix ratchet type lubricator and also describes the new Model "T" device. Illustrations are given showing the construction and operation of the lubricators. Bulletin No. 60 relates to the Model "M" lubricator. Interesting illustrations show the process of manufacture from the raw material to the finished lubricators on the test rack and give a good idea of the manner in which the pumps are drilled and milled from a solid block of cast iron. Other items of interest are a description of the new Richardson air spray attachment, and the steam and electric attachments for heating the oil in the lubricator reservoir.

BRITISH LOCOMOTIVE EXPORTS.—There was a slight improvement in British locomotive exports in September, the value of the shipments for the month having been about \$1,454,500, as compared with \$1,439,590 in September, 1914, and \$1,395,525 in September, 1913. The improvement was due to an increase in the value of the deliveries to the Argentine Republic during the month to \$118,720, as compared with \$31,855 and \$274,775. South Africa imported locomotives in September to the value of \$189,330, as compared with \$61,105 and \$133,185, but there was a great falling off in the deliveries to India and Australia.

Railway Construction

AMERICUS, HAWKINSVILLE & EASTERN.—Work on the remaining sections of this line from Games, Ga., to Hawkinsville, 27 miles, and from Flint river to Americus, 18 miles, is now under way. J. S. Morton, Byromville, Ga., is the contractor. The company was organized to build from Americus, Ga., northeast to Hawkinsville, 55 miles. (September 24, p. 585.)

ATLANTIC COAST LINE.—Work is now under way on a connection between the Monticello branch and the Fanlew branch, Fla., 1.3 miles; contract for the work has been let to J. F. Lamb, Thomasville, Ga. The company is also building an extension of the Hollywood spur in South Carolina, south about 4.5 miles; contract let to W. Z. Williams & Co., Macon, Ga.

BAY POINT & CLAYTON.—This company is building an extension from Cowell, Cal., to Clayton, 2.5 miles. The company now operates a line from Bay Point, Cal., to Cowell, 10 miles.

BELLINGHAM & NORTHERN.—This company plans to build an extension from Goshen, Wash., to Welcome, 11 miles. The company now operates a line from Bellingham, Wash., to Glacier, 44 miles.

CHARLES CITY WESTERN ELECTRIC.—This company has completed work on an extension from Charles City, Ia., to Colwell, eight miles.

ELECTRIC SHORT LINE.—On the line building from Winsted, Minn., west to Hutchinson, 45 miles, grading on a section of 18.25 miles is expected to be finished in about ten days. Track laying is now under way from Winsted west and the company expects to have the new extension in operation by January, 1916. In addition, about 2.5 miles of side track and track for a Y at a Hutchinson is expected to be finished. On the line now in operation from Minneapolis to Winsted, 60 miles, about 4 miles of side tracks, mostly at terminals in Minneapolis, Lyndale, Watertown, Hazleton and Winsted were laid in 1915. During 1916 the company expects to build about 50 miles of new line. (Sept. 10, p. 487.)

FORT DODGE, DES MOINES & SOUTHERN (ELECTRIC).—Work is now under way on a six-mile section from Swanwood Junction, Iowa, to Des Moines. (August 13, p. 1301.)

FORT WORTH BELT.—This company is now building 2 miles of team tracks at Fort Worth, Tex.

HETCH HETCHY.—This company has grading work finished on 9 miles of the line building from Rosasco, Cal., on the Sierra Railway to Hetch Hetchy dam site, 67 miles. The work is being carried out by the Utah Construction Company. M. M. O'Shaughnessy, San Francisco, Cal., may be addressed. (See San Francisco Roads, Nov. 5, p. 879.)

MATTAWAMKEAG & NORTHERN.—Financial arrangements have been made, it is said, for the construction of a line from Mattawamkeag, Me., northwest via East Millinocket to Millinocket, 23 miles. A charter to build the line has been given to C. W. Mullen and I. B. Wood, of Bangor; A. Weatherbee, Lincoln, and F. J. Rich, Mattawamkeag. Stone & Webster, of Boston, Mass., are the fiscal agents, and have already made a survey for this line.

MEXICO & SANTA FE (ELECTRIC).—This company has been incorporated in Missouri to operate an electric railway from Mexico, Mo., to a point in Monroe county, 16 miles distant. The incorporators are: J. A. Botts, W. W. Mundy, M. W. Beamer and J. P. Canthorn, of Molino, Mo., and T. C. Botts, J. D. Bates and W. W. Botts, of Mexico. The construction of the road has been practically completed.

NEW YORK SUBWAY. The contract for track-laying on the new rapid transit lines in the borough of Queens has been awarded by the New York Public Service Commission, First District, to the Thomas Crummins Contracting Company, the lowest bidders, for \$204,898. The contract includes the extension of the Queensboro subway from its present terminus at Jackson and Van Alst avenues, in Queens, to the Queensboro bridge plaza; the elevated railroad from the Queensboro bridge

plaza northward to Ditmars avenue, Astoria, and the elevated railroad from the Queensboro bridge plaza northeasterly to Alburts avenue, Corona.

NORFOLK, WASHINGTON & NEW YORK.—Organized to build from Newport News, Va., to Washington, D. C., 159 miles, with a branch down the Northern neck, 50 miles long. Surveys and estimates have been completed and the right of way is about secured. The company expects to begin construction work in the near future. Channing M. Ward, president, Richmond, Va.

PHILADELPHIA ROADS.—Bids are wanted by A. M. Taylor, director of city transit at Philadelphia, Pa., for the following work: On December 7, for the concrete column foundations and piers for about 4,000 linear ft. of a two-track elevated railway in Frankford avenue from Unity street to Dyre street, Philadelphia, Pa. Bids are wanted on December 14 for the steel superstructure and appurtenant work for a two-track elevated railway in Frankford avenue from Unity street to Dyre street, comprising about 4,000 linear ft. of structure. (October 29, 1915, p. 828.)

PINE BLUFF & NORTHERN.—This company plans to build an extension from Cullor, Ark., to Pine Bluff, 35 miles. The company now operates an 8-mile line from McCreanor to Cullor.

QUEBEC CENTRAL.—This railroad has projected an extension from English Lake, Que., to a point in the township of Dionne, L'Islet county, about 25 miles.

ROACH TIMBER COMPANY'S LINES.—Grading work has been finished on five miles of the line projected east from Sutherlin, Ore. The company will probably begin grading work in the near future on an additional section. W. L. Roach, president, Muscatine, Iowa. (October 22, p. 779.)

SUTHERLIN, COOS BAY & EASTERN.—The company has finished the survey and partially graded the line from Sutherlin, Ore., to Hinkle Creek, 14 miles. The delay in securing the necessary right of way, and the general condition of the lumber market at present does not encourage carrying on the work. It is expected that construction work on the line will be carried out next spring. J. F. Luse, Sutherlin, may be addressed.

TIDEWATER SECURITIES CORPORATION.—Grading work has been finished on the line building from Alabama Port, Ala., to Cedar Point, 3.2 miles. T. W. Nichol, chief engineer, Mobile. (April 2, p. 768.)

WATAUGA & YADKIN RIVER.—Surveys are now being made for an 8-mile extension to be built between Darby, N. C., and Rogers Mills.

WAUSHARA COUNTY.—This company is building with its own forces from Red Granite, Wis., to Pay Sippi, over 8 miles. Grading has been finished on six miles. A. L. Christofferson, president, Pay Sippi, Wis.

RAILWAY STRUCTURES

ALLENTOWN, PA.—The Central of New Jersey has given a contract to the Pennsylvania Steel Company, Steelton, Pa., for fabricating and erecting the steel superstructure of new bridges to be built over the Lehigh river at Allentown. The improvements include 3 double track, deck plate girders, with ballasted floors, each span to be 90 ft. long. The work calls for 500 tons of steel and 1,300 cu. yd. of concrete for the piers. The estimated cost of the improvements will be \$52,500. Bids for the masonry piers have not yet been asked for.

AURORA, ILL.—A fire, the origin of which is not known, destroyed a warehouse belonging to the Chicago, Burlington & Quincy on November 13. The gross loss, including the structure and contents, has been estimated at \$150,000. A temporary storehouse has already been secured by the company, and plans for a new building are now being prepared.

BEAUMONT, TEX.—The Texarkana & Ft. Smith will open bids on a new passenger depot on November 27. It will be a one-story, stucco structure, 46 ft. by 223 ft., with tile roof, steam heat and electric lighting. C. E. Johnston, chief engineer, 510 Kansas City Southern Railway building, Kansas City, Mo.

Railway Financial News

ALABAMA, TENNESSEE & NORTHERN.—On application of the Guaranty Trust Company representing a bondholders' committee, the United States District Court at Mobile, Ala., Judge Toulmin, on Monday of this week appointed John T. Cochrane, of Mobile, and M. W. Thompson, of New York, receivers for this property. Mr. Cochrane is president of the road and Mr. Thompson is president of the Railway Development Corporation, a holding company which has been organized to represent New York interests. The line of the road extends from Reform, Ala., southward 185 miles to Calvert, Ala., 34 miles north of Mobile. The security holders have a plan for extending the road northward from Reform to an intersection with the St. Louis & San Francisco. The company has outstanding in bonds \$3,882,000, in notes \$1,235,000 and in car trust certificates \$180,000.

ST. LOUIS & SAN FRANCISCO.—Further details have been given out of the plan for the reorganization of this company. The reorganized company will take over all the mileage of the old company (including the Kansas City, Fort Scott & Memphis lease), with the exception of the New Orleans, Texas & Mexico and the Chicago & Eastern Illinois.

The mileage of the new system, upon which the new bond issue will be secured, is 3,852.76 miles of first track and 1,009.16 miles of second and side track; total, 4,861.92 miles. To this may be added, in case of acquisition, the Quanah, Acme & Pacific mileage, 80.80 miles. The reorganization plan provides for:

Prior liens undisturbed, 5s-6s, due 1931.....	\$9,484,000
New issue of prior lien mortgage bonds.....	250,000,000
Cumulative adjustment mortgage bonds, maturing July 1, 1955.....	75,000,000
Income mortgage bonds, maturing July 1, 1960 authorized	75,000,000
<i>Capital Stock</i>	
Preferred stock 6 per cent redeemable at 100, authorized	200,000,000
Common stock, authorized.....	250,000,000
<i>Securities to be Presently Issued</i>	
<i>Prior lien mortgage bonds, viz.:</i>	
In partial exchange for existing securities embraced in the plan.....	93,398,500
Sold to purchase syndicate.....	25,000,000
For the corporate purposes of the new company....	6,811,500

Total	\$125,210,000
Balance reserved for future requirements under restrictions of mortgage.....	\$124,790,000
The outstanding prior lien mortgage bonds shall be as follows:	
\$93,398,500, series "A" 4 per cent, maturing July 1, 1950, redeemable at 100 and accrued interest; \$31,811,500, series "B," 5 per cent, maturing July 1, 1950, redeemable at 105 and accrued interest.	

<i>Cumulative Adjustments Gold Bonds</i>	
Rate not to exceed 6 per cent, as may be determined at time of issue:	
In partial exchange for the existing securities embraced in plan.....	\$40,545,737
(To be designated as series "A" 6 per cent, due July 1, 1955, callable at 100.)	
Reserved for future use under restrictions of mortgage	34,454,263

<i>Income Mortgage Gold Bonds</i>	
To be issued in exchange for existing securities....	38,661,200
(Designated as series "A" 6 per cent convertible, maturing July 1, 1960, redeemable at 100.)	
Reserved for future use under restrictions of mortgage	36,338,800

Total	\$75,000,000
Reserve bonds may be issued with interest not to exceed 6 per cent per annum, to be determined by board at time of issue.	
Rate per mile of new securities to be presently issued: Prior lien mortgage 4s and 5s, \$27,700; cumulative adjustment 6s, \$8,400; noncumulative income mortgage 6s, \$8,000. Total, \$44,100.	
Preferred stock, \$1,450; common stock, \$10,900. Total, \$12,350.	
Total capitalization, bonds and stock, \$56,450.	
Capital stock to be presently issued: Preferred stock, 6 per cent, redeemable at \$100, \$7,000,000; balance reserved for conversion of income bonds, \$75,000,000; reserved for future corporate uses, \$118,000,000.	
Common stock to be presently issued, \$53,000,000; reserved for corporate uses, \$197,000,000.	

The preferred and common stock is to be in the hands of the voting trustees for five years. The purchasing syndicate—Speyer & Co., J. & W. Seligman & Co., the Guaranty Trust Company, New York, and Lee Higginson & Co.—is to receive a commission of 4 per cent on the amount of the syndicate obligation of \$25,000,000.

ANNUAL REPORTS

CHICAGO, BURLINGTON & QUINCY RAILROAD COMPANY—SIXTY-FIRST ANNUAL REPORT

Chicago, July 1, 1915.

To the Stockholders of the Chicago, Burlington & Quincy Railroad Company:

The following is the report of your Board of Directors for the year ended June 30, 1915:

CHICAGO, BURLINGTON & QUINCY RAILROAD COMPANY.
YEARS ENDED JUNE 30.

Per Cent	1915	OPERATING REVENUES	1914	Per Cent
68.60	\$62,509,483.62	Freight revenue	\$62,799,188.01	67.03
22.15	20,185,564.28	Passenger revenue	21,743,507.05	23.21
2.70	2,464,372.90	Mail revenue	2,428,503.50	2.59
2.39	2,176,214.07	Express revenue	2,595,965.75	2.77
		Miscellaneous transportation revenue		
2.08	1,893,988.61		2,116,560.32	2.26
		Revenue from operations other than transportation	1,876,995.40	2.00
1.98	1,805,801.76			
.10	89,635.43	Joint facility	126,421.03	.14
100.00	\$91,125,060.67	Total operating revenue	\$93,687,141.06	100.00

OPERATING EXPENSES

12.47	\$11,360,210.26	Maintenance of way and structures	\$12,010,977.42	12.82
16.92	15,415,122.75	Maintenance of equipment	16,035,205.02	17.12
1.79	1,629,675.95	Traffic expenses	1,634,672.43	1.75
31.95	29,117,163.60	Transportation expenses	30,224,523.90	32.26
.91	832,153.90	Miscellaneous operations	921,586.39	.98
2.29	2,087,040.58	General expenses	2,397,887.66	2.56
66.33	\$60,441,367.04	Total operating expenses	\$63,224,852.82	67.49
33.67	\$30,683,693.63	Net operating revenue	\$30,462,288.24	32.51
	\$4,081,507.88	Railway tax accruals	\$4,016,657.74	
	24,157.35	Uncollectible railway revenues		
	\$4,105,665.23		\$4,016,657.74	
	\$26,578,028.40	Operating income	\$26,445,630.50	

OTHER INCOME

	\$879,286.07	Rents	\$879,286.07	
	389,994.77	Miscellaneous interest	415,072.02	
	\$1,224,069.41	Total other income	\$1,294,358.09	
	\$27,802,097.81	Gross corporate income	\$27,739,988.59	

DEDUCTIONS FROM GROSS CORPORATE INCOME

	\$1,549,474.44	Rents	\$1,765,669.73	
	24,032.26	Miscellaneous interest	128,707.50	
	7,118,898.27	Interest accrued on funded debt	6,981,650.49	
	55,010.56	Discount on funded debt	44,516.16	
	12,762.86	Miscellaneous debits	12,242.74	
	\$8,760,178.39	Total deductions	\$8,932,786.62	
	\$19,041,919.42	Net corporate income	\$18,807,201.97	
	\$1,753,006.79	Sinking funds	\$1,692,794.83	
	8,867,128.00	Dividends	8,867,128.00	
	3,340,669.28	Appropriations for additions and betterments	5,715,875.07	
	\$13,960,804.07		\$16,275,797.90	
	\$5,081,115.35	Surplus for the year	\$2,531,404.07	

NOTE.—The arrangement of the above table is in accordance with the new Interstate Commerce Commission form. This required that the figures, as presented in the 1914 report, be revised. Necessarily this revision has been general in its nature.

CAPITALIZATION
CAPITAL STOCK

Number of Shares	Total Par Value Authorized and Outstanding	Dividends Declared the Year	Rate	Amount
1,108,391	\$110,839,100.00	8%		\$8,867,128.00

FUNDED DEBT

Nominally Issued		Actually Issued		Interest Accrued During Year
		Reacquired		Actually Outstanding
In Treasury	In Treasury	Pledged	In Sinking Funds	on Bonds "Actually Outstanding."
\$9,873,000	\$1,098,600	\$31,000	\$21,850,400	\$181,690,000
				\$7,118,898.27

MILEAGE

MILEAGE OF ROAD OPERATED ON JUNE 30, 1915

STATE	Line Owned	Operated Under Lease	Total Line Operated
Illinois	1,671.58	112.89	1,784.47
Iowa	1,365.12	73.44	1,438.56
Missouri	1,122.30	13.15	1,135.45
Wisconsin	222.49	.53	223.02
Minnesota	23.61	14.84	38.45
Nebraska	2,850.34	22.37	2,872.71
Kansas	259.32	.82	260.14
Colorado	394.36	34.97	429.33
South Dakota	279.95		279.95
Wyoming	684.96	34.98	719.94
Montana	134.38	49.54	183.92
Total	9,008.41	357.53	9,365.94

LINE OWNED

STATE	Single Track	Second Track	Third Track	Yard Tracks and Sidings	Total
Illinois	1,671.58	360.36	42.40	941.54	3,015.88
Iowa	1,365.12	244.53		337.50	1,947.15
Missouri	1,122.30	107.22		439.12	1,668.64
Wisconsin	222.49	113.87		77.09	413.45
Minnesota	23.61	2.25		37.10	62.96
Nebraska	2,850.34	17.96		700.54	3,568.84
Kansas	259.32			24.23	283.55
Colorado	394.36			137.41	531.77
South Dakota	279.95			61.57	341.52
Wyoming	684.96			182.23	867.19
Montana	134.38			33.74	168.12
Total	9,008.41	846.19	42.40	2,972.07	12,869.07

TAXES

	1915	1914	Increase or Decrease
Illinois	\$ 927,813.36	\$ 916,308.10	Inc. \$ 11,505.26
Iowa	528,151.13	511,005.43	Inc. 17,145.70
Missouri	399,978.10	396,164.54	Inc. 3,813.56
Wisconsin	264,906.08	239,746.19	Inc. 25,159.89
Minnesota	31,568.25	32,481.93	Dec. 913.68
Nebraska	1,073,568.13	1,049,459.83	Inc. 24,108.30
Kansas	67,244.30	69,804.97	Dec. 2,560.67
Colorado	240,223.06	207,830.02	Inc. 32,393.04
South Dakota	108,817.83	92,831.92	Inc. 15,985.91
Wyoming	208,903.24	228,122.67	Dec. 19,219.43
Montana	61,330.50	57,858.55	Inc. 3,471.95
Other States	305.56	183.82	Inc. 121.74
Total States	\$3,912,809.54	\$3,801,797.97	Inc. \$111,011.57
United States Government	\$ 168,698.34	\$ 214,859.77	Dec. \$ 46,161.43
Grand Total	\$4,081,507.88	\$4,016,657.74	Inc. \$ 64,850.14

TRAFFIC AND OPERATING STATISTICS

ITEM	1915		1914		Increase or Decrease	
	Dollars and Whole Numbers	Cents and Decimals	Dollars and Whole Numbers	Cents and Decimals	Dollars and Whole Numbers	Cents and Decimals
PASSENGER TRAFFIC						
Numbers of passengers carried earning revenue.....	22,708,392		23,445,911		Dec.	737,519
Number of passengers carried one mile.....	1,079,264,875		1,152,123,930		Dec.	72,859,055
Number of passengers carried one mile, per mile of road.....	115.61		126.058		Dec.	10.497
Average distance carried, miles.....	47	53	49	14	Dec.	1 61
Total passenger revenue.....	\$20,185,564	28	\$21,743,507	05	Dec.	\$1,557,942 77
Average amount received from each passenger.....		88890		92739	Dec.	0.3849
Average receipts per passenger per mile.....		01870		01888	Dec.	00018
Total passenger service train revenue.....	\$25,457,027	54	\$27,443,201	76	Dec.	\$1,986,174 22
Passenger service train revenue per mile of road.....	\$2,725	79	\$3,002	66	Dec.	\$276 87
Passenger service train revenue per train mile.....	\$1	38800	\$1	47134	Dec.	08334
FREIGHT TRAFFIC						
Number of tons carried of freight earning revenue.....	11,758,791		12,388,800		Dec.	630,009
Number of tons carried one mile.....	8,527,444,254		8,612,629,607		Dec.	85,185,353
Number of tons carried one mile per mile of road.....	913,068		942,339		Dec.	29,271
Average distance haul of one ton, miles.....	268	51	265	91	Inc.	2 60
Total freight revenue.....	\$62,509,483	62	\$62,799,188	01	Dec.	\$289,704 39
Average amount received for each ton of freight.....	\$1	96826	\$1	93892	Inc.	02934
Average receipts per ton per mile.....		00733		00729	Inc.	00004
Freight revenue per mile of road.....	\$6,693	14	\$6,871	09	Dec.	\$177 95
Freight revenue per train mile.....	\$3	60408	\$3	48951	Inc.	11457

MILEAGE STATISTICS

ITEM	1915 Miles	1914 Miles	Increase or Decrease Miles
LOCOMOTIVE MILEAGE—Revenue Service.			
Freight locomotive miles.....	17,895,430	18,700,800	Dec. 805,370
Passenger locomotive miles.....	17,972,865	18,164,766	Dec. 191,901
Mixed locomotive miles.....	862,287	936,243	Dec. 73,956
Special locomotive miles.....	28,926	20,026	Inc. 8,900
Switching locomotive miles.....	9,719,358	9,779,536	Dec. 60,178
Total	46,478,866	47,601,371	Dec. 1,122,505
Locomotive mileage—non-revenue service	1,560,931	1,826,016	Dec. 265,085
CAR MILEAGE—Revenue Service.			
Freight car mileage:			
Loaded	443,389,629	451,470,933	Dec. 8,081,304
Empty	215,800,636	212,332,776	Inc. 3,467,860
Caboose	16,734,933	17,132,686	Dec. 397,753
Total	675,925,198	680,936,395	Dec. 5,011,197
Passenger car mileage:			
Passenger	46,061,646	47,548,623	Dec. 1,486,977
Sleeping, parlor and observation..	27,842,218	27,219,853	Inc. 622,365
Other passenger train cars.....	41,025,476	42,270,155	Dec. 1,244,679
Total	114,929,340	117,038,631	Dec. 2,109,291
Car mileage in special service:			
Freight, loaded.....	209,953	175,643	Inc. 34,310
Freight, empty.....	16,411	5,857	Inc. 10,554
Caboose	21,685	17,939	Inc. 3,746
Passenger	76,718	58,123	Inc. 18,595
Sleeping, parlor and observation..	8,097	.....	Inc. 8,097
Other passenger train cars.....	4,796	1,571	Inc. 3,225
Total	337,660	259,133	Inc. 78,527
Total car mileage—revenue service	791,192,198	798,234,159	Dec. 7,041,961
Car mileage—revenue service....	4,349,836	6,637,427	Dec. 2,287,591
TRAIN MILEAGE—Revenue Service.			
Freight train.....	16,490,454	17,065,955	Dec. 575,501
Passenger train.....	17,487,156	17,721,174	Dec. 234,018
Mixed train.....	853,620	930,638	Dec. 77,018
Special train.....	25,339	18,879	Inc. 6,460
Total train mileage—revenue service	34,856,569	35,736,646	Dec. 880,077
Train mileage—non-revenue service	829,327	1,043,727	Dec. 214,400

EQUIPMENT

ITEMS	Number on June 30, 1914	Number Added During Year	Number Retired During Year	Number on June 30, 1915	Average Tractive Power All Locomotives and Average Capacity All Freight Cars
Steam locomotives:					
Passenger	444	7	15	436	.....
Freight	910	35	36	918	.....
Switching	410	14	41	383	.....
Total locomotives	1,773	35	71	1,737	30,808 lbs.
Freight-train cars:					
Box cars.....	30,958	1,001	1,941	30,018	.....
Flat cars.....	1,572	.....	18	1,554	.....
Stock cars.....	7,534	370	225	7,679	.....
Coal cars.....	21,800	1,251	50	23,001	.....
Tank cars.....	213	.....	.....	213	.....
Refrigerator cars.....	2,997	.....	28	2,969	.....
Caboose cars.....	686	25	24	687	.....
Other freight-train cars..	83	.....	3	80	.....
All classes of freight-train cars.....	65,843	2,647	2,289	66,201	40.67 tons

Passenger-train cars:				
Coaches	667	1	2	666
Combination passenger cars	145	1	3	143
Other combination cars.....	108	.....	1	107
Dining cars.....	41	.....	.....	41
Parlor cars.....	14	.....	.....	14
Baggage and express cars..	196	16	2	210
Postal cars.....	73	.....	20	53
Other passenger-train cars..	41	.....	1	40
All classes of passenger-train cars	1,285	18	29	1,274
Company service cars:				
Officers and pay cars.....	32	1	.....	33
Ballast cars.....	2,781	.....	153	2,628
Derrick cars.....	24	3	2	25
Steam shovels.....	21	.....	3	18
Wrecking cars.....	17	.....	.....	17
Other company service cars	2,774	84	250	2,608
All classes of company service cars.....	5,649	88	408	5,329
All classes of cars in service	72,777	2,753	2,726	72,804
Floating equipment:				
Steamboats and tugboats..	1	.....	.....	1
Barges, car floats and canal boats.....	38	.....	1	37
Other floating equipment..	2	.....	.....	2
Total floating equipment..	41	.....	1	40

FREIGHT TRAFFIC MOVEMENT—ENTIRE LINE.
COMPANY MATERIAL EXCLUDED

COMMODITIES	Originat- ing on this Road	Received from Con- nections	Total Freight Tonnage	
	Tons	Tons	Tons	Per Cent.
Products of Agriculture:				
Grain	4,029,737	604,769	4,634,506	14.60
Flour	538,373	151,955	690,328	2.17
Other mill products.....	204,399	54,230	258,629	.81
Hay	251,430	165,699	417,129	1.31
Tobacco	2,998	916	3,914	.01
Cotton	2,793	43,286	46,079	.15
Fruits and vegetables.....	422,550	853,106	1,275,656	4.02
Other products.....	118,329	104,899	223,228	.70
Total	5,570,609	1,978,860	7,549,469	23.77
Products of Animals:				
Live stock.....	1,526,940	230,217	1,757,157	5.53
Dressed meats.....	154,558	8,783	163,341	.51
Other packing house products	127,692	8,975	136,667	.43
Poultry, game and fish.....	66,961	25,739	92,700	.29
Wool	6,349	5,009	11,358	.04
Hides and leather.....	16,433	4,806	21,239	.07
Other products.....	66,088	31,121	97,209	.31
Total	1,965,021	314,650	2,279,671	7.18
Products of Mines:				
Anthracite coal.....	22,756	194,549	217,305	.68
Bituminous coal.....	7,572,284	1,841,098	9,413,382	29.64
Coke	24,119	110,501	134,620	.43
Ores	90,854	290,443	381,297	1.20
Stone, sand, etc.....	1,633,330	298,815	1,932,145	6.08
Other products.....	105,778	236,786	342,564	1.08
Total	9,449,121	2,972,192	12,421,313	39.11
Products of Forests:				
Lumber	212,116	1,375,916	1,588,032	5.00
Other products.....	117,239	122,758	239,997	.76
Total	329,355	1,498,674	1,828,029	5.76
Manufactures:				
Petroleum and other oils....	251,861	334,382	586,243	1.85
Sugar	174,338	144,370	318,708	1.00
Naval stores.....	8,609	3,681	12,290	.04

TRAFFIC AND OPERATING STATISTICS—(Continued)

ITEM	1915 Dollars and Whole Numbers	1915 Cents and Decimals	1914 Dollars and Whole Numbers	1914 Cents and Decimals	Increase or Decrease Dollars and Whole Numbers	Cents and Decimals
OPERATING						
Operating revenues	\$91,125,060	67	\$93,687,141	06	Dec.	\$2,562,080 39
Operating revenues per mile of road.....	\$9,757	13	\$10,250	65	Dec.	\$493 52
Operating revenues per train mile.....	\$2	61429	\$2	62160	Dec.	\$783,485 78
Operating expenses	\$60,441,367	04	\$63,224,852	82	Dec.	\$445 96
Operating expenses per mile of road.....	\$6,471	70	\$6,917	66	Dec.	\$221,405 39
Operating expenses per train mile.....	\$1	73400	\$1	76910	Inc.	\$47 56
Net operating revenue	\$30,683,693	63	\$30,462,288	24	Dec.	\$221,405 39
Net operating revenue per mile of road.....	\$3,285	43	\$3,332	99	Inc.	\$47 56
Net operating revenue per train mile.....	15	88029	15	85241	Dec.	3
Average number of passengers per car mile.....	59	.....	62	.....	Inc.	13 09
Average number of passengers per train mile.....	6	27	6	27	Inc.	1 13
Average number of passenger cars per train mile.....	19	23	19	08	Inc.	47
Average number of tons of freight per loaded car mile.....	491	66	478	57	Inc.	64
Average number of tons of freight per train mile.....	38	97	37	84	Inc.	70
Average number of freight cars per train mile.....	25	56	25	09	Inc.	109
Average number of loaded freight cars per train mile.....	12	44	11	80	Inc.	70
Average number of empty freight cars per train mile.....	9,339	33	9,139	63	Inc.	70
Average mileage operated during year.....						

* Including cabooses.

Manufactures: (Continued)

Iron, pig and bloom.....	5,710	76,373	82,083	.26
Iron and steel rails.....	6,992	36,557	43,549	.13
Other castings and machinery.....	114,218	181,120	295,338	.93
Bar and sheet metal.....	39,021	185,145	224,166	.71
Cement, brick and lime.....	1,340,982	432,187	1,773,169	5.58
Agricultural implements.....	143,497	65,093	208,590	.66
Wagons, carriages, tools, etc.	30,898	57,112	88,010	.28
Wines, liquors and beers.....	123,895	41,219	165,114	.52
Household goods, etc.....	140,830	72,160	212,990	.67
Other manufactures.....	404,254	495,145	899,399	2.83
Total.....	2,785,105	2,124,544	4,909,649	15.46
Merchandise.....	1,509,568	662,473	2,172,041	6.84
Miscellaneous.....	463,560	135,059	598,619	1.88
Total tonnage.....	22,072,339	9,686,452	31,758,791	100.00

EXPENDITURES FOR NEW LINES AND EXTENSIONS, FOR EQUIPMENT AND FOR ADDITIONS AND BETTERMENTS DURING THE YEAR

ACCOUNT	Additions and Betterments			Total Expenditure
	New Lines and Extensions	Charged to Road and Equipment	Charged to Income	
Engineering.....	\$ 16,104.81		\$ 22,615.26	\$ 38,720.07
Land for transportation purposes.....	Cr. 42,280.67	\$2,399,107.01		2,356,826.34
Grading.....	534,580.98		254,078.15	788,659.13
Tunnels and subways.....	237,010.04			237,010.04
Bridges, trestles and culverts.....	206,070.68		334,462.04	540,532.72
Ties.....	179,598.58		78,143.26	257,741.82
Rails.....	305,743.68		325,244.16	630,987.84
Other track material.....	60,466.06		351,940.62	412,406.68
Ballast.....	91,177.81		88,486.53	179,664.34
Track laying and surfacing.....	152,844.05		142,989.56	295,833.61
Right-of-way fences.....	11,941.17		9,776.77	21,717.94
Snow and sand fences and snow sheds.....	6,335.06			6,335.06
Crossings and signs.....	7,293.76		82,862.01	90,155.77
Station and office buildings.....	Cr. 300,186.39		240,733.31	Cr. 59,453.08
Roadway buildings.....	6,894.04		Cr. 2,460.00	4,434.04
Water stations.....	62,615.69		53,982.75	116,598.44
Fuel stations.....	1,168.73		11,470.39	12,639.12
Shops and engine houses.....	1,982.62		42,054.57	44,037.19
Wharves and docks.....	Cr. 1.44		10,135.23	10,133.79
Telegraph and telephone lines.....	17,841.39		21,178.46	39,019.85
Signals and interlockers.....	1,510.80		160,264.93	161,775.73
Miscellaneous structures.....	1,712.92		15,677.28	17,390.20

Paving.....		\$6,896.27	\$6,896.27
Roadway machines.....	2.25	1,611.25	1,613.50
Roadway small tools.....	153.75		153.75
Assessments for public improvements.....		124,048.01	124,048.01
Other expenditures.....			
—Road.....	208,253.24	43.50	208,296.74
Shop machinery.....		11,621.45	11,621.45
Power plant machinery.....		10,665.37	10,665.37
Total expenditures for road.....	\$1,768,833.59	\$2,399,107.01	\$2,398,521.13
Steam locomotives.....		\$ 536,662.36	\$ 536,662.36
Freight-train cars.....		632,820.70	632,820.70
Passenger train cars.....		Cr. 6,949.63	Cr. 6,949.63
Floating equipment.....		405.48	405.48
Work equipment.....		Cr. 220,836.76	Cr. 220,836.76
Total expenditures for equipment.....		\$ 942,102.15	\$ 942,102.15
Law.....	\$ 30.16	\$ 46.00	\$ 76.16
Total general expenditures.....	\$ 30.16	\$ 46.00	\$ 76.16
Grand total.....	\$1,768,863.75	\$2,399,107.01	\$3,340,669.28

During the year the line extending southerly from Laurel, Mont., has been completed to Orin Junction, Wyo.; and the connection between Guernsey and Wendover should be ready for operation by December 1st of this year. The building of these tracks completes a line from Northport, Neb., to Billings, Mont., 532 miles in length, which will soon be an important line in the operations of the Company in that territory, as well as being a part of the plan for a low grade line between the Missouri River and Billings.

\$378,549.53 has been expended for second track, and there have been placed in operation during the year 104.58 miles of main track, 13.31 miles of second track and 55.93 miles of other tracks.

Heavy and continuing rains during the early summer caused floods which did considerable damage, particularly in parts of Wyoming, Kansas, Nebraska, Missouri, Illinois and Iowa, necessitating heavy expenditures in the month of June; and like conditions extended into July and August of this year.

A bridge across the Ohio River at Metropolis, Ill., is in process of construction by the Paducah & Illinois R. R. Co., a company whose capital stock is owned by your Company and the Nashville, Chattanooga & St. Louis Ry. Co. This new bridge will enable your Company to better compete with other north and south lines, for business to and from the south.

The complete reconstruction of the bridge across the Missouri River at Kansas City is well under way and will probably be completed in 1916. The old bridge was built in 1868-69 and is single tracked. The new bridge will be a double tracked, thoroughly modern, steel structure on concrete piers.

The new Kansas City Terminal Railway plant, with its passenger station and extensive passenger and freight facilities, was opened on November 1,

GENERAL BALANCE SHEET.

June 30, 1915.

ASSETS.		LIABILITIES.	
Investments:		Capital stock:	
Property investment—Road and equipment:		Common stock.....	\$110,839,100.00
Road.....	\$363,307,390.87		
Equipment.....	77,853,368.11	Long term debt:	
General expenditures.....	174,270.28	Bonds held by the public.....	\$181,690,000.00
Sinking funds:		Bonds held by trustees, account sinking funds.....	21,850,400.00
Book assets.....	\$21,723,505.99	Bonds owned by the Company, unpledged.....	10,971,600.00
Par value of Company's own issues included.....	21,850,400.00	Bonds owned by the Company, pledged.....	31,000.00
Deposits in lieu of mortgaged property sold.....	44,631.05	Total.....	\$214,543,000.00
Miscellaneous physical property.....	1,449,557.01	Less bonds held by or for the Company, included in above.....	32,853,000.00
Investments in affiliated companies:		Total long term debt.....	\$181,690,000.00
Stocks.....	\$27,574,645.01		
Bonds.....	1,590,622.93	Current liabilities:	
Advances.....	5,620,503.06	Traffic and car-service balances payable.....	\$1,807,328.31
Other investments:		Audited accounts and wages payable.....	6,047,293.04
Stocks.....	\$24,067.91	Miscellaneous accounts payable.....	309,367.71
Bonds.....	165,498.00	Interest matured unpaid.....	1,689,945.00
Notes.....	97,187.18	Dividends matured unpaid.....	445.25
Miscellaneous.....	3,035.00	Funded debt matured unpaid.....	6,000.00
Total investments.....	\$477,777,882.40	Unmatured interest accrued.....	1,118,246.66
Current assets:		Other current liabilities.....	442,477.49
Cash.....	\$7,123,451.12	Total current liabilities.....	\$11,421,103.46
Time deposits.....	10,000.00		
Loans and bills receivable.....	4,084,420.59	Unadjusted credits:	
Traffic and car-service balances receivable.....	809,841.31	Tax liability.....	\$95,310.00
Net balance receivable from agents and conductors.....	2,501,597.65	Insurance reserves.....	1,206,830.01
Miscellaneous accounts receivable.....	2,537,892.58	Operating reserves.....	565,000.00
Material and supplies.....	7,171,219.92	Accrued depreciation—Equipment.....	30,583,344.86
Total current assets.....	\$24,238,423.17	Other unadjusted credits.....	1,325,963.54
Deferred assets:		Total unadjusted credits.....	\$33,776,448.41
Working fund advances.....	\$23,202.91		
Other deferred assets.....	1,000.00	Corporate surplus:	
Total deferred assets.....	\$24,202.91	Additions to property since June 30, 1907, through income.....	\$30,486,904.50
Unadjusted debits:		Funded debt retired through income.....	14,642,465.38
Insurance premium paid in advance.....	\$148,096.36	Sinking fund reserves.....	22,108,870.97
Discount on funded debt.....	2,353,658.84	Appropriated surplus not specifically invested.....	3,740,856.00
Other unadjusted debits.....	2,043,138.04	Profit and loss.....	97,879,653.81
Total unadjusted debits.....	\$4,544,804.14	Total corporate surplus.....	\$168,858,750.75
Grand total.....	\$506,585,402.62	Grand total.....	\$506,585,402.62

1914. It was constructed by the Kansas City Terminal Railway Company, an organization consisting of all of the important Kansas City lines.

The Denver Union Terminal Railway, which is used by all the railroads of that city, is being remodeled and upon completion will be a thoroughly modern terminal.

The Chicago Union Station Co. has been organized by your Company, the Pennsylvania Lines and the Chicago, Milwaukee & St. Paul Ry. Work preparatory to the construction of a modern passenger terminal in Chicago has been begun and the structure, when completed, will not only avoid the serious congestion of the present station, by furnishing ample room for present needs, but will also allow for expansion of business in the future.

Other passenger stations and freight depots have been constructed where required.

The ruling grade between Chicago and Aurora has been reduced to .3%, which will result in more economical handling of tonnage rated freight trains between Mendota and Chicago and avoid reduced tonnage east of Aurora.

Following is the report of the General Auditor, with statements prepared by him.

By order of the Board of Directors.

HALE HOLDEN, President.

INCOME ACCOUNT.

OPERATING INCOME.

Railway operating revenues:

Transportation:

Freight	\$62,509,483.62	
Passenger	20,185,564.28	
Excess baggage	249,332.41	
Parlor and chair car	4,650.40	
Mail	2,464,372.90	
Express	2,176,214.07	
Other passenger train	8,710.32	
Milk	368,183.16	
Switching	1,217,513.31	
Special service train	45,749.01	
Other freight train	150.00	\$89,229,623.48

Incidental:

Dining and buffet	\$ 601,974.05	
Hotel and restaurant	71,143.06	
Station and train privileges	7,585.62	
Parcel room	12,721.88	
Storage—Freight	35,585.35	
Storage—Baggage	17,885.57	
Demurrage	265,540.27	
Telegraph and telephone	236,907.76	
Stock yards	238,934.97	
Rent of bldgs. & other prop.	134,589.06	
Miscellaneous	182,034.17	\$ 1,805,801.76

Joint facility—Cr.	\$ 105,327.09	
Joint facility—Dr.	15,691.66	\$ 89,635.43

Total railway operating revenues \$91,125,060.67

Railway operating expenses.

Maintenance of way and structures	\$ 11,360,210.26
Maintenance of equipment	15,415,122.75
Traffic expenses	1,629,675.95
Transportation expenses ..	29,117,163.60
Miscellaneous operations ..	832,153.90
General expenses	2,087,040.58
	\$60,441,367.04

Net revenue from railway operations		\$30,683,693.63
Railway tax accruals	\$ 4,081,507.88	
Uncollectible railway revenues	24,157.35	4,105,665.23

Total operating income \$26,578,028.40

NONOPERATING INCOME:

Hire of equipment	\$	202,472.80	
Joint facility rent income ..		505,493.50	
Income from lease of road ..		3,070.71	
Miscellaneous rent income ..		140,704.35	
Miscellaneous nonoperating property	Dr.	17,666.72	
Dividend income		18,895.84	
Income from funded... securities		40,880.67	
Income from unfunded securities and accounts ..		327,854.18	
Income from sinking funds ..		2,364.08	
			\$1,224,069.41

* Gross income \$27,802,097.81

DEDUCTIONS FROM GROSS INCOME:

Hire of equipment.....	\$ 333,098.58	
Joint facility rents.....	1,154,170.68	
Rent for leased roads.....	21,702.82	
Miscellaneous rents.....	40,502.36	
Miscellaneous tax accruals.....	12,751.31	
Interest on funded debt.....	7,118,898.27	
Interest on unfunded debt.....	24,032.26	
Amortization of discount on funded debt.....	55,010.56	
Miscellaneous income charges.....	11.55	8,760,178.39

Net income \$19,041,919.42

DISPOSITION OF NET INCOME:

Income applied to sinking funds	\$ 1,753,006.79
Dividend appropriations of income:	
2 per cent Sept. 25, 1914..	\$ 2,216,782.00
2 per cent Dec. 26, 1914..	2,216,782.00
2 per cent March 25, 1915..	2,216,782.00
2 per cent June 25, 1915..	2,216,782.00
Income appropriated for investment in physical property	8,867,128.00
	3,340,669.28
	<u>\$13,960,804.07</u>
Income balance transferred to profit and loss.....	\$ 5,081,115.35

FUNDED DEBT OF THE CHICAGO, BURLINGTON & QUINCY RAILROAD COMPANY

Designation of Bond of Obligation.	Term.		Nominally Outstanding, Held by or for Company.							Interest.	
	Date of Issue.	Date of Maturity.	Total Par Value Authorized.	Total Nominally or Actually Outstanding.	In Treasury.	Pledged as Collat- eral.	In Sinking Funds.	Actually Outstanding In Hands of Public.	Rate.	When Payable.	Accrued During Year on Bonds Actually Outstanding.
MORTGAGE BONDS											
C. B. & Q. R. R.:											
General mortgage.....	Mar. 2, 1908	Mar. 1, 1958	\$ 75,120,000	\$ 75,120,000	\$ 9,873,000			\$ 65,247,000	4	M. & S.	\$2,608,546.66
Illinois Division.....	July 1, 1899	July 1, 1949	50,835,000	50,835,000	384,000			50,451,000	3½	J. & J.	1,765,785.00
Illinois Division.....	July 1, 1899	July 1, 1949	34,165,000	34,165,000	189,000			33,976,000	4	J. & J.	1,359,040.00
Iowa Division mort- gage sinking fund bonds.....	Oct. 1, 1879	Oct. 1, 1919	3,000,000	1,960,000	16,000			1,944,000	5	A. & O.	99,259.59
Iowa Division mort- gage sinking fund bonds.....	Oct. 1, 1879	Oct. 1, 1919	12,502,000	5,265,000	180,000			5,085,000	4	A. & O.	210,013.64
Nebraska extension mortgage sinking fund bonds.....	May 1, 1887	May 1, 1927	29,441,000	21,639,000	89,000	\$31,000		21,519,000	4	M. & N.	869,910.76
B. & M. R. R. in Nebraska:											
Consolidated mortgage sinking fund bonds..	July 1, 1878	July 1, 1918	13,751,000	13,613,000	53,400		\$12,052,400	1,507,200	6	J. & J.	118,051.49
Republican Valley R. R.:											
Mortgage sinking fund bonds.....	July 1, 1879	July 1, 1919	1,078,000	932,800			857,400	75,400	6	J. & J.	6,684.04
Tarkio Valley R. R.:											
Mortgage bonds.....	June 1, 1880	June 1, 1920	210,000	19,000	1,000			18,000	7	J. & D.	1,452.50
Nodaway Valley R. R.:											
Mortgage bonds.....	June 1, 1880	June 1, 1920	188,000	17,000	3,000			14,000	7	J. & D.	1,300.84
Collateral Trust Bonds.											
C. B. & Q. R. R.:											
Sinking fund bonds (Denver Extension).	Dec. 1, 1881	Feb. 1, 1922	7,968,000	7,310,200	131,200		5,745,600	1,433,400	4	F. & A	60,084.32
PLAIN BONDS											
C. B. & Q. R. R.:											
Sinking fund bonds....	Sept. 1, 1881	Sept. 1, 1921	4,300,000	3,667,000	52,000		3,195,000	420,000	4	M. & S.	18,769.43
Total			\$232,558,000	\$214,543,000	\$10,971,600	\$31,000	\$21,850,400	\$181,690,000			\$7,118,898.27

COLORADO & SOUTHERN RAILWAY COMPANY—SIXTEENTH ANNUAL REPORT

To the Stockholders of the Colorado & Southern Railway Company:

Herewith is submitted the Sixteenth Annual Report of this Company, for the year ended June 30, 1915.

There are included the reports of A. D. Parker, Vice-President, and J. H. Bradbury, General Auditor.

By order of the Board of Directors,

HALE HOLDEN,
President.

MR. HALE HOLDEN,
President,

Chicago, Ill.

DEAR SIR:—I herewith submit the report for the fiscal year ended June 30, 1915, which report combines the operations and affairs of the lines operated by the companies named on the previous page, and which are herein designated as the

"COLORADO & SOUTHERN LINES"

Per Cent.	1915.	OPERATING REVENUES	1914.	Per Cent.
70.69	\$ 9,960,043.59	Freight Revenue.....	\$ 9,053,885.00	68.47
23.38	3,294,688.32	Passenger Revenue.....	3,345,489.44	25.30
1.66	234,206.23	Mail Revenue.....	226,844.16	1.72
1.64	230,757.01	Express Revenue.....	260,598.66	1.97
1.91	269,503.51	Misc. Transportation Rev..	252,452.15	1.91
		Revenue from Operations other than		
.61	85,159.65	Transportation	76,933.03	.58
.11	16,157.47	Joint Facilities.....	6,534.92	.05
100.00	\$ 14,090,515.78	Total Operating Revenue..	\$13,222,737.36	100.00

OPERATING EXPENSES

12.26	\$ 1,728,253.99	Maintenance of Way and Structures	\$ 1,818,146.33	13.75
19.10	2,691,585.14	Maintenance of Equipment.....	2,184,784.04	16.52
1.53	215,445.89	Traffic Expenses.....	216,445.43	1.64
34.64	4,881,074.01	Transportation Expenses..	5,055,015.62	38.23
3.52	494,489.13	General Expenses.....	471,611.16	3.57
71.05	\$ 10,010,848.16	Total Operating Expenses..	\$ 9,746,002.58	73.71

28.95	\$ 4,079,667.62	Net Operating Revenue..	\$ 3,476,734.78	26.29
	17,565.12	Net Deficit from Outside Operations	16,956.19	

	\$ 4,062,102.50	Total Net Revenue.....	\$ 3,459,778.59	
	\$ 616,053.40	Taxes Accrued.....	\$ 638,450.24	
	483.02	Uncollectible R'y Revenue.....		
	\$ 616,536.42		\$ 638,450.24	

	\$ 3,445,566.08	Operating Income.....	\$ 2,821,328.35	
--	-----------------	-----------------------	-----------------	--

OTHER INCOME

	\$ 285,063.62	Rents	\$ 262,487.79	
	172,811.84	Miscellaneous Interest...	627,915.08	
	\$ 457,875.46	Total Other Income.....	\$ 890,402.87	
	\$ 3,903,441.54	Gross Corporate Income..	\$ 3,711,731.22	

DEDUCTIONS FROM GROSS CORPORATE INCOME

	\$ 363,730.30	Rents	\$ 177,662.85	
	5,631.02	Miscellaneous Interest...	817.01	
	2,842,249.47	Interest Accrued on Funded Department	2,853,001.18	
	14,143.27	Extinguishment of Discount on Securities Sold.....	10,300.80	
	61,382.56	Sinking Funds.....	61,029.76	
	62,538.37	Miscellaneous Deductions..	202,768.49	
	\$ 3,349,674.99	Total Deductions.....	\$ 3,305,580.09	
	\$ 553,766.55	Net Corporate Income...	\$ 406,151.13	
		Dividends	340,265.84	
	\$ 553,766.55	Surplus	\$ 65,885.29	

Compared with the preceding year, the total operating revenues show an increase of \$867,778.42, or 6.56%. The operating expenses show an increase of \$264,845.58, or 2.71%. The net operating revenue shows an increase of \$602,932.84, or 17.34%.

Adjustment in tax accruals makes the taxes show a decrease of \$22,396.84, or 3.50%. The taxes as assessed and paid, however, differed little from the previous year.

Operating Income shows an increase of \$624,237.73, or 22.12%. The percentage of operating revenues required for operating expenses was 71.05%, as compared with 73.71% in the previous year. It required 72.81% of the Gross Corporate Income to meet interest on funded debt this year, as compared with 76.86% in the previous year.

Credits to Other Income on account of Miscellaneous interest show a decrease of \$455,103.24. This is due to the fact that this Company received no interest during the year on their investment in securities of the Trinity & Brazos Valley Railway Company.

As reflected on pages 17 and 19 there was appropriated from surplus \$1,000,000.00 to establish a reserve to provide for possible losses arising out of the depreciation in value of the securities of certain railroads owned by The Colorado and Southern Railway Company.

During the fiscal year the following securities have been issued and added to the Long Term Debt of these Companies:

Fort Worth & Denver City Railway Company Equipment Trust, Series C.....	\$1,120,000.00
---	----------------

and the following Long Term Debt obligations have been retired:

First Mortgage Bonds of C. S. & C. C. D. Ry. Co. through Sinking Fund	\$ 58,000.00
Deferred Rentals under Equipment Leases.....	273,226.18
Making net increase in Long Term Debt of.....	\$ 788,773.82

There were charges to capital account aggregating \$1,110,895.63 for Additions and Betterments to property. Of this amount there was expended for:

Structures and Machinery.....	\$ 16,380.41
Substituting permanent bridges for wooded ones.....	40,302.26
Laying tie plates, main line.....	59,700.55
Additional Equipment	954,555.37
Various other Additions and Betterments.....	39,957.04

New equipment purchased and placed in service during the year included:

Five Santa Fe Type automatic stoking and superheated locomotives of 73,440 pounds tractive power each.	
Ten Mikado Type oil-burning, superheated locomotives of 52,300 pounds tractive power each.	
1,200 40-foot steel center-sill box cars, forty-ton capacity.	
300 40-foot steel center-sill stock cars, forty-ton capacity.	
200 steel gondola coal cars, fifty-ton capacity.	

During the year a number of spur tracks and industry tracks were abandoned as they were of no further service to the Company, and credits equal to the original cost of the property were passed to the various Additions and Betterments accounts.

The following equipment was condemned and credited to Property Account:

Sixteen steam locomotives, five passenger train cars, six hundred fifty-nine freight train cars and seventeen work cars.

During the fiscal year there was credited to Property Account the Discount on Securities of this Company sold between July 1, 1909, and June 30, 1910.

During the year the movement of Products of Agriculture has shown a substantial gain, both in respect to the tonnage moved and the revenue received.

Products of Animals show a slight decrease.

The tonnage and revenue from Products of Mines have not returned to the normal capacity, and still show a considerable decrease from what this Company was accustomed to handle in previous years. The total tonnage handled and the total freight revenue received show a substantial increase over the previous year. Present prospects would indicate an increased tonnage of both Products of Mines and Products of Agriculture over the lines of this Company's property during the next year.

It was noted last year that the property of The Trinity & Brazos Valley Railway Company was placed in the hands of a Receiver on June 16, 1914, and was operated during the year by such Receiver. His operating results show a net operating revenue of \$49,594.24, against which net revenue, taxes and miscellaneous items were charged, creating a net deficit to Income for the twelve months of \$42,626.96.

A recent contract has been made by the Receiver whereby he will be able to operate freight trains between Fort Worth and Waxahachie over the Houston & Texas Central Railway, making a direct connection at Fort Worth with the Colorado & Southern Lines. This, it is believed, will increase the earnings of the Receiver.

The following statistical tables have been compiled in the form required for the annual report of carriers to the Interstate Commerce Commission:

INCOME STATEMENT.

JUNE 30, 1915.

Transportation:		
OPERATING REVENUES.		
Freight	\$ 9,960,043.59	
Passenger	3,294,688.32	
Excess Baggage	29,021.09	
Mail	234,206.23	
Express	230,757.01	
Other Passenger Train....	1,504.79	
Switching	231,924.38	
Special Service Train	6,862.16	
Other Freight Train.....	191.09	\$13,989,198.66

Incidental:		
Dining and Buffet.....	\$ 79,640.70	
Hotel and Restaurant....	2,821.35	
Station and Train Privileges	18,408.60	
Parcel Room	1,141.56	
Storage Freight	2,383.68	
Storage Baggage	4,244.19	
Demurrage	45,857.17	
Rent of Buildings and Other Property	5,557.71	
Miscellaneous	7,566.74	\$ 167,621.70

Joint Facilities:		
Joint Facilities—Cr.....	\$ 16,179.70	
Joint Facilities—Dr.....	22.23	\$ 16,157.47

Total Operating Revenues..... \$14,172,977.83

OPERATING EXPENSES.		
Maintenance of Way and Structures	\$1,741,313.17	
Maintenance of Equipment...	2,723,291.50	
Traffic Expenses.....	215,497.05	
Transportation Expenses...	4,908,457.09	
Miscellaneous Operations ..	81,235.01	
General Expenses	441,090.61	\$10,110,875.33

Net Operating Revenue		
Railway Tax Accruals	\$ 616,053.40	\$ 4,062,102.50
Uncollectible Railway Revenue	483.02	\$ 616,536.42
Operating Income.....		\$ 3,445,566.08

INCOME STATEMENT—(Continued)

OTHER INCOME.		Miscellaneous Deductions.....	\$33,413.31	\$ 3,288,292.43
Income from Lease of Road.....	\$ 239,702.82	Net Income.....		\$ 615,149.11
Joint Facility Rent Income.....	24,550.20	DISPOSITION OF NET INCOME.		
Miscellaneous Rent Income.....	20,810.60	Appropriations of Income to Sinking Funds.....		\$ 61,382.56
Separately Operated Properties Profit.....	1,233.24	Income Balance Transferred to Profit and Loss....		\$ 553,766.55
Dividend Income.....	8,133.00	PROFIT AND LOSS STATEMENT.		
Income from Funded Securities.....	113.87	Credit:		
Income from Other Securities and Accounts.....	39,192.45	Balance June 30, 1914.....	\$ 2,655,451.65	
Miscellaneous Income.....	124,139.28	Balance for Year brought forward from Income Account.....	\$ 553,766.55	
Gross Income.....	\$ 3,903,441.54	Profit from Sale of Investment Securities.....	263,934.00	
DEDUCTIONS FROM GROSS INCOME.		Miscellaneous Credits.....	135,691.51	\$ 3,608,843.71
Hire of Equipment—Balance.....	\$ 303,856.48	Debit:		
Joint Facility Rent Deductions.....	45,253.91	Appropriations of Surplus....	\$ 1,391,652.06	
Miscellaneous Rent Deductions.....	14,619.91	Miscellaneous Debits.....	254,617.47	1,646,269.53
Interest Deductions for Funded Debt.....	2,842,249.47	Balance Credit June 30, 1915.....		\$ 1,962,574.18
Other Interest Deductions.....	5,631.02			
Amortization of Discount on Funded Debt.....	14,143.27			
Separately Operated Properties—Loss.....	29,125.06			

GENERAL BALANCE SHEET.

JUNE 30, 1915.

ASSETS.		LIABILITIES.	
Investments:		Capital Stock:	
Investment in Road and Equipment.....	\$110,954,697.89	Common Stock.....	\$ 31,021,484.00
Sinking Funds.....	412.57	Preferred Stock.....	17,000,000.00
Deposits in lieu of Mortgage Property Sold.....	13,035.40	Total Stock.....	\$ 48,021,484.00
Miscellaneous Physical Property.....	4,710.00	Long Term Debt:	
Investments in Affiliated Companies:		Funded Debt Unmatured—	
Stocks.....	\$ 446,228.21	Total Book Liability.....	\$68,113,346.55
Bonds.....	10,200,498.05	Held by Carrier.....	5,218,446.55
Advances.....	18,995.88	Actually Outstanding.....	\$ 62,894,900.00
Other Investments:		Current Liabilities:	
Stocks.....	\$ 1,021,610.30	Traffic and Car Service Balances Payable.....	334,186.49
Advances.....	413,477.44	Audited Accounts and Wages Payable.....	1,048,843.52
Total Investments.....	\$123,073,665.74	Miscellaneous Accounts Payable.....	1,752.95
Current Assets:		Interest Matured Unpaid.....	84,445.00
Cash.....	\$ 1,561,710.79	Dividends Matured Unpaid.....	214.60
Special Deposits.....	85,812.73	Unmatured Interest Accrued.....	627,988.39
Loans and Bills Receivable.....	7,850.00	Unmatured Rents Accrued.....	4,743.30
Traffic and Car Service Balances Receivable.....	271,403.21	Other Current Liabilities.....	30,863.81
Net Balance Receivable from Agents and Conductors.....	165,803.67	Total Current Liabilities.....	\$ 2,133,038.06
Miscellaneous Accounts Receivable.....	304,340.96	Deferred Liabilities:	
Material and Supplies.....	1,227,006.98	Other Deferred Liabilities.....	\$ 10,853.98
Rents Receivable.....	20,871.42	Unadjusted Credits:	
Other Current Assets.....	6,387.98	Tax Liability.....	\$ 463,168.56
Total Current Assets.....	\$ 3,651,187.74	Accrued Depreciation—Equipment.....	3,919,526.77
Deferred Assets:		Other Unadjusted Credits.....	80,855.11
Working Fund Advances.....	\$ 1,037.73	Total Unadjusted Credits.....	\$ 4,463,550.44
Other Deferred Assets.....	30,104.15	Corporate Surplus:	
Total Deferred Assets.....	\$ 31,141.88	Additions to Property through Income or Surplus.....	\$ 6,208,571.39
Unadjusted Debits:		Funded Debt Retired through Income or Surplus.....	402,000.00
Rents and Insurance Premiums Paid in Advance.....	\$ 17,786.55	Sinking Fund Reserves.....	31,626.55
Discount on Funded Debt.....	299,380.94	Appropriated Surplus Not Specifically Invested.....	1,000,000.00
Other Unadjusted Debits.....	55,435.75	Total Appropriated Surplus.....	\$ 7,642,197.94
Securities Issued or Assumed—Unpledged.....	\$5,218,446.55	Profit and Loss Balance.....	1,962,574.18
Total Unadjusted Debits.....	\$ 372,603.24	Total Corporate Surplus.....	\$ 9,604,772.12
Grand Total.....	\$127,128,598.60	Grand Total.....	\$127,128,598.60

Railway Age Gazette

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WE GUARANTEE, that of this issue 8,750 copies were printed; that of these 8,750 copies 7,294 were mailed to regular paid subscribers to the weekly edition, 155 were provided for counter and news companies' sales, 1,038 were mailed to advertisers, exchanges and correspondents, and 263 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 450,900, an average of 9,202 copies a week.

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GENERAL NEWS SECTION.....

*Illustrated.

It appears that the optimism inspired by the generosity of the Missouri Public Service Commission, in allowing the railroads

The Commission Giveth and the Commission Taketh Away

cents a mile for round trip tickets and 2 cents a mile for mileage books, whereas the roads had asked for a fare of 3 cents a mile in place of the existing fare of 2 cents. The decision, while granting less than the railroad men had declared necessary, bore the semblance of a well-intended compromise, at least. But the executive officers of the Missouri roads, after a study of the commission's order, point out that "the conditions under which

of the state to make general advances in their freight and passenger rates, was to a certain extent unfounded. The commission authorized the roads to charge 2½ cents a mile for one-way tickets, 2¼

the advance is permitted prevent the railroads from getting it," because they are required to sell 500 and 1,000 mile mileage tickets, good for bearer and any number of persons, to be used within one year, at the rate of 2 cents a mile. Under these conditions it is evident that the sale of individual one-way or round trip tickets will be materially reduced. Mileage books are ordinarily sold under certain restrictions which confine their use to persons who travel extensively, such as commercial travelers, on the theory that a wholesale business is entitled to a reduced rate. The order of the commission brings the purchase of these tickets within the reach of the majority of travelers at a reduction of 20 per cent under the rate for one-way tickets and makes possible a practice which prevailed in New England when the standard rate was 3 cents. Hotels, saloons, grocery, cigar and drug stores, and even many local capitalists with \$100 or so to risk, used to buy Boston & Maine mileage books at 2 cents a mile and rent them out to anyone they were willing to trust to return the book with payment for the mileage used at 2¼ cents a mile. This plan of scalping was taken advantage of by people who did not travel enough to warrant the investment of the price of a book of their own and who were therefore not entitled to the reduced rate. The commission advances the threadbare argument that the sale of mileage tickets at this low rate will increase travel, while admitting elsewhere in its opinion that the present 2-cent fare has not increased travel sufficiently to offset the loss in revenue.

The New York Times recently published a large number of figures taken from "Statistics of Railways, 1904-1914, United States," a bulletin issued by the Bureau

Omitted Columns

in

"The Omitted Table"

of Railway Economics. These figures show—although the bulletin itself does not call attention to the fact—that for years the expenses and taxes of the railways have been increasing much faster than their earnings. Under the caption, "The Omitted Table," the Des Moines Register and Leader editorially castigates the New York Times for not having published a table showing the dividends the railways paid during this period. The Freeport (Ill.) Bulletin takes the matter up and chastises the "railway statisticians" for not having presented these figures. The "railway statisticians" were not guilty of the offense attributed to them. The very statistics regarding dividends which the Freeport Bulletin quotes from the Des Moines Register and Leader were taken by it from page 14 of the bulletin compiled and published by the reviled "railway statisticians." The Register and Leader and the Bulletin make much of the fact that the increase in the total dividends declared during this period was 100 per cent. The implication is that the railways were abnormally prosperous. But, curiously enough, the virtuous Register and Leader, in calling attention to "The Omitted Table," itself omitted certain columns from that same table. These columns showed, among other things, that in 1904 42.53 per cent of the railway stock outstanding did not receive a cent of dividend, the average paid on all stock being only 3.5 per cent; and that in 1914, 35 per cent of the stock received no dividend, the average on the total being only 5.2 per cent. Furthermore, total dividends paid in 1914 were swelled abnormally by a distribution of \$80,000,000 made by the Harriman system in connection with its dissolution under a decree of the United States Supreme Court. The average percentage paid in 1913 was only 4.28. Why has the average dividend increased only from 3.5 to 5.2 per cent, while the total dividends paid have increased 100 per cent? The answer is that between 1904 and 1914 the investment in the road and equipment of the railways of the United States increased, according to the statistics of the Interstate Commerce Commission, from \$10,511,537,131 to \$16,936,697,810, or 61 per cent, a great part of which represented capital raised by the sale of stock. In the absence of the large extra disbursement made by the Harriman lines in the effectuation of their dissolution the dividends paid in 1914 would have been only 61 per cent greater than in 1904, although, as already shown, 43 per cent of all the stock outstanding in 1904 received not a cent of dividend. When

the ostentatiously knowing and virtuous Register and Leader set out to correct the New York Times, why did it not finish the story?

The right to hire a man to work ten hours a day, in an ordinarily healthful occupation—if the employee is willing to enter into such a contract—is one of the primary rights enjoyed by everybody under the constitution. This salutary declaration of fundamental law was delivered by the United States Supreme Court, and has just been reaffirmed by the Supreme Court of Massachusetts, as reported last week, page 1026. In other words, laws limiting hours of labor have no just basis except as it is found in the actual needs of the individual or of society. It would be well if this principle were enunciated more frequently by the press and other leaders of public opinion. The higher courts, speaking only at infrequent intervals, and to restricted audiences, seem to be our only impressive mouthpieces for this and many cognate truths, which are of the first importance. This Massachusetts law, under which a criminal indictment was found against the Boston & Maine, limited station-baggage-men's hours to nine a day, and included also other employees around passenger stations, such as crossing tenders. It was a flagrant illustration of the "progressive" character of the labor leaders' demands. They first got a law limiting street railway men's hours; then, the next year—we speak from memory—a similar law making the day an hour shorter; and then the same thing applied to steam railroad employees. Except for the mandate of the court, the successive legislatures apparently could have been induced easily to keep on till the work day was reduced to six hours, or less; or until the labor leader should become ashamed of his own audacity and turn his efforts in some other direction. Not the least noticeable of the harmful tendencies in matters connected with labor legislation is the attitude of the press in its attempts always to be friendly to "the masses." This Massachusetts decision, as printed in the New York Tribune, is headed "Robs Men of Rest Hour." Instead of working from say, 7 to 5, with an hour out for dinner, the station men—unless they can show that they are overworked—will have to work the old-fashioned day, 7 to 6, with one hour out. There may be some occupations in which, for social reasons, the working day should be restricted to 10 hours or less by law; but these must be very few; and certainly that of station baggage-men is not one of them.

THE SMOKE NUISANCE AND ELECTRIFICATION IN CHICAGO

FOR some years there has been a vigorous agitation in favor of legislation to require the railways entering Chicago to electrify their terminals in that city. The principal, and in fact almost the only, argument for such action has been the contention that it is needed to reduce the smoke nuisance. About four years ago the Association of Commerce, the leading civic organization of the city, took a hand in the matter. It created a commission to investigate thoroughly the subject of smoke prevention and electrification of railroad terminals. Four of the members were appointed by the city, four by the railroads and nine by the Association of Commerce. The commission employed a strong staff of experts and made the most comprehensive study, both of smoke prevention and of electrification of terminals ever conducted. The necessary funds were furnished by the railroads.

The conclusions reached by the commission in its report, which has just been made public, and an abstract of which is published in another column, may be briefly summarized. It finds that smoke in the atmosphere probably does not have the deleterious effects on the health usually attributed to it. It finds further that steam locomotives cause only 10 per cent of the total smoke in Chicago. This is only one-half as much as is attributed to furnaces for metallurgical and manufacturing

processes, or low-pressure steam and other stationary heating plants, and only one-fourth as much as is attributed to high-pressure steam and stationary heating plants. Therefore, electrification of all the terminals would not remedy, and in fact would cause only a small and temporary reduction in the smoke nuisance.

As to electrification, the commission has ascertained that its application to all the terminals in Chicago would include 3,476 miles of track, which exceeds the entire mileage of steam railways thus far electrified in the entire world. It does not believe that the best system for electric operation has yet been definitely enough determined to justify, from a technical or a practical point of view, legislation requiring the carrying out at present of such an enormous project. It finds, however, that electrification is technically practical, but financially impractical. The estimated cost in Chicago would be \$178,127,230. Railways which have investigated the subject individually report, however, that for practical operating reasons it would be necessary for them to extend electrification beyond the zone covered by the commission, and this would increase the total cost to \$274,440,630. The commission finds that electrification would make it practicable to effect certain operating economies, but on the other hand, it would cause an enormous increase in fixed charges, and the annual loss which it would cause is placed at \$14,600,000. The loss on the basis of the railways' estimate as to the mileage, which for practical reasons it would be necessary to include, would be much larger.

It is not reasonably to be expected that this report will be received favorably by those who have been agitating the question of electrification in Chicago. But it will be much easier to find fault with the commission than to controvert the evidence it presents or to refute its conclusions. Its finding that smoke it not so harmful to health as has been assumed is important, but not necessarily decisive, since most people will not find it agreeable to live in an atmosphere of smoke, even though assured that its only effect is as a producer of dirt. The evidence given that Chicago is not as smoky as some other cities is rather damaging to the atmosphere of these other cities than creditable to that of Chicago.

Of widely different significance are the data presented showing the relatively small amount of the smoke nuisance which is fairly attributed to steam locomotives. The facts presented demonstrate that legislation requiring electrification cannot be justified by the effect which would be produced on the smoke nuisance, for after the money had been spent, the improvement effected would be so small as not to be noticeable. Electrification would involve the construction of large power houses, which themselves would emit smoke, and in consequence the net reduction in smoke is estimated by the commission at only 5 per cent.

It is being alleged in some quarters that the commission has wasted time and money in investigating the question of the electrification of all the city's terminals, it being asserted that this is not the end toward which the agitation has been directed. But the demand has been for the electrification of all terminals, as can be demonstrated by the records. Every proposed ordinance which has been drafted has provided for general electrification. Furthermore, if it is the electrification of only certain suburban lines that is demanded, then the smoke nuisance has nothing to do with the matter, because the electrification of only a few lines would not materially reduce even the amount of locomotive smoke produced. The commission shows that locomotives engaged in suburban service on all roads contribute only 1.54 per cent of the visible smoke, 1.97 per cent of the dust and cinders of smoke, and less than 1 per cent of the total polluting gases discharged into the atmosphere.

There can hardly be any serious exception taken to the commission's conclusion that, even though electrification in Chicago were desirable, it would be almost impossible to decide what system should be adopted. The Chicago problem involves 38 railroads, as against only 37 steam roads throughout the world

that have been partially electrified. It involves a network of tracks and yards incomparably more extensive and complicated than exists elsewhere. Its solution could not be carried out by individual lines, but would involve joint action by all. In determining the system to be adopted, each line necessarily would think of the conditions on its lines outside of Chicago with which it would have to deal if the use of electricity should be extended. It would, therefore, be impossible to get experts voluntarily to agree as to what system should be adopted in Chicago, and if some system should be adopted under the compulsion of law it is probable that future experience would demonstrate that great and costly mistakes had been made. In view of these views, it would be the height of folly to incur the risk of an investment of \$275,000,000, or even of \$178,000,000, to secure a reduction of perhaps 5 per cent in the smoke in the atmosphere of a single city.

In spite of the engineering and operating difficulties in the way, the commission finds that electrification is technically feasible, but decides that it is financially impracticable. The reasons it presents for this conclusion appear incontrovertible. The Chicago lines, under the requirements of city ordinances, already have spent \$80,000,000 for track elevation and must spend a total of \$150,000,000. They have invested many millions in passenger terminals, and must invest literally hundreds of millions more. If the cost of electrification, in addition to that of these other improvements, were to be spread over their entire traffic, people throughout the country would be required to pay for investments which would benefit Chicago alone. If rates were so adjusted as to make the traffic of Chicago bear the load of all the actual and proposed expenditures, the effects would be disastrous for Chicago. Track elevation and electrification would involve an investment of \$5,000 per mile for every mile of line owned by all the railways entering that city. Certainly, no such enormous burden should be imposed on the railways directly and on the commerce of the country as a whole, or on that of Chicago alone, except for reasons of the greatest potency. That the entire burden, if imposed, would have to be borne by commerce is clear, since the laws do not permit the city to meet any part of the expenditure by taxation.

As already indicated, the commission finds the project "financially impracticable." Each road would have to raise its share of the necessary capital. But while some roads would have no trouble in doing so, others would find it impossible. There are a number of lines running into Chicago which are very weak financially. Three of the important lines are in the hands of receivers, and another has just emerged from bankruptcy. Such roads find it very hard to get new capital, even for improvements which might yield a good return on the investment. But electrification is not in this class of improvements. On most roads it would cause an increase in fixed charges greatly exceeding the savings in operating expenses. Weak roads would therefore find it impossible to raise new capital for this purpose. There are a number of switching and terminal lines which lie almost entirely within the Chicago district. They would be unable to offset by increase in their net earnings outside of Chicago any part of the increase in fixed charges which electrification would cause.

The commission specifically says that its conclusions relate only to electrification of all the steam railroad terminals of Chicago. They have no application to the electrification of the suburban lines of individual railways. It is contended in some quarters that certain suburban lines should be operated by electricity, both for the good of the city and because the roads would benefit by the increase in traffic, and reductions in operating expenses, it is claimed, would result. This argument may have some validity, but the question as to whether it is desirable from the railroad standpoint for certain suburban lines to be electrified is one which their officers are competent to determine. There can be no question regarding the desirability and probability of an increase in electrification of steam railroads; but the problems to be solved are numerous, and they will not

be solved by action on the part of public authorities, who do not possess the expert knowledge necessary for guidance in such matters, or who arbitrarily refuse to give full consideration to all the interests affected.

INCREASING EFFICIENCY AS INDICATED BY LARGER TRAIN LOADS

WHILE the business depression and other unfavorable conditions during the past few years have compelled the railroads to practice a degree of economy that undoubtedly has been too drastic for their best interests and for those of the public they serve, the necessities of the situation have had a salutary effect in one respect in stimulating efforts toward the greatest efficiency.

In the fiscal year 1915 the gross earnings of the railroads of the United States were \$163,000,000 less than in 1914, but the roads succeeded in reducing their operating expenses by \$186,000,000. Nearly half of the reduction was in maintenance expenditures, and much of it represents deferred maintenance that must be made up some time. A little over half of the saving, however, was in transportation expenses, which were reduced 9 per cent per mile. This represents a real saving, which was accomplished by more efficient methods of operation.

One of the most effective ways of improving railroad efficiency is to increase the number of tons of freight per train. Out of 35 important roads whose annual reports for the fiscal year 1915 are available, 28 show increases in their tonnage per freight train, as compared with the previous year, while only 7 show decreases, the average gain for these roads being 22 tons per train, or from an average of 482 tons in 1914 to 504 tons in 1915. The most remarkable feature of this showing is that it was accomplished in a year when most roads had decreases in freight traffic, and when, therefore, the difficulty of increasing train loads was especially great. The list of roads, with their average tons per freight train for 1915 and 1914, is as follows:

Road	Average tons per train		Road	Average tons per train	
	1915	1914		1915	1914
A., T. & S. F.....	442	420	G. N.*	650	663
B. & O.*	692	645	H. V.	1,068	1,036
B. & M.*	333	279	I. C.	523	488
B., R. & P.*	707	694	K. C. S.....	582	545
C. P.	463	464	L. V.	643	645
Cent. of Ga.*	360	347	L. & N.....	347	297
C. & O.....	962	927	M., St. P. & S. S. M.	396	404
C. & A.....	454	479	M. P.*	417	389
C. & N. W.....	443	411	N. C. & St. L.....	215	206
C., B. & Q.....	492	478	N. Y., N. H. & H..	333	304
C. G. W.....	574	512	N. & W.*	841	802
C., M. & St. P.....	459	454	N. P.*	567	573
C., R. I. & P.....	380	362	P. M.*	498	459
C., St. P., M. & O..	360	331	St. L. & S. F.....	378	351
C., H. & D.....	649	636	St. L. S. W.....	345	338
C. & S.....	308	291	Southern	382	339
D. & R. G.....	433	390	S. P.	464	471
D., T. & I.....	477	439			
			Totals	17,637	16,869
			Average	504	482

* Revenue freight only.

An especially noteworthy feature of the improvement in 1915 is the fact that the general average was pulled down by many branch lines where but one train a day is run, particularly in the west, because it was impossible on such lines to reduce train mileage to offset the lighter tonnage, and the increases shown for the systems represent a much greater proportionate improvement on the busier divisions.

Handling a greater tonnage without a proportionate increase in the number of trains has been for many years one of the most vital factors in enabling the railroads of the United States to stand as well as they have an almost continuous reduction of rates in connection with constantly increasing expenses. An examination of their trainload figures reveals an amazing record of increased efficiency. In 1891 the average number of tons per freight train was 179.8, in 1901 it was 307.8 and in 1914 it had increased to 451.8, a gain in 20 years of 152 per cent, and in 10 years of 47 per cent. During most of these years the volume of traffic was increasing, and the only way by which it

could be handled with the available facilities was by increasing the trainload. When traffic declined in 1908, as compared with 1907, the trainload also declined from 357 to 352 tons. With that exception it has increased in every year since 1904. But in 1914, as compared with 1913, and in 1915 as compared with 1914, the traffic declined. The fact that the roads have gone on increasing their train tonnage during these years makes a remarkable showing and indicates clearly the great exertions made by the operating officers to reduce expenses.

In 1894 the railroads of the United States hauled 80,335,000,000 tons of freight one mile and in 1914 a total of 288,319,000,000 tons one mile. This is an increase of 259 per cent; but it was handled with only 42 per cent more train miles. The 1914 ton mileage also represents an increase of 65 per cent over that of 1904, which was 174,522,000, but it required an increase of only 12.5 per cent in train miles. In other words, to have handled the traffic of 1914 with the average train of 1894 would have required running 1,600,000,000 train miles instead of 638,000,000. The saving, 962,000,000 train miles, is 150 per cent of the train miles actually run in 1914.

The average cost of operation per train mile for all trains as shown by the Interstate Commerce Commission reports, was \$1.31 in 1904 and \$1.77 in 1914. The cost per train mile in freight service is considerably higher than the average for both freight and passenger service. While it is impossible to state exactly the average cost of operation for a freight train mile it is evident that a saving of 962,000,000 train miles means a saving of hundreds of millions of dollars annually in operating expenses. When compared with this actual accomplishment, Louis D. Brandeis' "scientific management" schemes for saving the railroads a million dollars a day pale into insignificance. Even the average loading of 307.8 tons in 1904 would have required running 936,000,000 train miles in 1914, instead of the 638,000,000 actually run, so that the saving as compared with 10 years before was 298,000,000 train miles. This was accomplished both by using larger cars, by loading more tons of freight into a car and by using more cars per train. The average number of loaded cars per train was increased from 17.4 in 1904 to 21.4 in 1914, while the average number of tons per loaded car was increased from 17.7 to 21.1.

The amount of the *increase* in tons per train from 1904 to 1914 alone is greater than the total average tons per train for the railways in most other countries. Outside of Canada and Mexico, Germany is the only country in the world whose railways come anywhere near ours in train loading. The figures for some of the principal countries for 1912 are as follows: Canada, 325.3; Germany, 240.4; Mexico, 224.1; India, 184.4; Austria, 180.5; Roumania, 143.7; France, 141.7; Holland, 137.1; Switzerland, 132.8; Japan, 110.7; South Australia, 109.6.

The heavy train loading is the principal element in making possible the low freight rates charged and high wages paid in the United States as compared with foreign countries. The operating expenses for a heavy train are somewhat higher than for a lighter train, because the engine crews receive higher wages on the larger engines, the fuel consumption is greater, the trains often require a longer time in getting over a division, and the increased supervision necessary to secure the most economical loading adds something to the payrolls. These increases per train, however, are more than offset by the reduction in the number of trains run. It is almost true that revenues are measured by ton miles and expenses by train miles.

In view of this showing of savings in operating expenses, the question naturally arises as to why so many railways are complaining that they are in a bad plight financially. This is due partly to the fact that the economy in operation secured by increasing trainloads is partly offset by the increase in investment and fixed charges that it is necessary to incur in order to effect this economy. The investment in reductions in grades and curvature, in heavier rails, more powerful locomotives and longer sidings and passing and yard tracks has greatly increased total interest charges. But the greatest increase in outgo

has been caused by the heavy advances in wages. The railroads in 1914 paid over \$300,000,000 more in compensation to their employees than they would have paid on the basis of the wages in effect in 1904. Without the increase in the average freight trainload, with the consequent savings effected, most of the railways, in the absence of large increases in rates, would have been in the hands of receivers. On many roads the increases in wages, fixed charges and other expenses actually have come faster than trainloads could be increased, and other economies could be effected, and the results have been disastrous.

MISSOURI, KANSAS & TEXAS

THE Missouri, Kansas & Texas has completed the valuation of its property in Oklahoma and has made an estimate of the valuation in Missouri and Kansas based on the Oklahoma valuation. This estimate places the original cost, with additions and betterments, of the system in the three states, exclusive of Texas, at \$58,370 per mile (the company operates 1,660 miles in these three states). The cost of reproduction new is placed at \$68,604 per mile. In the fiscal year ended June 30, 1915, operating income amounted to \$8,603,000. This would be 7 per cent on a capitalization of \$34,000 per mile on the total 3,604 miles of railroad operated.

In 1915 operating income was the largest in the history of the company. The operating ratio in 1915 was 69.81 per cent, the first time this ratio has been below 70 since 1907, and in that year there was allowed for maintenance only 11.13 per cent of the total revenue as against 13.92 per cent in 1915. The operating ratio in 1914 was 72.77 per cent, but the actual economies effected are greater than would be shown by the comparison between 72.77 and 69.81, because the average revenue per ton per mile in 1915 was 9.9 mills as against 10.9 mills in 1914, a decrease of 9.2 per cent. The revenue per passenger per mile was less than half of one per cent greater in 1915 than in 1914, being 2.26 cents. The average revenue trainload in 1915 was 310 tons, comparing with 268 tons in 1914, an increase of 42 tons, or 15.7 per cent.

Total operating revenues in 1915 amounted to \$32,899,000, an increase of \$981,000. The freight revenue was \$22,397,000, an increase of \$2,169,000 over the previous year, and the passenger revenue was \$8,096,000, or \$1,009,000 less than in 1914. The total tonnage of revenue freight in 1915 was 10,135,000, an increase as compared with the previous year of 1,013,000 tons. The total ton mileage of revenue freight was 2,263,782,000, an increase of 413,190,000 ton-miles, or 22.3 per cent. The mileage run by revenue freight locomotives was 7,172,000, an increase of 222,000, or 3.2 per cent.

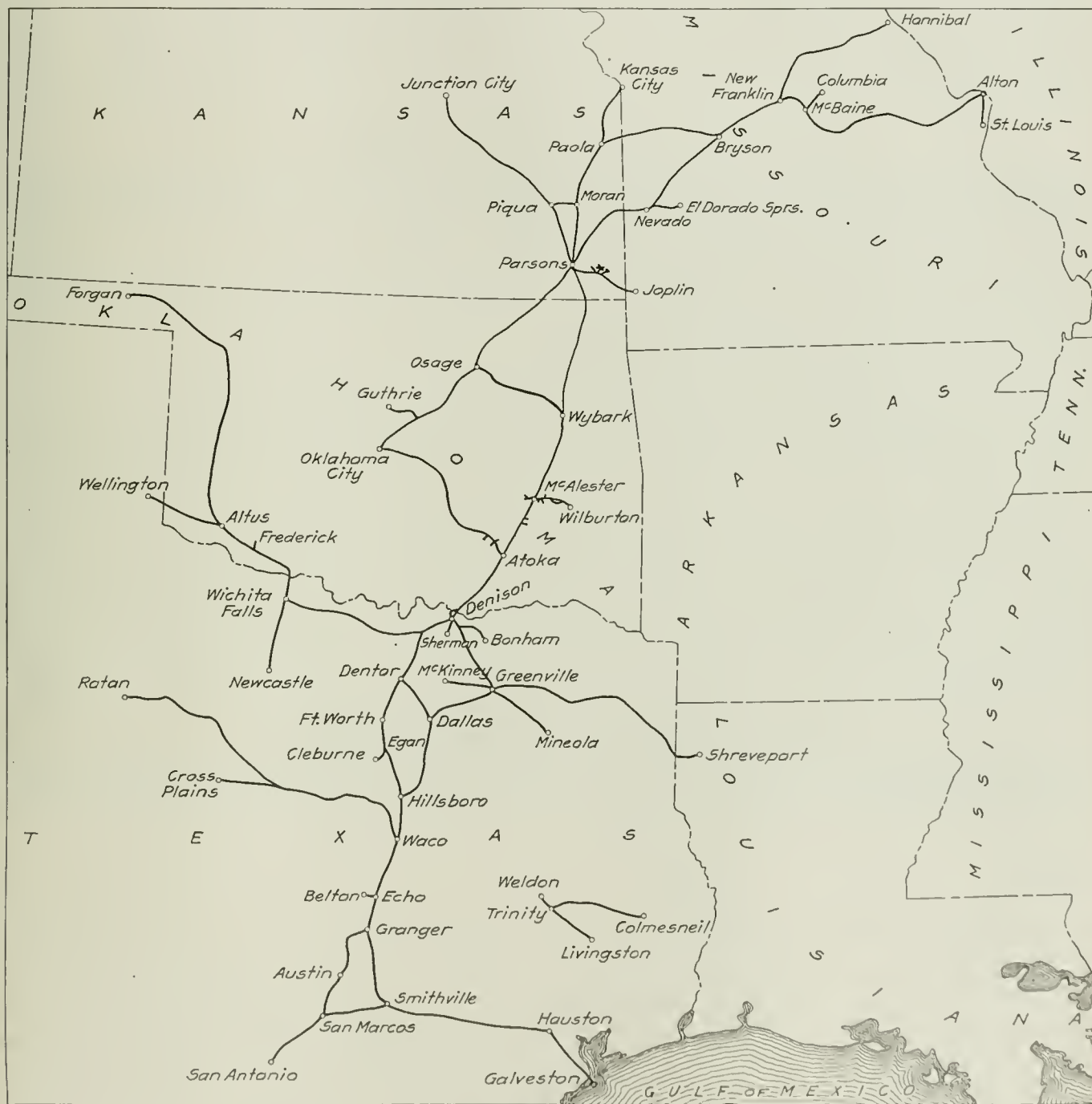
The total number of passengers carried was 6,556,000, a decrease of 779,000, and the passenger mileage was 358,631,000, a decrease of 45,403,000, or 11.2 per cent. Passenger-train mileage was 7,353,000, a decrease of 405,000 train-miles, or 5.2 per cent.

Assuming that the cost per passenger-train mile was approximately the same in 1915 as in 1914, which is a fairly safe assumption, it is fair to arbitrarily make a guess at a figure for the total operating expenses, including taxes and general expenses per train-mile, for passenger service and to assign this figure to the passenger service for both years so as to get some rough figure by which to measure the reduction in expenses per ton-mile of freight. Taking \$1.25 as the average cost per passenger-train mile, the total passenger expenses in 1915 would have been \$9,201,250, and in 1914, \$9,697,500.

In 1915 over 22 per cent more tons were carried one mile than in 1914, at a cost in 1915 less by over \$200,000 than in 1914. There are four principal factors which have brought about this result. In 1914 operating conditions were extraordinarily bad, and while there were floods in 1915 also, conditions were not quite so bad as in the previous year. The organization which has been built up since the new management took hold of the property five years ago has been showing from year to year greater facility in the economical operation of the property. In July, 1914, 30 new Mikado locomotives were placed

in service. In 1915 for the first time the Missouri, Kansas & Texas secured a substantial tonnage of crude petroleum, giving it a traffic which could be moved in heavy tonnage trains north-bound. Each one of these factors is important, although the first one mentioned is probably of much the least importance and the crude petroleum traffic possibly the most interesting. In 1914, 199,000 tons of crude petroleum was hauled. This was only a little over 2.18 per cent of the total traffic handled. In

As previously mentioned, total operating expenses amounted to \$22,968,000, a decrease of 1 per cent. There was spent on maintenance of way \$4,503,000, or but \$72,000 less than in the previous year, and on maintenance of equipment \$4,579,000, which was \$645,000 more than in the previous year. When the present management took the Missouri, Kansas & Texas there was a large amount of deferred maintenance, of equipment especially. In 1915, \$2,508 was spent for repairs per locomotive,



Missouri, Kansas & Texas

1915, 1,056,000 tons of crude petroleum was hauled, or 10.42 per cent of the total tonnage in that year. There was a large increase in the tonnage of grain carried, the total in 1915 amounting to 2,499,000 tons, an increase of 471,000 tons over the previous year. This was the result of large crops and of extraordinarily large shipments of grain for export via gulf ports on account of the war. The tonnage of coal in 1915 amounted to 1,571,000 tons, a decrease of 400,000 tons as compared with the previous year, the decrease being due to general business depression.

\$658 per passenger-train car and \$60 per freight train car. At the end of the year 19.3 per cent of the locomotives owned and 6.73 per cent of the freight cars owned were undergoing or awaiting repairs. Since the close of the fiscal year the equipment has been brought up to a satisfactory standard for the first time in a number of years.

During the year under review, the company spent \$1,494,000 for additions and betterments, exclusive of additions to equipment. Ballast and track laying and surfacing were the most important items of betterment expenditures. There was also

\$165,000 spent for land for transportation purposes. During the year \$1,062,000 was spent for new equipment, and equipment having a cost of \$713,000 was retired. A \$646,000 issue of Mis-

Kansas & Texas on September 26 have been discussed previously in these columns. The annual report which has been issued emphasizes the point which was made in that discussion, namely,



Profile of Great Northern Low Grade Line from St. Paul to Seattle

souri, Kansas & Texas, of Texas equipment trust 5 per cent notes was sold, and various issues of notes and bonds were retired or

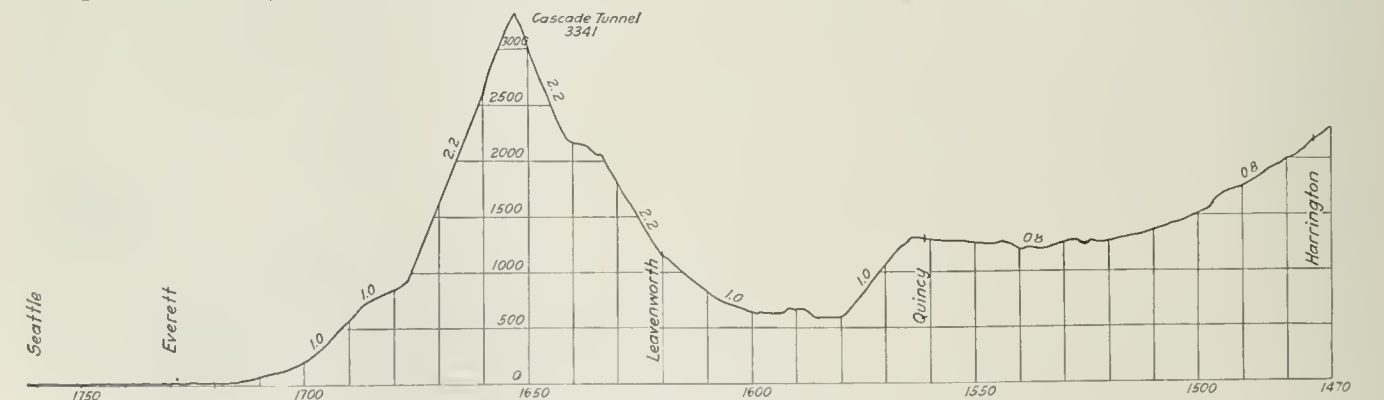
that the receivership was not because the results of operation of the property were bad, but because of special circumstances



Profile of Great Northern Low Grade Line from St. Paul to Seattle

bought for the sinking fund, making a net decrease in the outstanding funded debt of \$379,000. On June 30 there was a total

beyond the control of the management. The Missouri, Kansas & Texas is working its problems out. Its revenue freight train-



Profile of Great Northern Low Grade Line from St. Paul to Seattle

of \$1,039,000 cash, which included \$497,000 cash deposited to pay interest, and there was \$2,810,000 loans and bills payable. After paying expenses, taxes, rentals and all interest charges, the Missouri, Kansas & Texas had a net income available for dividends of \$1,475,00, an increase as compared with the previous year of \$936,000. No dividends were paid and this amount was carried to the credit of profit and loss.

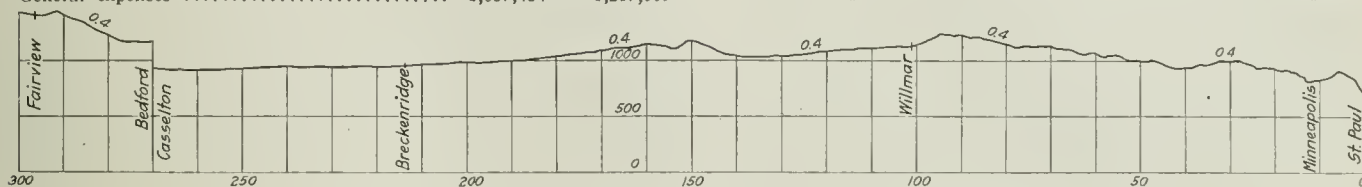
The causes which led up to the receivership of the Missouri,

load was uneconomically low. It has been increased by 38 per cent since 1911. Its relations with Texas have been friendly where they were previously hostile. The company has secured strong banking support, and what is now essential is that it should get a square deal from the state railroad commissions and state legislatures.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated.....	3,865	3,825
Freight revenue.....	\$22,397,364	\$20,228,337
Passenger revenue.....	8,096,063	9,105,242
Total operating revenues.....	32,898,759	31,917,924
Maintenance of way and structures.....	4,502,567	4,574,726
Maintenance of equipment.....	4,579,464	3,934,119
Traffic expenses.....	657,215	737,766
Transportation expenses.....	12,080,328	12,408,688
Miscellaneous expenses.....	267,515	504,713
General expenses.....	1,037,434	1,217,009

against which no securities have been issued. In 1915 apparently the Great Northern was under no necessity of making an uneconomically drastic cut in maintenance appropriations. Total operating revenues in the fiscal year ended June 30, 1915, amounted to \$67,163,000, a decrease as compared with the previous year of \$9,692,000, or 13 per cent. There was \$3,194,000 saved in transportation expenses; a cut in maintenance expenses



Profile of Great Northern Low Grade Line from St. Paul to Seattle

Transportation for investment-Cr.	186,932	150,188
Total operating expenses.....	22,967,592	23,226,832
Taxes.....	1,327,871	1,499,521
Operating income *	8,603,296	7,299,548
Gross income.....	8,818,130	7,516,927
Net income.....	1,474,985	539,227
Dividends.....		261,429
Surplus.....	1,474,985	277,798

* The figures for operating income, gross income, etc., are not absolutely accurately comparable because of changed rules regarding accounting put into effect by the Interstate Commerce Commission, but are approximately comparable.

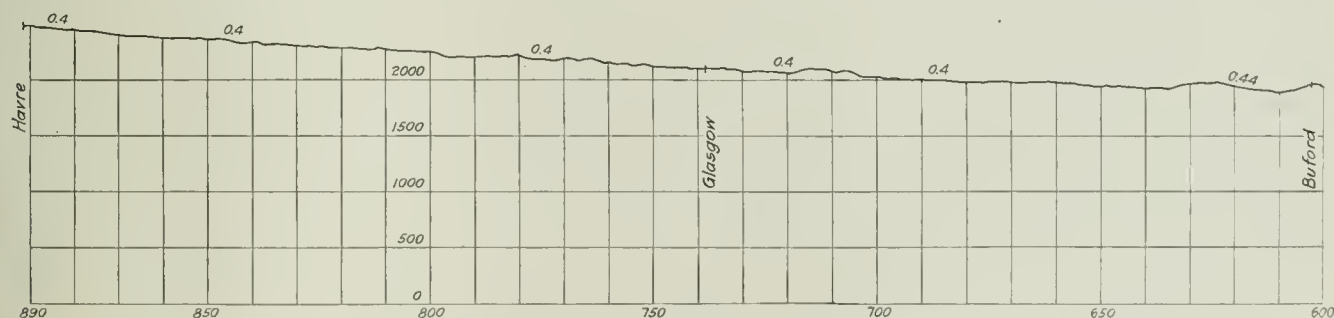
GREAT NORTHERN

THE Great Northern is one of the few railroads in North America that could cut maintenance of way expenses 36 per cent and maintenance of equipment 31 per cent and not lay itself

exactly in proportion to the falling off in revenue would have saved an additional \$3,000,000; the company had \$3,800,000 surplus above its dividend requirements; or a total of nearly \$10,000,000, while loss in revenue was but \$9,692,000.

In concluding his report in 1914, President Hill said: "The company's roadbed, tracks and equipment have been fully maintained and greatly improved. The season's track work was finished by the end of July, a large amount of delayed bridge work was completed, heavy shop forces, maintained during last winter, have been materially decreased, so that, for at least the first half of the coming fiscal year, the expenses of maintenance and betterments should be greatly reduced."

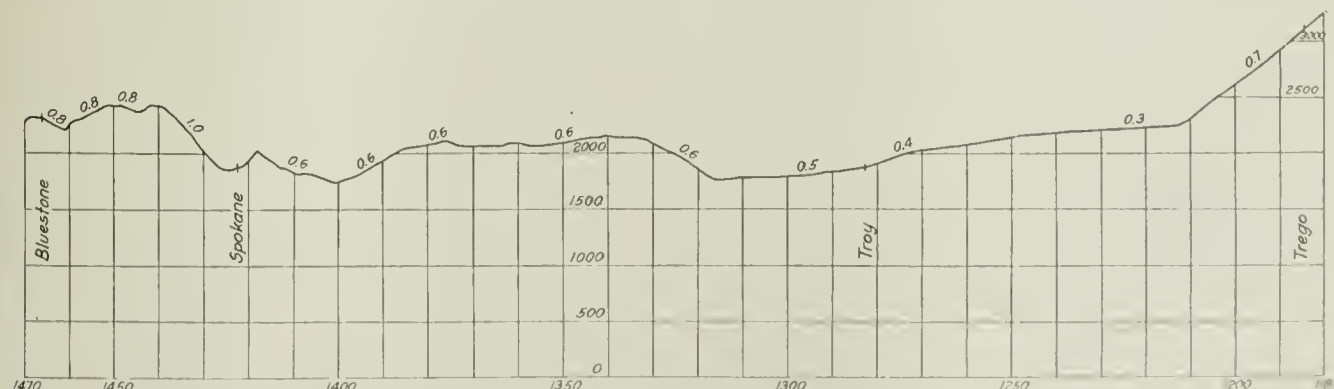
For a great many years the Great Northern has been working toward certain standards, both in trainloading and in main-



Profile of Great Northern Low Grade Line from St. Paul to Seattle

open to the suspicion of inadequate maintenance. This it did in 1915. The Great Northern, like the Southern Pacific, has never been through a receivership; it has never had to live on its own

tenance. These standards in maintenance were reached, apparently, in 1914. It was known, as will be seen from Mr. Hill's statement, that it would be much cheaper to maintain these



Profile of Great Northern Low Grade Line from St. Paul to Seattle

The profile from St. Paul to Surrey is via the new Surrey line, which gives better grades than the old St. Paul line via Fargo. The mileage is only approximately correct, nothing being allowed for a short connection between Castleton and Bedford, for which a profile was not available. The portion of the old main line between Surrey and Grand Forks is shown on the Duluth-Surrey profile on the following page.

fat, if the expression may be permitted. On the other hand, there has been invested in the property approximately \$80,000,000*

* This is arrived at by taking the sum of the fund for permanent improvements and betterments, the cost of additions and betterments made and paid for from that fund, and the profit and loss credit, and subtracting from it the cash on hand.

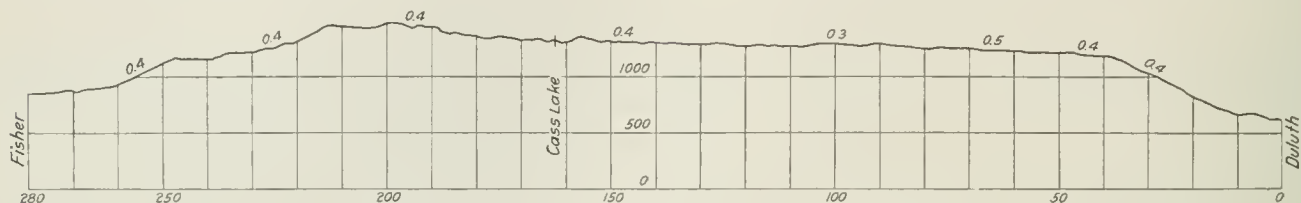
standards than it had been to attain them. How much cheaper it was, however, possibly came as a surprise even to the Great Northern management. This is the real explanation of the cut in maintenance figures.

In the fiscal year ended June 30, 1915, it would appear from

the railroad annual reports which have appeared so far, that there have been larger economies made in transportation expenses by railroads generally than in any year in the last decade. It has only been within the last few years that conditions on many roads were thought to permit the attention being given to heavier trainloading that has been the fundamental principle of Hill railroad operation. The comparison for many roads therefore between 1914 and 1915 is more favorable than it would have been had they set a "Hill" standard in past years. On the other hand, it is possibly the results obtained on the Great Northern in 1915 that made James J. Hill remark recently that he believed that if he were starting over again he would set the peg for trainloading higher than he did.

The ton mileage of freight on the Great Northern in 1915

the line running to Great Falls and Billings. This continuous movement of through trains from the Pacific ocean to St. Paul, with a minimum of service on branch lines and with an insistence on heavy carloading, is the explanation of the Great Northern's success. The vast sums of money which have been invested in the property have been spent with the single purpose of making a transportation machine which would perform its functions at the least possible cost for repairs, renewals or operation. In the carrying out of this scheme, complicated details have been avoided through the adoption of simple standards, and local conditions have been made to adjust themselves to these standards rather than compelling the modification or complication of the standards. An analogous development has taken place in the organization. At least four of the superintendents

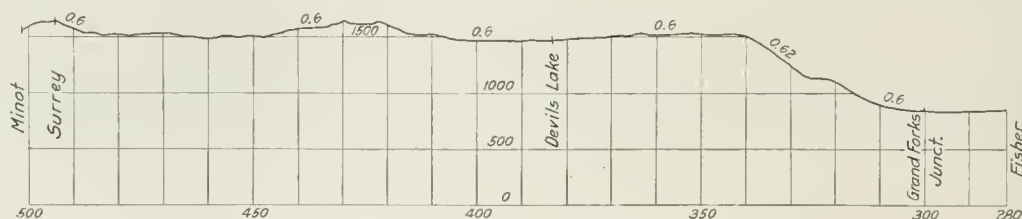


Profile of the Great Northern Line from Surrey to Duluth

was 6,598,341,000, a decrease as compared with the previous year of 17.80 per cent. There was a loss in iron ore tonnage of 4,341,000, or 31.57 per cent, and a loss in the copper ore tonnage of 1,398,000 tons, or 71.57 per cent. These, of course, are the heavy loading commodities. The average trainload in 1915 was 650 tons and in 1914, 663 tons. This is a decrease of less than 2 per cent. It is often pointed out in connection with the Great Northern's remarkably heavy trainload that it has a very large ore business moving from the Missabe range to Duluth. Grades and traffic conditions here permit of enormous trainloads, and when this tonnage is included in the general average make a comparison between the Great Northern and other northwestern transcontinental roads not entirely accurate. Excluding entirely the iron ore tonnage handled from the range to the head of the lakes, the average revenue trainload on the Great Northern in 1915 was 556 tons. The average trainload of revenue freight

now on the Great Northern began railroad work in the section house.

This brief resumé of the Great Northern's history is by way of saying that when the operations in 1915 compare very favorably with the previous year, a very high standard of comparison is being used. During 1915 the company spent a total of \$3,145,000 on additions and betterments, exclusive of additions to equipment. The total spent for equipment was \$1,771,000. A very liberal policy has been pursued toward charges for depreciation. The total to the credit of this account on June 30, 1915, was \$26,542,000, and when the annual report says that this represents "full depreciation to that date (June 30, 1915), on all equipment then in service," the statement may be taken at its full face value. The company had on hand, as was previously mentioned, at the end of the year \$11,591,000 cash and \$10,365,000 bills receivable, with no notes and bills payable, and total cur-



Profile of the Great Northern Line from Surrey to Duluth

The ore tonnage from the iron range passes over only about 75 miles of the eastern end of this line.

from and to the range was 3,174 tons. This is based on ore train movement both ways, that is, a combination of light and empty ore train mileage. It will readily be seen how much of a handicap in the average trainload figures a decrease of 32 per cent in ore tonnage was, and it is a high compliment to the management that average trainloading fell off less than 2 per cent.

The Great Northern has a mass of branch lines which necessitate local freights and light trainloads, but so thoroughly has the principle of heavy trainloading been inculcated in the organization that, exclusive of ore tonnage, the trainload was 556 tons. The heavy movement of traffic is eastbound. Through freight trains are run from Seattle to St. Paul with a full tonnage rating, including equipment behind the drawbar, of over 3,000 tons. There is electric service on the 2.2 grade shown in the accompanying profile up to and through Cascade tunnel, and helper service on the .8 and 1.8 grade up to Summit. At one point only is it necessary to fill out and this is at Cut Bank, where there is ample opportunity to use cars brought in from

rent liabilities of \$6,884,000, which included the unpaid coupons due July 1, 1915, amounting to approximately \$2,769,000.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated.....	8,061	7,781
Freight revenue	\$47,147,314	\$55,084,925
Passenger revenue	13,164,857	15,224,463
Total operating revenues.....	67,162,858	76,854,938
Maint. of way and structures.....	8,270,354	12,831,671
Maintenance of equipment.....	7,152,302	10,322,198
Traffic expenses	1,167,536	1,360,564
Transportation expenses	18,261,030	21,454,754
General expenses	1,258,755	1,127,440
Miscellaneous expenses	815,184	673,147
Transportation for investment—Cr.....	96,886	.....
Total operating expenses.....	36,828,275	47,769,774
Taxes	4,629,668	4,792,478
Operating income	25,704,915	24,292,686
Gross income	28,015,114	27,776,452
Net income	20,618,270	20,453,551
Dividends	16,796,857	15,063,048
Appropriated to "fund for permanent improvements and betterments".....	1,000,000	1,000,000
Surplus	2,096,762	3,311,572

Chicago Association of Commerce Smoke-Abatement Report

The Electrification of Railway Terminals Is Considered Technically Feasible but Financially Impracticable

The complete electrification of the Chicago railroad terminals as a means of abating smoke is technically practical, but financially impracticable. This is the finding of the Chicago Association of Commerce Committee of Investigation on Smoke-Abatement and Electrification of Railway Terminals, which has been studying the problem since early in 1911. The committee, in addition, holds that the elimination of steam locomotives alone would produce a hardly perceptible betterment of the Chicago atmosphere, and urges the appointment of a permanent Municipal Pure Air Commission which both through instruction and coercion shall reduce all sources of air pollution to a minimum.

The association committee, as a result of its painstaking investigations, reaches the following conclusions:

That the minimum cost of electrification as a means in smoke-abatement would be	\$178,127,230
That the more probable cost, due to the necessity for improvements and rearrangements, which would be precipitated by electrification, would be	\$274,440,630
That the least net annual operating deficit produced by electrification would be	\$14,609,743

That Chicago, under the state constitution, cannot aid in meeting this expense.

That an arbitrary or tax on terminal traffic to support the capital for electrification would constitute a burden upon the business interests of Chicago.

That the cost would be so heavy that no court would uphold an electrification ordinance.

That the Chicago electrification would equal the combined electrifications of the whole world, would involve problems never heretofore met, and would be the first ever undertaken for air betterment where terminals were adequate from an operating viewpoint.

That before the steam locomotive is eliminated pollution must first be reduced to a minimum from the three more damaging services, high-pressure steam plants, metallurgical and other manufacturing furnaces and domestic fires.

That the steam locomotive stands third among smoke-producing services, using but 12 per cent of the fuel consumed, and that its elimination would reduce the gaseous pollution of the air only 5 per cent and the solid pollution less than 4 per cent.

That electrification, hydro-electric and other long-distance transmission being inapplicable, would add power-house smoke in quantities sufficient to offset much of the gain through elimination of locomotive smoke.

That suburban passenger services, such as those of the Illinois Central and other roads, produce but 1.54 per cent of the total visible smoke, and 1.97 per cent of all the dust and cinders.

That electrification would involve at least 3,476.4 miles of track.

That electrification would subtract only 1,291,282 tons of coal from the total of 21,208,886 tons now consumed annually in the city.

That all smoke regulation in Chicago and elsewhere has erred in confining itself to the visible aspects of smoke, whereas the really harmful factors are the invisible gases and the solids of combustion, sulphurous gas and mineral dust in particular.

That, despite the fact that Chicago burns more coal annually than any other large city—eight tons per capita as against four for Manchester and one and one-half for Berlin—its air is better than that of most large cities.

That, in Chicago air, the products of combustion constitute only two-thirds the total pollution, the other third being due to avoidable and unavoidable dirt from the general activities of the city and from poor municipal housekeeping.

PRACTICABILITY OF ELECTRIFICATION

As regards the financial practicability of electrification the committee submits these findings:

"The complete electrification of the railroad terminals of Chicago as a betterment to be brought about by the railroads through the investment of free capital is, under present-day conditions, financially impracticable.

"The financial practicability, under present-day conditions, of electrification as it might be applied to individual roads or to a single service of individual roads, is a matter which has not been investigated by the committee and concerning which no opinion is expressed.

"The credit of the individual railroads, the properties of which make up the Chicago railroad terminals, differs greatly. Some have high credit and could secure funds for almost any project which their managements might care to propose; others must prove the profitable character of a particular project before underwriters would consider the placement of their securities; others would find it difficult to borrow on reasonable terms even if the particular project for which the funds are sought promises some return; and still others are in the hands of receivers, their administrative function being performed by the courts. These facts cannot be overlooked in estimating what portion of the potential credit of the railroads is available for the purpose of electrification.

"Certain railroads making up the Chicago terminals operate entirely within the prescribed zone, while for others the great predominance of traffic lies outside the terminal limits. There is more to this contrast than is implied by the fact that some of the roads involved are switching roads while others are long-haul freight and passenger roads. Complete electrification, from a financial point of view, would affect but a relatively small part of the fixed investments of some roads, while for others it would require practically the rebuilding of the property.

"Electrification is a matter which may present greater advantages in connection with certain classes of service than with other classes; for example, the electrification of a railroad having a large suburban business would be more effective in developing opinion favorable to the railroad concerned than the electrification of a road the activities of which are wholly those of freight switching yards. A few only depend upon passenger traffic within the city limits for any considerable amount of their revenue. A larger number derive passenger revenue within the terminals from the movement of through passengers only; while other roads perform little passenger service or no passenger service at all.

"The extent to which individual railroads have recently made large capital expenditures for terminal improvements, track elevation and enlargement of facilities in Chicago, and the extent to which they are committed to further expenditure for these purposes, must have a material bearing on their ability to make expenditures for new projects."

The committee holds that the city might well be expected to share in the burden of electrification, seeing that it would be undertaken for the public benefit, but a perusal of court decisions shows that this is impossible. Moreover, the report points out that it would be impossible for the city, under present constitutional and statutory limitations, at least for some years to come, to raise the necessary funds without the issuance of bonds beyond the authorized limit.

Realizing that many public spirited citizens will not understand its decision, in the light of reports of electrifications in New York and elsewhere, the committee points out the essential differences between electrification here and those installations that have so far taken place. Nowhere in the world, has a steam

railroad been electrified to avoid the pollution of a city's atmosphere. Nowhere has a terminal been electrified when that terminal has been satisfactory from an operating standpoint. No electrification in existence, either in America or abroad, is comparable, in scope and diversity of service, with that involved in the electrification of the Chicago terminals. A wide gap exists between that which has been accomplished and that which would have to be done before local electrification would become a success.

"Some of the electrifications that have been most widely heralded as such were in fact only a subordinate, though necessary part of a greater scheme for terminal enlargement. The New York Central, the New York, New Haven & Hartford, and the Pennsylvania electrifications are not alone projects of electrification; primarily they are an essential detail of a new tunnel entry into the heart of New York City. These projects must necessarily stand upon a different basis than the Chicago proposal, where physical conditions absolutely requiring electrification are lacking and where physical conditions and the nature of the traffic would make electrification extremely difficult."

Notwithstanding the engineering difficulties that would have to be overcome in electrifying the terminals, the committee believes that these difficulties can be surmounted. Its work leads it to the conclusion that the only feasible means of electrification will be by the overhead contact system or trolley. Great obstacles exist to the installation of any system, but it is believed the trolley wire more nearly meets all demands than the third rail. The committee states its conclusions as follows:

"(1) A limited mileage of track in Chicago (approximately 1 per cent of the total) cannot be equipped with any system of contact. The electrification of this not technically feasible.

"(2) While the third-rail system of contact might be extensively used in Chicago, there are, at intervals throughout a considerable percentage of the total trackage, conditions which would make difficult the use of this form of contact. The third rail is applied with difficulty wherever special track work abounds, where street and railroad crossings occur at frequent intervals, and in switching yards. In locations where employees must be between or must cross tracks, as in freight yards, it constitutes a physical obstruction which is highly objectionable. For these reasons the third rail is not considered feasible for general use in the Chicago terminals.

"(3) The facts developed show that any form of overhead contact which can be placed high enough above the rail to give the clearance necessary to permit men to ride and perform necessary duties on the tops of freight cars, is not objectionable from a technical point of view. The application of an overhead contact system to the terminals of Chicago will, however, require the contact wire to be lowered in many places in order that it may pass under structures presenting minimum clearance. The great number of points at which the contact wire must be lowered will require the installation of many warning devices, or the enforcement of rigid rules governing the presence of trainmen on tops of cars."

AIR POLLUTION

The study of atmospheric pollution carried on by the committee is said to be by far the most extensive and scientific ever attempted. All the committee's figures, both on smoke and on electrification, are for the year 1912. The total annual per capita consumption of coal in the city limits was 7.7 tons. The average square-mile consumption of coal within the city limits was 10,797 tons for steam locomotives as against 79,436 tons for all other services combined. In the industrial centers and the heavily populated districts the steam locomotive coal consumption and smoke production is small when compared with the total volume for all sources. In outlying districts where the population is small and where there is no grouping of industries, the steam locomotive sometimes becomes the greatest smoke producer. In only 4 out of the 27 districts in which the area under consideration was divided do steam locomotives use more than

half the total fuel consumed, and these districts are sparsely populated and have very limited smoke-producing services other than smoke from residence chimneys.

High-pressure steam power and heating plants are the principal smoke producers, metallurgical furnaces and other similar manufacturing fires come second, steam locomotives third, and low-pressure steam and other heating plants (domestic fires) fourth. Metallurgical furnaces and other similar manufacturing fires were found guilty of producing 64.26 per cent of all the solids due to combustion, which constitute two-thirds of the total solid pollution of Chicago air. High-pressure steam plants were found to rank second, with a production of 19.34 per cent, low-pressure steam and other domestic fires with 8.6 per cent and steam locomotives with 7.47 per cent, giving them fourth place.

High-pressure steam stationary power and heating plants consume 41.7 per cent of the total fuel used in the city. They are responsible for 44.5 per cent of the visible smoke, and for 19.34 per cent of the total solids, ranking second in this particular. They are responsible for 45 per cent of the total polluting gases of combustion and rank first in this division.

Low-pressure steam and other heating plants (domestic fires) consume 23.63 per cent of the city's coal. They are responsible for 3.93 per cent of the visible smoke, for 8.60 per cent of the solids in smoke and for .23 per cent of the total gases of combustion. In connection with their solid constituents these fires are responsible for 57 per cent of the total hydro-carbons or sooty materials, which makes their smoke the most damaging of any to clothing and similar articles.

The steam locomotive was ascertained to hold fourth place as a coal-consuming service. Of the total consumed, however, 98 per cent is bituminous, practically all of which comes from the fields of Illinois and Indiana. The steam locomotive "gets in bad" as its smoke is rather highly visible because, being emitted near the ground, the public gets the full benefit of the sulphurous fumes and because the cinders emitted, being heavy, fall close to the right of way, making somewhat intensive local pollution but adding little to the general dust of the air. The following is a summing up of the contribution of locomotives, to the smoke nuisance:

"Locomotives in suburban passenger service contribute 1.54 per cent of the visible smoke, 1.97 per cent of the dust and cinders of smoke, and 0.74 per cent of the polluting gases of smoke discharged annually into the atmosphere of Chicago.

"Locomotives in through passenger service contribute 2.07 per cent of the visible smoke, 1.80 per cent of the dust and cinders of smoke, and 0.89 per cent of the polluting gases.

"Locomotives in all passenger services combined, including suburban passenger, through passenger and passenger transfer, contribute 3.80 per cent of the visible smoke, 3.81 per cent of the dust and cinders of smoke, and 1.73 per cent of the polluting gases.

"Locomotives in road freight service contribute 2.01 per cent of the visible smoke, 1.18 per cent of the dust and cinders of smoke, and 0.66 per cent of the polluting gases.

"Locomotives in yard freight service contribute 10.25 per cent of the visible smoke, 1.73 per cent of the dust and cinders of smoke, and 5.17 per cent of the polluting gases.

"Locomotives in all freight services, including road freight, yard freight and freight transfer services, contribute 16.85 per cent of the visible smoke, 3.34 per cent of the dust and cinders of smoke, and 7.57 per cent of the polluting gases."

As a result of its investigation into air pollution the committee finds that one-third comes from sources other than combustion. The air is filled with vegetable, animal and mineral matter which rises from the various activities of the city.

"If all the fires in Chicago were stopped, dust and dirt in the atmosphere would remain. Atmospheric pollution cannot be reduced to a minimum through attention to smoke abatement alone. In order to accomplish its reduction attention must be given to all of those processes and activities of the city which give rise to dust or which deal with the collection and disposal of city dirt and waste."

STUDIES OF OTHER SYSTEMS

As a preliminary to its study of electrification the committee made an investigation into other methods of conducting transportation. It had been hoped that some type of self-propelling motor might be found, and the danger, engineering difficulty and expense of electrification be avoided. But this hope was not justified. The systems studied were the internal combustion

road service, the power requirements of heavy and diversified traffic are still beyond the gasoline-driven unit. The Diesel oil-burning marine engine has the power, but neither type is self-starting, an imperative requirement for switching work.

Much, also, had been hoped from the storage battery, but it was found to lack power, to be too expensive and to share with electrification the disadvantage of producing power-house smoke. The internal combustion motors are also smoke-producing and



Map of the Chicago Terminal Area Included in the Smoke-Abatement Investigation

motor with mechanical drive, electric drive, compressed air drive, hydraulic drive, and a direct-connected motor, the compressed-air motor, the hot-water motor and the electric storage-battery motor.

While it was found that progress had been made in adapting the gasoline engine to the requirements of light or special rail-

are regarded as adding a new hazard of operation through their fuel tanks. Compressed-air and hot-water motors were found impractical, but their use is suggested on those sections that cannot be electrified.

"There is available at this time," says the report, "no form of locomotive, carrying its own power, capable of handling the

traffic of the Chicago railroad terminals which could be substituted for the steam locomotive, and there is no prospect of the immediate development of any such locomotive."

After studying all electrifications now in existence or planned, both in this country and abroad, the committee finds that of the total of 15 American installations, 9 were undertaken because of operation in subways or tunnels, 1 as an experiment to test out economy in long-distance passenger service, 2 to hold suburban business, 1 was equipped for initial electric operation because of charter requirements, and 2 for the purpose of utilizing water power instead of coal.

ELECTRIFICATION ELSEWHERE

Of the foreign electrifications all English lines are classed as suburban. None conducts heavy electric locomotive service and none freight service except in a very minor degree. Practically all electric service is confined to suburban and interurban traffic handled by motor cars. In France the Orleans railway confines its electric locomotive operation to passenger trains through a subway entrance into an underground terminal. It also operates electrically a suburban motor car train service on a line connected with this terminal. The Midi electrification is, in its present stage, experimental only, and for heavy-grade lines where hydro-electric power may be substituted for steam.

In Germany no considerable heavy electric main line traction is as yet in operation; the Dessau-Bitterfeld is a short line and has been operated only in experimental service to test out apparatus and methods. The Magdeburg-Leipzig-Halle line, an important extension of which the Dessau-Bitterfeld line will form a part, when completed will represent the first German trunk line electrification, and the Lauban-Königszell line will represent a second such electrification. Both are predicted upon the production of cheap centralized power either from very low-grade coal or from hydro-electric plants. While both of these lines will conduct a heavy electric locomotive passenger and freight service, neither will conduct a freight-switching service comparable with that in the Chicago terminals. In Switzerland the Loetschberg line and the Simplon tunnel line were electrified primarily because of tunnel operation; other Swiss electrifications are for light multiple unit train service only. All Swiss electrifications utilize cheap water power instead of the more expensive coal fuel. In Italy the Giovi with its branches is the only road which operates heavy electric service. The secondary lines in foreign countries operate a service which is entirely different from American operation, and resembles our interurban.

THE CHICAGO PROBLEM

Thirty-eight steam railroads would be involved in the Chicago project, as against 37 for the rest of the world. Of the Chicago roads 25 maintain passenger and freight service and 23 are classed as trunk lines, while 13 perform transfer or switching service only. Eight of the trunk lines have no main tracks within the city limits but operate trains into the Chicago terminals over the tracks of other companies. Twelve railroads operate wholly within the area of investigation.

It was found that the Chicago mileage would be nearly twice that of all other electrically operated mileage in America, and, exclusive of foreign light-service lines, would be about 15 per cent greater than all existing electrifications in the world. The committee's plan involves several times as much yard track mileage as do all existing American electrifications. The number of electric locomotives required would be approximately 4 times that of all now in service in America and $2\frac{1}{2}$ times the number in the whole world.

Of switching service, which constitutes 59 per cent of the total locomotive mileage and presents a grave problem in that it has never been attempted electrically on a large scale, it has been ascertained that yard freight-switching services, on the basis of car-miles, is more than 65 times as great as that on all existing electrified steam roads in America.

"No similar service elsewhere is handled electrically in any

considerable volume except that on the Giovi railroad of the Italian State Railways and on the New York, New Haven & Hartford in America. The latter operates, in part electrically and in part by steam locomotives, 3 freight yards having in the aggregate 72.7 miles of track, requiring about 90,000 electric locomotive-hours per year and handling about 2,500,000 car-miles per year in switching and transfer service. The freight yard traffic of the Chicago terminals aggregates approximately 3,430,000 locomotive-hours per annum and approximately 164,400,000 car-miles per annum in switching and transfer service."

In its study of air pollution the committee states that even the comparatively small reduction to be expected from electrification is made less significant when it is recollected that substantial progress in recent years has been made in reducing the smoke from locomotives in Chicago. There is every reason to believe also that the process has not yet reached its maximum. The improvement has resulted both from embellishments in locomotive design and from the exercise of greater skill in operation.

"Among the more important changes in design which have aided in smoke abatement are the enlargement of grates, which has resulted in lower rates of combustion per unit area of grate, and consequently in a reduction in the amount of solids in locomotive smoke; the adoption of the brick arch in locomotive fire-boxes, by means of which a reduction in the amount both of visible smoke and of the solid constituents of smoke has been effected; the more efficient design of draft appliances, by which the air currents stimulating the fire have been modified and smoke production diminished; the introduction of superheaters, whereby the efficiency of the locomotive as a whole has been increased, the amount of fuel required for the performance of a given service diminished and the volume of smoke diminished; and the introduction of steam jets and other appliances especially designed to diminish visible smoke.

"Meanwhile, the amount of smoke emitted within the city has been greatly reduced through the exercise of diligence and skill in the operation of locomotives. The importance given this aspect of the matter by the railroads of Chicago is to be seen in the number of smoke inspectors which they have employed.

"When, therefore, the fact is set forth that electrification will serve to reduce the amount of visible smoke entering the atmosphere of Chicago, by 20 per cent, it should not be forgotten that progress in locomotive design and practice, without electrification, has operated and will continue to operate to bring about a reduction which, if smaller than that to be effected through electrification, is nevertheless material; and when emphasis is given the fact that electrification will serve to reduce the amount of the solid constituents of smoke and the gaseous products of combustion entering the atmosphere of Chicago, by 5 per cent, it should not be forgotten that progress in locomotive design and operation can very likely be depended upon to bring about an equal reduction."

"The electric operation of Chicago's railroad terminals must depend upon the existence and operation of a steam-driven electric generating station. The conclusion has been reached that a single power-station, located near the south branch of the Chicago river in the vicinity of Ashland avenue, would satisfactorily meet all requirements. The load center, under the plan of electrification as already defined, falls within the limits of the Union Stock Yards. The location indicated is not far from this point and is such as satisfies other requirements of the problem."

The committee believes that the highest degree of efficiency in electrification can only be secured by joint procedure by all the roads. "It is inconceivable that the different railroads will undertake such a work independently. It may be argued that a course necessary in the case of one railroad may prove quite unnecessary in the case of another, and yet the fullest measure of technical success in the electrification can only be secured when individual interests and preference are subordinate to the requirements of a general plan."

The committee's plan contemplates the electrification of all track within the city limits and the conclusion of electrified

trackage on each railroad as close outside the city limits as is practical. The mileage involved by this conception may be summarized as follows:

	Miles.
1. Main track	1,475.59
2. Yard track	1,456.64
3. Industrial track owned by railroads.....	277.19
4. Industrial track, railroad repair track and shop track so located in streets at grade, in buildings or under structures employed in industrial processes as to require some type of self-propelling motor	37.26
Total	3,476.40

While in general the committee decided to terminate electrification at the first convenient point outside the city limits, this could not be accomplished on certain roads which conduct a suburban passenger service. It would be impracticable to operate these frequent suburban trains part way by electricity and part way by steam. It has hence been decided that certain lines must be partially electrified beyond the limit of complete electrification, to the terminals of the suburban service. Through passenger and all freight trains are to be operated by steam on the partially electrified extensions, which will be for use only by multiple-unit suburban trains.

As yet no system of electric traction has been developed which can be accepted as standard for all conditions on all railroads. If it were decided to proceed at once with the electrification of the Chicago terminals, it would be difficult for any group of men to choose a system which would not be criticized by other men as able as those upon whom the choice of the system depended.

The system selected for Chicago must be suitable not only for passenger terminals and through line work, but also for yard switching and transfer work. It must be applicable to the requirements of railroads having a heavy suburban traffic, and also to those roads conducting freight-yard and switching service. It must not only be satisfactory in its application to the terminal portion of a trunk line railroad, but it must lend itself to an indefinite extension of the limits of electrification over other and adjoining portions of the road. Obviously, the project must be regarded as too important to permit of the introduction of methods in any way questionable, or of a type of construction of untried value. Furthermore, it is not permissible to consider any methods which might serve to tide over a temporary condition anticipating the later selection of a permanent and stable system.

After obtaining complete engineering data on these three systems, the committee selected the third as cheapest and most desirable:

- 1—Third rail contact, direct current at 600 volts.
- 2—Overhead contact, direct current at 2,400 volts.
- 3—Overhead contact, single-phase current at 11,000 volts.

The third-rail system was given up as the least practical of the three because of the difficulties to be met. Not only would the presence of the third rail be a danger to employees in the yards and make necessary a large amount of reconstruction, but there would be trouble in operating trains, owing to the large number of gaps in the third rail due to switches, street intersection and other such obstructions. It is estimated by the committee that a total of about 75 miles of track in Chicago could not be equipped by the third-rail system. Another objection to the third rail is the fact that except in very unusual sleet storms, service through the trolley wire would not be interrupted, whereas both sleet and drifting snow furnish a serious problem with the third rail. The rail is also a danger to property and life in case of wreck.

The difficulties of trolley installation would also be great, but less, it is believed, than those attending the use of the third rail. The great trouble found is with low bridges and other structures over the tracks. A sufficient clearance to permit employees to ride on tops of cars cannot be obtained throughout the Chicago terminals.

The adoption of the overhead contact (trolley) system would permit the use of either a high-voltage direct current or an alternating current of much higher voltage. The use of the

first would result in damage to property by electrolysis. The use of the second would "kill" telephone and telegraph wires adjacent to the tracks, through inductive interference. Both conditions could be remedied, though with difficulty and at considerable expense.

The committee finds that it would make no practical difference whether the roads manufactured their own electric power or purchased it from public service corporations. Electricity would, it is concluded, neither increase nor decrease the dangers of operation. Added dangers would be introduced, but compensating safety in other directions would offset these.

The committee has made an effort to arrive at the incidental advantages that would accrue to the railroads through electrification. The change would give some increased capacity in existing trackage and terminals. In locations where operation under present-day conditions is congested, it would give relief, and in locations where there is at present no congestion, electrification would constitute, in effect, an enlargement of existing facilities and hence would postpone the day when additional facilities would be required.

Electrification would contribute to increased celerity and reliability in train movement. It would open the way to more intensive use of railroad property, both in this manner and by making double-decked freight and passenger terminal stations possible. It would also make possible the erection of buildings over tracks, but this value is regarded as speculative and, as a present-day asset, small. Electrification would give the roads an asset in the use of electric service beyond that required for trains. It would benefit the roads through the increased convenience and comfort of passengers and it would also give the roads whatever advantage accrued, entirely indeterminate, through the lessening of smoke.

COST OF ELECTRIFICATION

In arriving at the cost of electrification, the committee based its work on 1912 operation, extended to meet conditions if electrification were to begin in 1916 and be completed in 1922. The following accounting statement shows why the committee holds that electrification is financially impossible. The deficit on the minimum outlay of \$178,127,230 would be too great:

I. ANNUAL CHARGES:

1. Interest	\$8,906,362
2. Depreciation	7,808,278
3. Replacement of dissipated assets.....	231,796
4. Indeterminate charges	

Total charges	\$16,946,436
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II. ANNUAL REVENUES:

1. Increase in net revenues.....	\$2,336,693
2. Indeterminate benefits	

Total credits	\$2,336,693
Balance, annual deficit on investment.....	\$14,609,743

The investigations show that electrified operation for all the railroads taken together and disregarding depreciation and interest would result in a decrease in operating expenses. Under steam operation, those accounts that would be affected one way or the other by electrification show a total of \$10,934,064. Under operation by the 600-volt direct-current third-rail system, the total would be \$8,442,298, with the 2,400-volt direct-current system it would be \$7,355,771 and with the 11,000-volt alternating-current system it would be \$7,140,495. The installation of these three systems would result in a saving in operating expenses respectively of \$2,491,766, \$3,578,293 and \$3,793,569.

This saving, however, is in part nullified by new expenses due to the operation of stations that would have to be established at the end of electrified tracks to provide for a transfer of trains from electric to steam locomotives, and also by the waste and consequent loss due to operating over shortened steam railroad divisions, which have surrendered part of their mileage to make the new terminal electric divisions. The engineers' estimates place the added expense under the first item at \$1,546,113 and the added expense under the second at \$450,000. This would leave the net saving in operating expenses, to follow electrification, at \$495,653 for the third rail system, \$1,582,180

for the direct-current trolley system and \$1,797,456 for the alternating-current trolley system.

Following the work of the committee, a number of the Chicago railroads have made a study of the cost which would be imposed upon them in excess of those set forth by the committee. Eight of these railroads have filed with the committee the results of their investigations. The reports thus submitted have been analyzed with results which are set forth as follows:

ESTIMATES OF INDETERMINATE COSTS OF EIGHT RAILROADS

1. Costs due to an extension of the mileage of electrification over that provided by the committee's estimates.....	\$20,872,500
2. Precipitated costs principally for track elevation.....	29,198,400
3. Total cost to the eight railroad corporations in excess of that necessary to electrification under the plan of the committee	50,070,900
4. The committee's estimate of the cost of electrification for the eight railroads.....	92,599,908
5. The excess costs, including costs due to extension of the plan and precipitated costs, in per cent of those which are covered by the committee's estimates.....	54.07 per cent

The committee's estimates of the net cost of electrification for all the roads of Chicago totals \$178,127,230. Therefore, carrying forward the same ratio, the committee finds that the total added and precipitated costs for all the railroads would amount to \$96,313,400.

Upon this basis, the total capital requirement imposed by electrification would be:

That incident to the development of a minimum plan as estimated by the committee.....	\$178,127,230
That required to cover precipitated costs and costs due to extension of plan	96,313,400
Total	\$274,440,630

For example, in fixing the limits to be observed by the Chicago, Burlington & Quincy, the committee has specified complete electrification to Hawthorne, 6.8 miles, and partial electrification to provide for suburban service only to Downers Grove, 21.3 miles from the city terminal. In reviewing the work of the committee, the officers of this road have reached the conclusion that if they were required to electrify it would be necessary to provide for the electric operation of freight service to Eola, 33.4 miles from Chicago, and for suburban service to Aurora, 37.4 miles from the city terminal.

The committee sees an ultimate and large cost due to imitation of Chicago by other cities. "It is apparent also, that Chicago's claim to the benefits of electrification are in no way different from those which might be urged by many other cities with which Chicago railroads connect; that compulsory electrification, if achieved for Chicago, may in due time be secured by all the larger cities of the country. The cost, therefore, which might be imposed upon the railroads as a whole by the compulsory electrification of Chicago's terminals would be confiscatory."

RESPONSIBILITY OF EACH SERVICE FOR SMOKE POLLUTION WITHIN CHICAGO, ON PERCENTAGE BASIS

	Visible smoke per cent	Solids of smoke per cent	Total of smoke per cent	Gaseous carbon per cent	Gaseous sulphur per cent
Steam locomotives.....	22.06	7.47	10.31	10.11	18.22
Steam vessels	0.74	0.33	0.60	0.55	0.45
High pressure steam stationary power and heating plants	44.49	19.34	44.96	40.68	53.70
Low pressure steam and other stationary heating plants	3.93	8.60	23.00	23.06	19.73
Gas and coke plants....	0.15				
Furnaces for metallurgical, manufacturing and other processes	28.63	64.26	21.13	25.60	7.90
One-third of all air pollution is due to dirt other than that of combustion. These percentages refer to the remaining two-thirds.					

The committee was appointed in March, 1911, and consisted of four members appointed by the mayor, four appointed by the railroads and nine appointed by the Chicago Association of Commerce. The late Horace G. Burt was chief engineer for the committee until May, 1913, and was succeeded by W. F. M. Goss, dean of the Engineering Department, University of Illinois. The report was submitted to the association at a dinner on Wednesday evening, December 1.

FREIGHT CONGESTION AT THE ATLANTIC SEABOARD

The congestion of freight at New York, caused primarily by the lack, during the last few weeks, of vessels to take goods to Europe and to South America, has continued to grow more acute; and a similar condition now prevails at Philadelphia and at Baltimore. In contrast with like occasions in former years, there seems to be no disposition, at any of the congested ports, to charge the serious and costly delays to lack of cars or engines or track room. In addition to ocean vessel scarcity, some shipments at New York have been delayed because the lighters which take the freight from the railroad docks to ocean vessels are all overcrowded with traffic; and certain embargoes cover not only freight for export, but also domestic shipments which must be lightered.

On Saturday last, the Delaware, Lackawanna & Western placed an embargo on eastbound freight intended for export, except shipments for which vessels had already been engaged. The company had then over 5,000 loaded freight cars on its lines waiting to be unloaded at New York.

On Monday of this week the Pennsylvania Railroad placed an embargo on all flour and lumber to be exported or lightered at New York and on grain for export through Philadelphia and Baltimore. The Baltimore & Ohio placed an embargo on all iron and steel products for export through the port of New York.

Roads which have placed no embargoes have nevertheless been making all possible efforts to have shippers in the West hold back grain and other freight destined for Europe. The quantity of wheat in elevators at New York harbor at the present time is nearly double the quantity in store at the same time last year; and the wheat from Canada now on the road, consigned to ports in the United States, mainly New York, is estimated to amount to ten million bushels.

Navigation on the Great Lakes will close November 12; and the quantity of grain now afloat at Buffalo or near there is estimated at five million bushels.

The trunk lines have filed with the Interstate Commerce Commission notices that beginning January 1 the number of days free storage to be allowed at seaboard terminals on export package and piece freight, on local bills of lading, will be 15 days instead of 30 days, whether held in railroad warehouses or in cars. On grain billed through to foreign ports, the free time has been and continues to be unlimited, when held in cars, and until 10 days after it is loaded into elevators.

Two or three firms have taken American vessels from the Pacific trade and assigned them to the New York-Europe route for grain carrying, but this relief, like that due to the shortening of free storage, will not be of benefit before January. Moreover, there is a lack of unloading facilities in European ports that foreshadows even greater delays than are now known. Europe is suffering from a serious labor shortage, which will interfere greatly with the return of vessels to this country.

At Chicago, on Saturday last, the congestion at the seaboard terminals was given as a reason for a considerable weakening in the price of wheat. At Pittsburgh a number of steel mills and blast furnaces have been curtailing production for the reason, it is said, that shipping facilities are congested and coke cannot be procured promptly.

On Tuesday of this week the presidents of the Trunk Lines, at the invitation of President Samuel Rea, of the Pennsylvania, met in New York, and after a full discussion of the railroad situation and the conditions of ocean service appointed a committee of operating officers to meet daily in New York with a view to dealing with all matters connected with the freight congestion in the mutual interest of all the roads and of the public. This committee will seek the co-operation of shippers as well as of the steamship companies and will do everything possible to avoid declaring a general embargo. Besides all the trunk line presidents there were present at the conference Theodore Voorhees, of the Philadelphia & Reading; W. G. Besler, of the

Central of New Jersey; James H. Hustis, of the Boston & Maine, and C. R. Gray, of the Western Maryland. The roads will take similar joint action at Boston, Baltimore and Philadelphia.

The New York Committee will address itself to the equalization of conditions on the different roads, those which have placed no embargoes having felt extra pressure since embargoes were placed by other carriers. The committee finds that at the present time (December 1) the number of cars of freight on the tracks of the trunk lines at and destined for New York City terminals is about forty thousand; and that probably ninety per cent of these cars contain freight which is to be exported or which must be lightered for local delivery in the harbor.

The Pennsylvania Railroad gives details of the congestion on the lines of that company as follows:

"There were on November 30 on hand on the various divisions east of Pittsburgh and Erie 6,151 cars of freight for export and lighterage at New York. The location of these cars is as follows:

Greenville	1,335
Harsimus Cove	523
Meadows	91
Waverly	1
West Morrisville.....	21
Trenton Division	15
Moving New York Division.....	89
Stored West Morrisville.....	92
Stored Bristol	44
Stored between Rahway and Elizabeth.....	410
At Morrisville to be drilled.....	88
Stored Waldo avenue.....	37
Total in New Jersey.....	2,746
<i>Other divisions</i>	
Eastern Pennsylvania Division.....	1,766
Moving Eastern Pennsylvania Division.....	176
Western Pennsylvania Division.....	623
Philadelphia Terminal Division.....	34
Maryland Division	163
Central Division	328
New York, Philadelphia & Norfolk Railroad.....	124
Delaware Division	191
Total	3,405
Total east of Pittsburgh and Erie.....	6,151

"In addition to the lighterage freight being held in cars, there have been unloaded on piers in New York some 2,000 carloads, which is now awaiting orders. A special bureau, in charge of operating, traffic and accounting officers, has been established in New York to handle this extraordinary situation. This bureau keeps careful records of exactly where these cars are located, so that when ordered by a shipper for delivery they can be picked out and forwarded with the least possible delay.

"Another special bureau has been established to take charge of the local freight situation on the New York division. There are on various divisions of the railroad at the present time, exclusive of cars of freight for lighterage, some 7,000 cars of slow freight for delivery or movement through the New York terminal district. This includes some 2,000 cars for New England points. Records corrected every twelve hours show the exact location of each of these cars.

"These methods have proved effective in keeping the railroad open, and there is no congestion in the movement of west-bound freight.

"There are at present stored at different points on the road 450 cars of flour and 125 cars of lumber under through bills of lading for export through New York. In addition to the 1,000,000 bushels of grain in the Girard Point elevator at Philadelphia, there are 1,778 cars—2,600,000 bushels—of export grain on hand to go through that elevator, many of them being held at points west of Philadelphia until they can be taken care of.

"In addition to the 2,000,000 bushels of grain in the Baltimore elevator there are 2,829 cars of export grain on hand destined to go through that elevator. Seventeen boats are in Baltimore Harbor to-day to load grain; 5 of these have already received their cargoes. It is very indefinite what boats are expected at Baltimore the next week. However, space at Baltimore has

been contracted for up to December 15 that will require 32 boats. The average capacity of a boat is 250,000 bushels."

WHY TEXAS RAILROADS ARE IN RECEIVERS' HANDS

Henry N. Pope, president of the Farmers' Union of Texas, recently made a statement through Texas newspapers, calling on the men who manage railroad properties to "speak out" as to the responsibility for railroad receiverships in the Southwest. Following are replies to Mr. Pope's statement made by C. E. Schaff, receiver of the Missouri, Kansas & Texas, and by W. B. Scott, president of the Sunset-Central Lines. Mr. Schaff said in part:

"Commenting on the fact that railways comprising 30 per cent of the mileage in the state of Texas, and 45 per cent of the railroad investment in the state, are now in the hands of receivers, Mr. Pope has suggested that the people would like to have the 'plain truth from the men who manage the properties' as to the underlying causes of these receiverships. So far as the Missouri, Kansas & Texas is concerned, the 'plain truth' is, as usual, quite simple. The road's revenues, limited by federal and state agencies, have not kept pace with the increases in its expenses—increases that the management has been entirely unable to escape, and for which in most instances the management is not responsible. As a result its credit has been impaired and it has been unable to refund maturing obligations.

"Direct reply to any one of the specific inquiries Mr. Pope makes would not cover the situation. There are peculiar conditions, bearing on the financial situation of each carrier. In no case, however, would these peculiar conditions have resulted in bankruptcy except for general conditions affecting all. It is to these general conditions that thought must be directed before the present unsatisfactory condition can be corrected.

"To contend that the 'roads were unwisely built,' in the face of unanimous agreement that the Southwest needs improved, rather than impaired transportation, is useless. To say that the receiverships are due to 'manipulation by railroad financiers,' or to 'unnecessary expenses forced by law,' or to 'lack of revenue and improper expenditure,' or to 'mismanagement of the properties' would be inaccurate, even though any one of these elements may have contributed to bring bankruptcy in a special case. It is idle to disregard specific instances of 'manipulation by railroad financiers' as factors in developing adverse public sentiment which has encouraged legislatures and public service commissions to pursue unreasonable regulatory policies. It is equally idle to ignore the obvious fact that legislatures and public service commissions have utterly disregarded repeated warnings by railway managers that continuing decreases in net operating returns, due to increased operating expenses without proportionate increase in operating revenues, must result in disaster.

"Whatever may be said of 'financial management' will not change the fact developed in figures compiled by the Interstate Commerce Commission that between the years 1907 and 1914 the increase in cost of road and equipment of 41 western railways was \$1,250,000,000, while between the same years there was an actual decrease in their net operating income of \$23,500,000. In short, these railroads after increasing the actual investment in their properties, had less money with which to pay a return on investment than they had before. These figures are not affected by financial management, good or bad. Increases in gross earnings have been more than swallowed up by increasing wages to employees, increasing taxes, and increasing expenditures enforced by impractical regulatory policies that have not benefited the public. In the past eight years railroad taxes have practically doubled. In the same period the gross operating income of American railways has increased only 24 per cent, while their gross operating expenses have increased 40 per cent.

"Federal and state agencies have operated to hold earnings down so that the carrier has had so small a margin in periods of normal business activity that his margin entirely disappeared during the depressed periods. In the case of the Missouri, Kan-

sas & Texas, during the years from 1907 to 1914, operating revenues per mile declined from \$8,523 to \$8,241 or 3.3 per cent. Operating expenses increased from \$5,735 per mile to \$6,469, or 12 per cent, and operating income decreased from \$2,770 per mile to \$1,772, or 36 per cent. In these figures are to be found the outstanding reasons for the receivership.

"The road simply has not been permitted to make earnings that would provide a return on invested capital. The same condition applies to all carriers, and it clearly explains the impairment of railroad credit. So long as the regulating authorities do not permit railway earnings that will provide proper return on invested capital, regardless of the value of the service rendered the public, the public must expect carriers to become bankrupt, just as do individuals who do not operate on proper business margins.

"Responsibility may rest on some railway managements for conditions against which the public may have complained properly. No railroad man should find fault with government effort to prevent dishonest or unfair transportation practices. Such effort constructively directed will help rather than hinder the carriers. But such efforts alone will not help carriers to provide a return on invested capital, which they must do if the present unsatisfactory condition is to be remedied. And so long as the public does not discharge its duty to see to it that the regulating authorities give the railroads fair treatment, the public should expect to assume a large share of responsibility for railway bankruptcy."

Mr. Scott said in part:

"In my judgment, the Texas roads now in the hands of their creditors are there because of the simple fact that they cannot, with the existing freight rates, meet their current expenses and give the people what the people, the legislatures and the commissions demand. The candle must not be consumed at both ends.

"Business to be successful must earn net returns while its permanency is carefully maintained. Railroads are nowise different from commercial establishments in this respect, as witness the extent of the present receiverships in Texas and the number of roads included therein. Revenues must equal expense of operation, interest on obligations, taxes and renewals, to say nothing of rails and additional conveniences. When earnings fall off retrenchment necessarily follows, and this means fewer employees, reduction and impairment of service, and economies that sometimes seriously affect the maintenance that makes for safety and comfort, but which cannot be avoided.

"The old-time bugaboos—watered stock, over-capitalization, top-heavy bonds and incompetent administration—have no place in the operation of a trunk-line road. Mismanagement is quickly followed by a change of administration, while the roads which were established years since could not be built to-day for almost double the stock and bonds which represent their obligations.

"The roads which have contributed to the development of Texas were not unwisely built, even though they were projected at a time when money was scarce and when the state was barren of immediate results, the builders having only their own faith in the prospective upbuilding of the state, based upon a knowledge of the productivity of the soil and the opportunities which awaited the man of ambition and energy.

"For the last 10 years the Texas railroads have been beset upon every side. Legislation has decreased their earning powers while increasing their expenses and liabilities. Increase in labor charges and prices of material represent additional factors that have gradually lessened the earnings, while constant manipulation of rates, rate situations and changes in jobbing and competitive centers have reduced compensation for service all along the line.

"A casual examination of the following statistics, which relate to the Sunset-Central lines only, will, I am sure, convey a few of our arguments more forcefully than any I think I could present:

"Expenditures on account of state, federal and municipal re-

quirements and safety devices, \$2,200,000; the storm damage during the last two years amounted to \$900,000; personal injury payments, Texas, \$165 per mile in 1906; personal injury payments, Texas, \$275 per mile in 1914; personal injury payments, entire United States in 1913 constituted .985 per cent of earnings, while in Texas during the same year this expense was 2.472 per cent of the earnings; mail earnings per passenger train mile, 10.4c in 1906; mail earnings per passenger train mile, 7.2c in 1914; increased price fuel oil, 1915 over 1906, 109 per cent; increase in all classes of labor from 20 per cent to 90 per cent, 1915, compared with 1900.

"Freight rates instead of being readjusted to conform to changed conditions have been gradually lowered in most of the tariffs until the minima are from 20 per cent to 70 per cent and the maxima from 10 per cent to 50 per cent lower than the railroad commission considered reasonable more than 20 years ago, while many important items of expense have doubled.

"The whole situation resolves itself into a plain business proposition. The people rightfully demand safe and reliable transportation. This means good roadbed, new ties, heavy rail, first-class motive power, good passenger cars with modern conveniences, sound bridges, comfortable depots for passengers, convenient and adequate facilities for freight. All of these cost money, more money than the average Texas road can provide under the present conditions.

"Increase in labor and material changes, taxes, personal injury verdicts, flood and storm damages, should be met by additional earnings, and as earnings are reflected in rates of transportation it follows the rates should be revised upward instead of downward, and the roads given an opportunity of meeting their obligations to the public upon a broad and fair basis. Prosecution and persecution, baiting and browbeating, should be shelved, and instead there should be put into effect a spirit of mutual understanding and help and recognition of the great community of interest which makes the railroads and the public and particularly the farming public, positively dependent each upon the other."

RAILWAY HOTEL IN RHODESIA.—A \$250,000 palatial hotel, now building at Victoria Falls, in Africa, is to be opened next year. It has been leased to the Rhodesia Railways (Ltd.).

SUBSIDIZED CARRIERS.—Local branches of the New York Central have severely felt, during the past summer, the competition of automobiles run over state highways. The 'bus lines make trips at convenient hours for many people, but they run over a state-built road bed, doing a public-utility business without Public Service regulation, charging what they please and operating when they please. Their service may be discontinued during the winter months, when passenger trains are generally operated in this section at a loss. A railroad is responsible for accidents to passengers or goods. No guarantee holds good with auto buses or freight stages, unless the owner happens to carry heavy liability insurance. In fact, the advantages given the average 'bus operator practically make him a state-subsidized competitor of the railroad.—*Watertown (N. Y.) Herald*.

A COLOSSAL COAL TRAIN.—The English sometimes smile at the American's love for striking statistics. That has not prevented one Englishman, nevertheless, from compiling the following: On the Midland Railway the quantity of coal and coke consumed during one year is over 1,830,013 tons. If this were represented by a single block of Derbyshire coal, the block would be over 1,000 ft. long and wide and over 60 ft. in height. All the people in Derbyshire could stand in comfort on this block, which would outweigh the entire population of England and Wales. If the year's coal and coke were placed in railway cars, each carrying 10 tons, the resultant train with its engines (3,014 of them) would be long enough to reach from St. Pancras to the extreme north of Scotland. The cost to the Midland Company of this fuel is \$9.30 per minute—over \$13,220 per day, and more than \$5,000,000 a year.

Four-Wheel Trucks for Passenger Train Equipment*

A Discussion of the Fundamental Factors of Design and of the Ability of This Type of Truck to Fulfill Them

By ROY V. WRIGHT

The Pennsylvania Railroad uses four-wheel trucks under all of its passenger coaches, although the P 70 class, 70 ft. in length and having a seating capacity of 88, weigh light from 118,000 to 122,000 lb. Loaded with passengers they weigh about 135,000 lb., and never more than 140,000 lb. It is the standard practice on that system to use such trucks under all passenger equipment cars weighing less than 120,000 to 125,000 lb., except for so-called load-carrying cars, including baggage-express, mail, baggage-mail, etc., which are designed to weigh over 140,000 lb. when loaded. The light weight of the bodies of the Pennsylvania P 70 coaches—and these are now standard on that system—varies from 93,000 to 96,000 lb. It is assumed that these cars regularly carry as much weight in passengers and hand baggage as coaches on other roads, inasmuch as they seat 88 persons, or several more than the maximum provided for in the standard coaches of most roads. It is the practice on the great majority of railroads to use six-wheel trucks under coach bodies weighing much less than this, comparatively few roads using four-wheel trucks under bodies weighing more than 85,000 lb. and many of them using six-wheel trucks under bodies weighing even less than this.

FACTORS IN DESIGN

In designing the trucks for a passenger coach four features must be kept in mind and generally in the following order as to importance, although there may be some question as to the relative value of the last two:

- (1) They must be designed for safety.
- (2) They must ride smoothly, for travelers are particular as to this in these days and will desert a road with rough-riding cars if a competitor furnishes better service. With heavy steel cars operated in long trains at high speed and with the locomotives taxed to the limit of their capacity it is difficult to operate and brake the trains without occasional roughness and jolts, and a factor such as truck design cannot be allowed to contribute further to the rough riding.
- (3) The weight of the truck must be kept to a minimum if for no other reason than the effect on the cost of conducting transportation.
- (4) The truck should be designed with a view to keeping the cost of maintenance as low as possible. Here, as in the requirement for safety, it is desirable to have as few parts as possible and of simple construction.

DOES THE FOUR-WHEEL TRUCK MEET THESE REQUIREMENTS?

How does the four-wheel truck meet these requirements under the heavy passenger equipment in service on the Pennsylvania Railroad?

(1) The four-wheel truck of modern steel construction which has been in use on that system for a number of years has given splendid satisfaction so far as safety is concerned. As on other roads some trouble has been experienced with hot boxes, and it was at first thought that the journal-bearing area was too small. The use of larger bearing areas does not seem to have materially improved conditions, and it is now believed that the difficulty is entirely due to dirt or gritty matter entering the journal boxes. The problem then becomes one of improving the journal box lid and dust guard to prevent this, rather than to increase the diameter or length of the journals.

There has been no breakage of axles except for three cases due to defective material when the first steel trucks were introduced many years ago. No physical weakness has developed in

any of the parts in the ten years the trucks have been in service, so that as far as safety is concerned there can be no question. The possibility of accident would seem to be less with the four-wheel truck because of the smaller number of parts that are required.

(2) There seems to be a feeling on the part of some mechanical engineers that the four-wheel truck, with its shorter wheel base (7 or 8 ft. as compared with 10 to 11 ft. for the

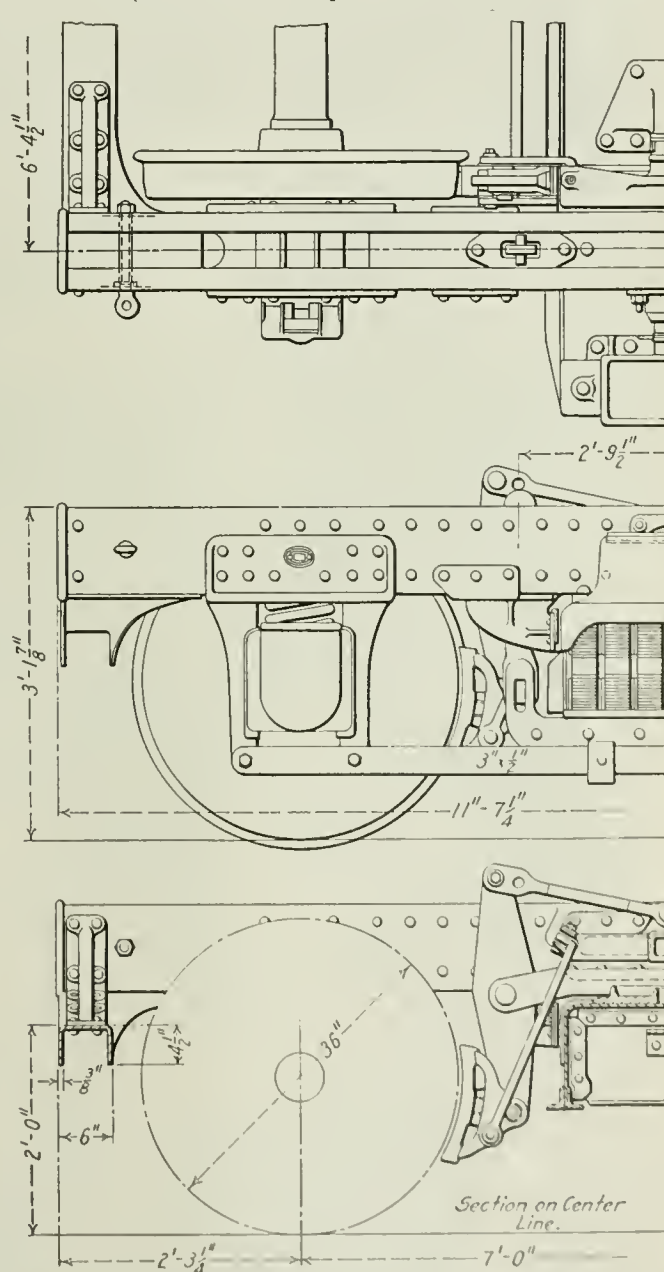


Fig. 1—One End of Original Four-Wheel Steel Passenger Car Truck Before the Application of the Clasp Brakes; Pennsylvania Railroad

six-wheel truck) will ride less easily than the six-wheel truck. With coil springs over the journals, elliptical springs under the bolster, and provision for lateral motion of the bolster, it would seem that there ought not to be much difference in this respect.

Experiments show that much of the rough riding or jolting on passenger coaches has been due to the method of anchor-

* From a paper to be presented at the December, 1915, meeting of the American Society of Mechanical Engineers, New York.

ing the top of the dead lever to the truck frame. The unbalanced forces in the truck when the brakes are applied tend to tilt the truck frame out of horizontal alinement, thus causing a "jerky" action. By anchoring the dead lever to the body under-

frame this is eliminated. This development is comparatively recent and affects the six-wheel as well as the four-wheel truck. The effect of anchoring the dead lever to the truck frame has possibly been more noticeable on the four-wheel truck, because

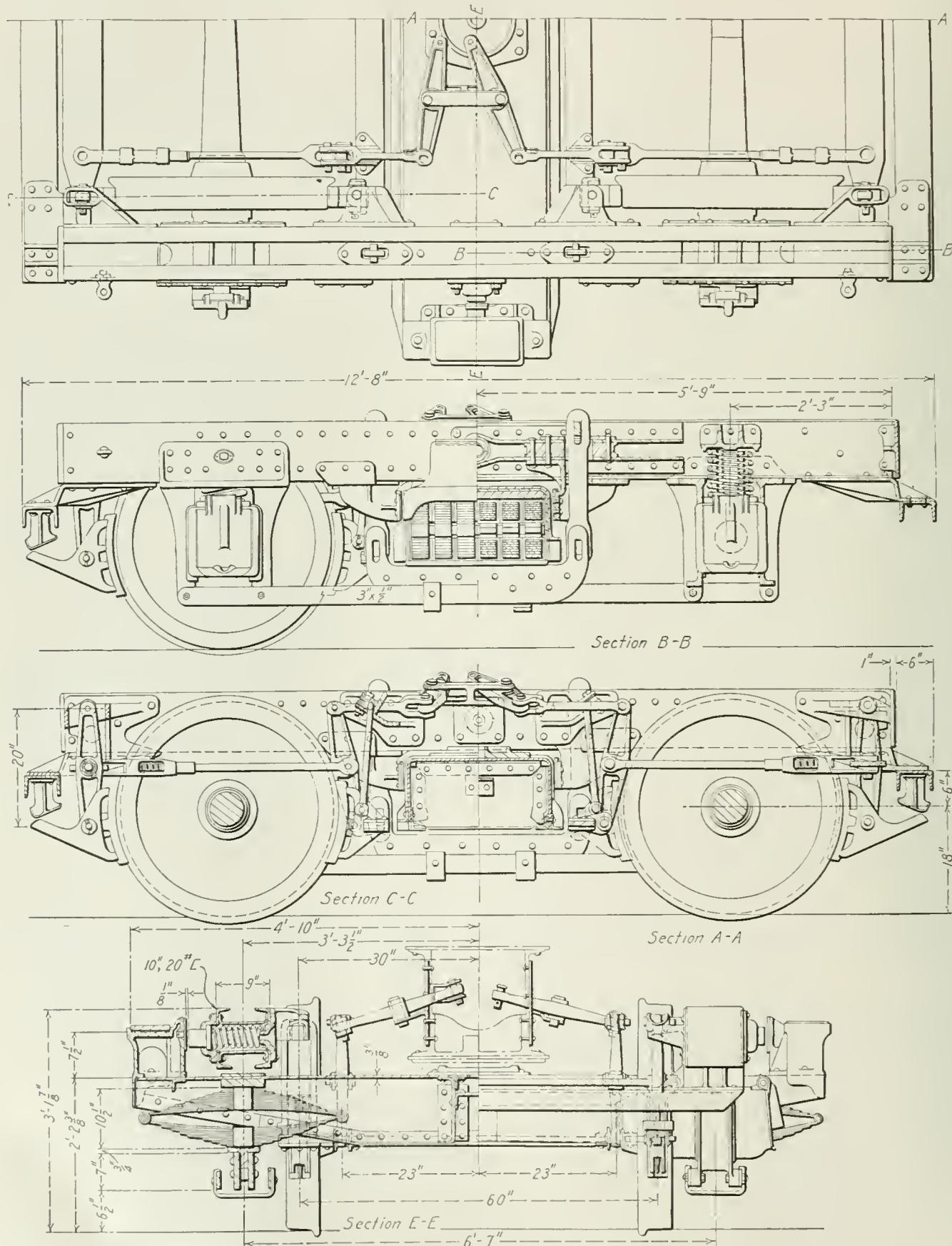


Fig. 2—Original Four-Wheel Steel Passenger Car Truck with Clasp Brakes Applied; Pennsylvania Railroad

one-to-one dead levers are used, resulting in a greater pull on the frame than in the case of the six-wheel truck; then, too, the resisting moment is less because of the shorter wheel base of the four-wheel truck. This improvement has been patented.

(3) There is a wide variation in the weights of different types of steel passenger car trucks, but it is probably fair to state that a pair of four-wheel trucks will weigh from 10,000 to 15,000 lb., or more, less than a pair of six-wheel trucks having the same carrying capacity. In other words, for the same total

weight of car the one with four-wheel trucks will carry ten to fifteen thousand pounds more loading or body weight, or with the same weight of body the total weight of the car with four-wheel trucks will be from 10,000 to 15,000 lb. less than the one with six-wheel trucks. For a car weighing 120,000 lb. and equipped with four-wheel trucks this means a saving of from 8 to 11 per cent in total weight as compared with what it would be if six-wheel trucks were used. On most roads it is the practice to carry car bodies weighing more than 85,000 lb. on six-

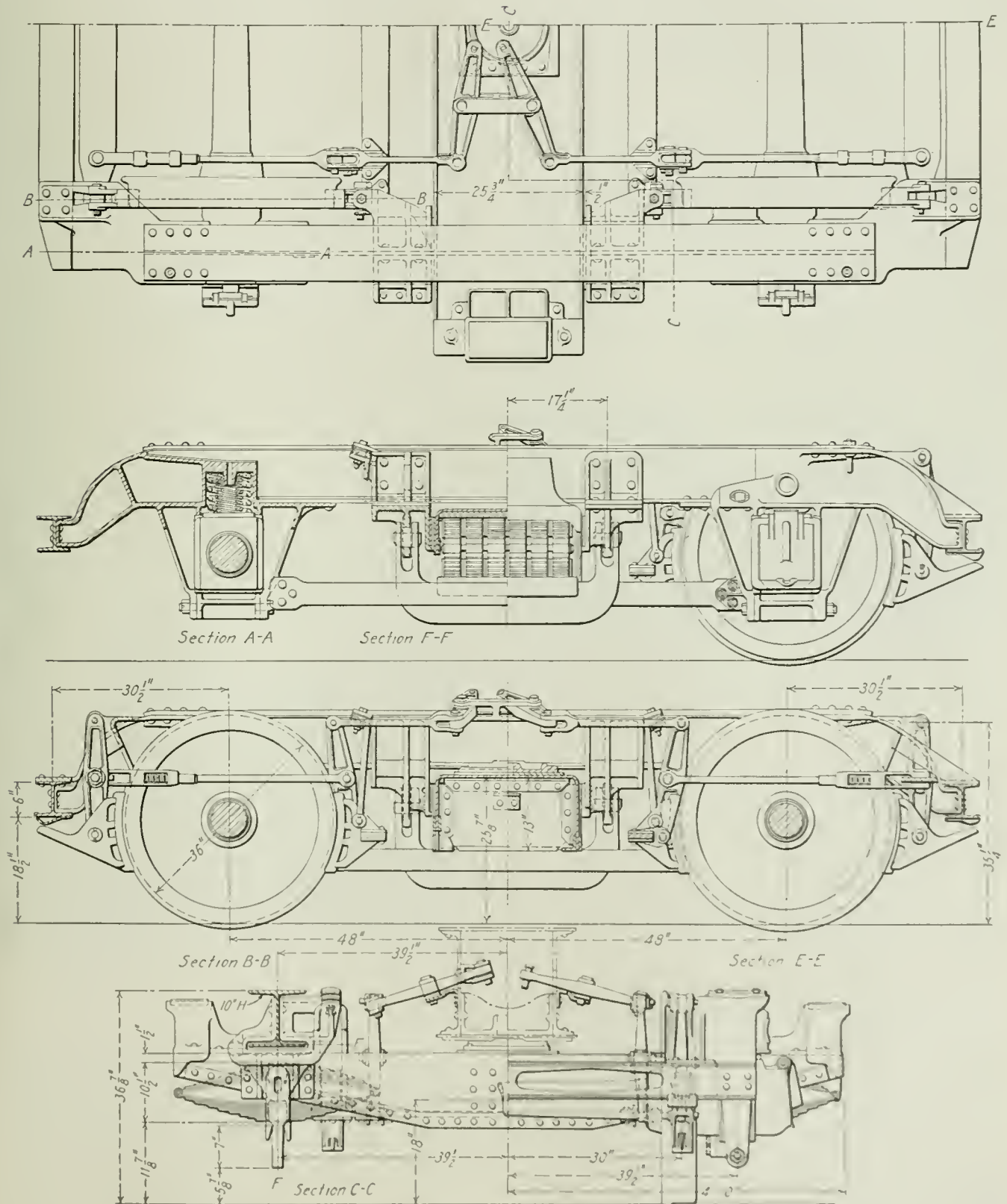


Fig. 3—Present Standard Four-Wheel Steel Passenger Car Truck; Pennsylvania Railroad

wheel trucks, which weigh fully 15,000 lb. per car more than four-wheel trucks. A locomotive that can haul eight cars equipped with such six-wheel trucks over a given division will haul nine cars of the same seating capacity having four-wheel trucks—a saving much to be desired.

(4) Roughly speaking, the cost of maintenance of a steel passenger car truck may be said to be very nearly in proportion to the number of its wheels and axles, these with the brake shoes being the parts subjected to the greatest wear and requiring frequent repairs and renewals. While no exhaustive data is available as to the comparative cost of repairs and maintenance of six-wheel and four-wheel trucks of the same carrying capacity, they are said by those who have checked these costs to be at least 50 per cent greater for the six-wheel truck than for the four-wheel truck.

DEVELOPMENT OF PENNSYLVANIA FOUR-WHEEL TRUCK

As a partial check on these conclusions, it is proposed to briefly review the development of the four-wheel steel truck for passenger cars on the Pennsylvania Railroad. From the outset and throughout this development the aim has been to reduce the number of parts to a minimum and make the construction as simple as possible. The problem has been complicated somewhat by the necessity of providing for the application of motors to the trucks used under motor cars in electrified districts and also by the application within the past few years of the clasp brakes, which are now standard on the Pennsylvania for all four-wheel trucks and for all new passenger equipment trucks.

In designing the first four-wheel steel trucks in the early part of 1905 it was aimed to use them under the largest coach possible and keep within the M. C. B. load limits for 5-in. x 9-in. axles. Shortly after the trucks had been placed in service three of the axles broke in the wheel seat, where the stress is least. Investigation finally showed that the breakage was due to defects in manufacturing caused by a faulty furnace which had been discarded shortly after these axles were made. In the meantime, however, as a measure of absolute safety, it was decided to increase the axles on existing cars $\frac{1}{2}$ in. in diameter and on new cars go to the next larger size standard M. C. B. axle, the $5\frac{1}{2}$ -in. x 10-in. Because of hot box troubles the length of journal was afterward increased to 11 in., although experience has since indicated, as previously noted, that the trouble was probably due more to dirt getting into the journal box than the lack of journal bearing area. The $5\frac{1}{2}$ -in. x 11-in. journal is now standard for all four-wheel as well as six-wheel trucks.

In going from the wood to the steel construction spring planks, axle guards and brake beams were done away with, the brake levers being attached directly to the brake heads. Each side frame was formed of two 10-in. 20-lb. channels, with the flanges turned inward and forming a box girder construction. The channels were spaced so as to measure 9 in. over-all. This was done to provide sufficient strength for resisting the lateral stresses, a requirement which has been overlooked in some designs. To check or limit the lateral motion or swaying of the bolster a spring arrangement was used, as shown in the drawing.

The subsequent use of clasp brakes made it necessary to modify this design somewhat. Fig. 2 shows the details of this modified design, which in general is practically the same as the original design, other than the braking arrangement, except for changes in the end construction of the frame to provide for the outside brakes. The detail of the original end construction is shown in Fig. 1. The end rail in the original design, which was formed of a $\frac{3}{4}$ -in. plate pressed in the form of an inverted U, 6 in. in width, was changed to make room for the brake levers. The outside brakeheads in the case of the clasp brakes are attached to the lower ends of the brake levers, which are anchored at the top to castings riveted to the ends of the side frames. A 6-in. channel with flanges turned

downward connects these castings and forms the end rail. It was also necessary to add brakehead tie bars because of the impossibility of connecting the tension rods for the outer brakeheads direct to the brake lever. It should be noted, however, that this brakehead tie bar is a simple rectangular bar and that the brake tension rod connects to it as close to the brakehead as possible. Obviously the weight and the cost of maintenance of this tie bar is much less than for a brakebeam where the force is applied at the middle. All of the brake levers, including both the dead and live levers, are made the same size and are interchangeable except for the drilling.

The peculiar form of the outer brakehead is noticeable. In the first application of the clasp brakes the ordinary type of brakehead was used, with springs to hold it balanced when hanging loose. These springs were difficult to maintain and were done away with by redesigning the brakehead and adding the tail piece. When the brakehead hangs loose this tail piece rests against a casting which is riveted to the underside of the end rail. When the brake is applied there is a clearance of $\frac{1}{2}$ in. between the brakehead tail piece and the rest. This device has given most satisfactory results.

The next development was a modification of this design to provide for the application of a motor for use under motor cars on electrified divisions. To do this it was found necessary to increase the wheel base from 7 ft. to 8 ft. 6 in. Transoms were also added to support the lip of the motor and the bolster design was modified slightly; otherwise the same parts were used as in the original design.

The next development was a radical one, the box girder sideframe being replaced by a Bethlehem 10-in. 54-lb. H-beam, thus simplifying the design as to construction by reducing the number of parts and still providing sufficient moment to resist the side stresses. As shown in Fig. 3, the journal box pedestal casting has a projection to which the top of the lever for the outside brake is anchored and which also supports the end rail, a 6-in H-beam. The H-beam which forms the side frame has its lower flange and web cut away over part of the journal box pedestal casting and is strongly riveted to it through both the upper and lower flanges. The casting which was formerly used on the end rail to balance the brakehead was replaced by a steel clip which is sprung over and welded to the lower flanges of the end rail.

Another noticeable change was the shortening of the bolster hangers, thus limiting the amount of side swing and making it possible to do away with the complicated spring mechanism which was formerly used to check and limit the lateral motion of the bolster with the longer hangers. Before making this change the springs were gradually blocked and finally wedged solid on a number of the cars. As this had no noticeable effect on the smooth riding, it was decided to discard the springs entirely.

The more important of these changes, that is, the side frame construction and the change in the hanging of the bolster, were first made on four-wheel trucks for suburban cars, several hundred of which were built. These trucks, however, were of lighter construction than those used under the standard coaches and will not be considered in this discussion. The details of this improved truck as designed for use under standard coaches are shown in Fig. 3.

THE BAGDAD RAILWAY.—The Sofia correspondent of a Holland paper writing on the progress of the Bagdad Railway, points out that there is now only wanting the completion of the Bagdad tunnel, which was pierced in May, and upon which work is now being prosecuted with all available energy, and the 24 miles of railway through the Taurus mountains—the most difficult piece of the whole line, in which about 70 tunnels, viaducts, and other engineering works occur. It is hoped that the work will be completed in the course of next year. The continuation of the line from Bagdad has proceeded north to Tekrif 90 miles.

A Large Track Depression Project at Minneapolis

The Chicago, Milwaukee & St. Paul is Building Concrete Street Viaducts to Eliminate 37 Grade Crossings

By C. N. BAINBRIDGE

Office Engineer, Chicago, Milwaukee & St. Paul, Chicago

One of the largest projects for the elimination of grade crossings recently undertaken is the depression of the tracks of the Hastings and Dakota division of the Chicago, Milwaukee & St. Paul through the southwest part of Minneapolis. With but few exceptions, the elimination of grade crossings in cities has been brought about by the elevation of the tracks and the depression of the streets. In the work described herein, these methods are reversed, i. e., the tracks are being depressed from 18 to 20 ft., and the streets are being elevated from 2 to 4 ft. and carried across the depression on bridges. Thirty-seven grade crossings are to be eliminated and the depression extends for approximately three miles.

Just prior to the completion of the Puget Sound extension from Mobridge to Seattle in 1909, the double tracking of the line from Minneapolis through Aberdeen to Mobridge was commenced and the grading has now been practically completed from Minneapolis to Aberdeen, with the exception of a short stretch at the eastern terminus, which is being constructed as fast as the track depression progresses.

In the latter part of December, 1910, the St. Paul was ordered by city ordinance to depress its tracks westward through the city from Hiawatha avenue to Irving avenue, and to carry over its tracks on bridges, all streets within these limits which crossed the right of way at grade. Previous to the passage of this ordinance, Fourth and Fifth avenues, which are located about midway of the depression, formed natural undercrossings with the tracks due to the topography of the site. The ordinance

The tracks which are to be depressed pass through a portion of the better residence district of Minneapolis and although numerous industries line the right of way for the greater part of the distance, it was desirable to have the finished work give as pleasing an effect as possible. Considerable attention was, therefore, given to the selection of the most suitable type of bridge. The tracks cross practically all of the streets at an angle of approximately 90 deg. and the right of way was of sufficient width throughout, with one or two exceptions, where additional land had to be bought, to adopt a uniform span bridge. Although there was some variation in the width of streets and roadways as required by the city, it was thought that probably unit construction (building slab and bent units at a central plant and lifting them into place) could be adopted. Accordingly designs were made and estimates and methods of erection were studied, but after due consideration, it was decided



A Shovel Taking a Third Cut



A Building Being Underpinned by Concrete Columns

requires that the street which originally passed under the tracks at Fourth avenue shall be carried over the tracks on a viaduct. Fifth avenue, however, is a less important street, and the ordinance allows this to become a grade crossing, thereby avoiding considerable property damages. Hennepin avenue, situated at the west end of the depression, had previously (in 1897) been carried across the tracks and no further change was required.

Work was started at the west end early in 1912, and has been carried on continuously, with the exception of two or three months during the winter seasons. The project is now approximately 75 per cent completed, and it is the intention to complete the work in the fall of 1916.

to abandon the idea of unit construction and build the structures in place, for the following reasons:

(1) About 50 per cent of the concrete in each bridge would have to be built in place in both bridges, of unit construction and those of monolithic construction. This would have required a movable plant for the abutments, as well as a stationary plant for the slabs and bents, if the structures had been built as units.

(2) Estimates showed that a larger yardage of concrete would be required in the unit than in the monolithic construction, as well as more steel, due to erection stresses and simple instead of continuous beam action.

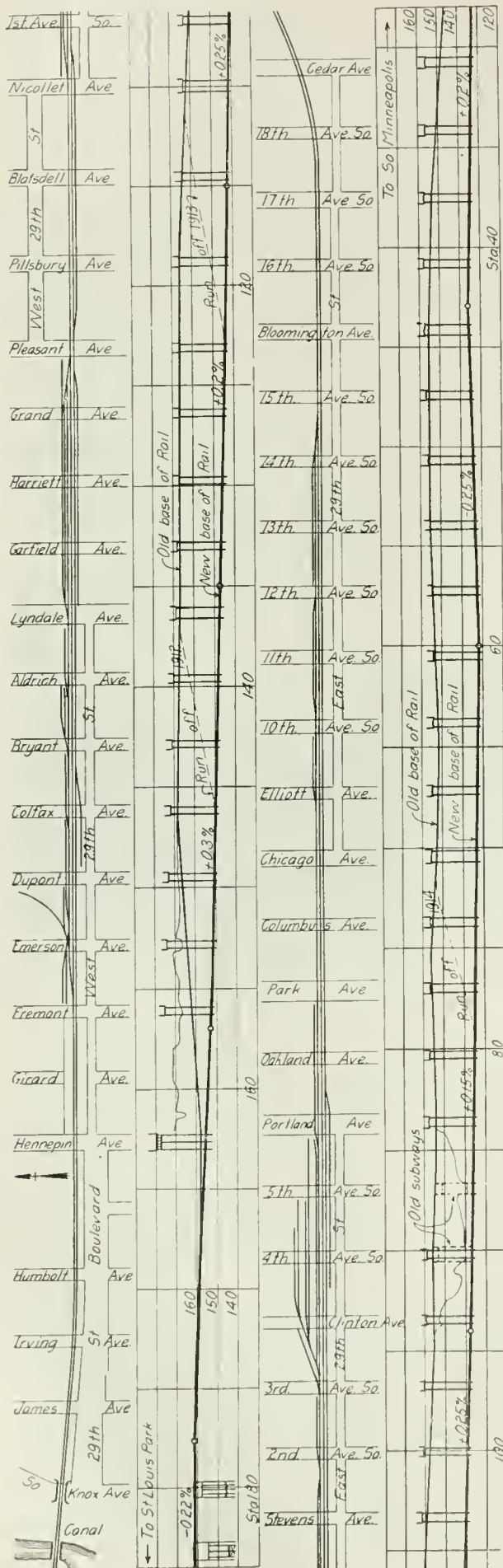
(3) The work would extend over three or four seasons, and in order to run the stationary plant efficiently, all the work on the different units would have to be done continuously, covering a period of about nine months. This would have necessitated space for the storage of some of the slabs and bents for from one to two years, besides tying up a considerable amount of money for a long time before the structures would really be required.

(4) The mixing and placing of concrete would have been cheaper in the unit construction than it is in the monolithic construction, provided the stationary plant were run efficiently and a large number of the units were alike, so that the forms could have been used to advantage. It was estimated, however, that this difference in cost would be practically balanced by the additional yardage and additional cost of storing and erecting units after they were made.

(5) In the case of unit construction, it would have been necessary to know beforehand just how each crossing was to be treated, and no changes could have been made later without discarding units already made. The monolithic construction had the advantage over the unit construction in that it allows a modification of the bridges to meet local conditions up to the time each bridge is built.

(6) Owing to the excessive weight of the units, it would have been necessary to alter the heaviest erecting equipment of the railway in order that it might lift and swing these slabs into position. This would have prevented the use of the equipment for other work for two or three years.

(7) In the case of unit construction, there would have been occasion to interfere with traffic to a greater extent than with the monolithic



Layout and Profile of the Track Depression

construction. This would be caused by the hauling of the different units from the storage yard or plant to the bridge; shifting the position of the derrick car from one track to another, to facilitate the placing of the units; and, finally, the placing of the units themselves, which would weigh from 35 to 45 tons. These would have to be lifted and swung a considerable distance, making the chance of accident greater with the unit system than with the monolithic system.

BRIDGES

The type of structure finally adopted is that shown in the accompanying drawing. The bridges are of reinforced concrete and conform to a uniform design. On account of the various widths of roadways, the structures vary in width from 48 ft. to 68 ft. overall, including the roadway, two 8-ft. sidewalks and hand railings; and with the exception of two structures, they consist of three spans, the center one being 29 ft. 6 in., and the side spans 29 ft. in the clear. They are supported at the ends on abutments, and at the third points on skeleton piers or columns. This arrangement permits placing two main tracks under the center span. The side spans cover the slope of the cut where only two main tracks are depressed, but they are of sufficient width to allow the placing of two additional tracks on either side for industrial purposes or railway use, as conditions require, with the alteration of abutments only.

The two exceptions noted above, one at Fourth avenue and the other at Clinton avenue, are of 10 spans and 6 spans respectively, and carry those streets across a team yard which will be located about midway of the depression. Entrance to the team yard is to be made from Twenty-ninth street, which parallels the tracks, and also from Fifth avenue, which, as previously mentioned, is to become a grade crossing. The clearance over the main tracks is 18 ft. 6 in., and that over the side tracks or industry tracks is 18 ft.

The abutments used under these bridges are of three types:

- (1) The small bank abutment used on bridges which do not make provisions for industry tracks under the side span.
- (2) The intermediate height abutment, which is high enough to provide for one track under the side span.
- (3) The high abutment, which is high enough to provide for two tracks under the side span.

The small bank abutments are of the ordinary gravity type. They are but 9 ft. high from bridge seat to foundation. The footing is 2 ft. thick, and the toe projects 12 in. beyond the neatwork. The abutments extend the full width of the street and have retaining walls, which extend back to the right of way line. They are built in two sections for the narrower streets, and in three sections for streets of 80- and 100-ft. widths. The intermediate height abutments are of the reinforced concrete counterfort type, and are 19 ft. high from bridge seat to foundation. The toe projects 3 ft. 6 in. beyond the face of abutment and the footing is stepped in the rear. Counterforts are provided every 12 ft. The high abutments are of the reinforced concrete counterfort type, and are 24 ft. 6 in. high from bridge seat to footing. The toe extends 4 ft. 6 in. in front of the abutment and is 3 ft. 6 in. deep. The base is stepped twice in the rear, the total width of base being 15 ft. 6 in. The bridge seat on all abutments is 18 in. wide, not including a 4-in. coping; 1:3:6 concrete was used in the gravity abutments, and 1:2½:5 concrete in the reinforced type.

The piers of the bridges are 25 ft. 6 in. high and consist of four, five or six columns, depending on the width of the bridges, and rest on spread footings of plain concrete. The columns are 2 ft. square, spaced about 11 ft. 6 in. center to center. The footings were poured in one run, reinforcing bars projecting about 4 ft. above the construction joint to form a splice with the main reinforcing steel in the columns. A key block 14 in. square is placed at the construction joint at the base of each column. The cross girders connecting the top of the columns are cast with the floor beams. These girders are 2 ft. thick and 4 ft. 6 in. deep and are joined to the columns by circular arches, which add materially to the strength and appearance of the structure. They are reinforced as a continuous beam with straight bars in the top and bottom and with stirrups and bent-up bars. The fillets or curved portion are reinforced with

bars placed at 45 deg. The footings are of 1:3:6 plain concrete and the remainder of the bent is 1:2:4 concrete.

The accompanying illustration shows also the saddle which is used to protect the sewers crossing the right of way. This consists of an 8-in. layer of concrete forming an arch, reinforced with $\frac{3}{4}$ -in. bars along the intrados and $\frac{1}{2}$ -in. bars along the extrados. A 1-in. layer of felt is placed between the concrete covering and the top of the sewer.

The floors of the bridges are of the T-beam type, are 3 ft. 6 in. deep, including 5 in. of paving, and are built continuous from abutment to abutment, a distance of 91 ft. 6 in., expansion joints being placed at the bridge seats. The stems of the beams under the roadway are 13 in. wide, spaced 5 ft. center to center. The sidewalk slab has a span of 8 ft. The outer beam under the sidewalk was given the form of three 3-centered arches for appearance. All other beams are straight on the bottom with fillets at the supports. The beams are figured as continuous for three spans and are reinforced with 1-in. and $\frac{3}{4}$ -in. bars, part of which are bent up near the supports to provide for shear and negative moment over the supports. Vertical stirrups are also used in reinforcing for shear. As a precaution against cracks, due to any unequal settlement which might occur at the abutments or piers, a small excess of steel is placed over the center supports and in the beams. The foundations are for the most part of good gravel, and, as the structures are designed for a bearing of only 2.5 tons per sq. ft. on the foundations, the danger of unequal settlement is slight.

The slabs between the T-beams vary in thickness from $6\frac{1}{2}$ in. to 11 in., to provide for the crown of roadway and the grade on the bridge. They are reinforced with straight and bent $\frac{1}{2}$ -in. bars spaced 6 in. center to center. The sidewalk slabs are $5\frac{1}{2}$ -in.

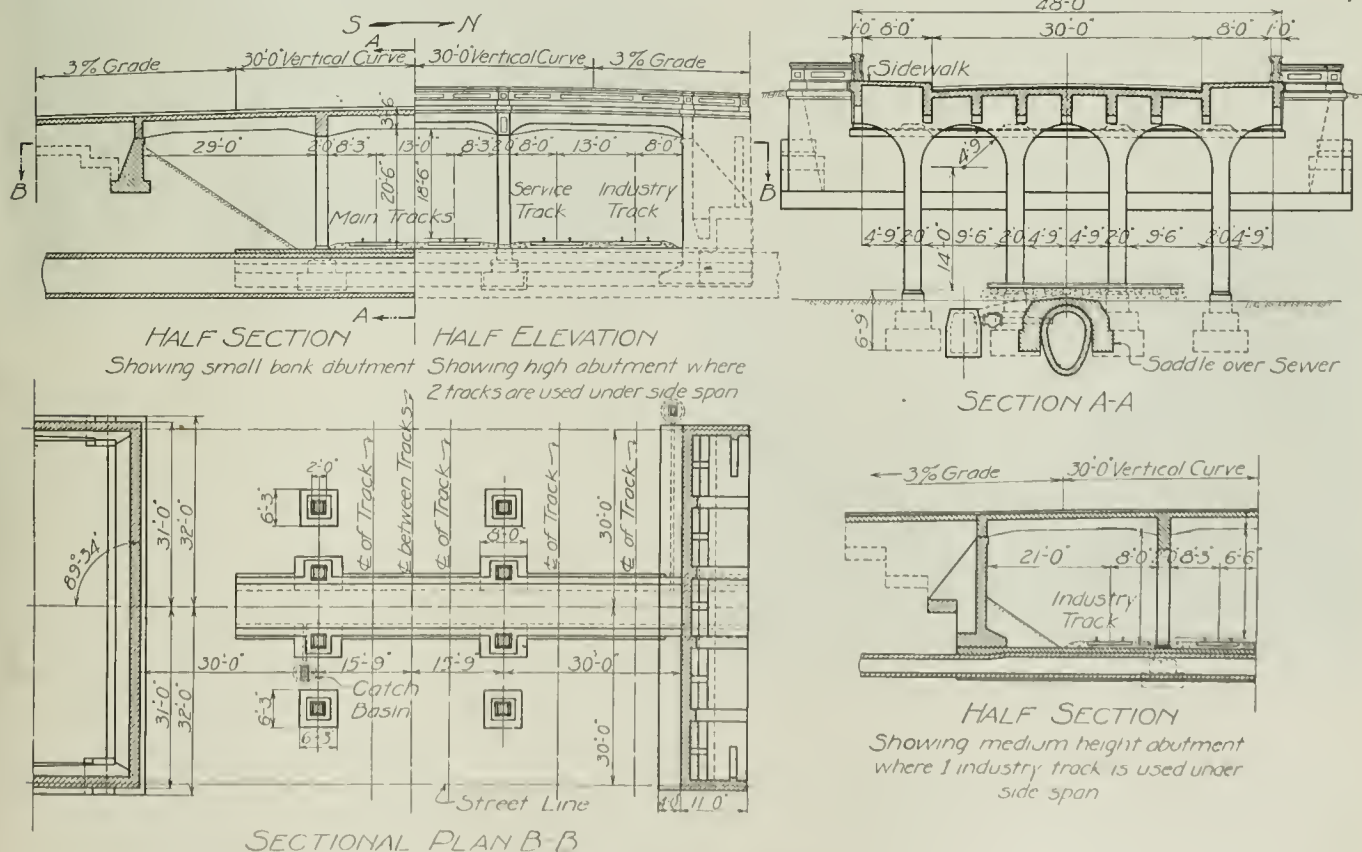
reinforced concrete and is built in place, after the floor is completed.

Water and gas mains as well as numerous conduits of various utility companies were encountered at the majority of the streets. Ledges are provided on the side of the stems of adjacent



The Concrete Plant—A Temporary Foot Bridge in the Background

T-beams to carry the conduits across the bridges. At first the gas and water mains were carried across the depression beneath the abutments and tracks. The cost of this, however, proved to be excessive and provisions are now made to carry the water pipes across under the bridge floors in a similar man-



Typical Plan of Reinforced Concrete Viaducts

thick, have a 1-in. finishing coat on top, and are reinforced with $\frac{1}{2}$ -in. bent bars spaced 7 in. center to center. Concrete in the slabs, beams and cross girders is of 1:2:4 mix. A layer of 1:2 cement mortar is placed in the bottom of all beams and slabs to a sufficient depth to insure the covering of all bars before any concrete is poured. The hand rail is of the solid type

ner to that used for the conduits. A compressed fiber covering of about 3 in. in thickness is placed around the pipes, the fiber being moulded to fit the pipe. Wrought pipe with screw threads is used across the bridges in place of the usual cast iron pipe.

The bridges which do not carry street cars are designed to carry a moving concentrated load of 24 tons on two axles at

5-ft. gage and a load of 100 lb. per sq. ft. upon the remaining portion of the roadway. The six bridges which carry street cars are designed to carry two 40-ton cars and 100 lb. per sq. ft. upon the remaining portion of the roadway. The live loads are increased 50 per cent to provide for impact.

INDUSTRIES AND INDUSTRY TRACK FACILITIES

The majority of the industries are located on the north side of the tracks, Twenty-ninth street being adjacent to the right of way on the south side for nearly the full length of the depression. The presence of these industries introduced special problems and was the cause of considerable delay and numerous controversies.

The industrial concerns maintained that the railway company was liable for the cost of all changes to industries and industry tracks made necessary to continue service on the lower level after the main tracks had been depressed. The railway company, on the other hand, contended that the tracks were lowered by order of the city authorities as a measure of public safety, and not for the benefits, nor on the initiative of the railroad, and that therefore the industries should make any adjustments required at their own expense and also pay the cost of changing the tracks serving them. Litigation was avoided when the railway company decided, because of the many switches and the great amount of switching which would otherwise come off of the main track, to construct a third track from which to serve the industry spurs. As in practically all cases the right of way was only wide enough to depress two main tracks without resorting to retaining walls, the railway company contributed to the industries an amount approximately equivalent to what it would have had to expend to construct a retaining wall, within the right of way, adequate to provide for the third track, if the spur tracks were absent. The industries expended this money in altering their plants and providing the spur tracks, while the railroad was relieved from any further responsibility for retaining adjacent lands. Notwithstanding this decision of the railroad company, the result to the industries in providing



Elevation of a Typical Viaduct—Elevator for Raising Coal on the Right

themselves with industry tracks and adjusting their plants to the lower level, was a very large and burdensome expense, and it was also a large additional burden to the railroad.

There are about 20 industries situated along the depression and no two were treated alike. Each industry required special treatment to meet the requirements of the particular situation. For the most part, each industry handled its work with its own engineers, although the railroad assisted to a considerable extent with suggestions. In some cases where the buildings were old and of little value, they were torn down and the entire property excavated to the new track level and new buildings constructed. Other concerns underpinned the buildings, and added

shipping and receiving floors beneath, while still others allowed the slopes to extend under the building, supporting the buildings on skeleton framework. The accompanying photographs illustrate some of the methods used in solving the various problems.

CONSTRUCTION

The excavation work is being done with a 65-ton Bucyrus shovel, the material being removed by two trains of 20 standard gage 12-yd. air dump cars each. The excavated material varies from sand to gravel and is used largely for filling a site for a freight yard at Bass Lake, about nine miles from the depression, and also for taking out some sags in the main track immediately west of the work. The excavation for the abutments is made in many instances in advance of the shovel, the material being thrown in front of the abutment site and then loaded on cars as the shovel passes. Where this is impossible, material is loaded on wagons by hand and used for grading the street approaches to the bridges. Two train crews are employed to handle the cars to and from Bass Lake, each crew spotting its own cars at the shovel. A third crew and engine handle the cars at the yard, using a spreader.

In lowering the tracks, two methods were employed. The first 5,000 ft. of right of way is largely confined between private



A Building Underpinned by a Masonry Wall

property and was not of sufficient width to allow a temporary operating track to be constructed, without one or more shifts, while excavation to the final grade was being made. Excavation was consequently made in stages, the shovel making several cuts while the operating track was shifted several times to lower levels, before reaching its final position. The shovel worked in cuts of a length of about 2,500 ft., which is equivalent to about eight city blocks, with temporary run-offs to meet the original grade of the tracks on grades of from 2.5 to 3 per cent. On the remainder of the work, however, a temporary operating track was constructed along Twenty-ninth street, which is parallel and adjacent to the right of way. This permitted the shovel to operate in the cut unrestricted by regular train movements. After the shovel had started and was in operation, it was necessary to block traffic on seven or eight adjacent streets, until the excavation was completed to the final grade. A temporary timber bridge was then erected at one street to provide for street traffic until some one of the concrete bridges could be constructed and opened to traffic.

At the six streets where street car traffic had to be handled, a temporary bridge for street car traffic spanning the first cut of the shovel was constructed as soon as the shovel had made its first cut across the street. After the shovel passed through for the second time, however, street car traffic was discontinued across the cut and passengers were required to transfer from cars on one side of the cut to cars waiting on the other side,

crossing the cut by steps leading down into the portion excavated in the first stages. As the shovel progressed and the cut became deeper, an overhead foot bridge was provided, which was lowered after each trip of the shovel, until on the approximate grade of the final bridge. The abutments for the bridges carrying street car traffic were, as a rule, in course of construction before street car traffic was discontinued, and the bridge was completed as soon as possible after service was discontinued.

For the first two seasons of work, stationary stiff leg derricks were erected at each bridge site at the original ground level and in such a position as to reach any portion of the structure. This allowed the derrick to be used in erecting the falsework, forms and reinforcing, and for placing the concrete for the whole bridge. During this last season, however, A-frame derricks fitted with hand crabs or hoists were used to erect the falsework and forms. The concrete was then placed from a portable concrete plant, traveling on the construction track at the low level. This consisted of a ½-yd. mixer of the drum type, mounted at the rear of a flat car. Following this was a track pile driver converted into an elevator, using the leads as guides for a specially designed ½-yd. dump bucket with the discharge door at the bottom of the forward side. The concrete was raised and then conveyed to the forms by chutes. The accompanying illustration shows the complete concreting plant in operation. Owing to the similarity of the bridges, unit forms are being employed to good advantage and are being used from three to five times with but slight alterations.

In all, there will be about 900,000 cu. yd. of material excavated about 33,000 cu. yd. of concrete and 900 tons of reinforcing bars will be required for the bridges, abutments and retaining walls.

According to usual practice on the St. Paul, the work is being done by company forces under the direction of C. F. Loweth, chief engineer. The plans are prepared under the direction of H. C. Lothholz, acting engineer of design, and the construction work is in charge of W. R. Powrie, district engineer, Minneapolis.

THE SHIPPING BILL

BY W. L. STODDARD

WASHINGTON, DEC. 1

Signs are increasing that the fight for the shipping bill, which is to be one of the most important items in the Administration's program this winter, will be of more than cursory interest to the railroads. The congestion of freight in the east, due to lack of ships, is being used as an argument for government-owned freighters, and in a despatch from Washington early in the week, bearing all the marks of official inspiration, it is declared that the Interstate Commerce Commission, at the suggestion of the President, has been investigating ocean freight rates and the relations between rail carriers in the United States and transatlantic steamship companies. Some of the information thus collected, it is declared, reveals close relations between the land and sea carriers, "particularly in matters connected with through freight shipments from interior points to foreign ports. If power is granted to the shipping board to prescribe reasonable rates for steamship traffic, it probably would include the power to fix, possibly in conjunction with the Interstate Commerce Commission, joint through rates from the interior to ports in other countries."

In this connection it may be well to state that from interviews had with officers of the Administration who are in the thick of the work for the shipping bill, it would seem that the bill is almost certain to be received very favorably by Congress. During the last year, so the reports which come to Administration leaders have it, there has been a decided change of sentiment for the measure, and in spite of the opposition, traceable to the foreign shipowners and those who are constitutionally against government ownership, the President's pet scheme will have pleasant, if not absolutely successful, sailing in Congressional waters.

George W. Norris, former director of wharves at Philadelphia, made a statement here the other day which was issued by the

Democratic committee as part of the propaganda for the shipping bill. "The conditions which exist in ocean transportation," said Mr. Norris, "and the theory upon which government intervention must be justified, are so wholly different from the railroad situation that there can be neither analogy nor comparison between the two. Moreover, as the government intervention would probably be temporary—ultimately yielding the field to private capital—and would probably show a balance on the wrong side of the ledger, the opponents of government ownership of railroads should rather welcome the experiment as likely to prove an illuminating object-lesson."

Interesting comments on the proposed shipping bill from a New England railroad man, E. D. Codman, former president of the Fitchburg Railroad, are contained in an interview, which is here presented for the first time. Mr. Codman believes that the government merchant marine line offers the only means of overcoming the discrimination enforced by the "shipping pool" against Atlantic seaboard ports.

His statement follows:

"Because I see no other way of relieving Boston of the burden of discrimination laid upon her commerce by the foreign-owned shipping pool, I feel I can endorse the idea of placing in commission a government-owned merchant marine. This government-owned service would seem to be able to deal with the present situation by establishing a fair transportation rate between here and Europe. At the same time it would give ports such as Boston a chance to enter on equitable terms the competition for the trade of South America.

"Take, for example, the rates from this port to Liverpool. We are so much nearer Liverpool than is New York to that English port, that a vessel can make a little better than eleven trips from Boston to Liverpool and back while she would be making ten trips from New York to Liverpool and back. Applied to freight rates, that saving in time should make a difference in our favor, and applied to passengers it should amount to enough to pay a \$5 fare from New York to Boston on a first-class passenger.

"Yet under the conditions established by the shipping combine on the Atlantic, the railroads carrying a shipment from Chicago to be sent to Liverpool are allowed practically only the same amount to deliver that shipment on the docks in Boston as to deliver it on the pier in New York. On both exports and imports the rates allowed the railroads are so low as to afford only a slight profit. The fact that there is less profit in bringing shipments by rail to Boston than to New York discourages the railroads from developing their service here. Boston is the victim of this discrimination. Only when her ocean rates to Europe are readjusted on a basis of the shorter distance can she hope to get a fair chance at the export business. The trouble lies in the fact that the foreign-controlled shipping pool has arbitrary control of the rates.

"If the United States government will build and operate, or control the operation of, a merchant marine that will enter upon the task of correcting this injustice, the whole country will be the gainer. The public loses whenever rates are fixed on any other basis than that of a fair price for the service rendered, as in the case of ocean freight transportation. Let the government put on a line of ships temporarily, and the shipping pool will have to meet the rates which a government board shall determine are fair for the distance from Boston to Liverpool.

"I do not believe in government ownership of shipping where private capital can and does render equal service for a fair price. But I do believe that where private capital is so combined, and under control so far removed from the action of public opinion, as is the case with our trans-Atlantic shipping, and where it fails so notably to render to the public a reasonable service at a fair price, the government should step in with its own corrective power. The corrective power in this instance is not the legal regulation of the rates to be charged by the privately owned lines, but the temporary establishing of a shipping line which will set the desired standard of service.

"Boston will be the gainer if this is done."

General News Department

The trains of the Delaware, Lackawanna & Western and the New York, Ontario & Western now run to and from the new passenger station of the New York Central at Utica, N. Y., making that the union station for the city.

The Denver & Rio Grande announces that after the end of this year the dining cars of that road will carry no intoxicating liquors. This rule is to apply not only in Colorado, where a prohibitory law goes into effect on January 1, but also in Utah and New Mexico.

A. D. Parker, vice-president of the Colorado & Southern, has announced that contracts covering the handling of business for the Colorado Midland between Denver and Colorado Springs over the Colorado & Southern, will be terminated on May 1, as part of a plan to rearrange division points.

Homer B. Vanderblue, assistant professor of transportation at Northwestern University School of Commerce, has been awarded the second prize of \$500, awarded annually by Hart, Schaffner & Marx, for essays on economic subjects. Mr. Vanderblue's paper was on the subject of "Railroad Valuation."

The Massachusetts Public Service Commission is making another investigation of the capital, expenditures and investments of the New York, New Haven & Hartford, and will assess the cost of it, up to \$10,000, against the company. Accountants are examining the company's books and a public hearing will be given by the commission on December 7.

The Coconino Water Development and Stock Company, recently organized in Arizona, proposes to lay 200 miles of pipe to supply water to the desert stations on the line of the Atchison, Topeka & Santa Fe between Ash Fork and Angell, about 90 miles, and also to the tourist resort towns on the rim of the Grand Canyon. The water is to be obtained by drilling wells on the slope of San Francisco Peak, about 10 miles north of Flagstaff.

The legislature of Georgia, which has just finished an extra session, has created a commission of five persons to have power to lease the Western & Atlantic Railroad, owned by the state. The chairman of the commission is Governor N. E. Harris and another member is C. M. Candler, chairman of the State Railroad Commission. The Western & Atlantic is now operated by the Nashville, Chattanooga & St. Louis under a lease which expires in 1919.

A. W. Newton, assistant to president of the Chicago, Burlington & Quincy, has been appointed chairman of the Engineering Committee, western group, Presidents' Conference Committee for the Federal Valuation of the Railways, succeeding H. C. Phillips, who was appointed assistant general secretary of the Presidents' Conference Committee some time ago. C. F. Loweth has been made a member of the Engineering Committee, western group, Presidents' Conference Committee.

R. C. Richards, chairman of the Central Safety Committee of the Chicago & North Western, in issuing a bulletin to employees calling for more general use of postal cards prepared by the division safety committee, on which employees or patrons are invited to make suggestions for making railroad operation safer and more satisfactory to the public, calls attention to the fact that from January 1, 1911, to September 1 last, 24,176 recommendations were made on the safety postal cards and otherwise, of which 23,502 were adopted and have already been put into effect.

Indictments were returned last week by the federal grand jury at Kansas City against the St. Louis & San Francisco and the Union Pacific railroads and the Western Tie & Timber Company, of St. Louis, charging an illegal reduction by which the timber company paid less than the lawful tariff rates for transportation of oak ties. The president of the timber company has given out a statement that the reduction of the rates arose

from a readjustment of divisions between the two railroads, and that according to the traffic departments and attorneys the proper rate was paid.

The Southern Railway, as a result of two years' attention to the education of special apprentices, has now in its employ, in the roadway department, 13 student apprentices, of whom seven have been promoted to the position of assistant supervisor. The company seeks to enlist in its service young men of technical training, who were born and bred in the South, and is at all times looking out for graduates of the leading southern universities. Special attention is given not only to scholastic attainment but also to personality, as judged by teachers and fellow students; and special consideration is accorded also to men who wholly or in part have paid their own way through college. Students have to begin on the road as common section laborers.

Victor Carlstrom, a Swede, riding in a Curtiss biplane of a new type, with a motor of 160 h.p., flew last week from Toronto, Ont., to New York City, by a route said to be about 600 miles long, in 400 minutes, or at the rate of 90 miles an hour. This, however, was not the inclusive time, as the aviator was compelled to stop over at Binghamton because of dizziness, due partly to a strong wind and partly to ill health. The 6 hours and 40 minutes represents the time actually on the wing. Most of the journey was made at a height of about 5,000 ft. The railroad lines of the Delaware, Lackawanna & Western and the Erie were the aviator's guides for most of the way. He started with 146 gallons of gasoline and with a total dead weight of about 960 lb.

The attorney-general of Texas proposes to get a receiver appointed for the Pacific Fruit Express in order to compel payment of a large sum of money which is alleged to be due on account of a tax of 3 per cent on its gross receipts from intra-state business since October 1, 1909—if the court grants the application which has been filed. The Pacific Fruit Express has no permit to do business in Texas, but its cars have been run extensively in the state for many years. If the officers accept service and come into court there will be a straight contest of the legal right of the state to tax the gross receipts of private car lines. Cars of a large number of private car lines are run in Texas, but it is said that very few of them have observed the gross-receipt tax law.

The Western Association of Short Line Railroads, with office in San Francisco, is conducting a publicity campaign in the interest of an increase in railway mail pay, and is sending to newspapers articles giving information regarding the effect of the present low rates on the short line railroads. The association says that "this matter is most vital to the little railroads in the mountain districts and the Pacific coast. These roads are none of them prospering, most of them are losing money, and a few are in the hands of a receiver. The association is composed of these small roads. We think that the government should be as fair to us as other shippers, and we believe that rates for mail pay should be fixed by the Interstate Commerce Commission."

Smoke Abatement in Chicago

The report of the Chicago Association of Commerce Committee on smoke abatement, which was presented at a dinner at Chicago, December 1, is reported in another column. The report was presented by Judge Jesse Holdom of the Illinois Appellate Court, as chairman of the committee. Harry A. Wheeler, vice-president of the Union Trust Company, spoke on the "History and Problems of the Committee." Harrison B. Riley, president of the Chicago Title & Trust Company, spoke on the "Arguments and Conclusion of the Report," and Charles L. Dering, president of the Chicago Association of Commerce, accepted the report on behalf of the association.

Committee on Prevention of Accidents at Highway Crossings

At the recent meeting of the American Railway Association, on the recommendation of the executive committee, the president appointed a Special Committee on the Prevention of Accidents at Grade Crossings, consisting of seven members, with James A. McCrea, general manager of the Long Island, as chairman, representing the railroads of the country territorially to consider the whole question. The other members of the committee are J. Q. Van Winkle, assistant to general manager, Cleveland, Cincinnati, Chicago & St. Louis Railway; C. L. Bardo, general manager, New York, New Haven & Hartford; L. E. Jeffries, general attorney, Southern; Howard Elliott, San Pedro, Los Angeles & Salt Lake; W. J. Towne, assistant general manager, Chicago & North Western, and W. R. Scott, vice-president and general manager, Southern Pacific.

St. Paul Electrification Tests

On November 13 the Chicago, Milwaukee & St. Paul made a test of one of the new electric locomotives which has just been received for operation on the Rocky Mountain division. This test was made on the tracks of the Butte, Anaconda & Pacific, as power is not yet available on the St. Paul. This locomotive, weighing 284 tons, took an ore train with 4,660 tons trailing load down a 1 per cent grade from Butte at a maximum speed of 25 miles an hour, reducing to 16 miles an hour on a portion of the line with heavy curvature and to a minimum of 7 miles an hour. Regenerative braking was applied on the descending grade, returning 21 per cent of the current to the line. As there was only 2,200 volts on this line at the time the test was made and as the St. Paul line will operate at 3,000 volts, it is estimated theoretically that on this basis 52.5 per cent of the power would have been returned on the St. Paul line on the 2 per cent mountain grade or 38.1 per cent on a 1 per cent grade. This same locomotive took this train up a 0.4 per cent grade into Anaconda on this low voltage. Three locomotives have now been received. Additional exhaustive tests of the locomotives will be conducted on the 2 per cent grades over the Rocky Mountains next week.

Street Accidents in New York City

The New York State Public Service Commission, First District, reports a marked decrease in casualties to persons on railroads and street railroads in that district [New York City, population about 5,000,000] for the month of October, 1915. Only 12 persons were killed during the month, which is the smallest total in the history of the Commission. The largest number of fatalities ever reported, 67, was in September, 1907. This was within three months after the creation of the Public Service Commission and two years before the Commission issued orders for the installation of efficient fenders and wheelguards on street surface railroad cars. These devices, together with the improved types of cars installed by the companies, the installation of air brakes, and quite recently the establishment of the near-side stop for street cars, have resulted in materially reducing the number of fatal accidents. When the Commission was created the number of persons killed ranged from 500 to 600 a year. This has been practically reduced 50 per cent, though there has been a great increase in traffic. Of the total of 5,395 accidents 3,920 occurred on surface lines, 950 on subway and elevated lines, 509 on standard railroad lines, 12 on railroad terminal [freight] and 3 on motor bus lines. Of the killed 6 met death on the surface lines, 4 on the subway and elevated lines, 1 on railroad lines and 1 on a railroad terminal line.

Strict Discipline

The Altoona Tribune reports, evidently on authentic information, that 28 employees of the Pennsylvania Railroad were disciplined during the week ending November 14 by the superintendent of the Middle division.

For running past a stop signal, a passenger engine man was suspended a week, and another was reprimanded for failing to stop and report a medium-speed signal light out. Overlooking orders brought a trip suspension for a passenger engine man and a reprimand for his fireman. A passenger conductor was suspended two days for failing to look after his train properly, another was suspended two days for failing to notify his engine man of restricted speed. For failing to make proper

car record report, one freight conductor was reprimanded. For intoxication off duty, a yard conductor was suspended two weeks, and another was reprimanded for failing to deliver manifests. A third yard conductor was reprimanded for despatching a train without manifest, while a yard flagman was reprimanded for sitting on rail. A passenger fireman was reprimanded for improper firing and a freight fireman was suspended a trip for collision.

Reprimands and suspensions of brakemen were imposed as follows: A passenger brakeman for starting train before car was loaded; a yard brakeman for drinking off duty and making false statement about the offense; for draft collision, five brakemen reprimanded; leaving work without permission, yard brakeman suspended; and sleeping on duty, one telephone exchange operator demoted to position of extra telephone operator.

The New Haven Trial

Charles S. Mellen, testifying for the government in the trial in the Federal Court in New York on Monday last, said that John L. Billard, the Meriden coal dealer, was such a good friend to the New York, New Haven & Hartford that if "my directors had asked me to take a pound of flesh out of him, he would have willingly gone off bleeding." Mr. Billard, as noted in last week's issue, held a large block of Boston & Maine shares for the New Haven for more than a year and then sold it back to the latter. Mr. Billard, it appears, willingly gave up a nominal profit of \$2,750,000 for an actual profit of \$150,000. The New Haven settled with him, in 1909, for \$450,000, but he gave up \$300,000 of it to Frank Brown, a Connecticut lawyer who had helped him to get the charter of the Billard Company and wanted, according to Mr. Mellen, to give \$50,000 to him. After this settlement, Billard endorsed the stock of the Billard Company to Mr. Mellen and the latter held it for two years when it was turned back to Mr. Billard.

A large part of the session on Tuesday was devoted to a discussion as to whether the government should be allowed to submit testimony concerning the New York, Westchester & Boston. This road is entirely an intrastate road, its mileage all being in the state of New York. The government contends that, under the company's charter, it was projected into Connecticut for the purpose of operating a through line into New England and that control was sought by the New Haven to prevent dangerous competition. R. V. Lindabury, for the defence, argued that the route set forth in the charter was re-located and that not only was the road not built beyond the New York state line, but was not so projected when the New Haven acquired control.

Judge Hunt, after hearing an hour and a half of argument, reserved decision.

On Wednesday the matter of the Westchester evidence was again taken up, Judge Hunt finally holding that all reference in regard to the road must be excluded. This is an important element in favor of the defence.

Government Ownership Too Near Home

(From an Editorial in the New York Commercial)

Once in a while the light breaks in on the most rabid advocates of public ownership. A daily paper of large circulation in New York city essays to occupy the field of champion of public ownership of all public utilities from railroads down to "jitney" cabs, but once in a while its editor receives a slap on the wrist from some federal or municipal clerk and then he talks right out in school. Something of the kind happened over in Brooklyn the other day and the champion of public ownership, of the sacredness of the civil service list and of the irrevocable rights of policemen to hold their jobs, now calls for somebody's head.

Having investigated complaints concerning the attitude of employees in the Brooklyn Department of Licenses this newspaper says editorially, "these superior gentlemen look down contemptuously upon men and women who appear before them," and it reminds them that they are paid and hired by the people and are not occupying hereditary offices. They are reminded that various things might happen to them, such as the discovery of the possibility of reducing their number and getting better work from those remaining by a little judicious discipline. The commissioner is asked to interest himself in this matter, for, as our contemporary very truly says, "the first thing to do is to make the

government respectable in the person of the officials with whom foreigners deal."

If the president of some great corporation said such things he would be hauled over the coals by the newspaper that printed "those cruel words." If an employe of a public service corporation should make a slip the corporation would have to go with him if this newspaper would have its say. But, if such a complaint based on sufficient evidence were made by this newspaper or any citizen, any public service corporation or any store would dismiss the offending employe on the spot.

MEETINGS AND CONVENTIONS

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

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 2-5, 1916, Atlanta, Ga.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, January, 1916, Atlanta, Ga.
- AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill. Next meeting, June 20-23, 1916, Cincinnati, O.
- AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 8 W. 40th St., New York.
- AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION.—H. G. McConaughy, 165 Broadway, New York.
- AMERICAN RAILROAD MASTER TINNERS', COPPERSMITHS' AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 17, 1915, The Blackstone, Chicago.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 17-19, 1916, New Orleans, La.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 21-23, 1916, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June, 1916.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July, 1916.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, Rooms 1116-8, Woodward Bldg., Washington, D. C. Annual meeting, June 28, 1916, Hotel Statler, Detroit, Mich.
- ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Semi-annual meeting with Master Car Builders' Association. Annual convention, October, 1916, Chicago.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—Willis H. Failing, N. Y. C., 3842 Grand Central Terminal, New York. Next meeting, May 19, 1916, Atlantic City, N. J.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 20-22, 1916, St. Paul, Minn.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—T. O. Jacobs, II, W. Johns-Manville Co., Chicago. Meetings with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLTR.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.
- FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Traffic Manager, R. F. & P., Richmond, Va. Annual session, May 17, 1916, Washington, D. C.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, C. & E. L., 922 McCormick Bldg., Chicago. Annual meeting, May, 1916, Chicago.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Next meeting, August, 1916, Chicago.
- MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo.
- MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 23-26, 1916, Hotel Hollenden, Cleveland, Ohio.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next annual meeting, September 12-14, 1916, Wilmington, Del.
- MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Building, Chicago. Annual meeting, June, 1916.
- NATIONAL RAILWAY APPLIANCE ASSOCIATION.—C. W. Kelly, 349 People's Gas Bldg., Chicago. Next convention, March 1916, Chicago.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meeting, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. P. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.
- RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala.
- RAILWAY REAL ESTATE ASSOCIATION.—Frank C. Irvine, 1125 Pennsylvania Station, Pittsburgh, Pa. Annual meeting, October, 1916, Chicago.
- RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenherg, Myers Bldg., Bethlehem, Pa. Next annual convention, September, 1916, Grand Hotel, Mackinac Island, Mich.
- RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, N. Y. C. R. R., Box C, Collingwood, Ohio.
- RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders' and Master Mechanics' Associations.
- RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling Ill. Next annual convention, September 19-22, 1916, New York.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta Ga. Next meeting, April, 1916.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramaco Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.—Roy S. Bushy, Firemen's Bldg., Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings, October to May.
- TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 21, 1916, Toronto, Ont.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Next meeting, September, 1916, Chicago.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—E. M. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

President Fred Zimmerman and a delegation of members of the Chicago Traffic Club called on President Wilson on November 19, to invite the President to address the club at its ninth annual dinner to be held in Chicago on a date yet to be chosen. The President has taken the matter under advisement and will give the club his answer at a later date.

In an announcement of new Florida passenger train service in our issue of November 19, page 978, the schedule of the "Royal Palm," the train between Chicago and Jacksonville via the Southern, Queen & Crescent and Big Four, was incorrectly stated. On November 21, the schedule of this train was changed to leave Chicago at 10:05 p. m., arriving at Jacksonville at 7:40 the second morning.

The "Dixie Limited" train, running between Chicago and Jacksonville, Fla., over the Chicago & Eastern Illinois, Louisville & Nashville, Nashville, Chattanooga & St. Louis, Central of Georgia, Georgia Southern & Florida and Atlantic Coast Line, will be put in service for the winter on January 10, leaving Chicago at 11:30 a. m., and arriving at Jacksonville at 7:30 p. m., the second day. Northbound, the train leaves Jacksonville at 9:35 a. m. and arrives at Chicago at 5:55 p. m.

Merchants of Atlanta, Ga., have started a campaign against increases in freight rates, from northern points to southeastern cities, recently granted the railroads by the Interstate Commerce Commission; and at a meeting, on Tuesday last, the wholesalers, retailers and jobbers agreed on the appointment of a committee to raise \$10,000 to finance the project. Attorneys have been retained to ask the suspension of the proposed rates, which would go into effect January 1. The merchants declare that the new rates, if they become effective, will cost Atlanta shippers \$500,000 a year above their present freight bills. They say that the railroads are preparing also to advance intrastate freight rates, and this they will oppose.

During the month of September, as in August, the expenses charged to the operation and maintenance of the Panama Canal were in excess of the tolls collected on vessels making use of the canal, according to the Canal Record. The shortage was \$63,177. During September, 1914, the second month of canal operation, the tolls exceeded the cost of operation and maintenance by \$63,601. The shortage was caused by the closing of the canal on account of slides during nearly one-half of the month. More than one-half of the total charges for operation and maintenance in September, 1915, represents the cost of dredging operations, which amounted to \$259,604, as compared with \$31,545 in September, 1914.

The traffic officers of the Missouri railroads held a conference at St. Louis on November 23, to consider the decision of the Missouri Public Service Commission, allowing general increases in freight and passenger rates, and adjourned subject to the call of the chair, Thomas R. Morrow, solicitor for Missouri of the Atchison, Topeka & Santa Fe. Three committees were appointed, with Joseph Bryson of the Missouri, Kansas & Texas, as chairman of the legal committee; J. M. Johnson of the Missouri Pacific, chairman of the freight committee, and Alexander Hilton of the St. Louis & San Francisco, chairman of the passenger committee, to study the decision in comparison with the present rates, and render a report at the subsequent meeting on the effect of the decision in detail. The commission has changed the effective date of the new rates from January 1 to January 20.

Increase of Fares on the New York Central

The New York Central has notified the New York State Public Service Commission that local one-way passenger fares in that state will be advanced on January 1 to the basis of 2½ cents a mile, except between Albany and Buffalo, on the main line, where the rates are limited by charter to two cents a mile. Between New York City and Albany, 142 miles, the advance is from \$3.10 to \$3.58.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Import Rates on Brewers' Rice

Opinion by Commissioner Clark:

Because of informal complaints filed with the commission, to determine the propriety of the import rates on brewers' rice from gulf ports to various destinations which were lower than the domestic rates, a hearing was had under a general order of the commission which provides for an investigation into the relationship between import and domestic rates.

The commission finds that since the import rates on brewers' rice from gulf ports are not made with relation to the domestic rates, but are controlled by and made differentials under the import rates on brewers' rice from north Atlantic ports, the circumstances surrounding those rates are substantially dissimilar from those surrounding the domestic rates, and that the allegation of discrimination, except where the differential in import rates is greater than the recognized differentials between the gulf ports and the north Atlantic ports, has not been proven.

It also holds that the relationship between the import and domestic rates on brewers' rice from gulf ports to Pueblo, Colo., Salt Lake City, Utah, and other points at which similar rate relationships obtain, is unjustly discriminatory, and that where defendants maintain from the gulf ports import rates on brewers' rice that are more than 6 cents lower than the import rates from New York to the same points, it is discriminatory to charge higher rates on domestic than on import shipments. (36 I. C. C., 389.)

Rates on Bituminous Coal to Mississippi Valley Territory

Brownville Cotton, Oil & Ice Company v. Louisville Nashville. Opinion by the Commission:

This proceeding involves a petition by the carriers to be allowed to continue to charge rates on coal from mines in Illinois, Kentucky, Tennessee and Alabama to points in Mississippi valley territory that are lower than rates on like traffic to intermediate points.

The mines in Illinois from which these rates apply are situated in the southern part of that state and are served by the Mobile & Ohio and Illinois Central. The mines in Kentucky are divided into two groups, one of which, known as the eastern group, is in the extreme eastern portion of that state, and the other, known as the western group, is in the western-central section of the state. The principal lines operating from these mines to Mississippi valley territory are the Illinois Central and the Louisville & Nashville from the western group, and the Louisville & Nashville from the eastern group. The Tennessee mines are situated in the eastern part of that state on the lines of the Southern, the Louisville & Nashville and the Nashville, Chattanooga & St. Louis. The mines in Alabama are situated for the most part in the northwestern portion of that state. The lines from these mines to Mississippi valley points are the Southern, the Northern Alabama, the Illinois Central, the St. Louis & San Francisco, the Mobile & Ohio and the Alabama Great Southern and their connections.

The territory of destination described as Mississippi valley territory consists of all that section of the United States east of the Mississippi river and south of the Ohio river lying on and west of a line formed by the Nashville, Chattanooga & St. Louis from Paducah, Ky., to Paris, Tenn., the Louisville & Nashville from Paris to Milan, Tenn., the Illinois Central from Milan to Jackson, Tenn., the Mobile & Ohio from Jackson to Mobile, Ala., and includes also stations on the line of the Mobile & Ohio east of West Point, Miss., to and including Columbus, Miss.

The commission's findings are as follows:

The carriers are authorized to continue lower rates to Memphis, Tenn., Natchez, Miss., Baton Rouge, Bayou Sara, Plantation group, Kenner and New Orleans, La., and group, Gulfport, Miss., and Mobile, Ala., than to intermediate points.

They may continue rates from mines in Illinois and Kentucky to Greenville and Vicksburg, Miss., lower than rates to intermediate points.

Authority to continue rates on coal via indirect routes from mines in Illinois, Kentucky, Tennessee and Alabama to junction and common points in Mississippi valley territory lower than rates to intermediate points is granted.

Authority to continue rates on coal from mines in Illinois and Kentucky to Bemis, Gibbs, Humboldt, Jackson, McKenzie, Milan, Paris, Union City, Martin and Rives, Tenn., lower than rates to intermediate points is denied.

Authority to continue rates via direct lines from Alabama mines to Aberdeen, Ackerman, Columbus, Ellisville, Enterprise, Hattiesburg, Holly Springs, Jackson, Laurel, Newton, Meridian, Starkville, Vicksburg and West Point, Miss., and Grand Junction and Middletown, Tenn., lower than rates to intermediate points is denied.

Reasonable maximum rates on bituminous coal from mines in Illinois, Kentucky and Alabama to Dyersburg, Tenn., Grenada, Oxford and Kosciusko, Miss., and other points are prescribed. (36 I. C. C., 401.)

Extension of Time to Comply with Safety Appliance Acts

The commission has granted a further extension of 12 months from July 1, 1916, to the time within which the carriers must make their freight train cars conform to the safety appliance acts. By an order of the commission dated March 13, 1911, issued in conformance with an act of Congress approved April 14, 1910, the carriers were allowed an extension of time of five years from July 1, 1911. By the present order the former order is extended one year.

The commission's order of March 13, 1911, was as follows:

(a) Carriers are not required to change the breaks from right to left side on steel or steel underframe cars with platform end sills, or to change the end ladders on such cars, except when such appliances are renewed, at which time they must be made to comply with the standards prescribed in said order of March 13, 1911.

(b) Carriers are granted an extension of five years from July 1, 1911, to change the location of brakes on all cars other than those designated in paragraph (a) to comply with the standards prescribed in said order.

(c) Carriers are granted an extension of five years from July 1, 1911, to comply with the standards prescribed in said order in respect of all brake specifications contained therein, other than those designated in paragraph (a) and (b), on cars of all classes.

(d) Carriers are not required to make changes to secure additional end-ladder clearance on cars that have 10 or more inches end-ladder clearance, within 30 inches of side of car, until car is shopped for work amounting to practically rebuilding body of car, at which time they must be made to comply with the standards prescribed in said order.

(e) Carriers are granted an extension of five years from July 1, 1911, to change cars having less than 10 inches end-ladder clearance, within 30 inches of side of car, to comply with the standards prescribed in said order.

(f) Carriers are granted an extension of five years from July 1, 1911, to change and apply all other appliances on freight cars to comply with the standards prescribed in said order, except that when a car is shopped for work amounting to practically rebuilding body of car, it must then be equipped according to the standards prescribed in said order in respect to handholds, running boards, ladders, sill steps, and brake staffs: *Provided*, That the extension of time herein granted is not to be construed as relieving carriers from complying with the provisions of section 4 of the act of March 2, 1893, as amended April 1, 1896, and March 2, 1903.

(g) Carriers are not required to change the location of handholds (except end handholds under end sills), ladders, sill steps, brake wheels, and brake staffs on freight-train cars where the appliances are within 3 inches of the required location, except that when cars undergo regular repairs they must then be made to comply with the standards prescribed in said order.

The petitioning roads operate a large percentage of the total railway mileage of the United States. A hearing was had at Washington, D. C., on September 28, 1915.

It is urged as a principal basis for relief that the carriers have acted in good faith and have made an earnest effort to comply with the commission's requirements, but that because of the financial and, to a certain extent, the physical difficulties involved, they will not be able fully to meet these requirements within the prescribed time. The proceeding involves only freight cars, locomotives and passengers having been made to comply with the act within the required time.

Out of a total of 2,025,254 cars in service on July 1, 1911, on roads having a total mileage of about 232,000 miles, it is estimated by the carriers that 1,669,064 cars, or about 82 per cent, will be either equipped in accordance with the order or removed from service by July 1, 1916, leaving about 356,000 cars still unequipped on that date. No information is available which will show, for the purpose of comparison, the yearly progress made in equipping the above 1,669,064 cars. The following table, however, compiled from data submitted by the

carriers indicates the progress of equipment with respect to 89 lines having a total mileage of 203,652 miles and an individual mileage of approximately 300 miles or over, and will perhaps afford a more comprehensive view of the general situation:

Cars in service July 1, 1911.....	1,849,222
Cars equipped year ended June 30—	
1912	122,213
1913	283,599
1914	315,184
1915	336,938
Total cars equipped June 30, 1915.....	1,057,934
Estimated number of cars to be equipped or removed from service year ending June 30, 1916.....	483,432
Estimated number of cars equipped by July 1, 1916.....	1,541,366
Estimated number of cars unequipped on July 1, 1916.....	307,856

It thus appears that about 57 per cent of the above cars were equipped on June 30, 1915, and that it is estimated that about 83 per cent will be either equipped or removed from service by July 1, 1916.

It may be conceded that the year ending June 30, 1914, was an abnormal one in railroading and that the general business depression during that period had a marked effect upon the volume of traffic, resulting in a large decrease in revenue. Notwithstanding these conditions it appears that, while there are a number of exceptions as to individual roads, the figures as a whole show a gradual increase in the number of cars equipped during each successive year and that the greatest number of cars was equipped in 1914 and 1915. It is perhaps proper to take into consideration that some time was consumed in making the necessary preparation and preliminary plans for an undertaking of this magnitude, involving, it is stated, an expenditure of about \$45,000,000. It is also doubtless true that as the carriers gained a more thorough working knowledge of the requirements they were in a position to equip a large number of cars in a given period.

It is asserted that unless a further extension is granted over a third of a million freight cars must be withdrawn from service until such time as they can be equipped and that this will result in congestion on storage and repair tracks and in hardship and inconvenience to the shipping public as well as to the railroads.

In view of these latter considerations and of the progress made under all circumstances by the carriers as a whole, the commission believes that sufficient cause exists for some further extension, though it is not convinced on the showing made that many of those roads which will still have a large percentage of unequipped cars on July 1, 1916, could not, by the exercise of somewhat more diligent effort and without undue hardship, have made considerably greater progress.

The commission believes that a sufficient extension of time would be 12 months. The order applies only to paragraphs (b), (c), (d) and (f). As to the matters in the other paragraphs the carriers have already been granted an indefinite extension of time. (36 I. C. C., 371.)

STATE COMMISSIONS

The Chicago & North Western, Chicago, Milwaukee & St. Paul, Chicago, St. Paul, Minneapolis & Omaha, and Minneapolis, St. Louis & Sault Ste. Marie have filed petitions with the Wisconsin Railroad Commission asking authority to increase freight rates within the state.

Attorneys for the receivers of the Missouri & North Arkansas have filed a motion with the Missouri Public Service Commission for a rehearing and modification of the commission's recent decision authorizing a limited increase of passenger and freight rates in Missouri. The petition declares that the rates allowed by the commission will not yield enough revenue to the Missouri & North Arkansas to enable it to maintain service.

The Louisiana Railroad Commission, after an investigation, has granted the application of the Illinois Central for authority to discontinue Frenier, La., as an agency station. Investigation showed that the storm on September 29 destroyed the entire settlement and all of the company's facilities at that point. All vestige of the little settlement in and around the station has been destroyed and the people formerly living there have either been drowned or have moved away.

The Louisiana Railroad Commission has ordered a general

investigation of the collection by conductors on passenger trains of one cent a mile additional, with a maximum of 10 cents, when tickets are not bought. The commission is thinking of prohibiting such penalties. The commission has also ordered a general investigation with a view to requiring railroads in the state to issue interchangeable excess baggage coupon books, or to accept penny script coupons for excess baggage between points in the state.

The contract of the New York, New Haven & Hartford and the Boston & Maine with the Joseph, Joseph & Brothers Company of Cincinnati, by which the railroads are selling their scrap iron to the Cincinnati firm for about \$1,500,000 a year, is being investigated by the Massachusetts Public Service Commission, on the complaint of Perry, Buxton & Doane Company of Boston, another junk dealer. The New Haven has decided not to renew the contract for next year. The Boston & Maine has not renewed its part of it, but defends it as being the most businesslike method for the disposal of its scrap.

COURT NEWS

The Wabash has filed a petition in the Missouri Supreme Court for a writ of mandamus to compel the secretary of state to issue a license to the new company to operate in Missouri. The secretary of state recently refused to do so on the ground that the laws of the state require the company to be incorporated in Missouri.

Free Pass Invalid

The Pennsylvania Superior Court holds that an agreement in the nature of a free pass for life between a railroad company and a prospective shipper is invalid where the consideration mentioned is \$1.00, and the proof is to the effect that the pass was merely a gratuity in recognition of past kindnesses—Pittsburgh & Lake Erie v. Peterson, 58 Pa. Sup. Ct. 44.

Fires—Right to Pile Wood on Right of Way

Action was brought against a railroad for damages for negligently burning two buildings adjoining the company's right of way. The fire started in the station, spread to a pile of seasoned pine, which had been delivered for shipment and was waiting until cars were ready. From this the fire appeared to have extended to the plaintiff's buildings. The only negligence relied on was permitting wood [lumber] to remain on the right of way. The North Carolina Supreme Court held that, as wood is a recognized and necessary commodity, with no extra hazards in its transportation or shipment, and as the railroad was compelled by law to receive it, and could only store it on its right of way, in the absence of evidence that the wood was placed at an improper place or improperly piled, there was no evidence of negligence.—Kemp v. Norfolk Southern (N. Car.) 86 S. E. 621.

Void Commission Order to Connect With Another Road

The St. Louis & San Francisco was convicted and fined for failing to obey an order of the Arkansas Railroad Commission to maintain a joint interchange track with the Kansas City & Memphis at Fayetteville. The order was based on a petition signed by 17 corporations and partnerships and one natural person. The Arkansas Supreme Court, on appeal, held the order to be void, as not being signed by 15 bona fide citizens residing within the territory affected, within the direct terms of the statute, since "bona fide citizens," as there used, means permanent residents as distinguished from sojourners, and refers to individuals to the exclusion of corporations and copartnerships.—St. Louis & S. F. (Ark.) 179 S. W. 342.

Consignor's Right to Sue

A consignor of lumber shipped on a straight bill of lading sued for negligence in transportation, attempting to prove that he had thereby been compelled to pay additional and increased freight charges. The only proof of this was a paid freight bill, which did not show whether it was paid by the consignor or the consignee. As goods thus shipped became the property of the consignee at the time of delivery to the railroad, nothing else appearing, he is prima facie liable for the freight, and in the absence of proof to the contrary it would be presumed that

he paid it. The North Carolina Supreme Court therefore held that the consignor was not entitled to recover.—Ellington & Guy v. Norfolk Southern (N. Car.) 86 S. E. 693.

Noncompliance With Headlight Statute

Action was brought for personal injury to an employee of an express company, who, in the course of his duty, was walking near a track in the Chicago & North Western's station in Milwaukee. As he knew, a train was past due, and he was hurrying. It was at night and the station was well lighted. The train came in and he was struck from behind by the pilot of the engine. Violation of the Wisconsin headlight statute was charged. The trial court directed a verdict for the defendant on the ground of contributory negligence, holding also that the headlight statute was so indefinite and uncertain as to be impracticable of enforcement, and was therefore void.

On appeal, the Wisconsin Supreme Court did not consider the question of the constitutionality of the headlight statute, holding that the vicinity of the accident must have been so brilliantly lighted by the nine arc lights that no more efficient headlight was necessary, and insufficient headlights had no casual connection with the damages claimed. The judgment against the employee was affirmed.—Smith v. C. & N. W. (Wis.) 154 N. W. 623.

Release of Railroad's Liability by Pullman Car Cook

Action was brought for the death of a Pullman car cook, alleged to have been caused by the negligence of the C., B. & Q. in operating its railroad in the state of Colorado. The cook's employment contract, in the Pullman company's usual form, was executed in Pennsylvania. It obligated the deceased to go wherever he was required in the service, and he renounced the rights of a passenger. The deceased was in no sense an employee of the railroad.

If the contract of employment and the release had been in Colorado, they would have been a complete defense in a suit for injuries not resulting in death. Both under the Colorado decisions and the federal decisions interpreting the common law, the deceased was not a passenger. An agreement that, in consideration of employment with the Pullman Company, the railroad should under no circumstances be liable for injuries or death of a Pullman Company porter not an employee of the railroad has been held to be not against public policy, and to cover injuries caused by the negligence of the railroad's employees, even though such negligence is not specifically mentioned in the contract. Denver & Rio Grande v. Whan, 39 Colo., 230, 89 Pac. 39; Robinson v. B. & O., 237 U. S. 84. The last point was expressly decided in Russell v. P., C. C. & St. L., 157 Ind. 305, 61 N. E. 678.

The plaintiff contended, however, that though the law of Colorado, where the tort was committed, governed the right of action, the employment contract and release were void in Pennsylvania, where executed, and therefore could not be availed of in defense in any jurisdiction. The Circuit Court of Appeals, Seventh circuit, pointed out that the Pennsylvania courts do not declare such a release null and void, even if made in Pennsylvania, but merely hold it contrary to the public policy of the state, and therefore unenforceable as a defense when the tort is committed in Pennsylvania; and that, too, though the release was valid where executed. On the other hand, if the injury occurred in a state which recognized the release as valid, the Pennsylvania courts enforce it, even though the contract was made in Pennsylvania. Moreover, the validity of the release as a defense in an action of tort is governed by the law of the place of injury. And, as Colorado has no statutory provision relating thereto, the federal courts, interpreting the common law, would, in any event, enforce the release as a bar for damages arising from the negligence in Colorado of the railroad's employees.

The Colorado statute as to wrongful death gives a right of action whenever the death of a person shall be caused by wrongful act, neglect or default of another, and the act is such as would, if death had not ensued, have entitled the party injured to maintain an action for damages. As the widow's action, therefore, was maintainable only if the deceased could have brought action if death had not ensued, the release constituted a bar to her suit. Lindsay v. Chicago, Burlington & Quincy, C. C. A., 226 Fed. 23.

Railway Officers

Executive, Financial, Legal and Accounting

H. D. Pollard has been elected president of the Wrightsville & Tennille, succeeding A. F. Daley, deceased.

H. P. McMillan has been appointed auditor of the San Antonio, Uvalde & Gulf, with office at San Antonio, Tex., vice T. S. Ford, resigned.

Edgar W. Sprague has been appointed assistant general claim agent of the Yazoo & Mississippi Valley with office at Memphis, Tenn., effective December 1.

Charles A. Leggo has been appointed assistant secretary of the Chicago, St. Paul, Minneapolis & Omaha, with office at Hudson, Wis. Effective December 1.

William Mueller has been appointed assistant tax commissioner of the Chicago, St. Paul, Minneapolis & Omaha, with office at St. Paul, Minn. Effective December 1.

John D. Caldwell, assistant secretary of the Chicago, St. Paul, Minneapolis & Omaha at Chicago, Ill., has been elected secretary with office in the same city. Effective December 1. He is also secretary of the Chicago & North Western.

T. A. Polleys, secretary and right of way and tax commissioner of the Chicago, St. Paul, Minneapolis & Omaha at Hudson, Wis., has been appointed tax commissioner of the Chicago & North Western and the Omaha, with office at Chicago, Ill., vice F. P. Crandon, retired under the pension rules. Effective December 1.

B. A. Worthington, who has been elected president of the Cincinnati, Indianapolis & Western, was born on November 20, 1861, at Sacramento, Cal. He was educated in the public schools at Sacramento and entered railway service on July 1, 1874, as telegraph messenger of the Central Pacific, now part of the Southern Pacific, at Sacramento, and later was telegraph operator of the same road. From 1877 to 1882 he was commercial operator of the Western Union Telegraph Company and then to 1888 he was chief clerk and secretary to the general master mechanic of the Southern Pacific at Sacramento. From 1888 to 1895 he was chief clerk and secretary to the vice-president and general manager of that road at San Francisco, Cal. In July, 1895, he became chief clerk and secretary to the assistant to the president, and from 1898 to 1901 he was in charge of tonnage rating of locomotives on that road. In July, 1901, he was appointed superintendent of the Tucson division of the Southern Pacific at Tucson, Ariz. In October of the same year he became superintendent of the Coast division, with headquarters at San Francisco, and from August 20, 1903, to April 1, 1904, he was assistant to Julius Kruttschnitt, general manager at San Francisco. From April 1, 1904, to February, 1905, he was assistant director of maintenance and operation of the Harriman Lines (Southern Pacific and Union Pacific Systems) at Chicago. He was then elected vice-president and general manager of the Oregon Railroad & Navigation Company, and from June 1, 1905, to June, 1908, he was first vice-president of the Wheeling & Lake Erie, the Wabash-Pittsburg Terminal Railway and



B. A. Worthington

the West Side Belt Railroad, comprising the Wabash lines east of Toledo, O. From September, 1905, to June, 1908, he was also general manager of the same lines. In June, 1908, he became receiver of the Wheeling & Lake Erie, with office at Cleveland, O. On July 1, 1912, he was elected president and general manager of the Chicago & Alton, and later became president of the Lorain & West Virginian.

Henry B. Hull, chief claim agent of the Illinois Central, has been appointed general claim agent, the position of chief claim agent having been abolished. His office will continue to be at Chicago, Ill. Philip M. Gatch has been appointed assistant general claim agent with jurisdiction over lines south of the Ohio river, with offices at Chicago.

W. O. Bunker, freight claim agent of the Chicago, Rock Island & Pacific, has been appointed general superintendent of freight claims, in charge of loss and damage claims and their prevention, with office at Chicago, Ill. The office of freight claim agent has been abolished. F. W. Main, assistant freight claim agent, has been appointed auditor freight overcharge claims, with office at Chicago. G. W. Loderhose has been appointed assistant general superintendent of freight claims, with headquarters at Chicago. Effective December 1.

The Cincinnati, Indianapolis & Western on December 1 took over the operation of the line from Hamilton, O., to Springfield, Ill., and the branch from Sidell, Ill., to Olney, Ill., heretofore operated by the Cincinnati, Hamilton & Dayton. The new company will have trackage rights over the C., H. & D. between Cincinnati and Hamilton. The officers are as follows, and all will have headquarters at Indianapolis, Ind.: B. A. Worthington, president; C. F. Smith, assistant to the president; J. G. Moore, secretary and assistant counsel; F. B. Brown, auditor; D. J. Curran, treasurer; J. A. Simmons, general traffic manager; M. V. Hynes, general superintendent; H. F. Passel, chief engineer; Edward Boas, superintendent motive power; W. H. Betticher, master car builder; H. Lewis, manager purchases and supplies; J. L. Powell, superintendent car service and accounting; L. E. Smith, freight claim agent.

Operating

M. O. Connor has been appointed terminal trainmaster of the Georgia & Florida with office at Augusta, Ga.

D. J. Madden has been appointed trainmaster of the Mahoning division of the Erie, with headquarters at Cleveland, Ohio. Effective December 1.

H. J. Humphrey has been appointed acting superintendent of car service of the Canadian Pacific eastern lines with office at Montreal, Que., vice W. Fansley, transferred.

H. H. Morris, assistant superintendent of the Huntington and Big Sandy divisions of the Chesapeake & Ohio, at Huntington, W. Va., has resigned to go into other business.

G. L. Candler, superintendent of transportation, with office at Savannah, Ga., has been appointed general superintendent of the Central of Georgia, vice J. T. Johnson, deceased.

J. W. Smith, assistant superintendent of the Indiana Harbor Belt at Gibson, Ind., has been promoted to superintendent, and the office of assistant superintendent has been abolished.

H. E. McGee, trainmaster of the Missouri, Kansas & Texas, at Smithville, Tex., has been promoted to division superintendent with headquarters at Greenville, Tex. E. E. Hanna has been appointed trainmaster to succeed Mr. McGee at Smithville.

L. L. McIntyre, trainmaster of the Carolina, Clinchfield & Ohio at Erwin, Tenn., has been appointed superintendent, with office at Erwin. W. T. Wohlford, assistant trainmaster at Dante, Va., has been appointed trainmaster with office at Erwin, vice Mr. McIntyre.

W. R. Cahill, acting superintendent of the Missouri, Kansas & Texas, at Wichita Falls, Tex., has been transferred in the same capacity to Smithville, to take the place of C. A. Thaneiser, who has been given an indefinite leave of absence on account of ill health.

John J. Mantell, superintendent of the Wyoming division of the Erie at Dunmore, Pa., has been appointed superintendent of ter-

minals, with offices at Jersey City, N. J., vice Eugene R. Allen, resigned. Augustus E. Ruffer assistant superintendent at Jersey City, has been appointed superintendent of the Wyoming division, vice Mr. J. J. Mantell, and Harold R. Cole succeeds Mr. Ruffer.

P. R. Albright, whose appointment as general manager of the Atlantic Coast Line, with headquarters at Wilmington, N. C., has already been announced in these columns, was born on June 26, 1866, at Greensboro, N. C., and was educated in the public schools. He began railway work on August 1, 1888, as a clerk to the general superintendent of the Cape Fear & Yadkin Valley, now a part of the Atlantic Coast Line. He subsequently served as chief clerk to the general superintendent and chief clerk to the general manager of the same road until September, 1898. He then organized the North Carolina Demurrage Bureau, and served as manager of that bureau until March 1, 1904. He went to the Atlantic Coast Line in March, 1904, as assistant to general manager. On November 17, 1914, he was appointed assistant general manager, which position he held at the time of his recent appointment as general manager of the same road, as above noted.

John Colin Murchison, who has been appointed general superintendent of the Atlantic Coast Line with headquarters at Jacksonville, Fla., as has already been announced in these columns, was born on September 8, 1867, at Gulf, N. C., and was educated in the public schools. He has began railway work on February 11, 1885, with the Cape Fear & Yadkin Valley, serving first as clerk and operator at Greensboro, N. C., and later as operator at Fayetteville. In May, 1886, he was appointed despatcher, and in September, 1890, was made master of trains. From February, 1899, to the following January he was train-master on the Atlantic Coast Line, and then for about five years was out of railway work. In 1905 he returned to the service of the Atlantic Coast Line as superintendent at Rocky Mount, N. C. Two years later he was transferred as superintendent to Wilmington, N. C., and from 1907 to 1915 served as superintendent at Charleston, S. C. On October 12, 1915, he was appointed assistant general superintendent at Jacksonville, Fla., and the following month was made general superintendent with headquarters at Jacksonville, of the same road, as above noted.

Traffic

Cecil Wray Johnston, whose appointment as assistant general passenger agent of the Grand Trunk, with headquarters at Montreal, Que., has already been announced in these columns,



C. W. Johnston

was born on July 27, 1879, at Actonville, Que. He was educated in the Elementary School, Sherbrooke Academy, and St. Francis College, Richmond, Que. He began railway work on September 1, 1897, with the Grand Trunk, as clerk and operator at Richmond. In April, 1899, he was transferred as clerk to Berlin, N. H. From June, 1899, to the following November, he was relieving operator and agent at Island Pond, Vt., and Portland, Maine district. In December, 1899, he was appointed day operator at Sherbrooke, Que., and in March, 1900, became a clerk in the audit department at Montreal. From June, 1901, to June, 1902, he was ticket clerk, and then to December 31, 1904, was traveling passenger agent. On January 1, 1905, he was appointed excursion clerk at Montreal of the same road, and later was transferred to the Grand Trunk Pacific at Winnipeg, Man. He returned to the Grand Trunk in February, 1912, as chief clerk to the passenger traffic manager at Montreal. Two years later he was appointed assistant to passenger traffic manager at Montreal,

which position he held at the time of his recent appointment as assistant general passenger agent of the same road, as above noted.

H. C. Cassels has been appointed general agent of the Georgia & Florida with office at Augusta, Ga.

Julian Nance has been appointed district freight agent of the Union Pacific, with headquarters at Kansas City, Mo.

Frank W. Smith, a member of the Committee on Uniform Classification, with headquarters at Chicago, Ill., has been appointed a member of the reorganized Official Classification Committee, with headquarters at New York City.



F. W. Smith

Before becoming a member of the Uniform Classification Committee Mr. Smith was for a period of 20 years connected with the New York, Ontario & Western, with office at New York City. His first position was that of general baggage agent, to which he was appointed on February 1, 1889. On September 1, 1893, he was appointed chief clerk in the general freight and passenger department. On December 30, 1902, he was made assistant general freight and passenger agent, in which position he served until September 15, 1908, when he was appointed to his present position as a member of the Uniform Classification Committee at Chicago. His new appointment as a member of the Official Classification Committee become effective on December 1.

D. T. Lawrence, whose appointment as a member of the Official Classification Committee, with office at New York City, has been announced, was born at Marysville, Ohio, on July 20, 1871. He



D. T. Lawrence

entered railway service in March, 1890, as an office boy in the general office of the Central New England & Western at Poughkeepsie, N. Y. He remained with this road at Poughkeepsie and Hartford, Conn., until November, 1892, in the successive capacities of office boy, stenographer and clerk. From November, 1892, until May, 1899, he was stenographer, clerk and soliciting agent for the National Despatch Fast Freight Line, at Boston, Mass. He was appointed New England agent of this line in May, 1899, at the same time assuming the duties of agent of the Great Eastern Fast Freight Line. In May, 1903, he was made manager of the National Despatch-Great Eastern Line, a consolidation of the National Despatch and the Fast Freight, with headquarters at Buffalo, N. Y. He remained in this position for eight years, with office first at Buffalo, N. Y., and later at Boston, Mass. In May, 1911, he was appointed general freight agent of the Central Vermont with headquarters at St. Albans, Vt.

W. V. Powell has been appointed industrial commissioner of the St. Louis Southwestern, with office at St. Louis, Mo., in charge of industrial and immigration matters. W. R. Beattie,

agricultural and industrial commissioner, has been relieved of the duties pertaining to industrial and immigration matters and will hereafter hold the position of agricultural commissioner.

Wallace S. Cookson, whose appointment as general passenger agent of the Grand Trunk, with headquarters at Montreal, Que., has already been announced in these columns, was born on June 12, 1871, at Port Jervis, N. Y., and was educated in the public schools. He began railway work in 1887, with the Erie; from 1890, to 1899, he was assistant ticket agent on the Chicago & Western Indiana. From 1899, to May, 1909, he served as chief clerk in the general passenger department of the Grand Trunk at Chicago. On May 1, 1909, he was appointed assistant general passenger agent of the Grand Trunk, with office at Chicago. He was transferred as assistant general passenger agent in June, 1910, to Montreal, Que., remaining in that position until his recent appointment as general passenger agent of the same road, as above noted.



W. S. Cookson

H. P. Barlow has been appointed right of way commissioner of the Chicago, St. Paul, Minneapolis & Omaha, with office at St. Paul, Minn. Effective December 1.

C. A. Leggo has been appointed right of way agent of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul, Minn. Effective December 1.

Henry R. McLean, contracting freight agent of the Central of Georgia at Atlanta, Ga., has been appointed commercial agent with office at Macon, vice W. B. Morgan, transferred.

Harry Gower, freight traffic manager of the Chicago, Rock Island & Pacific, with office at Chicago, Ill., retired from service on December 1. Mr. Gower was born in England on May 31, 1853, and entered railway service in 1878, as a clerk in the auditing department of the Rock Island. He has remained with the same railroad ever since, in the consecutive capacities of chief clerk, freight auditing department, until October 7, 1881; chief clerk, general freight department, October 7, 1881, to April, 1887; second assistant general freight agent, April, 1887, to March 1, 1888, first assistant general freight agent, March 1, 1888, to March, 1896; general freight agent, March, 1896, to March 1, 1899; assistant freight traffic manager, March 1, 1899, to January 15, 1906; and of freight traffic manager, January 15, 1906, to December 1, 1915.



H. Gower

S. H. Johnson, assistant freight traffic manager of the Chicago, Rock Island & Pacific, has been promoted to freight traffic manager to succeed H. Gower, resigned. Effective December 1.

C. C. Graves, traffic manager of the Carolina, Atlantic & Western and the Charlotte, Monroe & Columbia at Hamlet, N. C.,

has been appointed assistant general freight agent of the Seaboard Air Line with headquarters at Hamlet.

George H. Corse, Jr., special agent of the passenger department of the Union Pacific System, has been appointed foreign passenger agent of the system. His office will remain at Chicago, Ill., and his new appointment was effective November 29,

In the sketch of Benton M. Bukey, published in our issue of November 26, page 1028, a number of typographical errors occurred. The correct sketch follows: Benton M. Bukey has been appointed assistant general passenger agent of the Atchison, Topeka & Santa Fe, with headquarters at Chicago, Ill. Mr. Bukey was born at Williamstown, Wood County, W. Va., on November 6, 1879. He received a high school education in Washington, D. C., and entered railway service in that city on November 18, 1899, in the accounting department of the Southern. He remained in Washington until July, 1903, when he entered the employ of the Chicago, Burlington & Quincy, in the office of the auditor of ticket accounts, at Chicago, Ill. In November, 1904, he became a rate clerk in the passenger department of the same road, and in April, 1905, went to St. Louis, Mo., to perform the same kind of service for the Missouri Pacific. He was in the service of the Missouri, Kansas & Texas in the same capacity from August, 1906, to October, 1906. Since that time he has been continuously in the passenger department of the Santa Fe at Chicago, Ill. In September, 1908, he was promoted from rate clerk to chief rate clerk, and in September, 1909, was appointed chief clerk to the passenger traffic manager, the position which he held up to the time of his recent promotion.

Engineering and Rolling Stock

G. F. Shull, acting master mechanic of the Carolina, Clinchfield & Ohio at Erwin, Tenn., has been appointed master mechanic, with office at Erwin.

E. F. Gates, assistant signal supervisor of the Portland division of the Boston & Maine, has been appointed signal supervisor succeeding George W. Hayward, deceased.

Ed. Sheffield, assistant signal supervisor of the Texas & New Orleans during the leave of absence of L. H. Feldhake, has been appointed acting signal supervisor of the Houston & Texas Central.

L. Finegan, superintendent of shops of the Baltimore & Ohio at Glenwood, Pittsburgh, Pa., has been appointed superintendent of shops at Mount Clare, Baltimore, Md., vice P. Conniff, assigned to other duties.

A. A. Kurzejka has been appointed chief carpenter of the Iowa and Minnesota division of the Chicago, Milwaukee & St. Paul, with headquarters at Minneapolis, Minn., vice Michael Caton, resigned on account of ill health.

H. A. English has been appointed master mechanic of the Canadian Northern, Central division, with office at Winnipeg, Man., vice G. H. Hedge promoted. C. J. Quantic has been appointed master mechanic of the Pacific division, with office at Port Mann, B. C.

E. A. Cuthbertson, signal inspector of the Northern Pacific, with headquarters at Sand Point, Ida., has been appointed supervisor of signals for the lines east of Mandan, N. D., succeeding W. M. O'Laughlin, resigned to accept a position with the Interstate Commerce Commission.

OBITUARY

George Hayward, supervisor of signals of the Connecticut & Passumpsic division of the Boston & Maine, Springfield, Mass., died on October 20, 1915, from injuries caused by a fall from a signal ladder.

Walter J. Bell, who was superintendent of the Columbus division of the Southern Railway at Williamson, Ga., previous to January, 1914, died on November 22, at his home in Atlanta, Ga., at the age of 58.

INDIAN RAILWAY ENLISTMENTS.—The report of the South India Railway states that out of a staff of 83 European officers 16 have volunteered for and have joined the army for active service, as have also 21 European and four native subordinates of the Indian establishment, and two men from the London office.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE DETROIT, TOLEDO & IRONTON is in the market for a number of heavy freight locomotives.

THE DULUTH & IRON RANGE has ordered three Mikado type locomotives from the Baldwin Locomotive Works.

THE CARNEGIE STEEL COMPANY has ordered one six-wheel switching locomotive from the American Locomotive Company.

THE LAKE ERIE & NORTHERN has ordered three electric locomotives from the Westinghouse Electric & Manufacturing Company.

THE TUCSON, CORNELIA & GILA BEND has ordered one Mogul type and one switching locomotive from the American Locomotive Company, and is in the market for four more locomotives. John C. Greenway, general manager, Gila Bend, Ariz.

THE DULUTH, MISSABE & NORTHERN, reported in the *Railway Age Gazette* of November 19 as inquiring for prices on two Mallet and four Santa Fe type locomotives, has ordered two Mallet and six Santa Fe type locomotives from the Baldwin Locomotive Works.

THE CALUMET & ARIZONA MINING COMPANY has ordered one Mogul type locomotive and one 6-wheel switching locomotive from the American Locomotive Company. The Mogul type locomotive will have 19 by 26-in. cylinders, 56-in. driving wheels and a total weight in working order of 140,000 lb., and the switching locomotive will have 19 by 26-in. cylinders, 50-in. driving wheels and a total weight in working order of 133,000 lb.

CAR BUILDING

THE LEHIGH VALLEY is in the market for 500 automobile cars.

THE MISSOURI, KANSAS & TEXAS is inquiring for prices on 1,000 stock cars.

THE ATCHISON, TOPEKA & SANTA FE is reported as inquiring for 25 concentrate cars.

THE DELAWARE & HUDSON is in the market for 1,000 underframes for twin hopper coal cars.

THE RUTLAND is in the market for freight cars and is asking prices on 1,000, 2,000 or 5,000 cars.

THE MISSOURI, KANSAS & TEXAS is in the market for 4 dining cars, 2 postal cars and 15 baggage cars.

THE DULUTH & IRON RANGE has ordered 250 50-ton ore cars from the American Car & Foundry Company.

THE UTAH COPPER COMPANY is reported to have ordered 100 ore cars from the Pressed Steel Car Company.

THE DELAWARE, LACKAWANNA & WESTERN has ordered 1,000 box cars from the American Car & Foundry Company.

THE PENNSYLVANIA RAILROAD has ordered 12 combination baggage and mail cars, and six dining cars from the Pullman Company.

THE PENNSYLVANIA RAILROAD has withdrawn its recent inquiry for freight cars, it having been found that the prices quoted were too high.

THE MINNEAPOLIS & ST. LOUIS, which recently ordered 500 box cars from the Bettendorf Company, is now inquiring for 1,000 additional box cars.

THE DULUTH, MISSABE & NORTHERN has ordered 1,000 50-ton ore cars from the Western Steel Car & Foundry Company and 200 50-ton general service cars from the Pullman Company.

THE GEORGIA SOUTHERN & FLORIDA has ordered 2 combination passenger and baggage cars from the Pressed Steel Car Company and 130 40-ton gondola and 373 30-ton steel underframe box cars from the Lenoir Car Works.

THE INTERBOROUGH RAPID TRANSIT, reported in last week's

issue of the *Railway Age Gazette* as having given the Pullman Company an order for 311 subway car bodies, has also ordered 405 trailer trucks and 246 motor car trucks from that company.

THE NEW YORK, NEW HAVEN & HARTFORD has authorized the Osgood-Bradley Company to proceed with the construction of 50 baggage cars, 5 postal cars, 10 combination baggage and smoking cars, 5 combination baggage and mail cars, 10 smoking cars and 20 coaches, all of which will be of all-steel construction.

THE CENTRAL RAILROAD OF NEW JERSEY was incorrectly reported in an item in the *Railway Age Gazette* of November 5 as, having given the Standard Steel Car Company an order for 1,000 box cars, 1,000 hopper cars and 250 insulated box cars for ice. The company's orders were for 3,250 cars and were as follows: Pressed Steel Car Company, 1,000 110,000-lb. capacity hopper cars; Standard Steel Car Company, 1,000 110,000-lb. capacity hopper cars and 500 box cars; American Car & Foundry Company, 500 box cars and 250 insulated ice cars.

IRON AND STEEL

THE CHICAGO & EASTERN ILLINOIS has ordered 10,000 tons of rails from the Illinois Steel Company.

THE MISSOURI, KANSAS & TEXAS has ordered 15,000 tons of rails from the Illinois Steel Company.

THE SOUTHERN PACIFIC has ordered 20,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

THE ST. LOUIS, IRON MOUNTAIN & SOUTHERN, B. F. Bush, receiver, has been authorized by the federal court to expend \$175,000 for rails.

THE CHICAGO, BURLINGTON & QUINCY has purchased 15,000 tons of 90-lb. rails from the Colorado Fuel & Iron Company in addition to the tonnage reported on October 1.

THE MISSOURI PACIFIC, B. F. Bush, receiver, has been authorized by the federal court to expend \$530,630 for new rails and \$273,220 for the improvement of roadway and equipment.

TRACK SPECIALTIES

THE CHICAGO, BURLINGTON & QUINCY has ordered 6,000 tons of tie plates from the Interstate Iron & Steel Company and 1,200 tons from the Railroad Supply Company.

MACHINERY AND TOOLS

THE GREAT NORTHERN is in the market for the following list of machines and tools: One 16-in. motor-driven engine lathe with a 12-ft. bed; one 28-in. upright swing drill press with revolving table (not geared) and one 2-h.p. 250-volt d.c. motor to be belted to the driving pulley; two motor-driven pipe-threading machines with tools and motors; one 24-in. stroke shaper without traveling head, with tools and motor; one motor-driven, square base, emery grinder; one 48-in. by 6-in. motor-driven grinding stone with cast iron trough and motor; one 1,500-lb. single-frame steam hammer, with tools and one set of steel dies; two 50-in. by 54-in. by 24-in. square base, steel, stationary blast forges; one 18-in. motor-driven, vertical, wood-boring machine with adjustable table, having attachment for boring angles; one motor-driven, iron box frame rip-saw table, with attachment for raising table and cutting bevels, one motor-driven, 30-in. engine lathe with 18-ft. bed; one motor-driven, half universal radial drill with capacity to drill 2-in. holes, complete with tools and motor.

SIGNALING

THE EL PASO & SOUTHWESTERN proposes to install automatic block signals during the coming year on its line between Lee, Ariz., and Moores Spur, 25 miles.

THE SAN PEDRO, LOS ANGELES & SALT LAKE plans to install automatic block signals during the coming year on its line between Los Angeles, Cal., and Riverside, 58 miles. A manual interlocking plant is being put in at Magnolia avenue, Riverside, where the line is crossed by the Pacific Electric Railway. This machine will have 12 levers.

Supply Trade News

The Pere Marquette is inquiring for 500,000 ft. of lumber for car repairs.

The Western Electric Company has moved its Detroit headquarters from 263 Franklin street to larger quarters at Kirby and Dequinde streets.

The Chicago, Milwaukee & St. Paul has purchased 2,000,000 ft. of fir car decking on the Pacific coast. The lumber will be used in the Milwaukee shops.

The Electric Cable Company announces the opening of a western sales office at 122 South Michigan avenue, Chicago, Ill., in charge of James M. Brown, manager.

W. B. Wise, New York manager of the Adams & Elting Company, Chicago, has been appointed assistant to the president of Flint & Chester, Inc., with headquarters in New York.

L. H. Zintgraff & Co. is the name of a new company which has been established with an office at 200 Security Building, St. Louis, Mo., to deal in foundry, mine and mill supplies.

George R. Henderson, consulting engineer of the Baldwin Locomotive Works, has resigned from that position and opened an independent office as consulting engineer at 1321 Walnut street, Philadelphia.

The directors of the Baldwin Locomotive Works have declared the regular semi-annual dividend of 3½ per cent on the preferred stock, payable January 1, but no dividend has been declared on the common stock.

Benjamin M. Jones, president of B. M. Jones & Co., Inc., Boston, Mass., died at his home in Boston, November 26, age 78 years. Mr. Jones early entered the metal importing business, and dealt largely in railroad specialties.

Frank R. Peters, formerly with J. Stone & Co., London, has joined the electrical staff of the Franklin Railway Supply Company. This company has also secured the services of C. B. Little, one of the electrical engineers of the Baltimore & Ohio.

Flint & Chester, Inc., New York, have taken the exclusive sales agency for the United States and Canada for the National Graphite Lubricator Company, Scranton, Pa. The lubricators made by the latter have been adopted by 11 railroads and installed on 40 others.

The Chicago Railway Signal & Supply Company has completed arrangements for the opening of branch offices, as follows: F. N. Rumbling, to be known as Southern Pacific Coast representative, will be located in the Pacific Electric Building, Los Angeles, Calif.; S. J. Stjernstedt Pacific Coast representative, in 502 Rialto Building, San Francisco, and the Pacific Northwest representative is W. Frank Carr, Central Building, Seattle, Wash.

The National Lumber & Creosoting Company has established an office at 1209 Commerce building, Kansas City, Mo., in charge of M. K. Trumbull, vice-president, who was formerly principal assistant engineer of the Chicago & Western Indiana, and the Belt Railway of Chicago. He has been vice-president of the National Lumber & Creosoting Company for the past two years. The company's special lines are cross ties, switch ties, piling, poles, timbers, lumber, fence posts, etc., creosoted and untreated.

An opinion filed November 20 by the United States Circuit Court for the First District holds that the non-metallic flexible conduit or tubing, known as Duraduct, manufactured by the Tubular Woven Fabric Company, Pawtucket, R. I., is an infringement of the letters patent of H. G. Osburn, owned by the National Metal Molding Company, of Pittsburgh. The suit was first heard by the United States District Court of Rhode Island, and then taken to the Court of Appeals, the decision of which is final.

The Roberts & Schaefer Company, Chicago, has been awarded a contract by the Oregon-Washington Railroad & Navigation Company to build a coaling plant at The Dalles, Ore. It will be a reinforced concrete, fireproof, 150-ton plant with weighing facilities to record all coal passing to locomotives on two tracks,

complete with sand handling equipment. This will be the third structure of this kind being erected for this company. The contract price will be \$16,500. The Roberts & Schaefer Company will also design and build a counterbalanced bucket locomotive coaling plant for the Canton car shops of the Pennsylvania at Baltimore.

A change has been made in the control of the Reed-Prentice Company, manufacturers of machine tools, Worcester, Mass., a majority interest in the company having been acquired by investors headed by Robert F. Herrick, president of the Pacific Mills, chairman of the Saco-Lowell Shops, and an officer of other large corporations. On November 26 new directors were elected as follows: Robert F. Herrick, Malcolm Donald, Robert C. Morse, Henry P. Kendall, George C. Lee, Frank A. Drury, Homer Gage and Albert E. Newton. New officers have also been elected as follows: Robert F. Herrick, president; Jeremiah J. Mackin, treasurer and clerk; Charles M. Thayer, general counsel. Albert E. Newton will retain his position as vice-president and general manager.

The Westinghouse Electric & Manufacturing Company announces a number of changes in the supply department, which have recently been put into effect. S. A. Chase, formerly special representative; T. J. Pace, formerly in charge of the illuminating and rectifier divisions, and Carl G. Schluederberg, formerly head of switchboard sales, have been appointed assistants to the manager, J. J. Gibson. C. E. Stephens, engineer of lighting, has been appointed manager of the illuminating section to succeed Mr. Pace. C. Streamer, formerly head of the order division, succeeds Mr. Schluederberg as manager of the switchboard section, and A. P. Joseph is appointed head of the order section to succeed Mr. Streamer. M. C. Morrow, formerly of the Philadelphia office, is appointed manager of the appliance section, which is a combination of the former heating, fan, motor and ozonizer divisions of the supply department. M. C. Rypinski, formerly manager of the D. and S. division of the New York office, becomes manager of the meter section. The power department, E. H. Sniffin, manager, also announces the following section managers: W. H. Garrett, contracts; J. G. Worker, stokers, and H. D. Storer, auxiliaries.

TRADE PUBLICATIONS

BOND WIRE PROTECTORS.—The P. & M. Company, Chicago, has issued a pamphlet describing its bond wire protectors and their method of installation, with sketches and photographs showing their manner of application to the various types of joints.

CORRUGATED CULVERTS.—The Canton Culvert & Silo Company, Canton, Ohio, has issued standard specifications for corrugated metal culverts for use by railway engineers using this form of construction. These specifications are not limited to any single style of culvert, but are intended to insure first class material and workmanship.

DAYLIGHT AND VENTILATION.—The Detroit Steel Products Company, Detroit, Mich., has issued a booklet containing information concerning the construction of roundhouses, trainsheds, machine shops, freight houses and other railway structures, with special reference to the facilities for securing light and ventilation. The book also contains a number of illustrations showing typical railway structures in which "Fenestra" products have been used.

THE POPULAR PARCEL POST.—No less than 500 additional men will assist the regular force of United States railway mail employees [in New England] in handling the Christmas mail rush this year. Superintendent Van Dervoort, of the railway mail service, says that there is unmistakable evidence that the mail rush will be heavy. The parcel post mail it is expected will be greater than ever, due principally to the increase of the weight limit to 50 pounds. One innovation this year will be the service of extra trains between New York and Boston to carry Christmas mail, which will be "worked" during the trip. This will lighten the work of the clerks at the railroad terminals. Extra postal spaces have been procured in the railroad stations in Boston, Worcester, Albany, White River Junction, Portland and Bangor. Postmaster Murray plans to have 300 extra clerks and carriers at work. These men will be drawn from the civil service eligible list.—*Boston Journal*.

Railway Construction

BALTIMORE & OHIO.—Application has been made to the Public Service Commission of Maryland, it is said, for permission to build, under the name of the Washington County Railroad, a single track line from Hagerstown, Md., to Security, about 3.5 miles. It is estimated that it will cost about \$110,000 to build the line.

CHARLES CITY WESTERN (ELECTRIC).—This company, which operates a 13-mile line from Charles City, Iowa, southwest to Marble Rock, has completed work on an extension from Charles City to Colwell, eight miles.

CUMBERLAND & MANCHESTER.—A contract has been given to the Read Construction Company, Barbourville, Ky., to build from Barbourville, Ky., north to Manchester, 24 miles, and construction work is now under way. Charles F. Heidrick, president, Barbourville, Ky. (June 25, p. 1497.)

DULUTH & NORTHERN MINNESOTA.—Work is now under way on an extension from Harlan, Minn., to Temperance river, 7 miles.

EASTERN PENNSYLVANIA RAILWAYS.—See Pottsville & St. Clair.

HELENA SOUTHERN.—This company is the successor of the Three Forks, Helena & Madison Valley, which was organized to build from Helena, Mont., south to Yellowstone National Park, about 150 miles. On the section from Three Forks to Radersburg, 25 miles, about 15 miles has been graded. Construction work has been suspended but will probably be resumed by January, 1916. E. A. Tennis, president, Salina, Kan.

HUDSON BAY RAILWAY.—Construction work is now under way by J. D. McArthur, Winnipeg, Man., building from mile 241 to the Hudson Bay terminus at mile 424, in the province of Manitoba.

KANSAS CITY, MEXICO & ORIENT.—Construction work on the 17 miles from San Angelo, Tex., south to Cristoval, may be carried out next spring and the section completed by July 1, 1916. This is the first section of the branch projected from San Angelo south via Cristoval, Eldorado and Sonora to Del Rio, about 160 miles. Grading work has already been finished on 94.6 miles and track laid on 2.7 miles.

MANTAWNEY RAILROAD.—An officer writes that grading work is now under way on the line building from Stowe, Pa., northeast to Allentown and Bethlehem, 52 miles. The Highley Construction Company has the contract to build the line. A. E. Lehman, chief engineer, 717 Walnut Street, Philadelphia.

MARSHALL & EAST TEXAS.—This company now operates a line from Winnsboro, Tex., southeast to Elysian Fields, 91.7 miles. It has projected and partly surveyed an extension from Winnsboro to Paris, 60.5 miles, also an extension from Elysian Fields to the Sabine river, 98 miles.

NEW IBERIA & NORTHERN.—This company, which operates a line from Port Barre, La., southeast to Shadyside, 88 miles, has projected an extension from Oaklawn to New Orleans, 93.5 miles. An extension is also projected from Port Barre to the Sabine river, 107 miles.

NEW YORK SUBWAYS.—The Coast & Lake Contracting Corporation submitted the lowest bid at \$53,930 for the installation of tracks on the White Plains road extension of the Lenox avenue branch of the existing subway. This work is in the borough of the Bronx. (November 12, p. 923.)

OSARKS RAILWAY.—Surveys have been made, and it is expected that actual construction work will be started in December on the line from Rothville to Mountain Home, Ark., 10 miles. The contract has been given to the Blodgett Construction Company, Kansas City. K. V. Loba, president, Mountain Home. (September 3, p. 419.)

PELHAM & HAVANA.—Construction work is now under way on the extension from Darsey, Fla., southwest to Havana, 6

miles. The company now operates 19.3 miles from Cairo, Ga., southwest to Darsey, Fla. (August 6, p. 257.)

POTTSVILLE & ST. CLAIR ELECTRIC.—Grading work is now being carried out by the J. G. White Engineering Corporation on a line from Pottsville, Pa., to St. Clair, 2.3 miles. The work involves handling about 5,000 cu. yd. to the mile, 60 per cent of which will be hard shale. There will be five steel bridges on the line of from 60 ft. to 80 ft. each. Contracts for the steel superstructures of three bridges are yet to be let. The line will provide a short route for the Eastern Pennsylvania Railways. W. B. Rockville, president, Pottsville. (October 29, p. 828.)

SALINA NORTHERN.—Work is now under way on the section of this road from Lincoln Center, Kan., northwest to Osborne and Downs, 60 miles. The company now operates 36 miles of line from Lincoln Center southeast to Salina. The contractors include: A. J. Canaday; Eby Construction Company; Dick Eastes; E. S. Kelly; A. H. Carter; W. Burton; D. E. Dutcher; P. H. Smith and A. M. Colvin, all of Lincoln, Kan. An extension is projected from Salina south to Wichita. Surveys are being made for second track work between Lincoln and Osborne and Downs, on 10 miles.

SOUTH DAKOTA ROADS.—John Rosholt, Minneapolis, Minn., is said to be back of a project to build a line from Bruton, S. D., to Ortonville, Minn.

TEXAS, OKLAHOMA & EASTERN.—An officer writes that this company has built during 1915 about 30 miles of temporary logging roads in Oklahoma.

THREE FORKS, HELENA & MADISON VALLEY.—See Helena Southern.

TRINITY VALLEY & NORTHERN.—This company, which operates a line from Dayton, Tex., north to Lumm, 18 miles, has projected an extension from Lumm to Lamb, nine miles.

WASHINGTON COUNTY.—See Baltimore & Ohio.

WEST FORK LOGGING COMPANY.—This company has completed a branch railroad, running from West Fork, Wash., where it connects with the Tacoma Eastern, one and one-half miles up the east fork of the Tilton river. The company's five-mile spur up the west fork is, at the present time, being extended one mile farther. Construction work is being done by company forces, and Tacoma & Eastern equipment is used. L. T. Murray, president, Lindberg, Wash.

RAILWAY STRUCTURES

BALTIMORE, MD.—The Baltimore & Ohio has let contracts for the construction of the large new coal pier at Curtis Bay, Baltimore, to cost about \$1,500,000 as follows: For the dredging work and building the superstructure and bulkhead to H. S. Kerbaugh, Inc., Baltimore and New York; the grading work will be done by Smith-McCormick, Easton, Pa. The conveying machinery will be furnished by the Robbins Belt Company, New York, while the car dumpers will be installed by the McMyler Interstate Company, Cleveland. The thawing shed, in which the coal in carloads will be placed in cold weather prior to being dumped over the pier, will be built by the Surety Engineering Company, New York. It is intended to use reinforced Gunite applied by the cement gun on the walls of the building, the apparatus and crew for applying the Gunite being furnished by the Cement-Gun Company, Inc., New York. All the work will be started at once, and it is expected that the new improvement will be ready for operation during the season of 1916. The pier will have a capacity of 10,000,000 tons a year. (September 24, p. 855.)

BRONXVILLE, N. Y.—A contract has been let to the Transit Construction Company, Mt. Vernon, N. Y., by the New York Central, for the elimination of the grade crossing over the Harlem division tracks at Pondfield road, Bronxville.

CHICAGO, ILL.—The general contract for the new freight house and warehouse which is being built for the Pennsylvania lines, has been awarded to the George A. Fuller Company of Chicago, Ill. The total cost of the building will be about \$2,500,000.

The Chicago & North Western has awarded the general contract for its new grain elevator at 118th street and Calumet river to the Witherspoon Engler Construction Company of

Chicago, Ill. The elevator proper will be a reinforced concrete structure, having a river house frontage of 270 ft. for receiving and delivering grain from and to boats, a series of 39 circular storage bins in the rear of the river house, a working house 77 ft. by 287 ft. in the rear of the bins, and a track shed covering four tracks in the rear of the working house. The combined storage capacity of all the bins will be 2,500,000 bushels, and plans permit the future construction of additional bins until an ultimate capacity of 10,000,000 bushels is reached. The marine leg will allow the removal of grain from boats to any port of the elevator at the rate of 20,000 bu. an hour and the loading of grain from the elevator into vessels at the rate of 120,000 bu. an hour. The four-track receiving yard will have a capacity of 300 cars and the storage yard a capacity of 600 cars. The elevator will be fitted to receive 120,000 bu. an hour from cars. About 5,000 tons of steel will be used in construction of the elevator. The Armour Grain Company has arranged to lease the structure when completed.

CLARION, IOWA.—The Chicago Great Western has let a contract to John Jacobson, of Marshalltown, Iowa, for the construction of an icehouse, which will have the same specifications as the one to be built at Council Bluffs. (See item under Council Bluffs, Iowa.)

COUNCIL BLUFFS, IOWA.—The Chicago Great Western has let a contract to John Jacobson, of Marshalltown, Iowa, for the construction of a one-story, timber icehouse, with a cinder floor and J. M. asbestos roofing. The building will be 34 ft. wide by 63 ft. long, and will cost about \$5,000.

FREEMPORT, ILL.—The Illinois Central has completed plans for the enlargement of a roundhouse and the extension of a tool house. Three 90-ft. stalls will be added to the roundhouse and 14 stalls will be lengthened from 90 ft. to 100 ft., at a probable cost of about \$30,000. The addition to the tool house will be a one-story brick structure, 38 ft. by 62 ft. Construction work has been deferred until next spring.

GRAY BULL, WYO.—The roundhouse of the Chicago, Burlington & Quincy, recently destroyed by fire, is now being replaced. The new structure will consist of five 81-ft. stalls, and is being built of timber at a probable cost of about \$5,000. Company forces are doing the work.

NORTH PLATTE, NEB.—The Union Pacific station, baggage room and hotel burned to the ground on Tuesday evening, November 16. The company began the construction of a temporary frame building the morning after the fire, and plans are now being prepared for a permanent structure. The loss has been estimated at \$50,000.

PEMBROKE, VA.—Officers of Giles county have appropriated \$8,400, it is said, for the construction of a bridge across New river. It is understood that the Norfolk & Western will pay \$10,000 additional towards the cost of the bridge.

PLAINSBORO, N. J.—The Pennsylvania Railroad is building a highway bridge over its tracks at Plainsboro, to replace the present structure.

SIoux CITY, IOWA.—C. W. Ginby & Co., of Chicago, Ill., have received a contract to build a freight house for the Chicago & North Western. It will be a brick structure 40 ft. by 1,050 ft., 238 ft. of which will be 2 stories high and the remainder 1 story. The roof will be supported by steel trusses. The total cost of the building, including all incidental improvements, will be about \$175,000.

THE RAILWAYS IN SWEDEN.—The management of the government-owned railroads in Sweden has already prepared its budget for 1917, and is asking for an appropriation of \$1,894,700 for new construction work, which is \$400,000 more than it obtained for 1916. It is planning its construction work two years ahead.

SCOTTISH TRAIN SERVICES CURTAILED.—The passenger train services of the Caledonian and North British Railway Companies since Monday, November 15, have been somewhat curtailed. The curtailment has been brought about by so many employees of the companies having joined the colors and the tax imposed on the resources of the companies in the matter of locomotive power and rolling-stock in meeting the present abnormal requirements. The English services are not affected.

Railway Financial News

ATCHISON, TOPEKA & SANTA FE.—This company is to sell through J. P. Morgan & Co., \$10,000,000 preferred stock at 98½. The preferred stock pays dividends at the rate of 5 per cent. On June 30, 1915, the company had outstanding \$114,173,730 preferred stock.

BALTIMORE & OHIO.—This company has sold \$60,000,000 refunding and general mortgage 5 per cent bonds to Kuhn, Loeb & Co. and Speyer & Co., both of New York, at 97. The syndicate which will participate in the underwriting of these bonds will get their bonds at 98, and an offering will be made to the public at a price probably in the neighborhood of par. These are the first bonds to be issued under the new refunding and general mortgage. In the letter which Daniel Willard, president of the Baltimore & Ohio, wrote to the bankers who have taken the bonds, the following paragraphs occur:

"The refunding and general mortgage will be secured on practically the entire system of railroads of the Baltimore & Ohio, comprising about 4,486 miles of first track, about 1,257 miles of second track and about 3,318 miles of other track and upon the equipment of the company, or its interest therein, having a present net value after depreciation of over \$79,000,000. It will further cover the passenger and freight terminals of the company in Philadelphia, Baltimore, Pittsburgh and Chicago and the freight terminals at Staten Island, N. Y., in Cincinnati and Washington, as well as the company's one-half stock interest in the Washington Terminal Company and its one-half ownership of the joint yards at Washington.

"The mortgage will be a direct lien on about 2,272 miles of first track, 605 miles of second track and 1,761 miles of other track of the above mentioned mileage and a lien, through the deposit of bonds, and in most cases all, and in no case less than 96 per cent of the capital stock of each of the companies owning the same upon the remaining mileage.

"The 4½ per cent convertible gold bonds of the company, amounting to \$63,250,000, in accordance with the terms thereof, will be secured *pari passu* with the bonds issued under the new refunding and general mortgage."

Of the proceeds of the sale of these bonds, \$40,000,000 will be used to refund a like amount of notes maturing in 1917 and 1918.

CHESAPEAKE & OHIO.—Montgomery, Clothier & Tyler, New York, are offering \$1,000,000 Chesapeake & Ohio Northern first mortgage 5 per cent bonds of October 1, 1915-1945, guaranteed principal and interest by the Chesapeake & Ohio. The Chesapeake & Ohio Northern is a subsidiary of the Chesapeake & Ohio, which is building a bridge across the Ohio river and 30 miles of railroad, to give the Chesapeake & Ohio a direct connection to Toledo and the Lakes in connection with the Hocking Valley, which is controlled by the Chesapeake & Ohio. The Chesapeake & Ohio has subscribed at par, to be paid in cash, for \$3,000,000 of the authorized \$3,500,000 stock of the Chesapeake & Ohio Northern. The bonds are secured by a closed mortgage and represent one-fourth or less of the actual cost of the property on which they are secured.

CHICAGO, ROCK ISLAND & PACIFIC.—The debenture bondholders' protective committee now asks the deposit of the 5 per cent debenture bonds, on which interest is in default, with the Bankers Trust Company, of New York, or the First Trust & Savings Bank, of Chicago. When the committee was first formed, deposits were not asked for.

CINCINNATI, HAMILTON & DAYTON.—The bondholders' protective committee, Charles H. Sabin, chairman, has notified bondholders who have deposited their bonds that the committee proposed to sell deposited bonds at \$700 per \$1,000 bond to Kuhn, Loeb & Co. Any bondholder who desires to withdraw his bonds may do so before December 15 on the payment of \$6.30 per bond to cover the expenses of the committee.

NEW ORLEANS, TEXAS & MEXICO.—This property has been sold under foreclosure for \$6,000,000 to representatives of the reorganization committee.

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WE GUARANTEE, that of this issue 8,750 copies were printed; that of these 8,750 copies, 7,296 were mailed to regular paid subscribers to the weekly edition, 148 were provided for counter and news companies' sales, 1,041 were mailed to advertisers, exchanges and correspondents, and 265 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 459,650, an average of 9,193 copies a week.

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* Illustrated.

The recommendation of President Wilson that a commission be appointed to study and make recommendations regarding the entire subject of regulation of railways is one which it is to be hoped will receive favorable action at the present session of Congress. The situation with respect to regulation is very unsatisfactory. There are needless and harmful duplications and conflicts between state and federal regulation. Until recently the net earnings of the railways were steadily decreasing, with the result that their purchases were narrowly restricted and new construction was almost entirely stopped. These conditions were due to the fact that their expenses and taxes had greatly increased without any compensating advance in rates; in fact, there had been reductions in rates. More recently there has been an enormous in-

A Commission on Railway Regulation

crease in railway traffic and net earnings are now very large; but owing to weather and other favorable conditions it has been possible this fall to keep expenses down to a basis where they cannot long be held, and therefore the present very large net earnings must be regarded as somewhat abnormal. It is to be feared that unless the present policy of regulation is changed, the railways will soon be caught in another cycle of increasing expenses and taxes and declining net earnings. The policy of regulation should be made more flexible and constructive. The country, owing to the European war, is face to face with unprecedented conditions, and in order to meet them successfully it will need a prosperous and efficient transportation system. The rights of the public should be fully protected, but it is as much the function and duty of the government to further the interests of the public in respect to railways as to protect its rights with regard to them. A commission composed of the right kind of men should be able to offer recommendations, the adoption of which would help greatly in the solution of this momentous problem of regulation.

Those labor-union legislators who a year or two ago wanted a law under which enginemen should be notified in advance when surprise tests were to be made, will be pleased with a recent decision of the Supreme Court of Kansas, reported in another column, approving, in principle, the verdict of a jury which required the Atchison, Topeka & Santa Fe to pay damages to an engineman who was hurt by jumping off his engine to avoid injury by an impending collision, which collision was due to his own error or carelessness in running past a block signal which was set at stop. The court did, indeed, grant a new trial, on technicalities, and it may be that the net amount of damages (\$4,165) as named in the verdict, will be reduced—or increased. But the main point stands: that an engineman who deliberately or by gross carelessness runs into a train ahead, the block system being adequate, and the signals being set against him, may go into court and get a part of the blame shifted to the shoulders of the railroad company! Two of the judges of the court saw straight, and dissented from the majority opinion; but only two. For the railroad the principal lesson is, perhaps, to make the signal rules more simple and absolute. The space interval system should be adequate in itself, and independent. With a complete and thorough block system, that engineman would not have had any written papers on which his lawyer could trump up the charge that the railroad company (the dispatcher) had led the poor runner into trouble.

A Court's Idea of Block Signals

In his report to the city of Dallas, Tex., on the subject of grade separation, abstracted elsewhere in this issue, John F. Wallace offers an interesting solution of this problem. Instead of presenting plans for the complete elevation or depression of tracks in their present location, he suggests the diverting of a large part of the railway traffic now passing through the heart of the city to a proposed belt line in the outskirts, thereby removing in large measure, the necessity for grade separation. This plan involves the immediate withdrawal from the midst of the city of all but switching operations, which will be carried on preferably at night, and the ultimate removal of many of the tracks and the industries served by them. The plan of restricting the use of tracks has been carried out successfully in other cities and with some readjustments would probably not seriously affect the present commercial business of Dallas. The ultimate abandonment of the tracks, however, is a more serious matter, and will no doubt concern many of the industries as well as the railroads. Instances may be cited where railways have abandoned individual side tracks or short sections of line rather than incur the heavy additional expense of grade separation, but it has seldom been proposed to abandon or restrict the use of as extended trackage

A Substitute For Grade Separation

The recommendation of President Wilson that a commission be appointed to study and make recommendations regarding the entire subject of regulation of railways is one which it is to be hoped will receive favorable action at the present session of Congress. The situation with respect to regulation is very unsatisfactory. There are needless and harmful duplications and conflicts between state and federal regulation. Until recently the net earnings of the railways were steadily decreasing, with the result that their purchases were narrowly restricted and new construction was almost entirely stopped. These conditions were due to the fact that their expenses and taxes had greatly increased without any compensating advance in rates; in fact, there had been reductions in rates. More recently there has been an enormous in-

as in this instance. However, the fact that the belt line can be built for a small part of the cost of grade separation may have an important bearing.

INVERTING THE ORDER OF PROGRESS

THE agitation for legislation to require all of the railways of Chicago to electrify their terminals is a good example of many misdirected attempts to promote progress. The report of the Committee on Smoke Abatement and Electrification of Terminals of the Association of Commerce is not a blow to electrification in general. It is merely a blow to an attempt to compel the application of electric power to a particular set of conditions. At this time the demand for electrification of terminals has been based mainly on the ground that it would eliminate the smoke nuisance. The report shows that it would eliminate only about five per cent of it. But perhaps this is not the most forceful argument against the plan. Perhaps the most potent argument is that legislation that would require general electrification in Chicago would be an attempt to reverse the natural order of things, and, instead of furthering the progress of electrification, might set it back.

In the history of modern industrial affairs small developments have always led the way to large ones. The first steam locomotive was not a Mallet with all the modern appliances. The first telephone installation was not one of 500,000 telephones. The first automobile was not a twin-six. The "Tom Thumb" was followed by steam locomotives of somewhat greater size, power, and complexity. They were followed by others of still greater size, power and complexity, and thus developments up to the modern locomotive were worked out step by step, each being largely a result of those preceding and being based on the test of experience. The same thing may be said in a general way regarding the telephone, the automobile, the modern steamship, the large factory and the great corporation.

Thus far the use of electricity as a motive power has developed along similar lines. It has been only a few years since an electric street railway was a novelty. Presently electricity supplanted the horse and the cable. Then came the interurban trolley; and a few years ago began the application of electricity to heavy traction. The progress has been steady and even rapid; but like progress along other lines, it has always been from small things to greater; and that it has taken place at all has been because each larger development has been based on the test of experience with preceding smaller developments.

Now, the proposal to require all the railway terminals of Chicago to be electrified is a move in the wrong direction because it is inconsistent with all ordered progress. There is not a single case where even a few railways, either under compulsion or voluntarily, have simultaneously electrified all of their terminals, passenger and freight, in a large industrial center. People sometimes talk as if this has been done in New York. Most of the passenger and freight terminals serving New York City are in Hoboken, Jersey City and other places outside of New York City, and none of the freight terminals have been electrified except those of the New Haven. The railway terminals in Chicago constitute the largest and most complicated system in any city on earth. And yet, contrary to all precedent and to all the principles of ordered progress, it is proposed to require the largest and most complex system to be electrified first. The railways are not to be allowed to await the results of the installation and operation of electric power in smaller terminals where similar, but less gigantic and complicated, problems would be met. They must solve the biggest problem of all first, and because a committee of the leading business men of Chicago has reported adversely on the project, the committee is treated by the local newspapers and city fathers as unfair and lacking in public spirit.

In spite of this adverse report there is a movement in the city council to pass an ordinance requiring general electrification. If an ordinance is passed it will be contested in the

courts, and in view of the data collected by the committee of the Association of Commerce, it is improbable that any court of competent jurisdiction would uphold it. Such an ordinance would be merely an act to start a lawsuit.

While these are the facts, they do not by any means indicate that the progress of electrification is to be arrested. On the contrary, it probably will go forward rapidly, for there are numerous places where the adoption of electric power can be justified by reasons forceful from the standpoints of both the railways and the public. It is significant that a number of the roads entering Chicago are showing they appreciate the advantages that may be derived from the use of electricity under favorable conditions by making installations on other parts of their lines. This is true, for example, of the New York Central, the Pennsylvania and the Chicago, Milwaukee & St. Paul. Railways which do not enter Chicago are also making installations in various parts of the country. It will not be surprising if some of the roads decide in a comparatively short time to electrify certain of their Chicago suburban lines. Every step of this kind will yield experience which will help in the solution of the major problems of electrification; and doubtless the time will come when it will be both technically and financially feasible for all the terminals of Chicago to be electrified. But, as already intimated, true progress in this field, as in others, will, in the future as in the past, come gradually, although perhaps rapidly; and certainly the best results will not be secured in this or in any other field by attempting to coerce engineers and capitalists into trying to solve the biggest and most complicated and difficult problems first.

Meantime, the railroads owe it to themselves and to the public to continue to study the problem of electrification with a view to extending it wherever such action will be conducive to public safety, health and convenience.

DEMURRAGE AS A CURE FOR CONGESTION AND CAR SHORTAGE

CONCERTED action to relieve the enormous congestion of freight at the Atlantic seaboard and gulf ports is being taken not only by the railways directly concerned, but by the American Railway Association, on behalf of all the railways, for the purpose of averting a serious car shortage in every part of the United States. Such a shortage, with its disastrous effect on the commerce of the country, is threatened by the conditions at the ports, caused by the unprecedented volume of export shipments and the shortage of ocean transportation facilities.

While committees of railroad officers are holding daily meetings for the purpose of doing everything in their power to relieve the local situation at New York, Boston, Baltimore and Philadelphia, without declaring a general embargo, the American Railway Association, through its Committee on Relations between Railroads and its Executive Committee, has formulated a more comprehensive plan which was submitted on Thursday to the Interstate Commerce Commission providing for a strengthening of the demurrage rules long advocated by railroad officers. It is believed that this plan, if adopted, would not only alleviate the present situation at the ports, but prevent the even more serious effects on general business conditions which are liable to result from the tying up of so many cars when shippers are clamoring for them elsewhere, and also do much to minimize car shortage in the future.

It is proposed as the first step to reduce the free time allowed to the seaboard and gulf ports, both on export and domestic freight, and the tariffs have already been filed with the Interstate Commerce Commission to become effective on January 1. This is for the purpose of discouraging the practice of sending shipments to the ports before arrangements are made for their disposition on arrival and would prevent adding to the accumulation until some of the freight now on hand can be cleaned up. It is also proposed to advance the

demurrage charge on freight cars by a progressive scale of rates increasing after cars have been held for three days beyond the free time, for the purpose of inducing more prompt handling of cars by shippers and consignees throughout the country. A third step in this plan is to abolish the average agreement in the present demurrage rules, which railroad officers assert has been a most prolific source of freight car detention.

The Interstate Commerce Commission was asked to give prompt approval of these changes in order that the carriers may make them effective immediately.

The Committee on Relations Between Railroads after a special investigation and careful deliberation has formulated the plan outlined, and the Executive Committee has approved resolutions setting forth its details with the reasons therefor, to be presented to the commission, together with facts and figures, demonstrating the necessity of some such procedure to meet the exigencies of the situation. In the event of unforeseen obstacles to immediate action on the part of the commission the resolutions provide that the two committees shall be called into emergency session at Washington to take such further steps as may be deemed necessary, to the extent of petitioning Congress to confer upon the Interstate Commerce Commission such powers as may be lacking.

In a recent issue the *Railway Age Gazette* called attention to the fact that the present situation is due to a scarcity of vessel capacity rather than to such a shortage of rail facilities as has caused scarcity of freight cars in other years. We ventured to suggest that the Interstate Commerce Commission might do something to relieve the situation by waiving formality and promptly calling a conference of railroad men and shippers with a view to establishing more stringent demurrage and shortage rules. Since then the conditions have rapidly grown worse. The tracks leading into New York, and to a less extent into Boston, Philadelphia, Baltimore and the gulf ports, are congested with so many thousands of cars that cannot be unloaded that several of the railways have been compelled to place embargoes against additional shipments in order to prevent still worse confusion, and that they may not be blocked against westbound shipments. The congestion of cars loaded with export business is seriously hindering the handling of domestic business. This state of affairs has been explained to the Interstate Commerce Commission.

In support of the proposed increase in the demurrage rate, it is pointed out in the resolutions of the Committee on Relations Between Railroads that since the present rate of \$1 a day was adopted the cost of construction, the carrying capacity, and consequently the earning power, of a freight car have been greatly increased; that the adoption of a higher demurrage rate in California, which was approved by the Interstate Commerce Commission in 1912, and the higher rate in effect in Arizona, with no average agreement, have resulted in the practical elimination of undue detention of equipment, with consequent reduction of demurrage collections. It is also declared that the Canadian roads at times have secured the permission of the Canadian railroad commission to establish a progressive demurrage rate higher than the normal rate, which has operated to the advantage of that country, but that the higher rate in Canada than in the United States has operated indirectly to the disadvantage of the public, the shippers and the railroads of the United States.

The proposed demurrage rule makes no change in the present provision, to which there are several exceptions, for 48 hours free time and a rate of \$1 per day thereafter, for the first three days, but would impose a charge of \$3 per day for detention for the next succeeding three days and \$5 a day thereafter. This is the rule recently applied to refrigerator cars which was approved by the Interstate Commerce Commission in the form suggested by the shippers as a compromise. It has worked very satisfactorily in preventing the detention of refrigerator cars and thus increasing the efficiency of the available car supply. It has been shown that the average

freight car is in the hands of shippers or consignees, for loading or unloading, more than one-third of the time. A car is far more valuable for transportation than for storage purposes, and the man who uses it for a warehouse, even at the rate of \$1 a day, is not only depriving the railroad of the opportunity to make it earn several times that amount, but is also preventing some other shipper from obtaining prompt transportation of his freight. A higher demurrage rate therefore reduces the number of cars used for storage and increases the number available for transportation.

The free time allowed on export freight has always been excessive. The tariffs which are now before the commission for approval or suspension provide for the reduction of free time at the ports from 30 to 15 days on export freight not covered by through export bills of lading, which will not be issued unless the shipper can show that vessel space has been arranged for. The eastern roads have also asked authority to establish on less than the 30 days' statutory notice the same storage charge on export grain in cars which would be applied if the grain were stored at elevators. This rule is to apply at Boston, New York, Philadelphia, Baltimore, Norfolk and Newport News, and it is expected that the roads serving the gulf ports will take similar action if the commission gives the desired authority to the eastern roads.

This will prevent the sending of grain to points where it is known that the elevators cannot handle additional shipments.

Demurrage officers of the railways for two years have been advocating the abolition of the average agreement, by which shippers or consignees are allowed credits for releasing cars in less than the free time that may be used to offset detentions after the free time on other cars. One of the principal objections to the average rule is that large shippers who have every reason to load outbound shipments as promptly as possible in their own interest are enabled by it to accumulate credits which they use to offset the demurrage which should accrue for their undue delays in unloading inbound cars, thus removing the incentive to release those cars promptly. Elevators, which require only a very short time to load a car of grain, are given credits which make it possible to waste a great deal of time in unloading cars of other commodities which they receive.

The proposals of the American Railway Association for such vital changes in the demurrage rules constitute a rather ambitious program, but they should have been adopted long before the emergency arose. The present difficulty differs from similar situations which have existed in other years principally in the immediate cause. The effect is much the same as if it were due to an inadequate car supply and a lack of railroad terminal facilities. Under a system of regulation which so closely restricts the earning power it is a practical impossibility for the railways to own at all times a large enough surplus of cars to enable them to promptly supply all demands for them in the rush season of business, much less to be able to meet all emergencies. If the demands for cars cannot be more evenly distributed throughout the year, and if the shippers and the public are not willing to allow railroads to be prosperous enough to maintain at all times a supply of cars as large as the maximum number that may be needed at any time, it will be possible for them to handle the business of the country with reasonable expedition only by obtaining the maximum service from each car.

This means that it will be necessary for the shippers to cut down the time the cars are in their possession so that they may be used more for the purpose for which they were intended. With a demurrage rate of only \$1 a day it frequently is profitable to a shipper to keep a car out of service, but with a rate more closely approximating its value for transportation the shipper is more likely to spend his money for warehouse or loading and unloading facilities, and the car will spend more time in motion.

THE RAILROADS AND PREPAREDNESS

THE important part which railways have played in all the great wars of modern times is familiar to students of history. Germany has been especially proficient in developing and using transportation lines as an important element in her policy of militarism. To this were largely due her speedy successes in the wars with Austria in 1866 and in France in 1870-71. To this also has been largely due the ability she has shown to stand off her numerically stronger enemies in the present war.

There has been in progress lately a vigorous agitation for the adoption of a program of preparedness in the United States. Only very recently has anything been said about the necessity for recognizing and treating our railway system as one of the most vital factors in such a program. This phase of the subject was discussed by George D. Snyder, in a paper before the New York Railroad Club on November 19. An article dealing with it which has attracted widespread attention was contributed by President Charles H. Markham, of the Illinois Central, to a recent issue of the *Economic World*, and a forceful address on "Preparedness and our Railroads" was delivered by George Dallas Dixon, vice-president in charge of traffic of the Pennsylvania Railroad, before the International Trade Conference at New York City on December 6.

As Mr. Dixon points out, the part that railways would play in a war in the United States, where the seacoast is so extended, the area so great and the distances so long, would be even more important than their role in the hostilities in Europe. A railway system which was properly organized and in good physical condition might prove the salvation of the country. One which was not well organized and in good physical condition might render futile the most elaborate and skillful plans for the development merely of the army and navy.

With regard to organization, Mr. Markham has made a suggestion of great pertinence and importance. In case of war, it would be necessary, in order to raise the railways to the maximum efficiency, to have their management and operation directed by a central administration, which would, of course, be a part of the federal government. Mr. Markham has proposed a conference between representatives of the government and of the railways to work out a plan of organization and administration for the railways as a single system, which would immediately and automatically be put into effect in case of hostilities on a large scale. The railways of Great Britain, as he points out, like our own, are owned by numerous private companies. Such a plan was devised in England over 40 years ago, and was promptly put into effect on the beginning of the present war. Under this scheme the British railways are directed as a single unit by a committee of their own general managers with the president of the Board of Trade as ex-officio chairman. The results have shown that government ownership is by no means necessary to render railways an efficient arm of the military service. The railways of Great Britain seem to have given at least as good an account of themselves as any organization or agency used by the English in the present war. Mr. Markham's suggestion merits serious consideration and action in one form or another.

As all who have discussed this subject have pointed out the physical condition of the railways in case of war would be of vital consequence. On their physical condition would depend the facility and safety with which they could handle large bodies of troops. As the government does not own the railways it cannot by the direct use of its funds put them into the physical condition that the national defense requires they should be in. On the other hand, the shape they will be put in by their owners and managers will necessarily depend on their earnings; the amount of their earnings will depend on the way in which they are regulated, and they are regulated by the governments of the nation and the states. Therefore, the public authorities will indirectly determine the state of physical efficiency to which they will be brought and our policy of regulation will be either a favorable or an adverse factor in our policy of national defense. The policy of regulation now being followed is adverse to the de-

velopment of the railways to the highest state of physical efficiency, and is therefore antagonistic to an intelligent policy of preparedness. It is of great importance that this fact should be brought home to the public and to those influential in the affairs of government.

SEABOARD AIR LINE

ALL the roads in the South faced a very serious situation on the outbreak of the war in August, 1914. The Seaboard Air Line was no exception. However, the methods adopted for effecting economies were so successful as to result in a surplus of \$342,000 after the payment of expenses, interest charges and the regular 5 per cent on the adjustment mortgage bonds. The prospects for the fiscal year July 1, 1914-June 30, 1915, had been bright; before the outbreak of the war a dividend of 1 per cent had been declared on the preferred stock, payable August 15, 1914, calling for \$239,000; this of course had to be paid and was paid out of surplus. The falling off in total operating revenues amounted to 16.29 per cent, total revenues in 1915 being \$21,280,000 as against \$25,421,000 in 1914. To offset the loss of \$4,140,000 in revenue there was a reduction of \$2,541,000 in operating expenses, the total in 1915 being \$14,923,000. Besides this saving in operating expenses a notable saving in hire of equipment was made. In 1914 the Seaboard Air Line had to pay out \$266,000 on this account. In 1915 this had been changed to a net receipt of \$86,000, or a saving of \$352,000 to the company.

The loss in revenue was very large. The business of the South immediately after the outbreak of the war came almost to a standstill. Passenger business was much below normal and certain classes of freight business almost ceased to move. The tonnage of fertilizers for the fiscal year ended June 30, 1915, was 569,000 as against 994,000 in the previous year. The tonnage of phosphate was 446,000 tons in 1915 as against 1,027,000 tons in the previous year. To add to the depression caused by the war there were unfavorable weather conditions which made the movement of perishable vegetables unusually small, the tonnage in 1915 being 113,000 tons as against 146,000 tons in the previous year. The total tonnage of revenue freight in 1915 was 8,479,000, and in 1914, 10,411,000. The total number of passengers carried in 1915 was 4,224,000, and in 1914, 5,147,000.

It was out of the question to make all of the necessary reduction in expenses in transportation expenses, but these expenses were reduced by 16.8 per cent, or in greater proportion, even, than the reduction in business; and as usual it was found impossible to reduce passenger-train expenses to correspond with the falling off in business. Station expenses could not be reduced much. These factors were more than offset by quite remarkably large reductions in expenses, such as fuel, in which a saving of 23.3 per cent was made, and stationery, where a saving of 26.3 per cent was made. A very considerable part of the loss in passenger business was in local business, and the Seaboard Air Line in a great number of cases required the permission of the state commissions before it could take off local trains. The company was successful in securing the co-operation of these state commissions, but notwithstanding the best efforts of the management, passenger-train mileage could be reduced by 4 per cent only, the total passenger-train mileage in 1915 being 5,754,000. The falling off in passengers carried one mile was 14 per cent, the total in 1915 being 211,817,000. This, of course, is suspended business, and with the return of prosperity has not only been made up but is showing a normal increase over normal years. The remainder of the saving in transportation expenses was in freight service. The average revenue train load was 289 tons in 1915, an increase over the previous year of 26 tons, or about 10 per cent. The reduction in freight-train mileage amounted to 22.5 per cent, the total freight-train mileage in 1915 being 4,330,000.

A very comprehensive system of detail supervision over train performance had been inaugurated previous to 1914. With the great falling off in business in 1915 operating officers and employees naturally took a more than ordinary interest in trying to effect economies, and the lessons learned from the system

of daily reports of individual train performance, which the Seaboard had had in effect previously, were applied with more than ordinary effectiveness. In addition to the saving of \$1,578,000 in transportation expenses, there was a saving of \$719,000 in maintenance of way expenses and \$285,000 in maintenance of equipment, the total spent for maintenance of way in 1915 being \$2,415,000, and for maintenance of equipment, \$3,176,000. The following table shows the ratio of each class of expenses to total operating revenue:

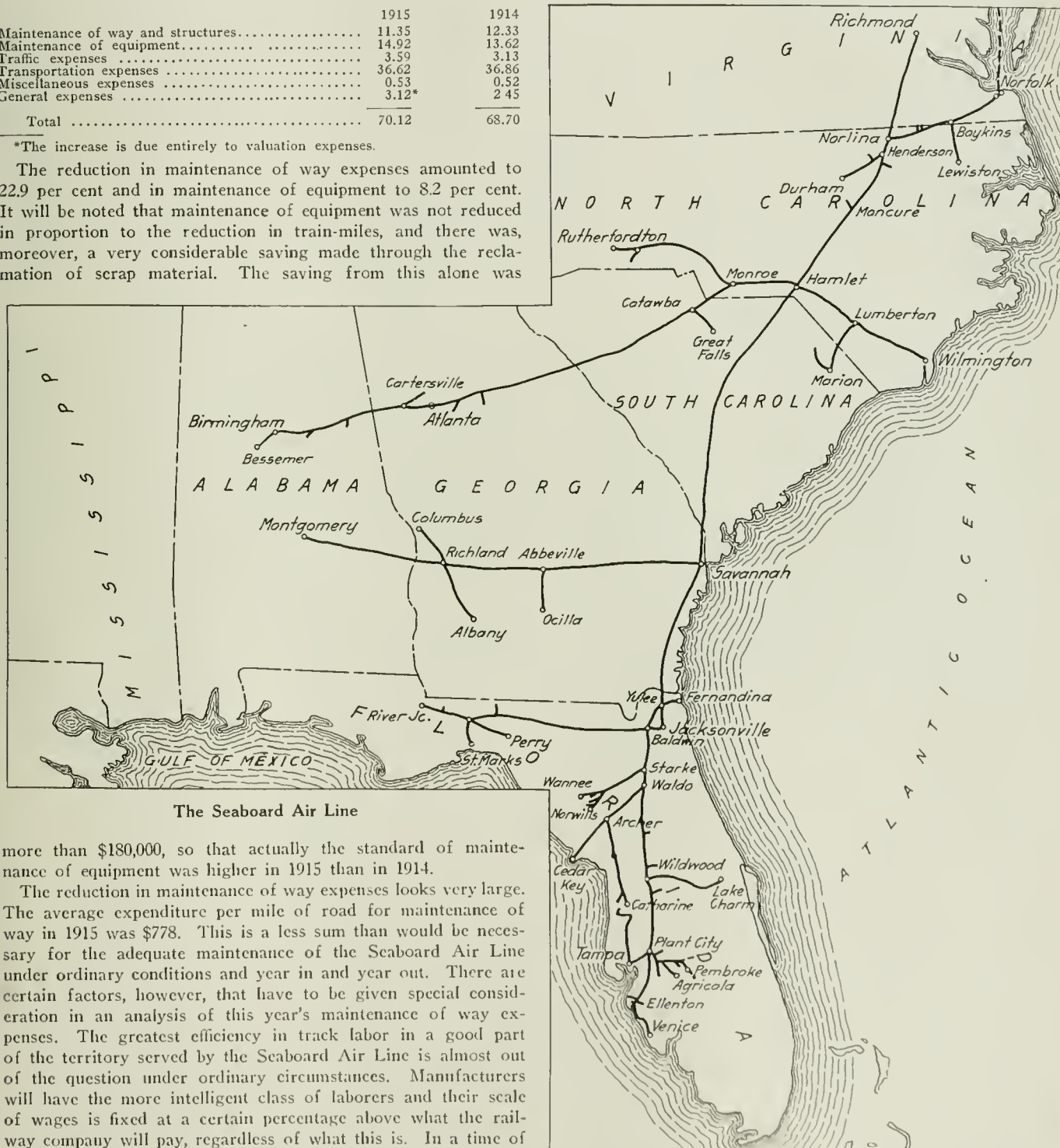
	1915	1914
Maintenance of way and structures.....	11.35	12.33
Maintenance of equipment.....	14.92	13.62
Traffic expenses.....	3.59	3.13
Transportation expenses.....	36.62	36.86
Miscellaneous expenses.....	0.53	0.52
General expenses.....	3.12*	2.45
Total.....	70.12	68.70

*The increase is due entirely to valuation expenses.

The reduction in maintenance of way expenses amounted to 22.9 per cent and in maintenance of equipment to 8.2 per cent. It will be noted that maintenance of equipment was not reduced in proportion to the reduction in train-miles, and there was, moreover, a very considerable saving made through the reclamation of scrap material. The saving from this alone was

ment work. The scrap reclamation campaign which helped reduce maintenance of equipment expenses also helped in reducing maintenance of way expenses. Ties and lumber also were much cheaper. A policy toward rail renewal was pursued which, although not particularly liberal, was adequate for the safety of the property and of train operation and was justified by conditions.

At the end of the fiscal year 1915 the company had \$1,056,000 cash on hand, in addition to \$839,000 on special deposit to meet



The Seaboard Air Line

more than \$180,000, so that actually the standard of maintenance of equipment was higher in 1915 than in 1914.

The reduction in maintenance of way expenses looks very large. The average expenditure per mile of road for maintenance of way in 1915 was \$778. This is a less sum than would be necessary for the adequate maintenance of the Seaboard Air Line under ordinary conditions and year in and year out. There are certain factors, however, that have to be given special consideration in an analysis of this year's maintenance of way expenses. The greatest efficiency in track labor in a good part of the territory served by the Seaboard Air Line is almost out of the question under ordinary circumstances. Manufacturers will have the more intelligent class of laborers and their scale of wages is fixed at a certain percentage above what the railway company will pay, regardless of what this is. In a time of depression, however, a considerable proportion of this more intelligent class of labor is thrown out of work, and the railroad then has a chance to make a selection and to secure a very much larger amount and quality of work per dollar paid in wages than it would under normal circumstances. The program of betterment work was discontinued wherever this could economically be done, and there was a consequent considerable saving in maintenance of way expenses which are incidental to better-

interest on funded debt and equipment trust obligations matured or about to mature, and had loans and bills payable of \$504,000.

Since the close of the fiscal year conditions in the Southeast have greatly improved. Everywhere there are reports of restricted areas planted to cotton, with much more diversified agriculture; cotton prices are better than even the most opti-

mistic cotton planters had hoped for a year ago, and it is in just such roads as the Seaboard Air Line, well managed, conservatively financed and serving a territory that was particularly hard hit by the war, that we may expect to see the largest proportional increase in credit. Such an experience as the Seaboard has gone through is a real test of the inherent value of the property, and under this test the road has shown up particularly well.

The following table shows the principal figures for operation in 1915 as compared with 1914:

	1915	1914
Average mileage operated.....	3,106	3,084
Freight revenue	\$14,324,670	\$17,307,034
Passenger revenue	4,576,795	5,430,531
Total operating revenues.....	21,280,463	25,420,503
Maintenance of way and structures.....	2,414,866	3,133,831
Maintenance of equipment.....	3,175,642	3,460,964
Traffic expenses	764,298	796,893
Transportation expenses	7,792,905	9,370,682
Miscellaneous expenses	114,014	131,235
General expenses	663,066	623,023
Transportation for investment—Cr.....	2,258	52,922
Total operating expenses.....	14,922,534	17,463,706
Taxes	1,062,247	999,000
Operating income	5,295,682	6,957,797
Gross income	5,720,623	6,990,570
Net income	1,591,632	2,924,216
Interest on income bonds.....	1,250,000	1,250,000

NEW BOOKS

Railway Accounts and Finance. By J. Alfred Fisher. Published by George Allen & Co., London. United States agents, D. Van Nostrand Company, New York. Price \$4.

This is the third edition. The book is a comprehensive description of the accounting system which in one modified form or another is in use on most of the larger English railways. It is of interest and value to American railroad officers because of the opportunity which it affords to translate the compilation of railroad accounts into terms other than those universally used in this country. The English terminology is quite different from ours. Since, however, the object of railroad accounting is the same in both countries, this English discussion of the subject, from the very fact that it makes the American railroad accounting officer analyze the terms used, is of value, since it forces attention on the facts back of the terms.

The English accounting system is divided into four departments: The "traffic department," which can roughly be translated the station accounts of passenger and freight revenue; the "expenditure," which, includes the expenses for maintenance, both of way and of equipment, and station expenses and most of our transportation expenses, as well as stores department accounts; the "secretary's department," which would in this country be called secretary and treasurer's, this department having charge of both the issue of securities and the custody of cash; and finally the "accountant's department," which includes the auditing department, the station ledger office and the bookkeeper's office.

In the preface to the third edition of his book Mr. Fisher discusses ton-mile statistics and apparently leans to the view held by the majority of English railroad officers that ton-mile statistics for English railways would be of no value. The first reason given in the minority report of the committee which was appointed by the Board of Trade to investigate this subject before the passage of the act of parliament which prescribed a form of accounts for English railroads is so much in the spirit of the English controversy on this point, and is evidently approved by Mr. Fisher, that it is worth quoting: "That practically no instance had been brought to the notice of the committee of any definite increase of earnings or decrease of expenditure in any specific case, which was the result of the use of the ton-mile figures, and which could not, and ought not to, have been brought about by other means, and that 'every witness who supported the ton-mile statistics was challenged to produce such concrete cases, and not one could do so.'"

Mr. Fisher's introduction to his book is admirable. He states clearly the sources of income and the destination of outgo, and distinguishes between receipts on capital account and revenues, and expenditures on capital account and expenses.

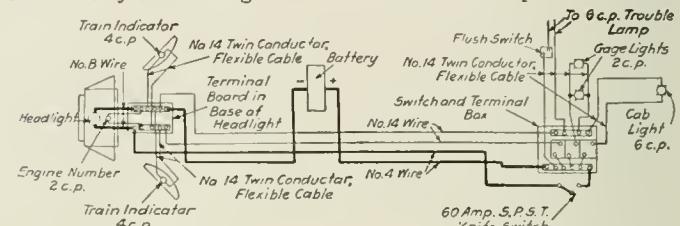
Letters to the Editor

SIX-VOLT INCANDESCENT HEADLIGHTS

SAN FRANCISCO, Cal.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

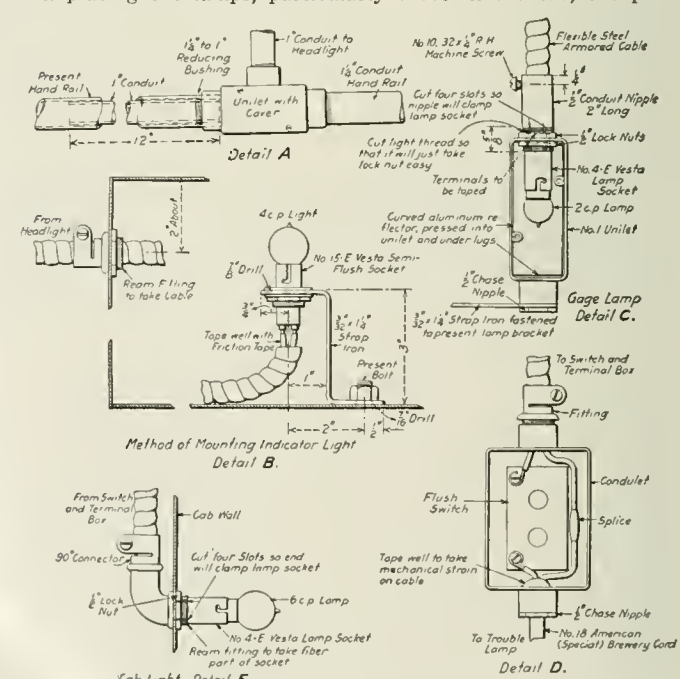
Your issue of October 29 contains a contribution on page 796 with respect to cab lights and other improvements, wherein a despatcher pleads for a reading lamp, conveniently placed, for the engineman to read his orders. About a year and a half ago the Pacific System of the Southern Pacific Company replaced all its acetylene headlights with incandescent lamps of the auto-



Wiring Diagram for Headlight and Cab Lights

mobile headlight type, but of larger size. The idea of automobile lighting was carried throughout the entire installation, even to the fittings employed in the cabs and to a portable trouble lamp on a long cord, to take the place of the old smoking torch. One of the illustrations shows the type of automobile light fittings that in practice has been found satisfactory, except that under extreme summer desert temperature combined with high boiler temperatures, fittings that are made of moulded rubber, or its equivalent, have softened. These are now being replaced with fittings of the vitrified type.

In placing the lamps, particularly those in the cab, the prin-



Fittings Used in Southern Pacific Electric Headlight Installation

ciple followed has been to direct the necessary amount of light upon the spot where it is needed and to cut off all extraneous light, with the result that very small lamps give entirely satisfactory illumination and the sensitiveness of the engine crew's eyes is not diminished unnecessarily.

There are now 900 of these headlights in service and their performance has been remarkable. The old acetylene or arc headlight reflector can be used by simply covering the openings. A new opening should be cut in the vertex of the reflector and

the incandescent lamp, with its focusing device, inserted from the rear. Lamps for six-volt circuits, especially in the sizes used for headlight purposes (108 watts) have filaments very strong and heavy, consequently they can be wound into an exceedingly small cylinder not more than $\frac{1}{8}$ in. in diameter by $\frac{1}{2}$ in. long. This can be placed very accurately in the focus of the reflector, and the result is a concentrated beam of light of very great penetration, the beam candle-power measuring approximately 1,046,000, while the mean spherical candle-power of the lamp itself is only 140. On the other hand, if a wide beam of less power is needed, as for example on crooked track in the mountains, an adjustment of the focus brings about this result. There is no flickering or jumping of the light, as is the ordinary experience with the arc headlight; and, furthermore, while the arc lamp has a mean spherical candle-power intensity of from 800 to 900 candles, according to conditions of the lamp and length of arc, its beam candle-power, with the same reflector is only 165,000.

Certain manufacturers of 32-volt arc headlight outfits, endeavoring by brute force to equal the results obtained with the six-volt incandescent lamp, are using 32-volt incandescent lamps, burned up to 37 volts, in the same reflectors, in the hope of securing equal illumination by forcing the candle-power. On account of the necessity of the longer filament in the 32-volt lamp, this hope cannot be realized; in fact, tests show that even under these conditions the beam candle-power is less than one-half that of the six-volt lamp. Furthermore, the steam consumption of the turbo generators designed for arc headlight purposes is from 250 to 450 lb. per hour, while that of the most recent six-volt turbo generator for cah lighting is less than 50 lb. of steam per hour, and the cost of installation is slightly in favor of the six-volt outfit.

The portable trouble lamp was hung convenient to the engineman's head and by it he read his train orders, until it became evident that the portable light was also convenient around automobiles, of which our enginemen seem to have many. In fact, the practical results indicate that they found the trouble lamps more useful in the automobiles than in the engine. We are now replacing the trouble lamp with a fixed lamp over the engineman's head with a switch convenient to the engineman's head.

For the reason that these installations were somewhat rushed, owing to legal requirements, there was not sufficient time to develop a suitable electric generator, and we found it necessary to use a battery, with stationary charging stations at the locomotive turning points, where the locomotives leave their exhausted

batteries and take full batteries, just as they take their supplies of sand, lubricant and water.

A. H. BABCOCK
Consulting Electrical Engineer, Southern Pacific.

STRAIGHTENING RAILS IN THE MILL

NEW YORK CITY.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I thoroughly agree with the views of Captain Hunt, expressed in his letter in the *Railway Age Gazette* of October 22, page 726, that the present methods of cold straightening rails are injurious to the material and are doubtless indirectly responsible for a considerable number of rail failures. I believe, however, that the improvement should be in the mill methods and not by the acceptance by railroads of rail not entirely straight. We would not care to accept rails out of line and surface and depend upon the ordinary methods of track laying to correct the trouble.

E. E. ADAMS
Chief Engineer, Union Pacific System.

DEUS EX MACHINA

By FRANCIS W. LANE

When the Western Advance case is settled and all the exhibits are filed;

When Thorne has discharged all his venom and respondents have ceased to get riled;

We may rest—and, faith, we shall need it,—and gather our senses a few,

Till the Master of rate regulation gets busy and starts something new.

And they that shall win will be happy, and they that shall lose will be sore;

None shall know till the Master has spoken, nor bank on the verdict before;

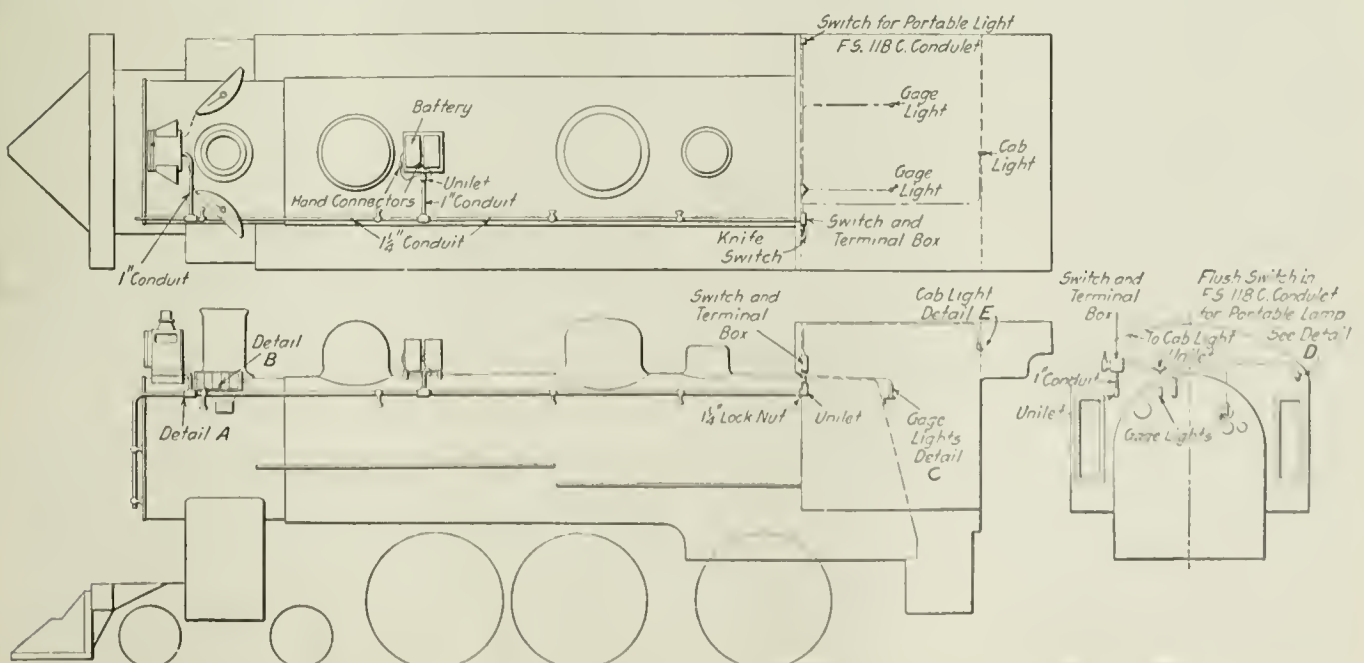
None can precedent quote with assurance, nor can cite a decision in bar;

Let us hope the Master digests well—the day it's decreed where we are.

For only the Master determines, and only the Master can tell
Whether railways shall thrive a while longer or plunge straight downward to (receiverships);

So we work for the joy of working, and handle each separate car

On the advice of the Commerce Commission, the Master of things as they are.



Southern Pacific Incandescent Electric Headlight Equipment

Importance of Railroads in a Plan of Preparedness*

Why Their Efficiency Is as Vital as That of Army and Navy in a Sound Scheme of National Defense

BY GEORGE DALLAS DIXON

Vice-President in Charge of Traffic, Pennsylvania Railroad

If the word should be flashed over this country that war had been declared and that the United States was about to enter into a conflict with another great world power, our condition of preparedness—what had been done and what had been left undone—would at once become the most immediately vital question before the American people.

War has not been declared. It is not imminent nor, so far we can see, even probable, and we hope that it never will be. But we have been compelled—even though unwillingly—to consider possibilities, and already national preparedness is being given much thought.

It has often occurred to me that in all the discussions of this subject, one of its most important phases, possibly its most important, has been overlooked by the majority of people. I refer to transportation. Taking everything into consideration, it is really a great question whether it is not every bit as important that our railroads should be prepared for national defense as it is that our Navy and our Army should be prepared.

MILITARY PLANS MUST BE FOR DEFENSE

As we are virtually pledged against another war of aggression, our military plans must necessarily be plans of defense, with a greater Navy, primarily, and a greater Army, secondarily, as the most obvious needs. There is danger, however, that the very obviousness of these necessities in any plan of preparedness may blind the eyes of Americans to another necessity which is less obvious but by no means any less vital, and that is adequate preparation for the mobilization and co-ordination of the internal resources of the country.

This means good railroads. Not merely as good as we have now, but better.

Suppose that a hostile army was about to invade our land. Can we exaggerate the importance that would then attach to an internal transportation system at the highest state of efficiency, with every facility ready to render the maximum of service, whether in the rapid assembling and transportation of troops, the movement of munitions, or the carrying of the materials required for the erection of the new plants that would probably be necessary to meet the enormous demands for military supplies?

Just for the sake of argument, imagine that the United States were attacked by some foreign power—England, or Germany, or France, or Italy, or Russia, or Japan, or any other great nation. Consider the diversity of the problems that would have to be met in any one of such contingencies, and then ask the question, What part would the American railroads play in the scheme of national defense and what would be expected of them under such circumstances?

THE VALUE OF RAILROADS IN PREPAREDNESS

There are, to be sure, abundant commercial reasons why it would well repay the American people to conserve and encourage their railroad systems and make their more rapid expansion and upbuilding possible. Well-constructed, well-equipped, properly manned, skillfully managed and solvent railroads are necessary to a healthy state of business. But as a military resource, a vital element in preparedness, they will be valuable beyond the possibility of expression in terms of money.

During the period from which we are just emerging, when business was, to say the least, quiet, our railroads were unable, for financial reasons, to improve their properties in anticipation of a return to what I might call a prosperous era. Their earnings

were not sufficient to warrant investors in supplying the capital needed to provide facilities for a greatly enlarged traffic, nor were they enough to enable the roads to put by a surplus for better cars, heavier bridges, more modern signals and all of those things which go to make up a good railroad, but which, except to a very small extent, do not increase a railroad's earning power.

Private capital is ready today to invest in our American railroads and needs only the assurance that the people and the Government wish to see it allowed a fair and reasonable return.

Just consider how helpful it would be now to the country's welfare if our railroads had the facilities needed at this very moment to handle our export commerce—I might almost say, under existing circumstances, the world's commerce.

RAILROADS SHOULD BE PREPARED FOR ANY EMERGENCY

Certainly the present situation in which the railroads of this country find themselves should be adequate proof to the people that our railroads should be prepared for any possible emergency, whether it be to handle an extraordinary quantity of traffic as is now being offered for transportation, or for any extraordinary service the Government might call on them to perform.

The very existence of the Nation, in the unhappy event of a war, might well hinge upon the ability of our interior transportation systems to bear the tremendous burden that would be put upon them, without collapsing. To be certain of so doing, they need great strength, much more than, as a whole, they have today.

The war in Europe has taught no surer lesson than this, that great forces of men, however courageous or admirably trained, are of little military value without the means of moving them with promptness and order and of keeping their many needs continuously supplied. This means transportation facilities that can be counted on to work with the smoothness and certainty of a machine. Without such facilities, all other preparations are useless, and the effort put into them wasted.

The railroads have played an important part in all the great wars of the last three-quarters of a century, that is, in every principal struggle of nations and rulers since the wars of Napoleon. But never before have they assumed the importance that they hold in the present war. Practically every great campaign in Europe during the last fourteen months has centered, at some crucial stage, about the possession of a railway line or junction point, control of which meant rail communication, or the loss of it, for one side or the other. The whole land campaign in the Balkan states, and the intricacies and ramifications and intrigues of diplomacy that have accompanied it, resolve themselves into a struggle, on the one hand, to establish a line of railroad communication between Central Europe and Turkey, and, on the other hand, to prevent the establishment of such a line.

THE STRENGTH OF THE GERMANS

The ability of the Germanic allies, thus far, to exist within the "Iron Ring" and not only to prevent it from contracting with a crushing pressure, but to push it back here and there and even to break through it in places, is of course due to many factors, but certainly to none more than to that perfection of plans and facilities for railroad transportation in every direction, at any time, which was one of the principal elements in Teutonic preparedness. By her railroads Germany has kept her armies and material resources liquid and they have flowed from

*From an address before the International Trade Conference, New York City, December 6.

one frontier to another with the swiftness and smoothness of water.

The German railroads were built and developed, under a militaristic system, with a first eye for military use. Our railroads were built by private capital to serve the needs of the commerce of a non-militant people, and are in themselves commercial enterprises. This, however, in no way detracts from their value for military purposes, since economic law has seen to it that they connect the centers from which men and supplies must be drawn in case of war.

A WISE INVESTMENT

The American people can make no wiser investment in military preparedness, and can buy no stronger assurance for the preservation of the Nation's integrity, than by allowing their privately owned railroads sufficient income at all times:

1. To bring all track and roadway up to standard conditions and maintain it thus.

2. To construct the double, triple and quadruple tracking and to make the terminal extensions and improvements that are required now, by the needs of peace, and which would be of immeasurably greater value if the railroads were ever called upon to assist in military operations.

3. To acquire sufficient supplies of locomotives and cars of modern types, and to reconstruct or replace all obsolete equipment.

4. To hold in the service a sufficient number of well-trained, well-paid and satisfied men, both officers and employees, to assure prompt and efficient operation in any emergency.

Some railroad systems are substantially in this condition at the present time, but many, less fortunately situated, are not. If all were enabled to become so, within a reasonable time, the Nation would be possessed of a military resource of inestimable value.

WHAT COULD THE PENNSYLVANIA RAILROAD OFFER OUR NATION?

To gain a more vivid idea of what our railroads could be—and ought to be—as factors in preparedness and as elements in an adequate plan of national defense, let us turn our thoughts to some concrete facts. Let us, for example, take the Pennsylvania Railroad System, with its associated lines, and consider what part it could play and what it could offer the nation in time of need.

In the first place it could offer a trained and disciplined army of more than 200,000 men for the performance of those indispensable transportation services without which the army and navy forces would be helpless.

It would probably not be within the province of any railroad management to decide where its men could perform the greatest service—on the battlefield, or in engine, train and shop—or to interfere with personal freedom as to enlistment, but the government would no doubt decide that every consideration of wisdom lay in maintaining the organization of this and other railroad systems substantially intact.

The English railroads sent a considerable number of men to the trenches early in the war, but in the first few weeks of the struggle England learned the value—indeed, the absolute necessity—of unhampered transportation, even though the actual battlefields are not on British soil. Both England and France have learned the lesson of the extreme unwisdom of sending to the front those men who have the special mechanical and other training and experience needed to keep up with the enormous demands made upon the national resources for production and transportation.

Secondly, the Pennsylvania Railroad could offer the nation a physical transportation system which handles the most extensive commercial railway traffic in the world—a system embracing more than 11,000 miles of line and over 26,000 miles of track, with terminals in the three largest cities of the country and in eight out of the ten largest centers of population.

The locomotives owned by the Pennsylvania Railroad System have power sufficient to haul, simultaneously, over any ordinary grades, soldier trains of 100,000 cars in all. These trains could

move an army of from 5,000,000 to 6,000,000 men and would fill a stretch of track as long as the system's main line from New York to Washington and from Philadelphia to Chicago.

In addition to carrying facilities this system has vast shop resources and a great body of skilled mechanics. The railroad shops at Altoona, Pa., alone—the largest of their kind in existence—employ 12,000 hands, a large proportion of whom are highly trained machinists. Counting all the shops on the Pennsylvania System, the total of men who might be called upon for specialized service is 64,600.

The Pennsylvania Railroad has in its service many other men highly trained in the professions and trades, or in special duties which from the standpoint of preparedness might make them invaluable to the nation.

It serves fifteen states and the District of Columbia, having a combined population of more than 40,000,000, or nearly half of all the people in the United States. In this great population there are probably 8,000,000 able-bodied men of military age, with the transportation facilities at hand for quickly mobilizing them.

In the territory served by this system is located much more than half of the fixed and liquid wealth of the country. It embraces the metropolis of the nation and its Capital, as well as the principal centers of finance, of foreign trade, of iron and steel production, of ship-building, of the manufacture of armor, heavy ordnance and powder, of meat packing, of the grain traffic and of various other important industries and commercial pursuits.

It so happens that because of geographical location, and by reason of the fact that it links together these principal centers of population and of industrial, mineral and agricultural wealth and production, the Pennsylvania Railroad System as an aid in defense, as in peaceful commerce, would inevitably hold a place among the transportation systems second to none.

A NATIONAL ASSET

But the Pennsylvania is only one of the nation's great railroads. For military purposes all of our railroads would have to be regarded from the viewpoint of their possibilities as one system, and the nation can ill afford to allow any part of this country-wide system of 250,000 miles of steel highways to deteriorate or to continue anywhere impoverished or inefficient, for what I have said of the importance to the nation of the Pennsylvania Railroad System applies, in a varying degree, to all railroads.

WHAT WOULD THE RAILROADS MEAN IN TIME OF WAR?

If the railroads have meant so much to France, England and Germany at war, with their comparatively small areas and relatively short distances, what would they mean to this country, under a like circumstance, with great cities 3,000 miles apart, with a population of almost 100,000,000 scattered over 2,974,000 square miles of territory and confronted with the immediate necessity of greatly increasing the industrial output and transporting the products to the place of utilization, of developing untouched and remote resources and of organizing and mobilizing large armies?

If our railroads are ever called upon to assist in the nation's defense, what would it be worth to the American people to have allowed these railroads the necessary funds required for the needed double and quadruple tracking, extension of lines, modernizing of all equipment, and the enlargement of the terminal facilities necessary to prevent congestion?

What would happen to America if its railroad transportation system broke down when called upon by the people of the country to aid in her defense? These are pertinent questions.

Next, then, to an adequate army and navy, if not indeed of equal importance, is the condition of the railroads of the United States as a factor in national preparedness. Only railroads of the highest efficiency can truly unify the country and keep its resources of men, money and materials in a liquid and mobile state. As a military precaution, if for no other reason, it

would be in the highest degree wise and profitable for the American people to see to it that their railroads have sufficient financial resources to be able to serve this end properly; and that the federal and state governments accord them treatment which will insure their healthy growth at all times.

TRAIN ACCIDENTS IN OCTOBER¹

The following is a list of the most notable train accidents that occurred on railways of the United States in the month of October, 1915:

COLLISIONS

Date	Road	Place	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
3.	Ch., R. I. & Pac.....	Rome	bc	P. & F.	0	8
9.	Southern.....	Tye River	bc	P. & F.	1	7
16.	Nor. Pacific.....	Angora	bc	P. & F.	1	34
19.	Ch., R. I. & Pac.....	Agawam	bc	P. & F.	7	47
22.	Pitts. & L. E.....	Beaver Falls	rc	P. & F.	0	4
30.	Western & A.....	Dalton, Ga.	bc	F. & F.	1	0

DERAILMENTS

Date	Road	Place	Cause of Derailment.	Kind of Train.	Kil'd.	Inj'd.
2.	Southern Pac.....	San Luis Obispo	Exc. speed	P.	1	2
10.	Southern.....	Mt. Zion	Unx.	P.	0	0
†16.	Union Pac.....	Randolph	Flood	P.	11	3
†18.	St. L., B. & Mex.....	Brownsville	Malice	P.	4	0
21.	Georgia North'n.....	Hollis	Unx.	P.	0	8
25.	Del. & Hudson.....	Milford	Unx.	F.	0	2
	C., C., C. & St. Louis.....	Champaign	B. frog	P.	0	0

OTHER ACCIDENTS.

Date	Road	Place	Cause of Accident.	Kind of Train.	Kil'd.	Inj'd.
2.	H. & Tex. Cent.....	Austin	Boiler	P.	0	0

The trains in collision near Rome, Ill., on the 3rd were a northbound passenger and a southbound freight. Both engines were wrecked, and 20 freight cars were badly damaged. The passenger cars were of steel and were not badly damaged. Eight passengers were injured.

The trains in collision near Tye River, Va., on the 9th were northbound express No. 38 and southbound local passenger train No. 19. Both engines and four cars were badly damaged. One baggageman was killed and 3 passengers, all on the southbound train, were injured. Three employees and one other person were injured. The cause of the collision was the failure of the southbound train to approach the meeting point under control.

The trains in collision at Angora, N. D., on the 16th, were a westbound passenger, No. 7, and an eastbound freight. The engineman of the passenger train was killed and 27 passengers, five employees and two other persons were injured. Angora was the appointed meeting place for these trains and the freight was at a standstill on the main track; the passenger came on at uncontrollable speed and failed to enter the side track, as it should have done, to clear the freight. It appears that both the engineman and the fireman of the passenger train overlooked an order, which they held, requiring them to take the side track at Angora.

The trains in collision at Agawam, Okla., on the morning of the 19th were southbound passenger No. 11 and northbound freight No. 98. Both engines, two baggage cars and ten freight cars were wrecked. Three trainmen and four trespassers were killed and forty-five passengers and two trainmen were injured. The southbound train had run past the appointed meeting station.

The trains in collision at Beaver Falls, Pa., on the 22nd of October were eastbound passenger trains, a local running into the rear of a preceding express train which was discharging passengers at the station. Four passengers were injured. The local train had stopped at the automatic signal at the entrance of the block section, but then went on at too high speed.

The trains in collision at Dalton, Ga., on the morning of the 30th about 4 o'clock were a southbound regular freight and a northbound extra. One engineman was killed.

The train derailed near San Luis Obispo, Cal., on the 2nd was a northbound express and the engine and two passenger cars fell down a bank. The fireman was killed and two trainmen were injured. The derailment was caused by running too fast where the speed was limited by a time-table rule.

The train derailed at Mount Zion, S. C., on the 10th was eastbound passenger No. 46, and the baggage car and two passenger cars were overturned. The coaches were of steel and all of the personal injuries were reported as slight.

The passenger train derailed near Randolph, Kan., on the 16th consisted of only two cars, a passenger car and a gasoline motor. The derailment occurred on a bank at the approach to a bridge where, in consequence of a freshet in the Fancy river, the earth had been washed away, but not sufficiently to change the appearance of the surface of the roadbed. The forward end of the passenger car was almost immediately submerged in the river and 11 passengers were drowned, three others being seriously injured. The stream had suddenly risen about 8 or 10 feet because of a cloudburst, 8 miles above, where 5 inches of rain had fallen within a very short time.

The train derailed near Brownsville, Tex., on the 18th was a southbound passenger, and the engine was overturned, causing the death of the engineman. Three passengers were killed and several were injured. The derailment occurred about 11 p. m., and it is believed that it was due to obstructions placed on the track by Mexican bandits. As soon as the train was stopped the bandits entered the passenger car and began shooting.

The train derailed near Hollis, Ga., on the 21st was a southbound passenger, and 8 passengers were injured. In the train were a number of freight cars and one of these, a tank car, ran off the track, carrying with it two box cars into a creek.

The train derailed near Milford, N. Y., on the 21st was a special, consisting of a locomotive and one car, the locomotive moving backwards. The train was running at about 20 miles an hour, and the tender was the first vehicle to leave the track. The engine fell over on its side and one end of the car fell down a bank. One trainman was injured. The cause of the derailment is reported as unknown.

The train derailed near Champaign, Ill., on the 25th was eastbound passenger No. 18, and the engine and three cars were ditched. No person was injured. The derailment was due to a broken frog.

The train involved in the accident near Austin, Tex., on the 2nd was westbound passenger No. 51, and the cause was the explosion of the boiler of the locomotive. The train was running about 20 miles an hour, but the engineman and fireman, as well as all other persons, escaped without serious injury.

THE RELATIVE MERITS OF ROAD AND RAILWAY IN WAR.—Some interesting calculations have lately been made by General Shumsky, the Russian military expert, as to the relative military advantages of road and rail transport. Where small bodies of troops are concerned, the railway is always preferable, and troops can be conveyed 12 miles in 20 to 30 minutes, while the journey by road would occupy not less than 6 hours. But the transportation of large masses of soldiers is quite another matter. An army corps, for instance, would require 144 trains, and according to General Shumsky, who has presumably in mind conditions which do not necessarily obtain in this country, not more than 50 trains a day could be run. Hence, an army corps, with its transport and artillery would require about four or five days for a railway journey of 12 miles. The deduction is that the value of railways for military purposes is not constant, and that the utility of railways is greater for long journeys than where the distance which troops have to be conveyed is only short. Obviously this depends on the number of tracks, the amount of locomotives and rolling-stock, and the platform and siding accommodation, etc., at the disposal of a commander. Conditions in Germany are more favorable than in Russia, owing to the much greater density of the German railway network, and the far higher number of parallel lines, the latter being an important strategical factor.—*Railway Gazette, London.*

¹Abbreviations and marks used in Accident List:

rc, Rear collision—bc, Butting collision—xc, Other collisions—b, Broken—d, Defective—unf, Unforseen obstruction—unx, Unexplained—derail, Open derailing switch—ms, Misplaced switch—acc. obst., Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of locomotive on road—fire, Cars burned while running—P. or Pass., Passenger train—F. or Ft., Freight train (including empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

The Elimination of Grade Crossings in Dallas, Tex.

A Report on the Situation in That City Favors a Belt Line as a Better Solution Than Track Elevation

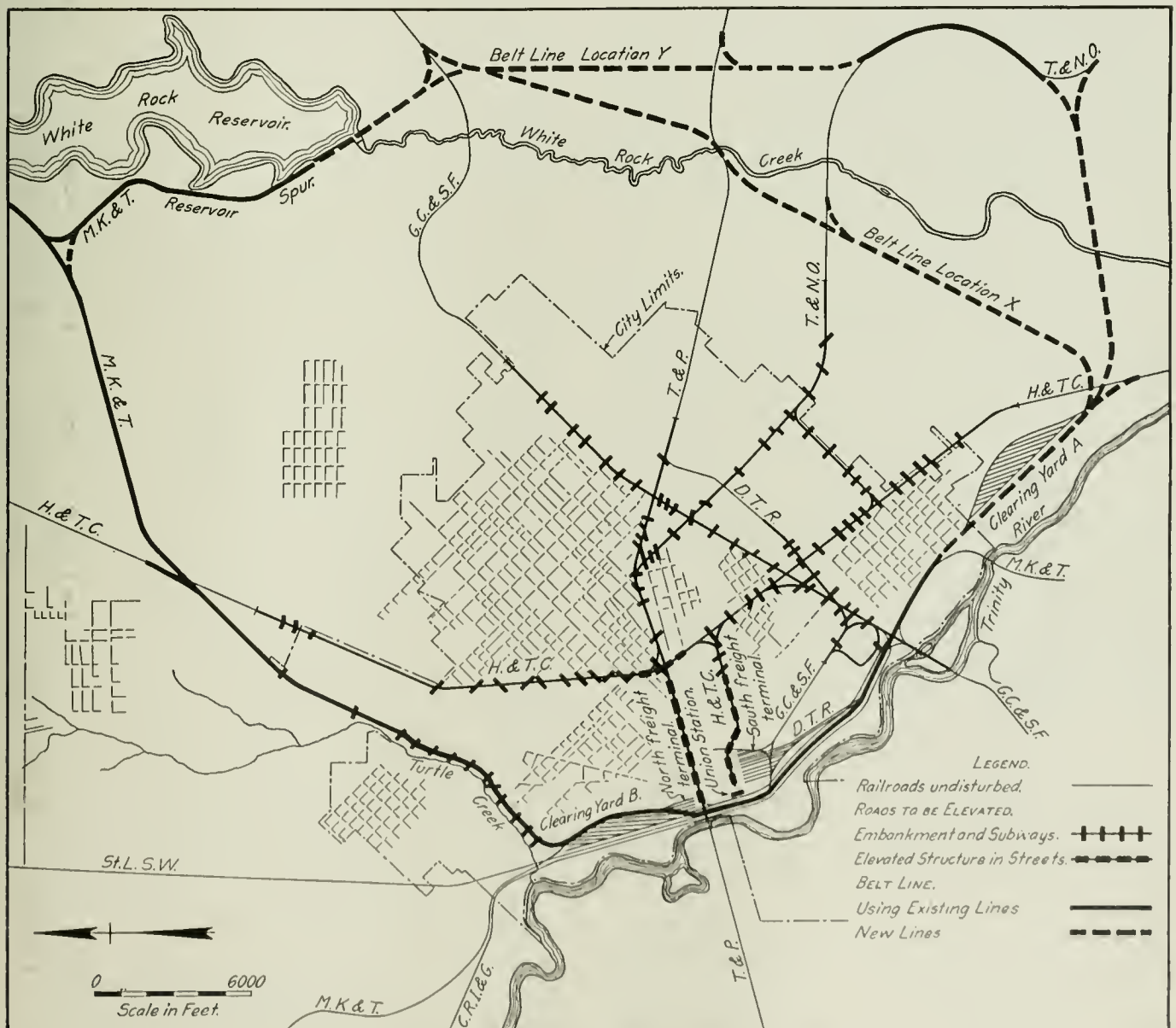
After several years of agitation for grade crossing elimination, the city of Dallas, Tex., retained John F. Wallace to make a study of the situation. His report, presented to the city on November 26, outlines a comprehensive plan for track elevation at an estimated cost of \$5,000,000. He strongly advocated, however, an alternative in the form of a belt line around the city to cost only \$900,000, which would remove so large a part of the railroad traffic from the congested portion of the city as to make grade separation unnecessary. The following is an abstract of the report:

THE PRESENT SITUATION

Dallas has a population estimated between 111,000 and 130,000 with an area of 17 sq. miles inside the city limits, in addition to

the growth of the city and pass through it in various directions. While the principal commercial development is segregated along the Texas & Pacific and in the vicinity of the Trinity river, industries are scattered pretty generally along the various lines. Similarly the character of the residential districts throughout the city suffers frequent variation because of the way the city has been cut up by the railroad lines.

The railroads entering and serving Dallas at the present time are the Texas & Pacific, the Houston & Texas Central, the Texas & New Orleans, the Gulf, Colorado & Santa Fe, the Missouri, Kansas & Texas, the St. Louis Southwestern, the Dallas Terminal Railway & Union Depot Company and the Chicago, Rock Island & Gulf. They own 77 miles of track within the city limits and use four passenger stations, 10 freight



Map of Dallas, Showing Plans for Track Elevation and Belt Line

considerable urban development outside. The railroad layout is typical of the American cities located in relatively level country. The railroads followed the lines of least resistance during

houses and numerous team yards, engine terminals and shops. Freight and passenger business of the St. Louis, San Francisco & Texas is handled into Dallas over the Gulf, Colorado &

Santa Fe. The valuation of the railroad property within the city on the basis of replacing new in kind modified by the condition of the property at the time of examination, exclusive of right of way for franchise values, aggregates in excess of \$1,000,000.

At the present time a union depot is being built by the Union Terminal Company, the stock of which is owned by the various roads, all of which will use the new station when it is completed. The station will be of the through type with 10 station tracks, 3 express tracks and considerable space for future development, and it is anticipated that it will provide adequate facilities for a great many years. The plan also includes provision for engine and coach terminals and is expected to represent an ultimate investment of about \$5,000,000.

TRACK ELEVATION

A careful study of the local conditions showed that track elevation with a limited amount of street depression offers the most feasible solution of the grade separation problem. This affects all tracks within the city limits except those immediately along the river front, hence the roads most seriously affected are the Texas & Pacific and the Houston & Texas Central, which pass through the heart of the city, while the tracks of the St. Louis Southwestern and the Chicago, Rock Island & Gulf would not be disturbed. A small portion of the Dallas Terminal Railway & Union Depot Co. tracks would be elevated and also the Greenville branch of the Missouri, Kansas & Texas, but the other lines of that road would not be changed. It is not practical or necessary to provide under crossings for all streets now crossing the tracks, and in the plan prepared as a basis for estimates about one hundred subways have been provided where they seemed most desirable from a study of the situation. In certain cases relocation of streets was found desirable.

The estimates are based on the use of embankments with retaining walls where a limited width of right of way makes them necessary, with unit construction reinforced concrete subways having lines of intermediate supports at the center line of street and at each curb line. In certain places where the railroads occupy streets for about a mile each on the Texas & Pacific and the Houston & Texas Central, and which it would be necessary to maintain for street traffic after the tracks are elevated, the plan provides for a continuous elevated steel structure. The total estimated cost of the work is \$4,785,000, of which \$4,675,000 represents the cost of track elevation, and \$110,000 represents the cost of changes to the industries. No recommendation is made for the apportionment of this cost, but references are given to methods of proportioning which have been used in other states and municipalities.

There are about 160 railroad grade crossings within the city limits, and the cost to provide, operate and maintain crossing gates at all of these is estimated at \$3,264,000. Of this \$64,000 represents the first cost of the equipment, while \$3,200,000 represents the capitalization at 5 per cent of the operating and maintenance expenses.

A BELT LINE

The topography of the city of Dallas and the location of the routes of the various railroads entering the city present an almost ideal situation for a belt line, over which all of the railroads could reach the new union station, and the local freight facilities, and thus decrease traffic on the tracks passing through the heart of the city to a sufficient extent to remove the need for grade crossing elimination. It is also believed that the construction of the belt line would encourage the removal of the industries from their present locations to points on the belt line, so that ultimately the tracks within the bounds of the belt line could be removed to the advantage of both the railroads and the city.

As seen in the accompanying map, the chief advantage of the situation lies in the fact that the absence of streets crossing the Trinity river at the track grade permits one side of the belt line to be placed along the river front close to the busi-

ness center, while the topography along Turtle creek is such that the Greenville branch of the Missouri, Kansas & Texas which follows this creek may be used advantageously as an outlet for the belt line to the unoccupied country on the north, with a minimum of expense for grade separation. Along the Trinity river from Turtle creek to the Missouri, Kansas & Texas bridge it is proposed to use the tracks of that road and the Union Terminal Company, with such additional facilities as may be found necessary. The rest of the belt line on the south and east would be new construction, two locations being suggested for a portion of the distance. This portion of the line is in relatively unoccupied territory, crossing few highways of any importance. The map shows two suggested clearing yards at *A* and *B* for the classification of freight of all the roads entering the city. It may develop on further study that it would be more desirable to have each road provide its own yard facilities at various points on the belt line. Layouts are also suggested for groups of local freight houses just north and south of the Union station, and a plan for reaching certain of the industries located in the immediate vicinity should it be decided to remove some of the existing routes.

The methods of construction and operation had best be left to the railroads themselves, but it is thought that the functions of the Union Terminal Company might be extended for this purpose. The plan adopted by the Indianapolis Union Terminal Company for operation and apportionment of expenses is suggested as a model.

The estimated cost of the belt line is \$900,000, of which \$500,000 represents the cost of new construction and \$400,000 the cost of grade separation for two tracks along the Turtle creek line of the Missouri, Kansas & Texas. To the above total must be added the value of facilities contributed by the various roads, less the salvage of trackage and facilities in the central portion of the city, which could be discontinued. The value of new real estate required is assumed as offset by the property of the railroad which may be vacated by the rearrangement.

DISPOSITION OF RAILROAD TRACKS

With the belt line established there is no question but that the ultimate solution of the problem would be the entire removal of the tracks within the city limits other than those necessary to reach the local freight facilities and such industries as are located immediately adjacent to the belt line. As mentioned before, the presence of the railroads has had an undesirable influence on the development of the residence district. It is believed that their removal would result in an expansion of the better residence districts by the elimination of the poorer residence districts now bordering the railroads, and thereby add materially to the taxable value. A further suggestion is to utilize the rights of way which could thus be vacated for the purpose of providing new streets, which, with certain existing streets, could serve as a basis for a system of through main thoroughfares. Street rearrangements of this kind also offer a suitable opportunity for the establishment of a civic center.

The probable readjustment of franchises with the local transportation company in Dallas in the near future offers another solution, in that it might be possible to turn the tracks over to this company, to form a part of a rehabilitated transportation system to be used for the purpose of rapid transit and also for switching service to the industries. The latter necessarily would have to be conducted during the night hours and under such precautions as to speed and flagmen as to protect the street traffic of the city.

An attempt to bring about the removal of these tracks immediately would probably not be desirable, but is put forward as an ultimate solution toward which the city should work. It may be found that the satisfactory arrangement, at least for the present, would be an arrangement between the railroads and the city which would restrict future industrial development to the portions of the city naturally segregated for industrial purposes, and the gradual removal of existing facilities to this district.

The Electrification of the Railways of Chicago

The Technical Phases of This Problem as Presented in the Report of the Smoke Abatement Commission

The report on Smoke Abatement and the Electrification of Railway Terminals of Chicago, made to the Chicago Association of Commerce on December 1, was abstracted in the issue of last week, page 1047. This report, comprising nearly 1,200 pages, contains the results of the most thorough investigation ever made of a problem involving the electrification of a large mileage of steam railway terminals. For this reason and also because of the complexity of the Chicago situation the following article is presented, abstracting in greater detail those portions of the report referring to the physical problems involved in the electrification of the steam railways within the terminal district of Chicago. In later issues other parts of the report will be similarly summarized. Unless otherwise stated all figures are for 1912.

PRESENT FACILITIES

Thirty-eight steam railroads are directly involved, including 23 trunk lines handling both freight and passenger service, 10 switching or belt lines and 5 industrial railroads. There are also over 1,600 industries having track connections with these railways, to a single one of which, the packing industry, nearly 1,000 cars, are delivered daily. In addition to the mileage controlled through direct ownership, a number of the railroads also have trackage arrangements permitting them to operate over the tracks of numerous other roads. There is also a considerable mileage owned jointly by two or more lines.

The mileage under consideration for electrification comprises a total of 3,476.40 miles of track, including 1,475.59 miles of main tracks, 1,456.64 miles of yard tracks and 277.19 miles of industrial tracks owned by railroads. This mileage is distributed over nearly every portion of Chicago. As illustrating the progressive character of the growth of the railway terminals with that of the city of Chicago, there are 78 miles of yard tracks within one mile of the City Hall and 219 miles within two miles. Within six miles, embracing 33 per cent of the area of the city, are 955 miles of yard tracks or over 50 per cent of all the yard tracks in the city.

Within the limits of the investigation there are 362 grade crossings between steam railroads, while the grades have been separated at 113 other crossings. Up to December 31, 1914, 169 miles of line and 1,079 miles of tracks had been elevated, while the elevation of 16 miles of line and 72.34 miles of tracks additional was provided for by ordinances. Approximately 70 per cent of the right of way is protected by fences, walls or buildings. An equivalent of 800 miles of single main track is protected by automatic signals. There are also 131 interlocking plants in this area.

There are six large passenger terminals in Chicago excluding the Van Buren and Randolph street suburban stations of the Illinois Central—the North Western, the Union, the La Salle street, the Grand Central, the Dearborn and the Central stations. At these and the two suburban stations referred to above 11,099,783 through and 42,119,593 suburban passengers were handled during 1912.

Less-than-carload freight is received and delivered through 69 freight houses, which handled 8,549,630 tons of freight in 1912. All the principal freight houses are located with 1¼ miles of the postoffice. There are also 62.97 miles of team tracks in the city, the largest yard being that of the Chicago & North Western at Grand avenue, which contains 5.5 miles of track. There are also 67 principal and 51 minor switching yards for the handling of carload freight within the city limits in addition to 40 principal and 19 minor yards outside the city, but within the zone of investigation. Other terminal facilities in this area include 65 engine houses containing a total of 1,129 stalls. Within the city limits there are 125 shop buildings of various types, 51 coaling

stations and 93 water stations. There are also 12 large passenger coach yards. Many of these terminal buildings are of brick or concrete and are of recent construction.

To secure the necessary data regarding present actual traffic conditions, forms were prepared for the tabulation of the essential information regarding each separate class of service. Full data was collected on these forms for five periods of one week each during the year. The information collected in this way was supplemented by a large number of field tests and observations. About 470,000 cards were required for the collection of the data regarding freight service and 348,000 for passenger service, each card showing the work of one engine or run, the hours worked, the termini, the amount of coal consumed, etc.

While any studies must necessarily be based upon present conditions, all plans and estimates of cost must be based upon conditions that will exist at the time the work is completed. This required the preparation of a tentative construction program by which it was estimated that if the work was undertaken in 1916 it would not be completed until 1922. On this basis it was necessary to estimate the increase in traffic which may reasonably be expected and the total demands of 1922. As a result of these studies it is estimated that the traffic shown in Table 1 will exist in 1922:

TABLE 1—ESTIMATE OF FUTURE GROWTH

	1912	Per cent annual increase over 1912	1922	Per cent increase over 1912
Miles of track.....	3,988	3.1	5,220	30.8
Number of through passengers	11,099,783	4.0	15,540,000	40.3
Number of suburban passengers	42,119,593	1.2	45,100,000	7.2
Number of through passenger trains	579	1.7	650	12.3
Number of suburban passenger trains	793	0.2	812	2.4
Tons of l.c.l. freight handled	8,549,630	4.0	10,140,000	18.8
Number of freight cars handled	14,826,739	4.2	20,950,000	41.3

THE ELECTRIFICATION PROBLEM.

After studying various proposed substitutes for the steam locomotive in the form of self-propelled cars and locomotives the commission came to the conclusion that the complete elimination of the steam locomotive in the railroad terminals of Chicago would, under present conditions, necessitate the abandonment of the service or the complete electrification of these terminals. A study was, therefore, made of existing steam railroad electrification in the United States and elsewhere to determine the practicability of its application to the Chicago situation.

Portions of 15 American and 22 foreign railroads, or a total of 37 roads, have been electrified up to the present time, as compared with 38 involved in Chicago. The total mileage of all American and foreign electrified steam lines is 3,007 as compared with 3,439 miles proposed in Chicago.

TABLE 2—MILEAGE OF AMERICAN AND FOREIGN STEAM RAILROAD ELECTRIFICATIONS

Classes	Route Miles	Miles of main Track	Miles of other Track	Total Miles of track
Total American	596.98	1,275.14	453.63	1,728.77
Total foreign	941.31	1,294.98	240.97	1,535.95
Total foreign, excluding "light service"	723.92	1,045.59	232.56	1,278.15
Grand total, all countries,	1,538.29	2,570.12	694.60	3,264.72
Grand total, all countries, excluding "light service"	1,320.90	2,320.73	686.19	3,006.92
Mileage to be electrified in Chicago	565.20	1,475.59	1,963.55	3,439.14

The study of these installations showed that they had been made to meet special operating requirements such as heavy grades, tunnels, etc.; to take advantage of cheap water power where the cost of coal is high; to meet the requirements of a growing suburban traffic where a frequent service and many

stops are necessary; to increase the capacity of stub end terminals; to experiment with the effect in stimulating traffic or to meet the competition of interurban railways. It was found that in no instance had a road electrified its terminals to avoid the pollution of the air where operating conditions are satisfactory.

A study of traffic conditions showed that the number of through passenger trains required by the traffic of Chicago terminals is 85 per cent of the total number of such trains at present operated electrically on all American steam railroads, while the number of suburban trains is approximately one-half the number of such trains at present operated electrically in America. Freight traffic, exclusive of switching service, is approximately 10 times greater in Chicago than on all existing electrified steam railroads in America, while yard freight switching service is more than 65 times as great. The only freight yards of any consequence operated electrically in this country are three yards on the New Haven with approximately 72.7 miles of track.

TABLE 3—THE CHICAGO TRAFFIC FOR ONE DAY

1—THROUGH PASSENGER SERVICE:	
Number of railroads operating.....	23
Average number of through passenger trains handled per week day	579
Locomotive miles	11,430
Per cent of all services.....	15.8
2—SUBURBAN PASSENGER SERVICE:	
Number of railroads operating.....	13
Average number of suburban trains handled per week day..	793
Locomotive miles	12,296
Per cent of all services.....	17.0
3—ROAD FREIGHT SERVICE:	
Number of railroads operating.....	25
Locomotive miles	5,756
Per cent of all services.....	8.0
4—YARD SERVICE:	
Number of railroads operating.....	39
Locomotive miles	30,790
Per cent of all services.....	42.5
5—FREIGHT TRANSFER SERVICE:	
Number of railroads operating.....	32
Locomotive miles	10,993
Per cent of all services.....	15.2
6—PASSENGER TRANSFER SERVICE:	
Number of railroads operating.....	16
Locomotive miles	1,083
Per cent of all services.....	1.5
Locomotive mileage for all switching services.....	42,866
Per cent of all services.....	59.3

The number of multiple-unit cars, including both motors and trailers, required for the Chicago service would be 66 per cent of the total number of such cars in service on all electrified American steam roads, while the number of electric locomotives required in Chicago would be approximately four times the number now in service on all American electrified steam roads, and approximately $2\frac{1}{2}$ times the number now in service on all electrified steam roads in the world.

As a result of its study of the experience gained on other installations the commission states that it has been demonstrated that trains of any weight can be hauled electrically at any required speed, provided the necessary amount of electrical power can be conveyed to the train motors; that where appliances can be properly installed and maintained, in view of local conditions, electric traction has been found to be reliable; and that under ordinary railroad conditions the introduction of electricity does not materially affect the hazard of railroad operation.

TECHNICAL PROBLEMS

The commission then entered into a detailed study of the engineering features of the problem. In this it assumed that the railroads would provide their own facilities for the generation and distribution of power, and that transmission lines in all cases would be of open wire construction on steel poles along the right of way, carrying current at 33,000 volts. This did not contemplate that each road would build its own individual power stations, but that all the roads would act as a unit in providing their common power supply rather than purchase power from outside sources.

The most important element of an electric traction system is the contact system, and it was given special attention. The

Chicago terminals present conditions which are unprecedented in complexity and magnitude in this regard, and which offer many difficulties affecting the application of any single form of contact system. In determining upon the practicability of the third rail, detailed studies were made on six railroads, on which it is found that there would be 3,834 gaps in the third rail more than 25 ft. in length. Of these 2,216 would be unimportant, as they would be short or at points where trains could coast over them, while 881 could be reduced so that proper operation could be maintained. The remaining 737 gaps, averaging more than 115 ft. in length, would require the use of an overhead third rail conductor. There is also some trackage on which it would not be possible to install a third rail or overhead conductor rail. The extent of this mileage on one road alone amounted to 11.65 miles. There is also objection to the third rail because of the necessity of employees working on both sides of the cars in the terminals, repair yards, etc.

In studying the advisability of overhead conductor wires the question of clearance becomes a serious one. Not only must these wires be placed at a suitable height to permit the contact to be made from a moving train, but it is desirable that they be maintained at a height sufficient to clear trainmen on the tops of cars. This would require that the clearance under overhead bridges should not be less than 25 ft., or where trainmen are barred from the tops of the cars, 16 ft. 6 in. An examination of the clearances in the Chicago terminals shows that there are now 492 permanent structures which do not have the full clearance. Of these 221 cannot be changed without great inconvenience and expense.

Under present rules trainmen are required to be on the tops of cars of road freight and transfer trains when approaching stations and railroad crossings and on the top of the head car of transfer trains when being pushed by locomotives. Trainmen also ride on the tops of cars in the hump and other classification yards. At a meeting of railway operating men to consider this question it was their conclusion that the exclusion of men from the tops of cars would make impossible the operation of the Chicago terminals. It was, however, the conclusion of the commission that with the installation of suitable warning devices the overhead contact system would be found practicable. This system also suffers relatively little from interference from storms as compared with the third rail. While sleet formations on the contact wires cause some sparking, they do not interfere with the movement of trains except in the case of a most unusual storm.

In the event of electrification the present signal system used by 23 roads in the Chicago terminals could not be employed. Likewise, the use of direct current would require careful design and construction to avoid the introduction of difficulties arising from electrolytic action, while the use of alternating current would require special care to avoid inductive interferences with existing telephone and telephone circuits. It is not believed, however, that either of these difficulties is serious enough to affect the practicability of any general scheme of electrification.

THE LIMITS OF THE ELECTRIFIED LINES

Before proceeding to make an estimate of the cost of any installation it was necessary to determine the limits to which electrification should be carried. Instead of attempting to establish a zone of electrification, the extent of the trackage to be electrified was determined for each individual road. In this it was the idea to terminate complete electrification at the first satisfactory point beyond the city limits. In the case of railroads having large yards, shops or other facilities a short distance beyond the city limits, the point where they are located was selected as the terminus for complete electrification. With those roads presenting no such features a location was selected as near the city limits as practicable, which afforded sufficient land on which to develop the necessary terminal and transfer facilities. For the North Western, the Western Indiana, the Burlington, the Rock Island, the Illinois Central, the Lake Shore and the Fort Wayne, estimates were made for further partial

electrification to the limits of their suburban territories to permit the operation of all suburban service electrically, while at the same time changing from electric to steam operation for through passenger and freight service a short distance beyond the city limits. The trackage to be electrified on each railroad and the limits of the electrification are indicated in Table 4:

TABLE 4—TRackage TO BE ELECTRIFIED ON EACH RAILROAD IN THE CHICAGO TERMINALS
(Basis of 1912)

Railroad	Outside Limits	Miles from Passenger Station	Miles of Main Track	Miles of Other Track	Adjacent Industrial or Privately Owned	Track to be Electrically Equipped	Total Miles of
A. T. & S. F.	McCook, Ill.	13.4	28.92	52.98	6.05	87.95	
B. & O.	Pine Jct., Ind.	29.6	32.55	25.79	1.13	59.47	
B. & O. C. T.	Barr, Ill.	20.5	....	....	....	....
B. & O. C. T.	Altenheim, Ill.	10.9	....	....	....	....
B. & O. C. T.	Pine Jct., Ind.	33.9	66.23	39.65	8.53	114.41	
Cal. Ham. & S. E. ....	....	....	....	5.90	....	5.90	
C. & O. of Ind. ....	....	....	....	0.18	....	0.18	
C. & A.	Glenn, Ill.	10.0	20.07	36.24	2.61	58.92	
Chgo. & Cal. R. ....	....	....	....	3.16	17.86	21.02	
C. & E. I.	Yard Center, Ill.	18.3	2.30	19.18	1.18	22.66	
C. & E.	Hammond, Ind.	22.5	5.41	28.54	0.29	34.24	
C. & N. W.	Waukegan, Ill.	36.2	....	....	....	....
C. & N. W.	Des Plaines, Ill.	16.7	....	....	....	....
C. & N. W.	Ehnhurst, Ill.	15.9	263.64	258.71	9.83	532.18	
C. & W. I. and Belt Ry. of Chgo.	Barr, Ill.	17.0	....	....	....	....
C. & W. I. and B. R. of C., Hammond, Ind.	....	19.8	141.39	162.53	15.00	318.92	
C. B. & O.	Downers Grove, Ill.	21.3	81.54	86.04	17.56	185.14	
C. G. W. ....	....	....	0.68	19.87	0.04	20.50	
Chgo. Ind. & S.	Osborn, Ind.	24.1	9.39	2.39	....	11.78	
C. I. & L.	S. Hammond, Ind.	23.3	3.98	1.66	....	5.64	
Chgo. Jct. ....	....	....	44.59	118.98	34.90	198.47	
C. M. & S. P.	Manheim, Ill.	14.5	....	....	....	....
C. M. & S. P.	Morton Grove, Ill.	14.8	....	....	....	....
C. M. & St. P.	Wilmette, Ill.	14.1	106.83	136.82	17.19	260.84	
Chgo. Riv. & Ind. ....	....	....	5.54	0.95	3.89	10.38	
C. R. I. & P.	Blue Island, Ill.	15.9	76.88	62.00	....	138.88	
Chgo. Short Line. ....	....	....	....	0.59	4.71	5.30	
Chgo. Union Transfer. ....	....	....	5.61	2.36	0.15	8.12	
Chgo. W. Pullman & S. ....	....	....	....	2.86	15.02	17.88	
E. J. & E. ....	....	....	6.07	104.46	2.71	113.24	
G. T. W.	Evergreen Pk, Ill.	15.3	21.64	36.65	6.07	64.36	
I. C.	Matteson, Ill.	28.8	....	....	....	....
I. C.	Hawthorne, Ill.	7.9	168.94	163.89	4.18	337.01	
Ill. Nor. ....	....	....	4.36	7.24	9.29	20.89	
I. H. B.	Chappell, Ill.	....	22.77	0.60	....	23.37	
L. S. & M. S.	Millers, Ind.	30.4	98.86	63.60	0.99	163.45	
M. S.	Gibson, Ind.	23.8	22.96	43.89	1.37	68.22	
M. St. P. & S. S. M. ....	....	....	0	0	0	0	
N. Y., C. & St. L.	Hessville, Ind.	23.7	30.64	27.42	....	58.06	
Pere Marquette ....	....	....	....	9.70	....	9.70	
P. C. C. & St. L.	Bernice, Ill.	26.9	62.05	68.74	5.35	136.14	
P., Ft. W. & C.	Clarke, Ind.	24.9	113.96	81.48	13.31	208.75	
Pullman R. R. ....	....	....	6.97	8.62	30.01	45.60	
Wabash.	Chicago Ridge, Ill.	16.9	20.82	50.16	0.50	71.48	
Totals	....	....	1,475.59	1,733.83	229.72	3,439.14	

The plans for this electrification involve the establishment of 30 new transfer yards, 50 groups of facilities for the maintenance of electric equipment, and 25 groups of facilities for the maintenance of steam equipment, the enlargement of 5 groups of existing facilities for the maintenance of steam equipment, and the abandonment or removal to new locations of 39 groups of facilities for the care of steam equipment.

As yet, the commission decided, no system of electric traction has been developed which can be accepted as standard for all conditions on all railroads. If it were decided to proceed at once with the electrification of the Chicago terminals, it would be difficult for any group of men to choose a system which would not be criticised by others as able as those upon whom the choice of the system devolved. There are many factors affecting the choice of a system, some of which are based upon known technical facts and others of which are the outgrowth of local conditions. The system selected for Chicago must be suitable not only for passenger terminal and main line work, but also for yard switching and transfer work. It must be applicable, the commission found, to the requirements of railroads having a heavy suburban traffic and also to those of roads conducting freight yard and switching service. It must not only be satisfactory in its application to the terminal portion of a trunk line railroad, but it must lend itself to an indefinite extension of the limits of electrification over other and adjoining portions of the road. It is furthermore essential that the rolling equipment of the system selected shall be capable of operating over the tracks of all railroads in the electrified zone.

At the present time no one system will perfectly meet the requirements of the Chicago terminals. For this reason the commission prepared estimates of the costs of three different systems, the third rail contact with direct current at 600 volts; overhead contact with direct current at 2,400 volts, and overhead contact, single-phase current at 11,000 volts. The estimates for the two overhead contact systems were prepared for all the railroads within the proposed limits of electrification, while those for the third rail system were developed for one road and the cost determined in this manner was extended to cover the entire terminals.

As described above, the amount of traffic to be handled daily was estimated carefully for five different periods in 1912, from information secured from a study of all train movements within the limits of the zone under investigation. From this Table 5 was prepared showing the total number of ton miles to be handled electrically in each class of service during the average day.

TABLE 5—TOTAL NUMBER OF TON-MILES TO BE HANDLED ELECTRICALLY IN EACH SERVICE
(Basis of 1912)

Service	2,400-Volt D. C. System Ton-Miles	11,000-Volt A. C. System Ton-Miles
Yard	9,554,316	9,554,316
Road freight	6,242,988	6,323,517
Freight transfer	8,252,126	8,252,126
Passenger transfer	375,678	375,678
Through passenger	4,529,575	4,574,025
Suburban passenger with locomotives	1,168,885	1,187,065
Suburban passenger with multiple-unit cars	2,844,231	2,692,109
Make-up and put-away	723,126	730,496
Totals of all combined	33,690,925	33,689,332

The energy units adopted for the operation of the different classes of service are shown in Table 6:

TABLE 6—ENERGY UNITS ADOPTED FOR ELECTRIC OPERATION
Watt-Hours per Ton-Mile at the Pantograph

Service	2,400-Volt D. C. System	11,000-Volt A. C. System
Yard	59	60
Road freight	25	28
Freight transfer	35	38
Passenger transfer	30	30
Through passenger	36	37
Suburban passenger with locomotives	63	63
Suburban passenger with multiple-unit cars	74	71
Make-up and put-away	30	30

On the basis of the 2,400-volt direct current system one central power station and 11 substations have been tentatively located in the terminal area, these substations carrying a total average hourly load of 78,608 kilowatt hours and a maximum of 125,700, with a load factor of 62.5 per cent. With the 11,000-volt, alternating current system, 31 substations would be required with an average hourly load of 73,550 kilowatt hours and a maximum of 114,600, with a load factor of 64.2 per cent. With the 2,400-volt direct current system the average hourly requirements at the pantograph of all the roads is estimated at 62,023 kilowatt hours and the maximum at 109,258 kilowatt hours, of which the Chicago & North Western alone will require 19.37 per cent, or more than twice that of any other individual road.

ENGLISH RAILWAY STOPS RESERVING SEATS.—The Great Northern Railway, beginning November 18, ceased, until further notice, to convey luggage in advance and to reserve seats for passengers. A probable reason for this action is that many consignees who have been sending their parcels by freight are now sending them by passenger train. The charges for the latter are considerably higher, but the transit is quicker, as while there are delays the accommodation on station premises for parcels traffic is generally so limited that the station staff is only too anxious to get rid of it.

ANGLO-RUSSIAN TRANS-SCANDINAVIAN RAIL ROUTE.—It is reported that at last an agreement has been reached with the Swedish government on the rules to govern the transport of private goods between Russia, Sweden, Norway and England, either outwards or inwards, for want of which the traffic had been very unreliable hitherto.

WILLIAM HENRY WILLIAMS

W. H. Williams, vice-president of the Delaware & Hudson, has been elected chairman of the board of directors and chairman of the executive committee of the new company which has taken over the Wabash after reorganization. Mr. Williams was recently elected a director of the Missouri Pacific. Kuhn, Loeb & Co. are the bankers who carried out the reorganization of the Wabash and are now working out the reorganization of the Missouri Pacific. They are also the bankers for the Delaware & Hudson. Mr. Williams will make his office in New York and will continue to act as vice-president of the Delaware & Hudson. It is seldom that a man of 41—Mr. Williams was born in June, 1874—has the broad responsibilities and broad opportunities in railroad work which are here presented.

Mr. Williams has been in railroad work since he was 16, and since 1901 has been an officer reporting directly to L. F. Loree, who was general manager of the Pennsylvania Lines West when Mr. Williams became his secretary, and who was later president of the Rock Island and president of the Baltimore & Ohio, and is now president of the Delaware & Hudson. Mr. Loree's ability to inspire his subordinates to an extraordinary output of work amounts to genius. In W. H. Williams he found a man of nervous, high-strung temperament, a remarkably keen, analytical mind, and a man capable of taking the faintest hint or suggestion, making the idea his own and carrying it out. Mr. Loree is a financier with broad interests as well as a railroad man, and the close association which Mr. Williams has enjoyed with him gave an opportunity for the younger man to study financial affairs of the first importance from an inside point of view as it were. He combines a quite varied experience in railroad affairs, as his service record shows, with an intimate knowledge of the financial problems which are often so little understood by railroad officers all of whose service has been on the road. When the Hadley Securities Commission was making its investigation of the question of government regulation of the issuance of railroad company securities W. H. Williams presented a discussion of the fundamental principles of financing railroads that in some ways showed a keener analysis of the facts and the principles involved than that furnished by any of the very prominent and very distinguished men who put their knowledge at the disposal of the commission.

Kuhn, Loeb & Co., have been conspicuously successful in the railroads they have financed. Nevertheless the bankers' point of view is quite different from that of the railroad executive, and it is particularly important in the case of the Missouri Pacific and Wabash that, on the one hand, the needs of the property should be thoroughly understood and, on the other, that a wise and conservative policy of financing these needs should be pursued. It is in this field that Mr. Williams can

perform a great service for two very important railroad properties. Furthermore, many of the financial disasters which have overtaken railroads have been due, at least in part, to the fact that the board of directors and the bankers financing the company have not been really cognizant of what was going on. There is little chance of this happening with W. H. Williams as chairman of the board. With his power of analysis is combined also fertility of resource in finding ways of obviating difficulties. He is above all an indefatigable worker.

William H. Williams was born at Athens, Ohio, and attended the Toledo (Ohio) public schools and the Beaver Valley Business College. He began work as a cashier in the local freight station of the Pennsylvania Lines West at Toledo in May, 1890. The following year he became an assistant on the engineering

corps of the Pittsburgh & Lake Erie, and in 1892 was given a job as stenographer to the superintendent of telegraph on the Pennsylvania Lines West. A few months later he went into the office of Joseph Wood, who was then general manager of the Pennsylvania Lines West, working as stenographer for Mr. Wood until January, 1896. In that year L. F. Loree was made general manager of the Lines West and Mr. Wood became third vice-president. Mr. Williams became Mr. Loree's secretary, and acted also as chief clerk to Mr. Wood. When Mr. Loree became president of the Baltimore & Ohio, Mr. Williams was made assistant secretary of that company and acted also as assistant to the general manager. Mr. Loree went to the Rock Island in 1904, and Mr. Williams was made superintendent of freight transportation, yard and station service on the St. Louis & San Francisco, which was then under the same management as the Rock Island, from April 1 to October 6. For the two years 1905-1907 Mr. Williams was statistician for the General Managers' Association and also traffic manager of the Merchants' and Manufacturers' Association and the Chamber



W. H. Williams

of Commerce of Pittsburgh. Mr. Loree became president of the Delaware & Hudson in 1907 and offered Mr. Williams a position as his assistant, which offer was accepted, and a few months later Mr. Williams was made third vice-president.

LIGHT RAILWAYS AND THE WAR.—Some particulars have already been given in regard to the use which the Germans have made of narrow-gauge light railways in Belgium. According to accounts from a Russian source similar methods are being employed on the Eastern front. For communicating with the rear the German army uses special "removal railways" of 2-ft. gage, the track for which was prepared in large quantities before war broke out. The speed attained is said to be nine miles an hour, which is good enough in the circumstances, and of course compares very favorably with the best that could be attained by road. Twenty-four trains can be run in 24 hours, and special attention has been paid to quickness of construction.

Mutual Beneficial Association on the Pennsylvania

An Organization of the Employees of This Road without Walking Delegates and No Strike Clause in Its By-Laws

By N. F. DOUGHERTY

Editor of the Mutual Beneficial Association Magazine

Employees of the Pennsylvania Railroad have formed an organization which promises to be a step forward in the direction of solving the question that has been giving so much concern to government and business in the past generation—namely, the solution of the labor problem. There have been many schemes, plans and even attempts to work out this problem, but they have usually proved to have been poorly planned or have lacked support. We believe that a brief outline of our plan would be of interest to the readers of the *Railway Age Gazette*.

The plan of the Mutual Beneficial Association of Pennsylvania Railroad employees is somewhat similar to that of labor organizations, in that it advocates the collective principle whereby the employee shall have a voice in determining the conditions under which he labors, but from this point on it differs in the following principles: The first exception is that it is an association made up exclusively of Pennsylvania Railroad employees. The walking delegate, the labor exploiter and the high-salaried labor official are given no opportunity to live by the toil of their fellow worker. The second exception is that there is no strike clause in the by-laws. The organizers took the position that the strike clause is the real factor that is keeping capital and labor apart rather than getting them together.

It might be well, however, to outline the aims and purpose of the association, as well as the reasons why the organizers think it a better method to settle the differences between capital and labor than the propaganda now followed and advocated by leaders of organized labor.

PLAN AND METHODS

The purpose of the Mutual Beneficial Association is to give the employees of the Pennsylvania Railroad all the advantages that can be gained by organization and at the same time protect them from the disadvantages that are to be found in many kindred organizations.

The method in seeking adjustments or improvements in pay or working conditions is to meet the officers of the road in an honest, friendly spirit, with threats of force and violence farthest from our thoughts. The advantage in this method is that both sides enter the game with their cards face up on the table, thus minimizing the danger of subterfuge and deception and permitting the discussion of every question on its merits alone. An agreement satisfactory to both sides is bound to result from such a method. We do not see how there could be any other result in this day of intelligence.

The Mutual Beneficial Association is one of the very few organizations with a membership composed exclusively of employees of a single corporation and also one of the very few operating under state charters. It is conceded that a chartered organization is infinitely safer, guarding much more effectively the interests of its membership and carrying with it supervision and inspection of its operation and books by state officers.

The by-laws provide for the election of committees of adjustment, giving to every member an organized method by which his interests and rights may be conserved and promoted.

The insurance rates are sound and lower than the same class of insurance can be procured for elsewhere. The rates are sound because, first, they were worked out by an expert actuary and have been approved by the National Fraternal Congress; and, second, they are also approved by the State Department of Insurance. The rates are lower because the insurance fund cannot be drawn on to pay high-salaried officers or to support grievance and legislative committees. Our premise

is that these are not, and never will be, necessary under the co-operative plan on which our association is built.

The dues are based on an insurance table and not on assessment. Every cent paid, outside of local dues, goes to the insurance fund. The insurance covers total disability as well as death, the one rate covering both. If a member is so disabled by the loss of a hand, a foot or an eye, or by insanity or paralysis, so that he cannot follow his regular occupation he is paid the total amount of his certificate. If a member leaves the service of the Pennsylvania Railroad he is permitted to continue his insurance.

It would take too much space to incorporate the entire insurance table here, but enough can be given so that a comparison may be made with other insurance rates of the same class:

Age	Class A, \$250		Class B, \$500		Class C, \$1,000		Class D, \$1,500		Class E, \$2,000	
	An- nual	Month- ly	An- nual	Month- ly	An- nual	Month- ly	An- nual	Month- ly	An- nual	Month- ly
20.....	\$3.93	\$0.34	\$7.86	\$0.68	\$15.72	\$1.35	\$23.58	\$2.03	\$31.44	\$2.70
25.....	4.08	.35	8.15	.70	16.30	1.40	24.45	2.10	32.60	2.80
30.....	4.22	.37	8.44	.73	16.88	1.45	25.32	2.18	33.76	2.90
35.....	4.37	.38	8.73	.75	17.46	1.50	26.19	2.25	34.92	3.00
40.....	4.51	.39	9.02	.78	18.04	1.55	27.06	2.33	36.08	3.10
45.....	4.81	.42	9.61	.83	19.21	1.65	28.82	2.48	38.42	3.30

Local assemblies are permitted under the by-laws to conduct a fund for temporary disability due to sickness or accident. This fund is conducted and controlled by the local assemblies. Several of the local assemblies have established such funds and are maintaining them successfully.

The by-laws provide for co-operative buying. Some of the local assemblies have accomplished much along this line. The plan followed is to arrange with local merchants to make a reduction on goods purchased by members of the association. We hope in the near future to appoint a committee to study this question with the idea of working out a plan for buying direct from the producer.

The association takes in all classes of employees. It is less than two years old and has a membership of over 5,000 and is growing rapidly. If the present interest and growth continue it will be but a few years until a majority of the employees are members.

ADVANTAGES OF THE PLAN

We will show why our method is the better one for working out the problems of capital and labor. We want to make it very clear that we not only have no quarrel with organized labor, but, on the other hand, we think that organized labor has done much to clear the ground and make possible such a movement as that represented by the Mutual Beneficial Association. There are two principal features in the labor movement. First, collective bargaining. We are in hearty accord with this principle, but prefer to call it collective representation. A request represents the desire of an entire class and not of an individual, but the word bargaining seems to carry with it a bartering which is based more on the strength than the justice of the cause. The difference here is only one of words—and we prefer representation to bargaining. Second, the method of procedure. The method in common practice today is for the workers to present their questions relating to wages and working conditions for adjustment, and then the employer and employee discuss each question with the idea of reaching a common ground of agreement. Naturally each side always tries to make the best bargain possible. We agree, to this extent, with the method of procedure; but together with the presentation of questions for adjustment is that bugaboo of present-day business conditions—the threat of strike unless the

demands are granted. We disagree with this and think our method the better one. A threat simply means displaying of force, and in a question of force justice is lost sight of and the stronger side wins irrespective of any economic argument whatsoever.

The Mutual Beneficial Association principle holds that the threat weakens the whole cause. We argue that should we be the weaker side we lose all, because in a question of force a concession is a sign of weakness, and for this reason the stronger side will make no concession. On the other hand, if we are stronger we will force concessions beyond what the economic conditions will stand, the result being that the employer must sacrifice goods, service or the interest of some other group of employees. An adjustment of this kind is only a temporary makeshift and in the course of time will react in the form of bankruptcy or general reduction in force. The financial conditions of the railroads in the country today prove this. The recent broadcast reductions in all industries are also another proof.

Our argument is that better and more permanent adjustments can be made by perfect frankness and honesty on both sides. Our plan is to work out our questions for adjustment on a basis of the cost and conditions of living; on wages and conditions in other industries; on the character of service; and then present our claim from the standpoint of equity with no threat of force. We feel quite confident in saying that our adjustment will be much more liberal than if we accompanied our request with the common alternative, because there would be no fear on the part of the employer that a concession would be an entering wedge to force further concessions. He would be relieved of the fear of strikes and their expense, as well as the expense necessary to guard against them. The funds thus released would be enjoyed by the employee in the form of higher wages and better working conditions. It would entirely remove the present spirit of barter and jockeying for advantage, and instead all questions would be settled in a spirit of justice. Good feeling and friendliness and a closer knitting together of interests would result.

The plan of the organizers of the Mutual Beneficial Association being to adjust the question between the officers and employees of our railroad by a round-table conference instead of by threats of force, it was necessary to get the official attitude toward such a movement, because the principle being that of co-operation, it takes two sides to co-operate, and the views of the officers were necessary. The answer from the officers was that if an organization were formed on the basis outlined (the by-laws embody the basis presented) there was no question but that they would meet their employees through the representatives of such an organization; and the sincerity of this statement has been proved by the spirit with which our committees have been met. It is a matter of public record that several of the highest officers of our company favor the collective principle and do welcome an organization of their own employees when it is entirely free from outside influences. This is exactly the principle of the United States government; that is, to work out its own problems without becoming involved by entangling alliances with foreign governments.

This must not be understood as a promise of support or help in any way from the officers of the road, but simply an announcement of a policy which has been made to the public through the press as well as to us. Quite a number of officers at various points on the railroad are not only members but are taking very active interest in the local assembly meetings in order to meet the employees on common ground and do what they can to improve working conditions.

CONTRAST WITH LABOR UNION METHODS

We have already given credit to organized labor for the great work that it has done. This work has been of the ground-clearing order, and though it has in a very great degree been a groping in the darkness, it has been educational to the extent

that the needs of labor and the ability and willingness of capital to supply these needs have been very clearly defined.

Anyone who has studied the labor question has no doubt noted three distinct groups, each holding a different opinion as to how the question should be worked out.

First, those who believe in the immediate and complete elimination of private property; the government to control both production and distribution.

Second, those who believe that the workers should get a greater share of the profits of the industry, and have organized to secure a more equitable distribution by force.

Third, those who believe that the workers should share more in the profits of industry, both financially and by better working conditions, but who do not believe that force is necessary to accomplish this end, and who hold that more permanent and satisfactory adjustments can be made by obeying the laws of economics. Their plan to accomplish this end is by conference and co-operation between employer and employee.

We belong to the third class and we think we have taken a step in advance of the others. As we pointed out before, when force is the weapon used to get adjustments, it goes without argument that both sides will be guided by their strength, and instead of justice and honesty being the actuating principles in such adjustments each side will study every means to circumvent the other. There is bargaining and jockeying for advantage and the justice and economic sides of the question are lost sight of. Such agreements are only makeshifts and compromises, neither side is satisfied, discontent continues, and while more compromises might be made, the end is bound to be either a strike or bankruptcy of the industry.

It might not be out of place here to state an ideal which we should all cherish and always hold before us as an ultimate goal, though every step toward this goal must be a constructive and not a destructive one, else we shall have to retrace our steps in each case and reconstruct all that we have destroyed. The ideal we wish to picture is that we hope to see the day when government will so control distribution that poverty will be unknown, and when every man, woman and child will not only be protected against hunger and cold, but will enjoy a distribution on such a basis that they will be able to command the real pleasures of living and not have their lives distorted and cramped by a mere existence in the struggle for the bare necessities. We are living in a wonderful age, and it is often difficult to see things as they really are, yet a retrospective glance over any previous period will bring with it astonishing realization of the changes in every line of human endeavor. One example that concerns us more than any other is that in the United States, about the middle of the nineteenth century, workmen were contending to be allowed to start work at 6:00 a.m. and stop at 6:00 p.m., instead of starting at 5:00 a.m. and quitting at 7:00 p.m. This is history. How many of us now even work from 6:00 a.m. to 6:00 p.m.?

An experiment that may advance us toward the ideal expressed is the present idea of government by commission. It might solve the question. It might fail. In any event it is certainly worthy of a trial. This trial is being made with little or no disturbance to government or business. Experiments on this basis are safer, but we must bear in mind that any new plan advocated is a theory and must be experimented with before its utility is proved. This is the reason we are so strongly opposed to the complete upsetting of any proven practice and the employment of something entirely new. The slightest changes sometimes upset both government and business, and the greater the change the greater the danger. We must not forget that our present practices and customs were all theories at one time and continued to be theories until their utility was proved by actual experience, and while all present practices might not give us everything we think we are entitled to, let us not forget that at the time they were put into effect they marked a great improvement over those in force previous to that time. We should not close our minds to a thought or theory because it is new. Rather should we in good faith care-

fully consider things which appear commendable no matter how much they may conflict with contemporary usage. The final acceptance or rejection of any proposition may safely be left to calm and unbiased deliberation. It cannot harm us much then if we sometimes make mistakes, because we have been open and honest in arriving at our conclusions.

Economic conditions are passing through the great crucible of change. The day of the Croesus is passing. The great individual fortune will soon be a thing of the past, not because some radical is jealous of the success of another man, but because both government and business are coming to recognize that it gives one man too much power. This is not a new thought, and the men wielding the power and enjoying the prerogatives of these great fortunes have so expressed themselves.

An encouraging movement, showing clearly the tendencies of the times, is that the federal and state departments of labor report more than 90 per cent of the industries of the country co-operating with them to improve conditions. This fact establishes conclusively to us that the organization of the Mutual Beneficial Association is opportune, and that our principle, once established, will spread throughout the land and influence all industries. It is also a matter of record that many industries have co-operated with and supported national and state officers in enacting child labor, compensation and conciliation laws.

It is our plan to build up such an organization that we shall be consulted on all these movements, and then, together with the employer and statesman, discuss and agree on what is the wise and safe thing to do—and then do it. We shall only reach the great end of an ideal government when statesmen, capitalists and workers co-operate in a common cause for the good of all.

THE PRESIDENT'S MESSAGE

By W. L. STODDARD

WASHINGTON, December, 7, 1915

Two unexpected passages in the President's message, delivered to Congress on Tuesday, related to the railroads and transportation. The first occurred in Mr. Wilson's discussion of the necessity of mobilizing our economic resources. Mr. Wilson intimated that he contemplates calling together for consultation with the directing officers of the army and navy "men of recognized leadership and ability from among those of our citizens who are thoroughly familiar, for example, with the transportation facilities of the country, and are therefore competent to advise how they may best be co-ordinated when the need arises." The second passage was the final recommendation of the message. The exact text of what the President said, which, it should be pointed out, differs from that of the printed copy generally published in the newspapers, is as follows:

"In the meantime may I make this suggestion? The transportation problem is an exceedingly serious one in this country. There has from time to time of late been reason to fear that our railroads would not much longer be able to cope with it successfully, as at present equipped and co-ordinated. I suggest that it would be wise to provide for a commission of inquiry to ascertain by a thorough canvass of the whole question whether our laws as at present framed and administered are as serviceable as they might be in the solution of this problem. It is obviously a problem that lies at the very foundation of our efficiency as a people. Such an inquiry ought to draw out every new circumstance and opinion worth considering, and we need to know all sides of the matter if we mean to do anything in the field of national legislation.

"No one, I am sure, would wish to take any backward step. The regulation of the railways of the country by a federal commission has had admirable results and has fully justified the hopes and expectations of those by whom the policy of regulation was originally proposed. The question is not what we should undo. It is, whether there is anything else we can do that would supply us with effective means, in the very process of

regulation, for bettering the conditions under which the railroads are operated and for making them more useful servants of the country as a whole. It seems to me that it might be the part of wisdom, therefore, before further legislation in this field is attempted, to look at the whole problem of co-ordination and efficiency in the full light of a fresh assessment, of circumstance and opinion, as a guide to dealing with the several parts of it."

It is yet, of course, too early to learn what the effect of this recommendation upon Congress will be. Senator Oscar Underwood, formerly administration leader in the House, has spoken publicly in favor of the proposed commission. But it is probably well within the truth to say that the idea does not meet in Washington with that hearty and ready response which goes out to legislative proposals that obviously fill a long-felt want.

In some quarters there is a disposition to say that the proposal is merely a play for time and a scheme to prevent the consideration of the railroad securities bill, originally a part of the Wilson program. Others declare that the country has had enough recently of commissions of inquiry and too little of constructive work growing out of their recommendations. More instantaneously popular with the statesmen here would doubtless have been a strong recommendation of the Rayburn bill, a recommendation that the Interstate Commerce Commission be increased in size so as to be able to handle its growing tasks more readily and promptly, or a recommendation for the creation of a permanent, non-partisan wage board, under the Interstate Commerce Commission, for the purpose of facilitating arbitrations at present conducted under the Newlands act.

The question of time and money will be large factors in any consideration of the President's proposal by Congress this winter. The session will be jammed with business and politics as never before for many years. Revenue is low and much thought must be given to methods of raising it. Regular services of the government will probably be the sufferers from this situation, for appropriations will be cut to the bone and then the bone will be scraped bare. With this condition, it is pointed out here, there will be no haste on the part of either the House or the Senate to rush through a bill embodying the recommendations for a new governmental body, requiring the expenditure for a new purpose of several thousands of dollars.

Of course, if the railroad world should get in behind this scheme and push, it might go through. But so far the idea is a new one to those who follow railroad matters fairly closely, and it would be regarded by many here as surprising if the carriers were all of a sudden to abandon their usual activities in the field of legislation and urge the establishment of a commission for the apparent purpose of reviewing ground already reviewed and re-reviewed year after year in the immediate past.

ROAD TRIALS TO DETERMINE TONNAGE RATING

By E. S. BARNUM

During the past few years there has been considerable discussion on the subject of scientific train loading and it seems to have been generally accepted that the best and simplest system yet devised is that of adjusted tonnage. In this system a car factor is added to the flat tonnage of each car in order to equalize the difference in drawbar pull necessary to haul empty trains and loaded trains of the same total tonnage. It is also a matter of general agreement that, despite lengthy and involved formulas any mathematically determined rating and adjustment factor can be accepted as approximately correct only. It must be checked and modified by actual road observation. With a dynamometer car and a corps of train observers it is a simple matter to obtain accurate ratings for each division. Comparatively few roads, however, are so equipped and in many cases it is necessary that the division staff be able to conduct the necessary tests. In such cases the method of procedure outlined herein may be found of considerable value.

The first step in establishing tonnage rating is the determina-

tion of the ruling grade in each direction over the division under consideration. This should not be a momentum grade but one long enough so that the locomotive will be called upon to develop full tractive effort before the summit is reached; it should not be overlooked, however, that local conditions such as a time table stops may change what would otherwise be a momentum grade into the ruling grade for the division.

With the ruling grade known the make-up of the test trains should next be considered. Under present day conditions with trains made up of both wood and steel equipment it is necessary to have a car factor covering both classes of equipment. The determination of such a factor requires the use of the following test trains:

All-steel trains, empties
All-steel trains, loads
All-wood trains, empties
All-wood trains, loads
Combined wood and steel trains, loads and empties

In each case the train should be provided with a single locomotive at the head-end and a pusher at the rear end. With the train at rest on the ruling grade, it should be made up of enough cars so that the head-end locomotive is unable to take slack and start the train alone. Cars should now be taken off by the pusher engine, one at a time, until the head-end locomotive is able to start the train without assistance. The train should be still further reduced until the head-end locomotive is able to start the train and bring it up to a speed of 10 miles an hour on the grade.

After completing the series of tests we have a record of the number and weight of the cars in five trains representing five sets of loading conditions; the gross weight of the cars is considered in each case. If we let x represent the adjustment factor the formula for the adjusted tonnage may be stated as follows:

Flat tonnage + number of cars $\times x$ = adjusted tonnage.

In the table the weight and number of cars are substituted in the above formula for each make-up of the train operating

Data for Determination of Adjustment Factor on a 0.3 per cent Grade.
Tractive Effort of Locomotive = 39,688 lb.

Loading conditions	Actual tons	No. cars	Adjusted tonnage equation
(1) Wood, loads and empties.....	2,480	74	$2,480 + 74x$
(2) Wood, loads and empties.....	2,549	72	$2,549 + 72x$
(3) Wood, empties.....	1,914	107	$1,914 + 107x$
(4) Steel, loads.....	2,983	40	$2,983 + 40x$
(5) Steel, empties.....	2,152	99	$2,152 + 99x$

on a .3 per cent grade. As all of these expressions represent the same tonnage rating they may be equated in pairs and solved for the unknown adjustment factor. The results are as follows:

1 and 5, $x = 14$ tons
1 and 4, $x = 14.5$ tons
1 and 3, $x = 17$ tons
5 and 2, $x = 15$ tons
5 and 4, $x = 14$ tons
3 and 4, $x = 16$ tons
3 and 2, $x = 18$ tons
2 and 4, $x = 13.5$ tons

Average, $x = 15.2$ tons

It will be noted that the expressions in lines 1 and 2 and lines 3 and 5 are not equated since the actual tonnages in each case are too nearly alike.

By substituting the value of the adjustment factor above determined in the formula for adjusted tonnage, the following adjusted tonnage is obtained for each of the trains recorded in the table:

(1) $2,480 + 74 \times 15 = 3,599$
(2) $2,549 + 72 \times 15 = 3,629$
(3) $1,914 + 107 \times 15 = 3,519$
(4) $2,983 + 40 \times 15 = 3,583$
(5) $2,152 + 99 \times 15 = 3,637$

Average adjusted tonnage = 3,593

With a car factor of 15 tons the adjusted tonnage therefore becomes 3,593 or practically 3,600 tons for the locomotive class and grade conditions assumed. Over a long division it might not be considered good policy from a transportation standpoint to maintain this full tonnage, but this does not alter the fact that for average conditions it is a properly determined tonnage rating. It is, of course, a fair weather rating and should be subject to reductions for adverse weather conditions.

RAILROAD CONDITIONS IN MEXICO

An interesting account of the deplorable condition of the Mexican railways as the result of the warfare in that country is published by the Chicago Daily News from its special correspondent at Mexico City, who reports that instead of being ready to handle the commerce of the country when peace is restored most of the rolling stock of the National Railways system has been destroyed. He quotes Alberto J. Pani, director general of the Constitutionalist lines, as declaring that more than 70 per cent of the standard-gage cars of the system have been destroyed and that less than 16 per cent are available for commercial purposes. The remaining 14 per cent are said to be either laid up for repairs or are being used by soldiers. The correspondent says in part:

"The service is sufficient to move the necessities of life, prevent starvation in the cities and carry those absolutely obliged to travel. Freight for the most part does not move and those who can postpone trips do so rather than face the hardships.

"Closing of the Panama Canal would naturally throw much of that transcontinental business on the road across the isthmus of Tehuantepec. But it cannot handle it, as its one-time rolling stock is gone and the steamship companies cannot get guaranties from the government that their shipments will be protected from bandits in the short distance overland between the oceans. Vessels again are making the long trip around the Horn.

"In Vera Cruz the big warehouses are crammed to the roofs, the terminal company has just notified consignees that storage charges will be doubled, but they are helpless to move the goods even if charges are increased tenfold, as there are not enough cars. With the government recognized, steamships from New York have resumed weekly sailings and are unloading thousands more tons of freight on the Vera Cruz docks.

"Most of the railroad property has been destroyed in the last 18 months. It is the hardest blow at the nation's prosperity in the entire six years of revolutions. Hardly a station has not been burned between Monterey and Mexico City. Along all the roads are overturned locomotives, remains of wrecked cars, twisted rails and other signs of ruin. With railroad transportation cut off cities are isolated, mines, mills and factories are silent, fields uncultivated, stores empty and the countryside relapsing to primitive condition because supplies cannot be brought in or produce shipped out.

"The figures of Director-General Pani on the rolling stock destroyed and that now available for commercial use were:

	—Cars—		—Locomotives—	
	Brd.	Nar.	Brd.	Nar.
In service June 30, 1914.....	15,700	3,267	762	223
Destroyed.....	11,025	1,342	422	74
Remaining.....	4,675	1,925	340	149

These are divided, according to Mr. Pani, as follows:

In military service.....	1,000	300	100	15
In repair shops.....	1,050	125	115	45
In commercial work.....	2,625	1,500	125	89

"These figures were compiled before the destruction of the Orizaba shops and the rolling stock standing in them. Every day has meant more cars and locomotives retired from service on account of wrecks, breakdowns and other incidents. To one who has ridden through the country where two-thirds of the cars one sees are inhabited by officers and soldiers and their families it would appear that Mr. Pani is also very lenient in estimating the number of cars in military service."

Director-General Pani is quoted as saying that the government expects to continue controlling the majority of the stock of the railroads, and that the law which gave the government the right to take over the railroads in war time requires that they be returned to the company in operating condition, and that an indemnity be paid, based on the earnings for the previous five years, with 10 per cent additional. Regarding plans for the restoration of service, he says:

"We plan first to purchase enough passenger cars to re-establish the former service between Laredo and Mexico City. Plans now are being made also for the purchase of freight cars, rails

and other material. A single order for 1,000,000 ties has been placed. As fast as we get possession the shops are opened up. All are at work repairing rolling stock. The military still gets first claim on the service, but each day its demands diminish and in the same proportion is increased the equipment which the roads can place at the disposition of the public for the transportation of passengers and freight."

1914 RAIL FAILURE STATISTICS

The American Railway Engineering Association has just published the statistics of rail failures for the year ending October 31, 1914. This information was compiled from data furnished by various railroads, and includes 6,262,712 tons of rail rolled

the average, the failures per 10,000 tons of Bessemer rail were about twice those of open hearth rail.

The accompanying tables give Association's statistics for the tons of rail, the total number of failures and the failures per 10,000 tons by years.

LOSS AND DAMAGE BUREAU FOR ROCK ISLAND

The Chicago, Rock Island & Pacific announces the organization of a system loss and damage committee with the assistant to the chief operating officer as chairman and the general superintendent of freight claims as secretary. The committee will include the general managers, superintendent of car service, superintendent of refrigerator service, division superintendents, supervisor of weights, chief special agents, special agents, general mechanical superintendents, mechanical engineer of car construction, general storkeeper, general freight agent, general livestock agent, general baggage agent, freight auditors and the freight agents at the principal terminals.

In the circular issued to all operating department employees, A. C. Ridgway, chief operating officer, points out that \$1,385,737, or 3.12 per cent, of the Rock Island freight revenue during the fiscal year 1914 was paid on account of freight loss and damage claims. In 1915, \$1,285,100, or only 2.7 per cent was paid. Had last year's ratio of claim payments to revenue prevailed this year, the road would have paid \$198,292 more than it did pay. It is stated that the efforts of all who aided in bringing about this improved condition are appreciated, but it has been decided to inaugurate a still more vigorous permanent campaign to prevent claims. The circular points out that claim payments are an operating charge, and that claim prevention is an operating function, by the exercise of which to the fullest extent it is hoped to bring about a still further substantial reduction in claim payments through the reorganization of the claim department. On December 1 the office of freight claim agent was abolished. W. O. Bunker, who has been freight claim agent, has been appointed general superintendent of freight claims, reporting direct to the chief operating officer, the duties of the new organization being to prevent loss and damage freight claims through greater supervision and a more intense study of the causes, for which a liberal increase in the traveling force has been provided.

The system loss and damage committee will meet semi-annually during January and July, the first meeting to be held in July, 1916. Other employees will be invited as local conditions at the time justify, and special committees will be appointed to report upon various matters. Action taken at the meetings will form the basis for modifications of the practice from time to

Mill	1909		1910		1911		1912	
	Relative Failures	Rank	Relative Failures	Rank	Relative Failures	Rank	Relative Failures	Rank
BESSEMER								
Maryland	73.9	3	64.1	1	28.7	1	84.9	2
Illinois	46.2	2	89.5	3	129.4	4	24.1	1
Lackawanna	27.6	1	79.6	2	161.6	5	179.3	4
Cambria	84.1	4	124.7	4	99.5	3	254.3	5
Carnegie	322.3	5	160.0	5	76.2	2	104.5	3
OPEN HEARTH								
Colorado	17.4	1	21.8	1	37.8	2	146.3	9
Maryland	-	-	101.9	4	58.7	3	20.9	1
Tennessee	45.0	2	46.8	2	32.0	1	119.9	7
Lackawanna	59.4	4	81.8	3	68.2	4	69.2	3
Pennsylvania	49.3	3	102.4	5	88.9	5	53.2	2
Carnegie	66.1	5	105.8	6	123.3	7	102.5	5
Illinois	109.8	6	126.6	8	112.6	6	80.6	4
Cambria	161.7	7	117.8	7	146.8	8	137.8	8
Bothlehem	261.8	8	224.6	9	227.9	9	107.5	6

NOTE.-- These figures are not related to geographical or service conditions.

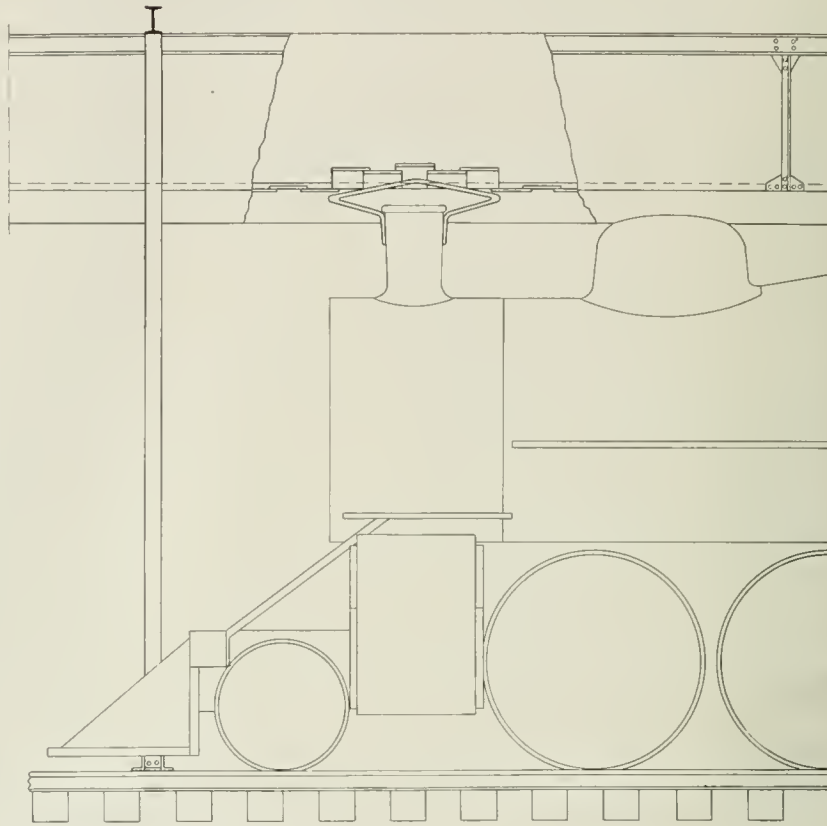
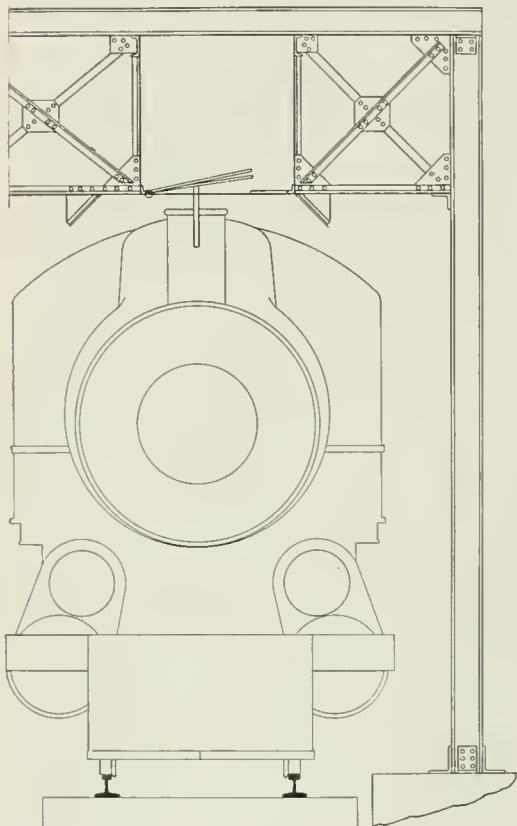
in the years 1909-1914, inclusive. The basis of comparison is the number of failures per 10,000 tons laid for each year's rolling from the date laid until October 31, 1914. A comparison with the statistics compiled last year indicates that on the average there is a gradual decrease for all of the mills in the rate of rail failures of rollings for the successive years since 1908, with which year's rolling the records were started. Also, on

Manufacturer	1909				1910				1911				1912				1913				1914			
	Tons		Failures		Tons		Failures		Tons		Failures		Tons		Failures		Tons		Failures		Tons		Failures	
	Total	Per 10 M Tons	Total	Per 10 M Tons	Total	Per 10 M Tons	Total	Per 10 M Tons	Total	Per 10 M Tons	Total	Per 10 M Tons	Total	Per 10 M Tons	Total	Per 10 M Tons	Total	Per 10 M Tons	Total	Per 10 M Tons	Total	Per 10 M Tons	Total	Per 10 M Tons
BESSEMER																								
Cambria	24,848	561	226.0	24,842	491	197.7	8,769	99	112.8	5,027	43	112.9	3,385	1	3.0	1,544	0	0.0						
Carnegie	78,980	6861	866.0	119,460	3040	254.6	64,124	554	86.4	4,098	19	46.4	33,537	35	10.4	2,425	0	0.0						
Illinois	145,120	1803	124.2	162,049	2301	141.9	47,306	624	146.7	8,359	9	10.7	4,507	1	2.2	-	-	-						
Lackawanna	106,241	789	74.2	190,097	2399	126.2	61,747	1132	103.3	14,071	112	79.6	4,160	0	0.0	3,320	0	0.0						
Maryland	66,021	1312	198.7	63,252	642	101.6	51,324	167	32.5	64,111	242	37.7	26,907	103	38.2	13,490	3	2.2						
Totals	421,210	11316	268.7	559,708	8874	168.5	273,270	2646	113.4	95,666	423	44.4	72,406	140	19.3	20,779	3	1.4						
OPEN HEARTH																								
Bothlehem	68,344	2532	370.4	84,237	1444	171.4	89,152	1195	124.0	99,338	195	21.4	121,114	114	8.6	80,040	0	0.0						
Cambria	11,522	264	229.1	24,509	221	89.2	38,946	341	87.5	84,163	237	27.7	82,709	115	18.7	26,530	4	1.1						
Carnegie	18,898	177	93.6	27,967	226	80.7	42,206	306	72.5	95,232	197	20.4	96,119	56	5.8	29,423	2	0.6						
Colorado	72,442	178	24.6	156,086	262	16.7	92,047	204	22.2	142,501	419	29.4	126,272	38	2.8	83,542	6	0.7						
Illinois	206,535	3213	155.6	301,778	2917	96.6	142,835	946	66.2	219,441	385	16.3	273,574	189	6.9	119,053	11	0.6						
Lackawanna	14,599	123	84.2	29,530	220	62.4	52,560	729	40.1	157,769	212	13.2	150,846	165	11.6	62,472	1	0.2						
Maryland	-	-	-	24,163	501	77.1	24,876	120	52.3	73,645	79	10.7	80,466	57	6.5	29,898	5	1.6						
Pennsylvania	41,909	293	69.9	64,163	501	77.1	24,876	120	52.3	73,645	79	10.7	80,466	57	6.5	29,898	5	1.6						
Tennessee	80,953	509	63.0	123,640	441	35.7	86,030	167	19.0	129,511	217	24.1	191,317	61	4.1	172,908	21	1.1						
Totals	514,302	7289	141.7	842,895	6435	76.3	620,694	3738	58.8	997,078	2006	20.11	1,120,910	915	7.9	67,164	85	0.8						

time. The circular says: "Suggestions for the prevention of loss and damage claims made to the general superintendent of freight claims will be cheerfully received and carefully considered. Only through the heartiest co-operation of every employee can the best results be obtained and the management earnestly solicits your full support in helping to reduce the

REMOVAL OF LOCOMOTIVE SMOKE FROM COVERED TRACKS

There are many instances where railroads could make much better use of property at terminals if the smoke from locomotives could be removed. In the larger cities it would mean that



Arrangement for Removing Smoke from Covered Tracks

heavy drain which loss and damage claims are inflicting upon the treasury, and providing better service to the patrons of the road."

In a circular to all freight agents, Mr. Bunger states that after December 1 it will be unnecessary to make over, short and damage reports in duplicate, but one copy of such reports is to be

space now occupied by train sheds and warehouse tracks could be built over with good-size buildings.

A method for removing locomotive smoke from covered tracks has been devised and patented by the Ilg Electric Ventilating Company, Chicago. The arrangement is clearly shown in the illustration. A smoke duct is placed immediately above the



Dummy Locomotive Entering Experimental Train Shed

Locomotive in the Train Shed, with Blowers in Operation

made and mailed to the general superintendent of freight claims at Chicago.

The report, including the stub, should be completely filled in with all the information called for, and the stubs must not be detached as is now the practice on some divisions. Reports of adjustments of over and short reports will also be mailed to the general superintendent of freight claims.

middle of the track. This is provided with a series of shutters, each so arranged that as a locomotive passes under them they will be raised by a shoe attached to the locomotive stack. The ducts over the tracks terminate in a main duct extending across the tracks at one end. At the end of the main duct a battery of suction fans is placed for the purpose of creating a substantial initial draft in the ducts. When there are no locomotives under

the ducts a damper automatically closes from the main duct, thus reducing the load on the fan.

To ascertain to some degree the service that could be performed by this system a working model has been constructed on the roof of the company's building at Whiting and Wells streets, Chicago. One of the photographs shows a dummy locomotive entering the train shed. The large volume of smoke is produced by burning tar paper and this smoke is forced up the stack, which corresponds to a full-size locomotive stack, by a high-pressure blower operating at a speed of approximately 3,000 ft. per minute. The stack is equipped with a shut-off gage so as to give intermittent puffs of smoke similar to those obtained on a locomotive when in operation. The second photograph shows the locomotive under the smoke duct, no smoke being apparent under the shed.

CAST STEEL SIDE FRAME WITH RE-ENTRANT FLANGES

The drawing shows a recently developed cast steel truck side frame which is now being used by the Pennsylvania Railroad. The principal feature of the design is the use of channel sections and channels with re-entrant flanges instead of angle and I-sections. The distribution of metal has been carefully considered and a well balanced structure obtained, effecting a uniformity of flexibility under the action of the vertical stresses due to both static and dynamic loading.

Where unbalanced sections are used in the design of cast steel truck frames, the unequal strains set up in the metal in cooling result in a distortion of the casting. This distortion is corrected

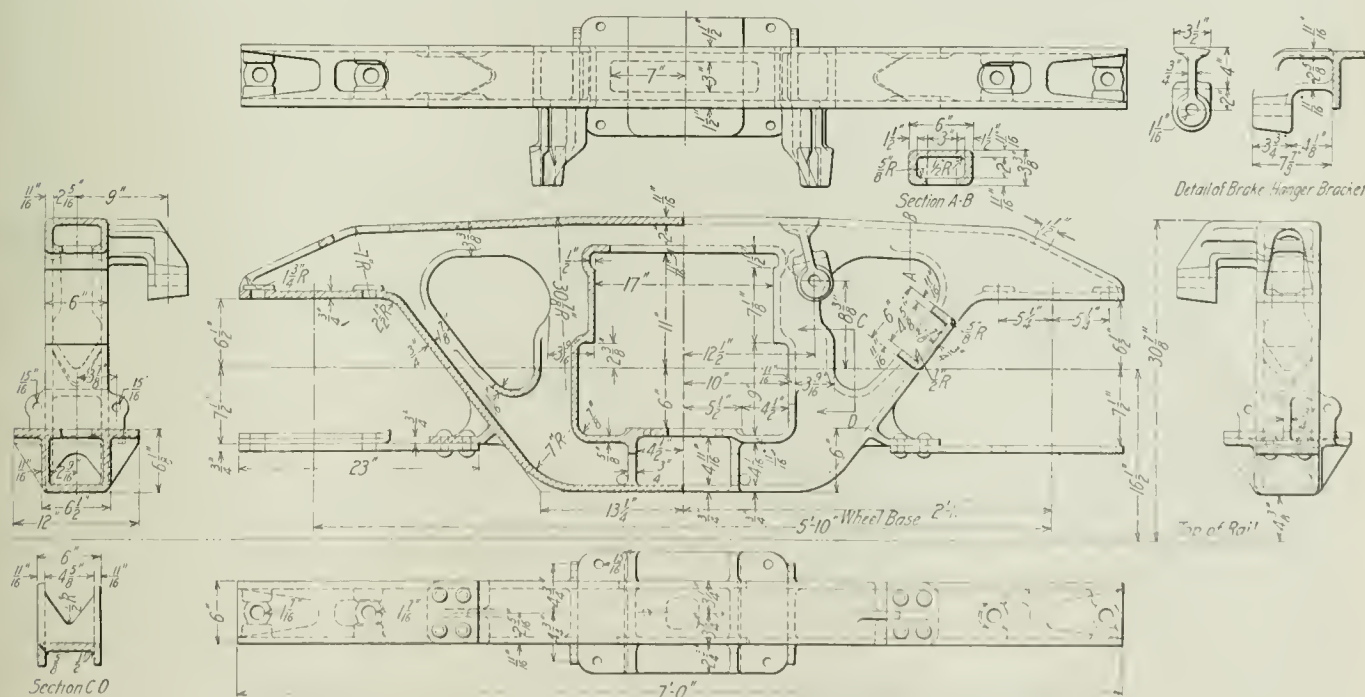
section and, therefore, at a point where the unit stress is considerably reduced.

After thorough tests of the Benners side frame, it has been adopted by the Pennsylvania Railroad and the Pennsylvania Lines West, now being in service under several thousand freight cars. The patents are controlled by Edwin H. Benners, 50 Church street, New York.

BUSINESS REVIVAL IN MEXICO

As a result of a recent conference between Alberto J. Pani, director of the so-called Constitutionalist Railways of Mexico, which embrace those lines of the National Railways that are in territory under control of General Carranza, and officers of the Southern Pacific, the latter agreed to furnish passenger cars for the through passenger service that has just been established between Eagle Pass and the City of Mexico. Pullman cars are run through between New Orleans and the Mexican capital. Provision has also been made for furnishing freight cars for through service, thus obviating the necessity of transferring goods at the border. The Southern Pacific has announced that freight service has been resumed by way of Eagle Pass, including connections to Monterey and Torreon. Freight may be billed to Eagle Pass and arrangements made through custom brokers for the movement beyond of carload shipments without transfer.

For a long time past the Southern Pacific and the other American roads leading to the border have refused to permit their cars to go into Mexico on account of the danger of destruction by revolutionary factions. The condition in the region that is under control of Carranza has improved until it is now believed



The Benners Truck Side Frame

by placing the casting when cool under the straightening press, the result being that the metal at certain points is subjected to a stress beyond the elastic limit. Certain weak points are, therefore, developed in the casting at the outset, their strength being very uncertain. Cracks tend to start at these points, which result in the ultimate failure of the casting. The symmetrical and well balanced design of the Benners side frame is such that the castings come out of the sand in perfect shape and the use of the straightening press is entirely unnecessary.

The Benners frame has no outwardly extending flanges, such as are found in castings of angular or I-sections, which always tend to develop cracks at the edges. The use of re-entrant flanges brings the edge of the material nearer the neutral axis of the

safe to resume the former practice of running through cars, both passenger and freight. Mr. Pani is now in the East for the purpose of ordering new engines and cars.

The International & Great Northern announces that freight in carloads will now be taken for shipment to Mexico by way of Laredo. The Laredo gateway has been closed to railroad freight traffic since February 10, 1913.

A Boston Notice: The Smederesvo Kragujevac railway in northern Serbia, the Mitrowiza Wutschitrn Katschanik-Skoplje railway in southern Serbia, and the Radujevac Zajecar Knjazevac line on the eastern front must be what they call transconsonantal roads. *Youth's Companion.*

A GREAT PUBLIC TRUST*

By A. J. COUNTY

Special Assistant to President, Pennsylvania Railroad

Don't balk at the word "trust" because it has been abused. It means confidence, reliance and loyalty. No better words can be used in describing the relation between the stock and security holders of the Pennsylvania Railroad Company and the management and organization of that company. Our trust in this instance consists chiefly of persons, property and money of a value and magnitude exceedingly difficult to express. In the last year over 180,000,000 persons confided the safety of their lives to the employees of the Pennsylvania Railroad system, a total greater than the combined population of England, Germany and Austria-Hungary, and not a single life was lost. Over 300,000,000 tons of freight were also shipped over our lines, having a value to this and other countries of several billions of dollars. To the high standard and regularity of this public service for over sixty-five years the present prosperous position of the state of Pennsylvania is in no small measure due. It has brought a much greater prosperity to the territory it serves by developing the natural resources, such as coal, iron, steel, oil, timber and manufactured products, by making them accessible to the most distant markets. It has also opened up avenues of employment and has been itself a large consumer of these products and materials.

That part of our great trust with which I especially desire to deal is that of money, without which our trust could not have been founded and without which it cannot exist. I cannot accurately estimate the value of lives and property entrusted to the employees of the system, but I can measure the value of the money given to its directors and management to invest in the railroad business. The investment in road and equipment of the 84 companies that now compose the railroad system amounts to about a billion and a half dollars. To best illustrate how this money has reached us and intimate the responsibility of each employee, I have, out of this number of companies, selected the parent—the Pennsylvania Railroad Company—the lines of which extend from the Atlantic ocean on the east to Pittsburgh and Erie on the west. For over six and a half decades this railroad has been in operation, and not only have a great many individuals, including women and children, invested their savings in its stock, but savings funds, insurance companies and many banking and other institutions have long considered its securities an attractive investment for their funds.

Now, instead of investing their moneys in real estate, building associations, saving funds, banking institutions, industrial and manufacturing companies, or the many other diversified fields of investment, these persons had sufficient confidence in the Pennsylvania Railroad management and employees to say, "Here is our money which we have earned in our business and saved from our wages against a rainy day; we, our children and our business are dependent upon the dividends from this investment, and we trust to you so to use and protect it that we will be sure of a reasonable return each year." To-day there are 94,000 stockholders in the Pennsylvania Railroad Company alone, representing all persons in the community, from the working man to the millionaire. Nearly one-half of the total number are women, and the average number of our share holdings is slightly over 100 shares for each stockholder. We must be discharging our trust with fidelity, for the number of stockholders is constantly increasing, not only here, but abroad, notwithstanding the European war and the great need there of converting securities into cash. One of the early incidents in connection with the European war was the prompt steps taken by the Pennsylvania Railroad to insure the regular receipt of dividends by stockholders on the continent. This illustrates the solicitude which the company has for its foreign stockholders under the present trying conditions. A great many of our stockholders, we are happy to say, not only travel upon our trains, but live in the districts where the lines are located, and thus have an opportunity

to observe how the railroad is operated and to judge the ability and faithfulness of the officers and employees.

As the result of the confidence of the stockholders in purchasing the parent company's stock and the willingness of investors to buy its bonds, the company has to-day a magnificent property devoted to the public service representing the investment of a billion and a half dollars in the railroads and equipment constituting the Pennsylvania system. This trust cannot be one-sided; we must preserve it. Each day's work should, therefore, be begun with a sense of the great trust of persons, property and money put into the hands of every officer and employee, and if each one does not satisfactorily perform that duty, it affects the other working trustees. No greater trust exists than the custody of other people's money, and we should work more zealously to safeguard this money than if it were our own. The present great body of employees must follow the successful policies and traditions of their predecessors. To show the spirit which is now and has been a dominant factor in the prosperous condition of the company, I quote from a statement made by a former president of the company over twenty years ago: "The moment this company forgets that its duty is to be at the head of the list of the carrying companies of the United States, and ceases to have the ambition to become the first in the world, that moment do I wish to pass from its management." And to him is attributed the phrase, "Improvements on the Pennsylvania Railroad cannot cease. The end of progress is the beginning of decay."

There are many officers and employees who are stockholders in the company, and we can expect more and nothing would intensify the interest of the employees in the welfare of the company more than for each employee to make it a part of his ambition to own at least one share of its stock. It requires only about \$57 at present to buy a share. We might profit from the example of the many men and women stockholders who have invested their moneys in the Pennsylvania Railroad's stock to create this great public trust. They were given no guarantee that their shares, which have cost them as high as \$75 per share, would receive dividends regularly, but their confidence has been rewarded, for in 65 years not a single calendar year has passed in which a return was not paid them upon their stock.

Suppose for a moment the management and working organization should become disloyal or indifferent to this great trust confided to us. What would be the result? The stockholders would, of course, receive lower and unreasonable returns upon their investment and much suffering would ensue, but this would not be one-sided, for it would quickly react against the officers and employees in a loss of confidence, and if it did not cause a sale of the investment by the owners, there would be a refusal to entrust additional moneys to our management. No law or commission can make people invest money in a railroad, or continue an investment already made. To accomplish that result requires confidence in the integrity and ability of those to whom their money has been entrusted, and an adequate and regular return comparing favorably with the dividends paid by other companies. But with the continuation of that confidence justified by the payment of fair dividends, these people are encouraged to place more of their moneys in our stock and securities. This enables us to continue enlarging the company's plant and facilities to render a high and regular standard of public service sufficient to keep pace with the expansion of business. Their additional investment also insures employment and promotion for ourselves and others, and as a result the stockholders and the employees are performing a valuable public service in the upbuilding and continued prosperity of our great country.

EQUIPMENT ON THE RAILWAYS OF GREAT BRITAIN.—According to the Railway Returns for 1913 there were on December 31 of that year 12,118 tender engines, 8697 tank engines, and 12,315 tenders on the railways of England and Wales; 2043 tender engines, 806 tank engines and 2049 tenders in Scotland, and 631 tender engines, 340 tank engines and 607 tenders in Ireland.

*From the Mutual Magazine published by the Mutual Beneficial Association of Pennsylvania Railroad Employees.

General News Department

The freight house of the Erie Railroad at Paterson, N. J., was partly destroyed by fire on the night of December 7, together with two freight cars. Estimated total loss, \$25,000.

The dining cars of the Pennsylvania Lines west of Pittsburgh now serve coffee (and also other drinks) in vacuum pots which keep the liquids hot throughout a meal, or even for several hours.

The shops of the Missouri, Kansas & Texas at Sedalia, Mo., have been ordered to run seven days in the week; nine hours a day on week days and eight hours on Sundays. A similar announcement was made last week by the Huntingdon & Broad Top Mountain Railroad.

Tests of the operation of electric locomotives on the Chicago, Milwaukee & St. Paul electrified line in Montana were held on December 8, when officers and directors of the road and officers of the General Electric Company made an inspection trip over the line in a test train consisting of three special cars and one of the new electric locomotives. The test included travel at various speeds up to 70 miles an hour and with various tonnages.

Harry E. Duey, a brakeman of the Pennsylvania Railroad has been awarded a medal by the Interstate Commerce Commission for saving the life of a small child which was playing on the track a short distance ahead of the train in which Duey was riding. He climbed out of the cab of the locomotive to the front end and succeeded in pushing the child off the track. His feat was noticed in the *Railway Age Gazette* September 3, page 430. The medal was accompanied by a commendation letter from President Wilson.

The report of the Chicago Association of Commerce committee on smoke abatement and electrification, declaring the electrification of the railroads in Chicago to be financially impracticable, was presented to the Chicago city council at its meeting on Monday evening, and was referred without comment to the railway terminals committee. The council then adopted unanimously by a viva voce vote an order directing the committee on railway terminals to "take up for immediate consideration the subject of electrification of steam railways within the city of Chicago, and to report to the council at an early date such ordinance or ordinances as in its judgment may be necessary to bring about the adoption of electricity as a transportation power where steam power is now employed." This action was also taken practically without discussion.

A Remarkable Improvement in Train Loading

In an editorial in last week's issue attention was called to the large increases in freight train loading in 1915 as compared with 1914, shown by nearly all of the roads whose annual reports we had received. We have since received the report of the Chicago, Terre Haute & Southeastern, which has increased its average number of tons of freight per train mile from 558.81 in 1913 and 669.01 in 1914 to 739.54 in 1915.

Land Valuation

Thomas W. Hulme, general secretary of the Presidents' Conference Committee for the federal valuation of the railroads, has sent a circular to the carriers suggesting that where the rights of way or other operating property of two or more carriers are so located or are of such character that their values are necessarily related, such carriers can well co-operate in securing information as to the value of this property, in this way avoiding duplications, decreasing the cost of making the valuation and securing values which are in harmony and which the carriers will be able to sustain.

It has also been arranged that territorial meetings be held at various points, attended by representatives of the carriers to discuss the progress made in securing land cost data and other problems which are arising from time to time.

American International Corporation

Frank A. Vanderlip, president of the National City Bank, New York City, announces that this concern has been formed for the purpose of establishing trade relations with foreign countries. The corporation has 20 directors, representing all lines of business. Included in the list are William E. Corey, James J. Hill, Otto H. Kahn, Robert S. Lovett (chairman of the executive committee of the Union Pacific), Charles A. Stone, and Edwin S. Webster. Mr. Vanderlip says that the corporation is not a mere money-making enterprise; it will stand for the development of America along international lines, and will endeavor to assist in financing the rehabilitation of industries in foreign countries.

J. G. White Co. in Brazil

The Latin-American Public Works Corporation is a concern which has been organized in the interests of the J. G. White Management Corporation, New York, for operations in foreign countries; and it is announced that negotiations are going on which are expected to result in a contract under which the Brazilian State Railways will be operated by the J. G. White interests. Reports indicate that negotiations are well on the way to completion; but the principal holders of the bonds of these Brazilian roads are in England and France, and to get their approval is likely to require several months.

The new project does not call for ownership by American interests of the Brazilian railway system. That ownership will remain with the Brazilian Government. The Government has leased its railways to English and French capitalists for a period of years, and it is understood that the Latin-American Public Works Corporation merely plans to take over the lease for the unexpired term. The project, however, will carry with it the necessity of financing for new equipment and possibly for new construction. This financing may call for the sale of South American securities in the New York market.

Recommendation on Change in Fiscal Year

At the last meeting of the National Association of Railway Commissioners in San Francisco the committee on statistics and accounts, of which B. H. Meyer of the Interstate Commerce Commission was chairman presented the following recommendation:

"In connection with the matter of annual reports required of carriers, representation has recently been made by the Association of American Railway Accounting Officers that the reporting year should be changed to the calendar year. The reasons urged for the change seem to have much merit. One obstacle in the way of change lies in the fact that several state statutes definitely fix June 30 for the close of the reporting year. The federal law gives to the Interstate Commerce Commission the option of changing this by a general rule to December 31, so far as reports to that commission are concerned. It is recommended by this committee that the various state commissions seek to procure corresponding amendment of state laws so as to give the state commissions the option of changing, if after a full and careful consideration of the matter they shall conclude that such change of date is desirable."

National Foreign Trade Convention

The National Trade Council has announced the preliminary program for the third national foreign trade convention to be held at New Orleans, La., on January 27, 28 and 29, by the council in co-operation with the New Orleans Association of Commerce. The convention has been called to enable American business men constructively to discuss the necessary national policy for extending foreign trade, and the council will lay before the convention results of investigations of the most pressing problems in connection with foreign trade. The time of the convention will be largely reserved for general discussion and there will be group sessions in which all delegates will have an

opportunity to participate. Among the prepared addresses which have been announced are the following: "World Trade Conditions After the European War," by Alba B. Johnson, president Baldwin Locomotive Works; "Foreign Investment of American Capital as an Aid to Our Foreign Trade," by James A. Farrell, president of the United States Steel Corporation. The group sessions will include a discussion on "Co-operative Foreign Selling," by Charles M. Muchnic, vice-president of the American Locomotive Sales Corporation; and "The Smaller Manufacturer in Foreign Trade," by William Pigott, vice-president, Seattle Car & Foundry Company. At the banquet on January 28, Fairfax Harrison, president of the Southern Railway, will speak on "The Relation of American Railroads to the Development of Foreign Trade." Special facilities will be afforded those seeking detailed information at the convention regarding either foreign markets or trading methods, a number of broadly experienced exporters and importers having offered their services for consultation by delegates.

Another Investigation of the New Haven

The investigation of the affairs of the New York, New Haven & Hartford, by the Public Service Commission, by order of the legislature of Massachusetts, was begun at Boston on Tuesday of this week, as had been announced. The action of the legislature, last spring, in empowering the railroad company to proceed with its plans for reorganization appears to have been conditioned on the approval of numerous past acts by the Public Service Commission, or on approval by the legislature of a report to be made by the commission after making an investigation.

President Howard Elliott laid before the commission a long statement answering questions which had been sent to the company some time since. In opening the hearing the chairman of the commission said that the road had done numerous things under its Connecticut or its Rhode Island charter which the State of Massachusetts did not approve, and the purpose of the hearing was to see what could be done about this. It is desired to determine what ought to be done to bring the New Haven system into harmony with the laws of Massachusetts. The principal subject in the mind of the chairman, apparently, is that of the investments of the road in outside property.

Mr. Elliott, explaining the acquisition of the Central New England, said that this line had been a boon to New England commercial interests. More than 1,000 cars a day have come into New England over this line during the past month. Control of the New York, Ontario & Western helps the New Haven to protect its coal supply and also gives it a voice in making through freight rates to the west. The New York, Westchester & Boston does not yet earn its operating expenses, but in time it will prove of great value to the New Haven. The New Haven's half interest in the New York Connecting Railway will be useful as relieving congestion at the Grand Central Terminal and cheapening the transfer of freight to and from New Jersey lines. The Rutland Railroad is valuable as a route to Montreal and also a freight route to Chicago. Mr. Elliott hopes that after a time the government will allow this road to resume the running of boats to and from the Great Lakes.

American Railway Association Plan for Remedying Congestion

The Committee on Relations Between Railroads of the American Railway Association has adopted resolutions, which have been approved by the Executive Committee, proposing changes in the demurrage rules for the purpose of relieving the congestion of export freight at the ports as well as to promote a freer distribution of freight cars at all times. Arrangements were made for the resolutions to be presented to the Interstate Commerce Commission at Washington on Thursday of this week with a request for immediate action, by a subcommittee of the Committee on Relations Between Railroads, consisting of Arthur Hale, chairman Committee on Relations Between Railroads; C. M. Sheaffer, general superintendent transportation, Pennsylvania Lines; W. A. Worthington, vice-president and assistant to the chairman, Southern Pacific; E. H. Coapman, vice-president and general manager, Southern; George E. Evans, fourth vice-president, Louisville & Nashville, and W. L. Park, vice-president, Illinois Central. The resolutions are as follows:

"Whereas, there exists throughout the United States a shortage of freight cars, due, largely, to the abnormal exporting of the products of agriculture, merchandise and manufactured articles, together with an insufficiency of ocean transportation

facilities, causing to be imminent and certain a rapid extension of such car shortage to every part of the United States, threatening to restrict and curtail very seriously business transactions and commercial activities of every description,

"Whereas, a large amount of export commodities, particularly war munitions, is, on account of uncertainty of the condition of the monetary exchange and credit, due to the European war, necessarily contracted for on a cash basis loaded upon cars without regard to the probabilities of trans-shipment at United States ocean ports, resulting not only in the misuse of freight cars, but also in abnormal detention, causing congestions and delays to normal business and traffic; and,

"Whereas, since the present demurrage rate was first established, the cost of car construction, the carrying capacity and, consequently, the earning power of a freight car has been greatly enlarged; and,

"Whereas, the adoption of a higher demurrage rate in California, which was approved by the Interstate Commerce Commission, December 2, 1912, and in Arizona, with no average agreement, has resulted in smaller demurrage collections in the aggregate, and in the practical elimination of undue detention to equipment; and,

"Whereas, the Canadian railroads have, at times, invoked the good offices of the railroad commission of that country to make effective and operative a progressive demurrage rate in excess of the normal rate which, while proven effective to obtain the release and prevent the misuse of freight equipment, and to be in the general interest of the public welfare of that country, at the same time when in effect operates, indirectly, to the disadvantage of the public, the shippers and the railroads of the United States; and,

"Whereas, the Committee on Relations Between Railroads of the American Railway Association has been specially directed to take such action as the exigencies of the situation warrant and has, after careful investigation and deliberation, concluded that the most expeditious and effective methods to relieve the situation are to reduce the free time at the seaboard and gulf ports, both on domestic and export business (which subject is now before the Interstate Commerce Commission), and by the adoption of a progressive demurrage rate, and by the elimination of Rule 9, Average Agreement, which has from the experience of the past several years been clearly demonstrated to be one of the most prolific sources of freight car detention, be it therefore

"Resolved, that the demurrage rules be amended as follows:

48 hours free time, after which a charge of

\$1 per day for three days,

\$3 per day for next succeeding three days,

and thereafter \$5 a day (the present rates on refrigerator cars), such rates to be submitted to the Interstate Commerce Commission, with the request for its prompt approval, in order to enable the carriers to promulgate and make effective at once these rates on all freight equipment,

"Resolved, that the carriers be authorized by the Interstate Commerce Commission to immediately cancel Rule 9, Average Agreement,

"Resolved, that arrangements be made to present at once this resolution to the Interstate Commerce Commission, and to furnish that body with such information, in connection with the conditions above recited, as may enable and induce that honorable body to act in the premises with such promptness as the exigencies of the situation demand,

"Resolved, that in the event of unforeseen obstacles to the immediate action on the part of the Interstate Commerce Commission, the Committee on Relations Between Railroads, together with the Executive Committee, be called into emergency session at Washington, to take such further steps as may be deemed necessary in the premises, to the extent of petitioning the Congress to confer upon the Interstate Commerce Commission such powers as may be lacking, or taking such other action to remedy the situation as may be deemed necessary."

Trial of the New Haven Directors

Charles S. Mellen, again on the stand in the trial of the 11 New Haven directors in the Federal Court in New York, admitted last Thursday (December 2), that the New Haven spent probably \$120,000 to block proposed extensions of the Grand Trunk into southern New England. The Grand Trunk had proposed to build a line from a junction with its subsidiary, the New London Northern, operated by Central Vermont, at Palmer, Mass., to Providence, R. I. According to Mr. Mellen, the real contest

between the two systems began in 1910, when he and C. M. Hays (then president of the Grand Trunk) agreed, as Mr. Mellen thought, that the Grand Trunk would sell the New London Northern to the New Haven and the latter would transfer control of the New York, Ontario & Western to the Grand Trunk. Immediately thereafter, however, Mr. Hays announced his intention of building from Palmer to Providence, but, because the Grand Trunk proposed, according to Mr. Mellen, to use the New Haven's facilities in Providence and to eliminate grade crossings, entailing expense to the New Haven, the latter opposed the charter in the Rhode Island legislature. Mr. Mellen also spent \$50,000 in the "collection and dissemination" of information to show that the Grand Trunk was violating obligations to the Canadian government in building the extension. After that, Mellen said, he bought a couple of farms in the neighborhood of Southbridge and Palmer, one of which "was peculiarly valuable as a location for a railroad. It was a perpendicular farm located in a notch," he said, "and I hoped to spend my declining years on it."

Mr. Mellen also spent about \$60,000 of New Haven money in opposing the other project of the Grand Trunk, the line from White River Junction to Boston. He at once took steps to extend the Sullivan County Railroad, a Boston & Maine subsidiary parallel to the Central Vermont.

After Mr. Hays' death in the Titanic disaster, Mr. Mellen came to an agreement with his successor, E. J. Chamberlain, whereby presumably the Grand Trunk was to stop work on the Providence extension in return for trackage rights over the New Haven. Work was stopped in October, 1912, and simultaneously the construction of Sullivan County extension was abandoned. The agreement, however, was never put in documentary form, and never, in fact, got beyond the stage of a memorandum.

The stoppage of work on the Palmer-Providence line aroused considerable popular feeling in New England and resulted at once in a grand jury investigation. Mr. Mellen testified that he had asked to go before the grand jury, for he desired to take all the responsibility in order to shield J. P. Morgan. "I thought," he said, "that by telling a good, straightforward story to the grand jury I could put the whole investigation on the bum. I thought I could straighten the whole matter out satisfactorily. I wanted to take the responsibility and keep Morgan out of it. I was afraid he had done something—I didn't know what—and I wanted to keep him out of the nasty mess."

Mr. Mellen completed his testimony for the government on Friday. On Monday he was subjected to cross examination, and in answer to questions by Charles F. Choate, for the defense, declared that it was the Federal government and not the ex-directors who were responsible for the financial misfortunes of the New Haven. The New Haven's ex-president told of the efforts he took to limit the grand jury investigation to the Grand Trunk deal. The New Haven's financial affairs were at that time, January, 1913, in a critical condition. "In January, 1912, we had issued a series of one-year notes, and we had a comprehensive plan for funding them. After what happened it failed, and we had to renew the notes in December, 1912, for another year at a higher rate of interest."

"Mr. Swacker's investigation did exactly what I expected it to do. It practically ruined the New Haven for a time, if not permanently. I could not imagine anything worse happening to the company than what did happen through the intervention of the Federal government. Up to the time of the government's investigation, or persecution, or whatever you like to call it, the company's reputation had been of the highest and its shares were selling far above par."

"I knew if I could limit the scope of the investigation it would be to the advantage of the road, and I knew it would mean my own reindictment and destruction. They accomplished that at once, and later they accomplished the other. We met refusal when we wished to renew our notes. Our stock came tumbling down. We had to carry a great floating debt, and we have not been able to fund it to this day."

Mr. Mellen thought that the Providence extension would never have been profitable; that it was not designed for the purpose of legitimate competition with the New Haven, but as a threat to force the hand of the New Haven. In 1908 the New Haven entered into an agreement with the Canadian Pacific whereby all of the New Haven's territory was opened to that road through Newport, Vt., and the Boston & Maine. Mr. Mellen was ready to give the Grand Trunk the same advantages, but Mr. Hays wanted much more.

Mr. Mellen in the cross examination on Tuesday brought out

that in his opinion the acquisition of other rail lines in practically every case resulted not only in efficiency of operation, but in better service and lower rates for the territory served.

The defense won an important point in the afternoon when Judge Hunt ruled that the defense might show the legislative enactments of various states and decisions of official boards, departments or commissions as their justification for acts now alleged by the government to have been in furtherance of a conspiracy to monopolize the transportation facilities of New England. Later, however, the judge limited this ruling to cases where the records should show that the action was definitely based on the alleged cause.

Mr. Mellen in the cross-examination on Wednesday enlarged further upon the benefits gained by the consolidation of the railway interests of New England and drew attention to the favorable opinions expressed in this connection by various governmental and other authorities. One interesting thing he brought out was the value of a united system from a military point of view.

"The route from New York to Boston by the New Haven," he explained, "from Boston to Portland by the Boston & Maine, from Portland to Bangor by the Maine Central, and from Bangor to St. John's, New Brunswick, by the Canadian Pacific Railway, is the most important military base line in the country. It is a most useful thing to the country at large to have it nearly all under one control."

Report on Weedon Derailment

The British Board of Trade has issued the report of Lieut. Colonel Druitt on the wreck of the Irish Mail of the London & Northwestern, near Weedon, on August 14th last, when 10 passengers were killed and 21 were injured. Colonel Druitt finds that the derailment was caused by the loss of a split pin from the end of one of the crank pins of a locomotive passing at high speed on an adjoining track. The loss of the split pin caused the screw washer holding the front end of the side rod, on the leading crank pin, to back off, resulting in the dropping of the front end of the side rod. This train was stopped before serious damage resulted, none of the wheels leaving the track; in dropping, however, the end of the side rod was bent outward, and in striking the end of a tie on the adjoining track, it pushed the track sideways enough to throw both rails partly out of line and narrow the gage. The Irish Mail came on a few seconds later and was derailed, as described.

The split pin, the loss of which was the primary cause of the accident, had been applied a few minutes before while the train was standing at the Rugby station, and the investigation indicated the probability that in the endeavor not to delay the train, sufficient attention was not given to the proper splitting of the pin after it was driven home. The crank-pin washer had right-hand threads and, being on the right-hand side of the engine, would be loosened and unscrewed by the friction of the side rod end when running ahead. It was suggested at the inquiry that the screw washers on the right-hand side of the engine should be fitted with left-hand threads, so that the tendency would be for the crank pins to screw themselves into the washer when the engine is running. Commenting on this point, Colonel Druitt says: "This is a matter for experiment, and if the result is in accordance with the suggested action, it is certainly a desirable change to make."

A Complaint to the Governor

John J. Dillon, commissioner of the New York State Department of Foods and Markets, who has ordered ten carloads of alfalfa to be sent from Syracuse to New York City, but who has been notified by the Delaware, Lackawanna & Western that the freight cannot be taken, has complained to the governor of the state, charging that the action of the road is instigated by the dealers in hay in New York who receive their supplies from points outside of New York state and who fear the competition of the alfalfa. The commissioner says that he is endeavoring to aid the Alfalfa Growers' Association of Onondaga county, the members of which have 30,000 tons of surplus product for sale. It is said that the New York Central and the Lehigh Valley had refused to take the freight before it was offered to the Lackawanna. The Lackawanna agreed to have ten cars in New York by November 30, but subsequently notified the shipper that the freight could not be taken because of the congested condition of the railroad.

Bureau of Explosives

N. D. Maher, president of the Bureau for the Safe Transportation of Explosives and other Dangerous Articles (75 Church street, New York) announces that J. E. Fairbanks has been appointed secretary and treasurer in place of W. F. Allen, deceased, and that H. J. Foster has been appointed assistant treasurer.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, January, 1916, Atlanta, Ga.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 7-10, 1915, New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Next meeting, December 14-15, 1915, St. Louis, Mo.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meeting, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings, October to May.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—E. N. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The railroads which carry hay to New York City have removed the embargo on that commodity which has been in effect in New York State for several weeks.

The mayors of Yonkers, Mount Vernon and other cities have complained to the New York State Public Service Commission against the proposed advance in passenger fares by the New York Central.

The United States and the Texas agricultural departments are running a demonstration car over the Missouri, Kansas & Texas in Texas on an itinerary extending from November 9 to December 23. Lectures are given on the different branches of farming and horticulture.

The total freight transported through the canals of Sault Ste. Marie, Mich., and Ontario during November, amounted to 9,168,431 tons, of which 7,536,552 tons were transported through the United States canal. The total freight eastbound was 7,418,067 tons and westbound was 1,750,364 tons.

There is constant complaint among receivers in New York of the large percentage of damaged eggs arriving over all roads. Since the disclosure of dishonest settlements and false claims made some months ago, the carriers require sworn affidavits naming the percentage of damage in each shipment.

The Ann Arbor has announced that the car ferry between Frankfort, Mich., and Menominee, Mich., and Marinette, Wis., will be discontinued January 1. During the period the route is closed freight for Menominee and Marinette will be handled via Manitowoc, Wis., on the Chicago & North Western or via Kewaunee and the Chicago, Milwaukee & St. Paul.

The Panama-Pacific International Exposition at San Francisco, which has been open since February 20, closed on December 4, after having had a total attendance of approximately 18,750,000. The Panama-California Exposition at San Diego, which has been open since January 1, is to be kept open for another year, and many of the exhibits from the San Francisco exposition are to be taken to the San Diego exposition.

The Alabama Public Service Commission has denied the petition of the Louisville & Nashville for a rehearing on its request for permission to continue the advanced freight rates which the commission has ordered put back to the former basis, ten per cent below the rates now in force; but has granted similar petitions of six other roads, the Southern, the Atlantic Coast Line, the Atlanta, Birmingham & Atlantic, the Central of Georgia, the Seaboard Air Line and the Western of Alabama. These six roads were also permitted an extension of time to continue the present increased rates to December 31.

To oppose the increase in freight rates from northern and eastern cities to points in the southern states, which is announced to take effect in January, the freight bureaus of ten southern cities are taking united action, a meeting held in Birmingham, December 3, having resolved on this course. The cities represented at the conference were Birmingham, Montgomery, Atlanta, Memphis, Chattanooga, New Orleans, Nashville, Jacksonville, Selma and Jackson. The conference was presided over by J. T. Slatter, manager of the freight bureau of the Birmingham Merchants' & Manufacturers' Association; and action was taken looking to the formation of a permanent organization.

The railroads of the Trunk Line Association, taking action similar to that which was taken by the Erie some time ago, have issued tariffs, to take effect January 1, prescribing limitations which will be enforced in dealing with claims for eggs broken in transit. Present rules will continue in force on lots of 300 cases or more which have been rehandled and repacked and so declared by shippers; but on all other shipments claims for broken eggs will be considered or paid only where the number of broken eggs in any case or crate is not in excess of 5 per cent of the contents of each such crate or case. Where the quantity of broken eggs in any case or crate exceeds 5 per cent

of the contents thereof, claims will be considered only on the excess above 5 per cent.

"Land Bulletin No. 1" has just been issued by the colonization department of the Missouri Pacific-Iron Mountain system. It is to be issued periodically for the purpose of putting the man who is seeking land in the West, South and Southwest in touch with information about the best farming lands that are for sale in Missouri Pacific-Iron Mountain territory. The field men of the colonization department keep in close touch with conditions, especially as regards the possibilities of locating settlers. Whenever a particularly attractive land bargain is found, it is at once reported to headquarters in St. Louis. The size of the farm, price asked, amount and condition of equipment, adaptability of the soil for the production of different crops and all other desirable facts are obtained and later appear in the land bulletin. The paper is given wide circulation, and whenever an inquiry is received the owner or agent of the property and the prospective purchaser are placed in communication through correspondence. Many sales are brought about in this way.

Further Embargoes at New York

The congestion of freight at New York City terminals continues, and the number of loaded cars on hand (within 500 miles) is reported now to be considerably above the forty thousand reported last week. On December 3 five other roads followed the Pennsylvania in putting an embargo on flour and lumber billed through for export, namely, the Lehigh Valley, the Lackawanna, the Central of New Jersey, the Erie and the New York Central. Not a little of the delay now troubling the railroads is due to their own leniency in allowing shippers to load c. l. freight for as many as three different vessels in the same car; delivery being made by the carrier at the three different docks without extra charge.

Additional embargoes were placed on Tuesday of this week. C. C. McCain, chairman of the Trunk Line Association, said:

"The embargoes previously announced have relieved certain of the roads to only a limited extent, and additional embargoes have been found necessary by the Lehigh Valley and the Central Railroad of New Jersey. The Lehigh Valley has placed an embargo on export, domestic and coastwise shipments of hay and straw; export, domestic and coastwise carload shipments of wire, all kinds; nails, all kinds; iron and steel rails; export and domestic carload shipments of locomotives and parts thereof, machinery, and all iron and steel articles.

"The Central of New Jersey has placed an embargo on all export traffic; also on hay and straw, and on locomotives and parts thereof, consigned to all New York deliveries."

The Philadelphia & Reading has joined the other roads in placing an embargo on grain for export.

Progress of Committee on Uniform Classification

C. C. McCain, chairman of the Uniform Classification Executive Committee, has furnished a statement of the progress of the work of the Committee on Uniform Classification in a letter to the Committee on Uniform Classification of the National Association of Railway Commissioners. The statement is in part as follows:

"An examination of the proportion of the total number of items in the respective territorial classifications which have been reviewed and rewritten upon a uniform basis by the Uniform committee discloses the following:

"The total number of items in each of the territorial classifications are: Official 5765, Western 6918, and Southern 4780. Of these, the Uniform committee has reviewed and recommended uniformity for the following number: Official 4207, Western 4887, and Southern 3959, these numbers representing, for Official 73 per cent, Western 71 per cent, and Southern 83 per cent, such percentages indicating the proportions of the number of descriptions in each classification which have been reviewed and brought to a uniform basis by the Uniform committee. The difference between these percentages and 100 per cent represents items not finally acted upon by the Uniform committee, although a large proportion of same are in various stages of completion.

"The foregoing indicates the progress of the work assigned to the Uniform committee in reviewing, rewriting and harmonizing the descriptions in the several classifications.

"As to the extent to which the separate territorial classifica-

tion committees have accepted the recommendations of the Uniform committee, the following may be stated:

"Of the recommendations made by the Uniform committee, the Official has accepted 89 per cent, the Western 80 per cent, and the Southern 89 per cent. These accepted recommendations for uniformity are the following percentage proportions of the total number of items in each classification, viz., Official 66.9 per cent, Western 54 per cent and Southern 65 per cent.

"The varying number of items in the different classifications make difficult any very accurate check as to the precise condition of the work; besides, there are a large number of articles which are already substantially uniform in the three classifications.

"The work of taking over the recommendations for uniformity as made by the Uniform committee is proceeding as rapidly as same can be absorbed by the public, and the successive issues of the respective classifications will show an increasing number of descriptions which are uniform for all. The changes recommended by the Uniform committee and adopted by the respective classification committees necessitate republishing periodically the several classifications. These publications are employed in great numbers by the shippers for the purpose of learning the rates, rules and regulations under which their shipments are to be transported. In addition to the changes recommended by the Uniform committee, a great many other changes necessarily arise from the currently changing commercial and traffic requirements. The inclusion of both of these classes of changes in the new classification publications has been found to be somewhat burdensome to shippers and the transportation companies, in that the number and character of changes were greater than could be readily adjusted to business and shipping requirements, and while as rapid progress as possible towards completion of general uniform freight classification is being made, it is evident that the changes resulting therefrom are now being published as rapidly as commerce can be adjusted thereto.

"No arrangements have been concluded for the construction of uniform ratings by which an article found in the classification will be assigned to the same numbered or lettered class in all territories. This is a matter which may receive attention following the completion of the present work in hand, if it shall then be found feasible or practicable to adopt any plan for uniform rating which shall be workable and meet the requirements in the respective territories."

Panama Canal Traffic

A total of 6,706,915 tons of cargo had been carried through the Panama Canal up to the time the canal was closed by slides on September 18. This is at the average rate of 496,808 tons a month, or 16,318 tons a day, according to statistics published by the Canal Record. Traffic through the canal in September was considerably less than in the month immediately preceding, amounting to 456,317 cargo tons. The tolls collected in September amounted to \$348,730. This makes a total of \$5,754,073 collected in tolls since the canal was opened on August 15, 1914. The traffic through the canal by months since August 15, 1914, is shown in the following table:

Month	Atlantic-Pacific		Pacific-Atlantic		Total	
	Vessels	Cargo tons	Vessels	Cargo tons	Vessels	Cargo tons
August	13	49,106	11	62,178	24	111,284
Sept.	27	141,762	30	180,276	57	322,038
Oct.	44	168,069	40	253,288	84	421,357
Nov.	54	206,510	38	242,291	92	448,801
Dec.	43	179,235	57	271,219	100	450,454
Jan., 1915.	44	208,082	54	240,925	98	449,007
Feb.	39	150,987	53	276,078	92	427,065
March	57	217,447	80	417,610	137	635,057
April	59	237,384	60	285,457	119	522,841
May	67	246,534	75	332,174	142	578,708
June	83	320,619	60	282,561	143	603,180
July	93	316,773	77	388,696	170	705,469
August	89	249,119	72	326,218	161	575,337
Sept.	49	181,380	51	274,937	100	456,317
Total	761	2,841,007	748	3,833,968	1,519	6,706,915

ELECTRO-BENZINE FIELD RAILWAY—The Austro-German forces on the Italian front are now using an electro-benzine field railway, which they have found very effective in the quick transportation of stores and munitions.

COMPLETION OF THE KAHETIAN RAILWAY—The Kahetian Railway, which was opened to limited traffic in January last, has now opened to traffic of every description, having been officially declared incorporated in the Russian railway system.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has denied the application of the G. B. Markle Company and the railroads for a rehearing of the anthracite rate case. The operators in the former petition asked the commission to modify its decision as far as the smaller sizes of coal are concerned. In its order the commission ordered reductions in the rates on the prepared sizes, but not in the rates on the smaller sizes.

Examiner Thurtell, of the Interstate Commerce Commission, began a hearing at Dallas, Tex., on November 29, in what is known as the Dallas-Ft. Worth rate case, on which preliminary hearings were held in Dallas several weeks ago. The case involves a complaint filed by the commercial organizations of Dallas and Ft. Worth, charging discrimination in the rates to those points from St. Louis and Kansas City as compared with the rates to Shreveport, La., and Texarkana, Ark. Shippers' organizations of a number of other cities in Texas, Arkansas, Oklahoma and Missouri intervened in the case.

STATE COMMISSIONS

The Railroad Commission of Tennessee has suspended until January 30 certain tariffs proposing increases in freight rates from Nashville and Memphis to stations on the Illinois Central and the Yazoo & Mississippi Valley, and also numerous local rates.

The Missouri Pacific has notified the Missouri Public Service Commission of its intention to file a motion for a rehearing of the case in which the commission ordered the road to reinstate sleeping car service between St. Louis, Carthage and Joplin, as furnished prior to April 11, 1915, when service was discontinued. The commission's order, which is effective on December 15, provides that the company shall have the right at the end of one year to file with the commission an account in detail showing the number of passengers carried, and all receipts and expenditures arising from furnishing the service, and shall also have leave at that time to move that the order be set aside.

PERSONNEL OF COMMISSIONS

Edward E. McCall, chairman of the New York State Public Service Commission, First district, has been removed by the Governor, and Commissioner William Hayward has been designated as acting chairman. Chairman McCall's removal was made because of the finding of a legislative investigating committee that he had retained his ownership of shares of stock in an electric light company, contrary to law, the light company being subject to the supervision of the commission.

COURT NEWS

The Chicago, Rock Island & Pacific has filed an application to be allowed to intervene in the suit of the Missouri Pacific to enjoin the two-cent fare law in Nebraska.

The hearing before the United States District Court at Oklahoma City on the application of the railroads for an injunction against the Oklahoma two-cent fare law was adjourned last week for about two months.

Judge Trieber, of the United States District Court at Little Rock, Ark., has rendered a decision that the freight tariff of the Arkansas Railroad Commission, as applied to the St. Louis & San Francisco and the Kansas City Southern, is confiscatory, and he has therefore declared it inoperative. The court directed that a court tariff now being used be continued, pending the decision of the United States Supreme Court on a similar suit now pending against another tariff of the commission.

J. E. Sexton, of Palisade, Nev., a stockholder of the Atchison, Topeka & Santa Fe, who some months ago complained of the action of the road in carrying, on its trains, without com-

pensation, the members and employees of the California Railroad Commission, when these state officers were engaged on other than railroad business, has taken his complaint into court. He entered suit in the Superior court for the county of San Francisco, November 27. Mr. Sexton declares that the law of the state requiring railroads to carry state employees without compensation is unconstitutional. The suit is against not only the railroad company but each of its directors, and also against the members of the railroad commission. It is charged that at least \$5,000 worth of transportation has already been thus granted, and that the directors not only have done this, but intend to continue the same course; and that they have formally ignored this stockholder's complaint. Mr. Sexton is general manager of the Eureka Nevada Railway, 84 miles long.

Struck by Train—Contributory Negligence

In an action for personal injuries it appeared that the plaintiff went to a station to board a train, and, in order to signal his train with a lantern, stood in a space of 3½ feet across between two tracks, on one of which a passenger train distant about a quarter of a mile was approaching, and on the other a freight train distant about a mile was approaching. The trains passed each other where the plaintiff was standing. He became panic-stricken and stepped away from the freight (which was running between 30 and 40 miles an hour) far enough to be struck by the beam on the passenger engine. The trial court directed a verdict for the defendant. On appeal this was reversed, the Arkansas Supreme Court holding that the question of the plaintiff's contributory negligence in standing where he did should have been submitted to the jury.—Cook v. St. Louis, I. M. & S. (Ark.), 179 S. W. 501.

Rutland Suit Dismissed

In the United States District Court at Rutland, Vt., December 7, the suit of the Estate of A. C. Spring and other minority stockholders of the Rutland railroad against W. Seward Webb, Chauncey M. Depew and other majority interests for an accounting of profits alleged to have been made through a conspiracy to defraud, was dismissed. The case has been pending for several years. Judge Hough, dismissing the suit, said that the majority stockholders had proved that the plaintiffs had inexcusably delayed action, which justified the court in refusing relief. He spoke of "the utter inapplicability of the evidence to sustain a bill for conspiracy to defraud." The profits for which the minority interests sought an accounting were alleged to have amounted to \$2,000,000 and to have resulted from a conspiracy to purchase various small railroads and sell them to the Rutland at considerable advances.

Disorderly Passenger—Negligent Conductor

Suits were brought against the L. & N. by two colored women for damages on account of the misconduct of another colored woman in a coach in which all were riding. In the lower court each of the plaintiffs was awarded \$500. It appeared that the accused woman was drunk and used vulgar and indecent language. The conductor had his attention called to the facts, but merely remarked, with a smile, that the woman was drunk, and passed out of the car. It was held by the Kentucky Court of Appeals that this was not a compliance with the duty of the carrier to the other passengers. He should have either ejected the woman at the next station or he should have notified the police officers. This was his duty under the Kentucky statutes, one of which provides for the punishment of this offense and another prohibits drinking on trains. The awards of damages were held not to be excessive, as they did not in themselves indicate passion or prejudice.—L. & N. v. Bell (Ky.), 179 S. W. 400.

Inspection of Records of Liquor Shipments

The local agent of an express company in a "dry" town in Kentucky was acquitted of the offense of unlawfully refusing to keep open to public inspection during business hours the company's book in which was kept a record of shipments of intoxicating liquors. The agent had refused to allow a private citizen of the town to inspect the record, relying on the interstate commerce law. On appeal, the Kentucky Court of Appeals held that the Kentucky statute prohibiting the sale or possession of

intoxicating liquors in local option districts does not prohibit all shipments of liquor; and one may lawfully have liquor which has been bought where its sale is lawful. The courts will not presume, in the absence of proof, that a record of interstate liquor shipments kept by a carrier as required by the Kentucky statute contains a record of an unlawful shipment. Where interstate shipments are for lawful use the carrier cannot divulge information of them to private persons, and the Kentucky statute, making refusal to divulge such information unlawful, cannot apply to lawful interstate shipments.—*Commonwealth v. White* (Ky.), 179 S. W. 469.

Demurrage—Private Cars on Private Tracks

The federal District Court, N. D. Ohio E. D., holds that under a contract between plaintiff railroad and defendant consignee providing that a certain track shall belong to the railroad, and that it shall be used only for receiving and delivering shipments made to or by the defendant, and by the railroad for any purpose not unreasonably interfering with defendant's shipments, the defendant could not use it as a storage track for its own cars without being subject to demurrage charges. A tariff made private cars on private tracks of the owners of the cars subject to demurrage charges, even when engaged in transportation of commodities produced by their owners, if they are then "in railroad service." The court holds that such cars of the defendant on the track were in railroad service, for they not only stood to interfere with the use of the track by the railroad under the provisions of the contract, but the railroad's obligation with reference to them had not ceased, in that it was compelled to haul them to the initial point and pay mileage thereon to the defendant company.—*St. Louis, I. M. & S. v. National Refining Co.*, 226 Fed. 357.

Demurrage—Private Cars on Private Sidings

As applied to interstate commerce the law is that private cars are subject to demurrage rules. The Pennsylvania Superior Court holds that the principle also applies to intrastate shipments. If consignees may detain loaded private cars at pleasure an advantage is afforded them which is not accorded to consignees receiving freight in cars owned by the railroad company, and this is inconsistent with the Pennsylvania statute forbidding undue or unreasonable discrimination. Where the cars did not belong to the defendant consignee in an action for demurrage, it had no standing to inquire what were the circumstances under which the railroad obtained possession of them from the owners, the consignors. The fact that the consignee's private siding was used did not give it control over the cars of other corporations or persons. If this were so the owners of private sidings would have a great advantage over shippers who were obliged to accept their freight from the tracks of the railroad, and one of the discriminations which the law prohibits would be thus afforded. Cars are not intended for storage of freight.—*Pennsylvania v. Waverly Oil Works*, 58 Pa. Sup. Ct. 154.

Injury to Engineer—"Comparative Negligence"

An engineman on a dark and foggy morning ran so fast that he could not stop before passing a block signal which was set at "stop." To save himself from being caught in an impending collision with the rear of another train a short distance beyond the signal, he jumped off and was injured. The company had failed to include the other train in the order furnished him, listing the trains he would meet and pass, thus "leading the engineman to expect no other than a clear signal at that place." The Kansas Supreme Court, in an action against the railroad, held that the issue became, in effect, one of comparative negligence, under the statute providing that contributory negligence of an employee shall not be claimed by the employer as a defense, but shall be considered by the jury in assessing the amount of recovery. The jury found the plaintiff's damages were \$6,000, and deducted one-fourth of that on account of his own negligence. The railroad put in a counterclaim of \$1,312 against him for the destruction of its property and the jury charged him with one-fourth of that amount. In effect, the jury decided the railroad's negligence was three times as great as that of the plaintiff. The Supreme Court held that the findings as to \$6,000 and \$1,312 damages should stand, but ordered a new trial on the issue of comparative negligence, its incidents and consequences.

Two judges dissented in part, holding that judgment should be

ordered for the railroad because its negligence in furnishing the plaintiff an inaccurate list of trains did not contribute to the collision; that the sole cause of the collision was running by a stop signal in disobedience of a rule which was imperative, whatever train list the plaintiff had received.—*Ballou v. Atchison, T. & S. F.* (Kan.) 152 Pac. 284.

Recovery of Undercharge from Consignee, Agent of Undisclosed Principal

In an action against a consignee for a balance of freight charges which had not been claimed at the delivery of the goods, 15 months before, it appeared that the goods were consigned to the defendant to be sold on commission, he to remit the proceeds to his principal, less commission and freight charges. Before the carrier demanded the additional freight the defendant had settled with his principal. The New York Court of Appeals holds that neither the delay nor the settlement affected the railroad's right to recover. It had the right to treat the consignee as the owner of the goods, and the consignee, in allowing the railroad to act on that assumption and deliver the goods, impliedly agreed to pay the transportation charges. The delay was immaterial, since the rate filed is the lawful, arbitrary and immutable rate, all parties concerned being charged with knowledge of it and its unescapable force. And for that reason payment of part of the freight charge could, under no circumstances, relieve the consignee from full payment.—*Pennsylvania v. Titus* (N. Y.) 109 N. E. 857.

The Central Pacific Suit

A hearing in the suit of the government to require the Southern Pacific to give up its control of the Central Pacific was held at St. Louis on December 1 and 2, before Judges Sanborn, Hook and Carland of the United States Court. The government was represented by Edward F. McClennen of Boston, as assistant counsel. He asserted that the Pacific railroad law provided that the continuous line of the Central Pacific and the Union Pacific should be operated without discrimination against either line, but that the Southern Pacific has endeavored to send as much as possible of the California traffic through the New Orleans gateway rather than through the Ogden gateway, although the latter route was the shortest from points on the Atlantic seaboard and in the central western states.

Mr. McClennen, referring to the bearing of the decree in the Union Pacific case on the present litigation, said that there is still a monopoly of traffic through the Ogden gateway, as there was when the Union Pacific suit was filed; that the proper course for the government was first to separate the Southern Pacific from the Union Pacific, and then to separate the Central Pacific from the Southern Pacific.

Peter F. Dunne, representing the Southern Pacific, argued that the government having effected the dissolution of the Union Pacific-Southern Pacific merger, on the contention that thereby competition between the Ogden route and the Sunset route would be restored, cannot now come in and ask the severance of the Central Pacific and the Union Pacific on the ground that competition cannot exist between the Ogden and the El Paso route, so long as the Southern Pacific controls the Central Pacific. Counsel for the Southern Pacific also said:

"It would seem that if the government wins in this case it will establish a precedent justifying the breaking up of all the railroad systems of the country that have been built up by the acquisition of lines, often competing, and by leases, ownership of stock, etc., prior to the passage of the Sherman law."

Flooding—Extraordinary Rains or Floods

The Kentucky Court of Appeals holds that one who builds a bridge over a stream is liable for flooding only in the event that the bridge obstructs the passage of water that accumulates from such ordinary and usual rainfalls in the vicinity as might have been anticipated by persons of ordinary prudence and experience. He is not liable for damages growing out of overflows caused by extraordinary rains or floods. Where it was shown that the waters of a creek and its tributaries were higher and wider than they had ever been before in the memory of the oldest inhabitant, it must be regarded that the rains and flood were extraordinary and could not have been anticipated, so that the railroad building the bridge was not liable.—*Louisville & Nashville v. Cohen* (Ky.), 179 S. W. 195.

Railway Officers

Executive, Financial, Legal and Accounting

Charles Boettcher has been elected president of the Denver & Salt Lake and Lawrence C. Phipps has been elected chairman of the board. Fred G. Moffat has been elected assistant treasurer, Gerald Hughes has been elected secretary, and William Wadden has been elected vice-president and assistant secretary.

Howard S. Palmer, statistical accountant of the New York, New Haven & Hartford, at New Haven, Conn., has been appointed auditor of disbursements of the New York, New Haven & Hartford, the Central New England and the New England Steamship Company. Mr. Palmer succeeds S. C. Fleetwood, who, after 45 years of continuous service, at his own request has been assigned to other duties. John J. Ward, Jr., has been appointed statistical accountant, vice Mr. Palmer.

E. F. Kearney, president of the Wabash, was re-elected at a meeting of the board of directors on December 1. William H. Williams, vice-president of the Delaware & Hudson, was chosen chairman of the board and of the executive committee; W. C. Maxwell, general traffic manager, was elected vice-president in charge of traffic; James L. Minnis, general solicitor, was elected vice-president and general solicitor; J. C. Otteson was elected treasurer, and Winslow S. Pierce, general counsel.

W. A. Gore, superintendent of the Carolina, Atlantic & Western at Charleston, S. C., has been appointed vice-president and general manager of the Orangeburg Railway, with office at Orangeburg, S. C., in charge of traffic, transportation, maintenance, accounting, claims and purchases, effective December 1.

Frank P. Crandon, whose retirement from the position of tax commissioner of the Chicago & North Western was announced last week, was born at Portsmouth, R. I. He entered railway service in 1873, as clerk in the land department of the North Western, and was soon placed in charge of assessment and tax matters. In 1878, when the tax department was made a separate department of the company's business, he was placed in charge as tax commissioner. He was also appointed tax commissioner of the Fremont, Elkhorn & Missouri Valley and the Sioux City & Pacific, when these roads were assimilated by the North Western. He was retired under the pension rules of the company after being continuously in its service for over 42 years. Mr. Crandon is a member of the board of trustees of Northwestern University, and has held the position of secretary of the board since 1891.



F. P. Crandon

Operating

Edwin H. Buhlman has been appointed trainmaster of the Erie, with office at Marion, Ohio.

Albert M. Kelly has been appointed trainmaster of the Erie, at Jersey City, N. J., vice H. R. Cole, promoted.

E. D. Cotterell has been appointed acting superintendent of car service of the Canadian Pacific Western Lines with office at Winnipeg, Man.

C. E. McMullen has been appointed superintendent of the Rio Grande division of the Texas & Pacific at Big Spring, Texas, vice L. M. Dooley, who has been appointed superintendent of

transportation. R. B. Ayres, inspector of transportation at Dallas, has been appointed trainmaster of the Baird sub-division with office at Big Spring.

W. P. McHugh has been appointed night trainmaster of the Terminal Railroad Association of St. Louis, vice H. L. Burlingame, deceased.

C. H. Doorley, acting superintendent of the Gary division of the Elgin, Joliet & Eastern, has been appointed superintendent, to succeed John Kirk, deceased.

John T. Jarvis, general inspector of dining cars for the Union Pacific Railroad, has been appointed general inspector of dining cars for the Union Pacific System.

E. M. Wrenne, acting superintendent of transportation of the Nashville, Chattanooga & St. Louis at Nashville, Tenn., has been appointed superintendent of transportation.

M. J. McDonald, road foreman of equipment for the Chicago, Rock Island & Pacific, with office at Eldon, Iowa, has been appointed trainmaster with headquarters at the same place.

E. A. Sollitt, acting superintendent of the Peru division of the Wabash, has been appointed superintendent, vice James Sullivan, retired on a pension. Mr. Sollitt's headquarters will continue to be at Peru, Ind.

D. N. Bacot, trainmaster of the Seaboard Air Line at Americus, Ga., has been appointed superintendent of the East Carolina division, with headquarters at Charleston, S. C. This division comprises the lines of the Carolina, Atlantic & Western, which have been consolidated with the Seaboard Air Line. These lines are as follows: between Hamlet, N. C., and Charleston, S. C.; Poston and McBee; Hartsville and Sumter; Lydia and Timmons-ville; Georgetown and Lanes.

Howard Elliott, chief clerk to the general manager of the San Pedro, Los Angeles & Salt Lake, and secretary to the road's central safety and efficiency committee, has been appointed inspector of transportation with office at Los Angeles, Cal. He will "closely observe the loading, packing, marking, bracing and movement of freight with a view to discovery and remedying the causes of freight claims," and perform such other duties as may be assigned by the general manager.

Carl D. Van Hecke, who has been appointed general manager of the Muscatine & Iowa City, entered railroad service with the Chicago & North Western in 1900, as a call boy. In 1905, he entered the service of the Chicago, Rock Island & Pacific as secretary to the general manager, and in 1907 left to enter the employ of the Denver & Rio Grande. He returned to the Rock Island and held various positions in the general manager's office until 1910, when he accepted a position with the Duntley Manufacturing Company of Chicago. In the same year he returned to the Rock Island as contract clerk in the general manager's office. In 1911 he was made assistant chief clerk in the office of the second vice-president, which position he held at the time of his recent appointment. His headquarters are at Muscatine, Iowa.

Thomas W. Hansell, who has been appointed superintendent of the Atlantic Coast Line, at Sanford, Fla., as has already been announced in these columns, was born on January 20, 1871, at Nettleton, Miss., and was educated in the common schools. He began railway work in January, 1886 as station agent and telegraph operator on the Mobile & Ohio. In the summer of the same year he went to the Memphis & Charleston as freight clerk and telegraph operator, and left that road later in the same year to go to the Louisville & Nashville as telegraph operator. He was subsequently promoted to train dispatcher at Birmingham, Ala., on the same road, leaving that position in November, 1901. The following January he entered the service of the Gulf, Colorado & Santa Fe as train dispatcher at Cleburne, Tex. From September, 1902, to June, 1903, he was train dispatcher at the City of Mexico, on the Mexico National, now a part of the National Railways of Mexico. Since June 28, 1903, he has been in the continuous service of the Plant System, and its successor, the Atlantic Coast Line, consecutively as train dispatcher at Montgomery, Ala., general yardmaster, foreman of engines, trainmaster, superintendent of terminals and assistant superintendent at various places.

Traffic

R. A. G. Barnes, traveling freight and passenger agent of the Atlantic Coast Line at Washington, N. C., has been ap-

pointed commercial agent at Wilson, N. C., and his former position has been abolished. J. D. Wright has been appointed commercial agent at Memphis, Tenn.

John T. Wray, district freight solicitor of the Pennsylvania System at Atlanta, Ga., has been promoted to southern freight agent with office at Atlanta.

George L. Leitner, traveling freight agent of the St. Louis Southwestern at Chicago, Ill., has been appointed commercial agent, with headquarters at Detroit, Mich.

C. H. Stinson, general freight agent of the Wabash at St. Louis, Mo., has been appointed freight traffic manager. H. E. Watts, assistant general freight agent at St. Louis, has been appointed general freight agent.

E. M. Westervelt has been appointed real estate and industrial agent of the Chicago, Burlington & Quincy Lines West of the Missouri river, with office at Lincoln, Neb. J. A. Saxon has been appointed assistant real estate and industrial agent for the lines west of the Missouri river, with office also at Lincoln.

John M. Cornatzar, general passenger agent of the St. Louis & San Francisco, will have his office at St. Louis, Mo., instead of Memphis, Tenn., after January 1. A. P. Johnson, chief rate clerk in the passenger department at St. Louis, has been promoted to division passenger agent, with headquarters at Memphis, Tenn.

O. S. Lewis, division freight agent of the Baltimore & Ohio Southwestern at Cincinnati, Ohio, has been appointed assistant general freight agent of the Cincinnati, Hamilton & Dayton and the Baltimore & Ohio Southwestern, to succeed J. W. Allison, resigned to become a member of the Official Classification Committee. Mr. Lewis' headquarters will continue to be at Cincinnati, Ohio, his promotion having taken effect on December 1.

William H. Johnson, general western agent of the Erie & Western Transportation Company, has been appointed manager of the Star Union Line, with office at Chicago, Ill. He was

born at Buffalo, N. Y., on February 28, 1866, and began his career in 1882 as a messenger boy for the Anchor Line in the same city. Within two years he was made paymaster and four years later chief clerk of the Buffalo office. In 1898 he became the Buffalo agent of the Anchor Line, and in 1899 was appointed superintendent of the Connecting Terminal Railroad, owned by the Anchor Line. A little more than 10 years ago he was transferred to Chicago to become the general western agent of the line. He assumed his new responsibilities on December 1.



W. H. Johnson

Mr. Johnson was formerly president of the Chicago Lake Line Agents' Association.

Charles Carroll Graves, who has been appointed assistant general freight agent of the Seaboard Air Line, with headquarters at Charleston, S. C., was born on April 8, 1873, at Somerset, Orange county, Va. He was educated at Locust Dale College and began railway work in March, 1893, on the Seaboard Air Line in the general auditor's office. In October, 1900, he was transferred to the general freight agent's office, and from March, 1901, to July of the following year was traveling freight agent of the same road at Norfolk, Va. From August, 1905, to December, 1909, he was chief clerk to general freight agent on the Virginian Railway, and from January, 1910, to the following June was traveling freight agent of the Chesapeake & Ohio and the Cleveland, Cincinnati, Chicago & St. Louis at Wilmington, N. C. From May to July, 1910, he was general freight and passenger agent of the Raleigh & Charleston at Marion, S. C.

In August, 1910, he was appointed traffic manager of the Carolina, Atlantic & Western at Hamlet, N. C., which position he held until the recent consolidation of that road with the Seaboard Air Line, when he was appointed assistant general freight agent of the Seaboard Air Line, as above noted.

Arthur Mackenzie, chief clerk to the first vice-president of the Chicago, Rock Island & Pacific, has been appointed assistant freight traffic manager, effective December 1. Mr. Mackenzie entered railway service in 1888, with the



A. Mackenzie

Grand Trunk; in 1890 he was employed by the Michigan Central at Buffalo, N. Y., in a clerical capacity, and in 1892, entered the service of the Atchison, Topeka & Santa Fe, as a clerk in the commercial agent's office at Buffalo. In 1894, he went to Chicago, Ill., to become a tariff clerk in the general freight office of the Santa Fe, and two years later went to Indianapolis, Ind., as a record clerk in the office of the superintendent of car service for the Cleveland, Cincinnati, Chicago & St. Louis. In the same year—1896—he removed to Rochester, N. Y., to become chief clerk to the division freight agent of the Lehigh Valley, and shortly after, he again went to Chicago, to become chief clerk to the general agent of the St. Louis & San Francisco. In 1897, he entered the employ of the Iowa Central as chief clerk to the assistant general freight agent at Peoria, Ill. In July, 1897, he returned to the service of the Santa Fe, as a stenographer in the general freight office at Chicago. He remained with this road until December 14, 1909, in the consecutive capacities of claim clerk, chief rate clerk, assistant chief clerk and chief clerk to the freight traffic manager. Since December 15, 1909, he has been chief clerk to the first vice-president of the Rock Island. His office will continue to be at Chicago.

Engineering and Rolling Stock

Charles K. Scott has been appointed supervisor of maintenance of way for the Erie with office at Huntington, Ind.

L. C. Ord, assistant works manager, Angus car shops, Montreal, Que., of the Canadian Pacific, has been granted leave of absence to enter active service, as lieutenant in No. 1 overseas battery of the siege artillery, Canadian expeditionary force.

J. J. McNeill, road foreman of engines for the Erie at Cleveland, Ohio, has been appointed supervisor of locomotive operation with office at Youngstown, Ohio, vice D. J. Madden promoted. Joseph Blutge has been appointed road foreman of engines at Cleveland, to succeed Mr. McNeill.

P. Coniff, superintendent of shops of the Baltimore & Ohio, at Mount Clare, Baltimore, Md., has been appointed special inspector of the mechanical department. E. J. Brennan, division master mechanic, of the Buffalo, Rochester & Pittsburgh at Du Bois, Pa., has been appointed superintendent of shops of the Baltimore & Ohio, at Glenwood, Pittsburgh, Pa.

F. J. Yonkers has been appointed road foreman of equipment for the Colorado division of the Chicago, Rock Island & Pacific, with headquarters at Goodland, Kan., and J. W. Tenney has been appointed road foreman of equipment, with jurisdiction over that portion of the Missouri division west of Eldon, Iowa, with headquarters at Trenton, Mo., vice M. J. McDonald, promoted.

Purchasing

E. J. Alexander, second assistant to receiver, has been appointed fuel agent of the Chicago & Eastern Illinois, vice C. G.

Hall, resigned to become secretary of the Northern Indiana Coal Trade Bureau, effective December 15.

A. S. Brown has been appointed storekeeper of the Salt Lake & Ogden with office at Salt Lake City, Utah, vice W. H. Bliss, resigned.

OBITUARY

Edward Rathbone Bacon, vice-president of the Baltimore & Ohio Southwestern, with headquarters at New York, died on December 2, in the John Hopkins University Hospital at Baltimore, Md., following an operation for appendicitis. Mr. Bacon was born on November 22, 1846, at New York, and was educated at Phillips Exeter Academy, Exeter, N. H. In November, 1869, he was admitted to the bar at Buffalo, N. Y., and for 18 years was counsel for different railroad companies. In 1881 he was vice-president of the Cincinnati, Washington & Baltimore, now a part of the Baltimore & Ohio Southwestern. He served as president of the Baltimore & Ohio Southwestern Railway and the reorganized road, the Baltimore & Ohio Southwestern Railroad, from its organization to 1902, and since that time was vice-president of the same road. He was one of the reorganizers of the Baltimore & Ohio and was one of its directors, also a director of the Kansas City Southern and the Cincinnati, Hamilton & Dayton.

Henry C. Diehl, at one time general freight agent of the Chicago, Burlington & Quincy, died at Montclair, N. J., on December 8 at the age of 73.

Ariel B. Copley, assistant general manager, Third district, of the Chicago, Rock Island & Pacific, died at Mitchellville, Iowa, on November 27. Mr. Copley was born at Geneseo, Ill., on November 10, 1862. He attended the public schools for two years at Geneseo, and for 13 years at Mitchellville, Iowa. At the age of 19 he entered railway service as a messenger for the Rock Island, and remained in that capacity until 1886. From 1886 to 1893, he was brakeman and conductor on the Iowa division of the Rock Island. In 1893 he was appointed yardmaster of the same railroad at Des Moines, Iowa, and continued in that position for ten years. In 1903 he was appointed trainmaster, with headquarters at Estherville, Iowa, and in 1904 was transferred in the same capacity to the East Iowa division. In 1905 he was transferred to the Colorado division, and in 1906 was promoted to superintendent, with office at Kansas City, Mo. In 1907 he went to Haileyville, Okla., as superintendent, and in 1909 became superintendent, with office at Little Rock, Ark. On July 1, 1914, he was promoted to assistant general manager of the third district of the Rock Island, with headquarters at El Reno, Oklahoma.



E. R. Bacon



A. B. Copley

Equipment and Supplies

LOCOMOTIVES

THE PULLMAN RAILROAD is inquiring for one switching locomotive.

THE FAIRCHILD & NORTHEASTERN has issued an inquiry for one Prairie type locomotive.

THE INLAND STEEL COMPANY is inquiring for prices on 5 switching locomotives.

THE IRONTON RAILROAD has ordered one eight-wheel switching locomotive from the Baldwin Locomotive Works.

THE LEHIGH & HUDSON RIVER recently placed an order with the Baldwin Locomotive Works for 4 Mikado locomotives.

THE AKRON & BARBERTON BELT RAILROAD has ordered one Mogul type locomotive from the Baldwin Locomotive Works.

THE TEMISKAMING & NORTHERN ONTARIO is inquiring for prices on two Mountain type locomotives and 4 Consolidation locomotives.

THE YOUNGSTOWN SHEET & TUBE COMPANY has ordered one four-wheel switching locomotive from the Baldwin Locomotive Works.

WORTH BROTHERS COMPANY, Coatesville, Pa., has ordered 3 four-wheel switching locomotives from the Baldwin Locomotive Works.

THE ERIE, reported in the *Railway Age Gazette* of November 12 as being in the market for 10 Pacific type locomotives, has ordered these locomotives from the American Locomotive Company.

THE NORFOLK & WESTERN, reported in the *Railway Age Gazette* of October 1 as being in the market for 10 Mountain type locomotives, is building 8 locomotives of this type in its Roanoke shops.

THE MONONGAHELA RAILWAY has ordered six superheater Consolidation locomotives from the American Locomotive Company. These locomotives will have 22½ by 30-in. cylinders, 51-in. driving wheels and a total weight in working order of 200,000 lb.

THE SOLVAY PROCESS COMPANY, Syracuse, N. Y., has ordered one superheater six-wheel switching locomotive from the American Locomotive Company. This locomotive will have 21 by 26-in. cylinders, 51-in. driving wheels and a total weight in working order of 156,000 lb.

THE LEHIGH VALLEY, reported in the *Railway Age Gazette* of October 22 as having ordered 10 Mikado locomotives from the Baldwin Locomotive Works, has increased the order to 20 locomotives. Like the former 10 engines the additional locomotives will be equipped with superheaters and with Street stokers.

THE CINCINNATI, INDIANAPOLIS & WESTERN, reported in the *Railway Age Gazette* of November 26 as inquiring for 5 ten-wheel locomotives has ordered 6 superheater ten-wheel locomotives from the American Locomotive Company. These locomotives will have 21 by 28-in. cylinders, 69-in. driving wheels and a total weight in working order of 194,000 lb.

THE LAKE SUPERIOR & ISHPEMING has ordered 4 Consolidation locomotives from the Baldwin Locomotive Works, one of which will be used on the Munsing, Marquette & Southeastern. The engines will have 26-in. by 30-in. cylinders, a weight on the driving wheels of 240,000 lb., a weight on the trucks of 30,000 lb., and a total weight of 270,000 lb. Cardwell friction draft gear has been specified for the tenders.

THE DETROIT TERMINAL has ordered two superheater six-wheel switching locomotives and one superheater eight-wheel switching locomotive from the American Locomotive Company. The six-wheel locomotives will have 21 by 26-in. cylinders, 57-in. driving wheels and a total weight in working order of 172,000 lb.; and the eight-wheel locomotive will have 25 by 30-in. cylinders, 58-in. driving wheels and a total weight in working order of 240,000 lb.

FREIGHT CARS

THE GRAND TRUNK will repair 1,500 steel freight cars.

THE CHICAGO GREAT WESTERN is inquiring for 500 40-ton box cars.

THE DENVER & RIO GRANDE has revived its inquiry for 1,000 box cars.

THE LEHIGH & NEW ENGLAND is in the market for 550 hopper and 200 flat cars.

THE RAY CONSOLIDATED COPPER COMPANY is in the market for 20 dump cars.

THE COAL & COKE RAILWAY is contemplating the purchase of 1,500 coal cars.

THE NEW JERSEY ZINC COMPANY, New York, is in the market for 40 hopper cars.

THE UNITED STATES GOVERNMENT, DEPARTMENT OF THE INTERIOR, is asking bids on 50 dump cars.

THE PENNSYLVANIA RAILROAD has revived its inquiry for 6,000 freight cars for the Lines East of Pittsburgh.

THE CHICAGO & NORTH WESTERN has ordered 250 ore cars from the American Car & Foundry Co.

THE ILLINOIS CENTRAL has ordered 40 air dump cars from the Western Wheeled Scraper Company.

THE AMERICAN SHEET & TIN PLATE COMPANY is reported to have ordered 6 tank cars from the German-American Car Company. This item has not been confirmed.

THE ATCHISON, TOPEKA & SANTA FE reported in the *Railway Age Gazette* of December 3 as inquiring for 25 concentrate cars has ordered these cars from the Pullman Company.

THE PENNSYLVANIA LINES WEST have ordered 1,000 110,000 ton capacity gondola cars from the American Car & Foundry Company, and 1,150 of the same type from the Haskell & Barker Car Company.

THE NATIONAL RAILWAYS OF MEXICO are understood to be contemplating the purchase of a large number of cars. The finances of the company are such that it may be necessary to purchase second-hand equipment.

THE CANADIAN PACIFIC reported in the *Railway Age Gazette* of November 26 as being about to build 250 refrigerator cars in its shops at Montreal, is also planning to build 800 box cars in its own shops.

THE NEW YORK, ONTARIO & WESTERN, reported in the *Railway Age Gazette* of November 12 as contemplating the purchase of 500 freight cars, has issued inquiries for 450 50-ton coal cars and 100 low side gondola cars.

THE ERIE has ordered 500 55-ton drop end steel underframe gondolas from the American Car & Foundry Company and 1,000 50-ton triple hopper gondola cars from the Pressed Steel Car Company.

THE NEW YORK, NEW HAVEN & HARTFORD, reported in the *Railway Age Gazette* of November 12 as being in the market for 20 milk and 50 refrigerator cars, is also understood to be contemplating the purchase of 500 coal cars.

THE DULUTH & IRON RANGE, reported in last week's issue as having ordered 250 50-ton ore cars from the American Car & Foundry Company, has also ordered 500 50 ton ore cars from the Standard Steel Car Company and will soon place an order for 100 30-ton all-steel flat cars.

THE IMPERIAL OIL COMPANY, LTD., will assemble in its own shops at Sarnia, Ont., during 1916, 200 single compartment, 15 two compartment and 20 three compartment tank cars, the bodies and trucks being purchased from the Canadian Car and Foundry Company and the National Steel Car Company and the tanks being made by the company itself at Sarnia.

PASSENGER CARS

THE NEW YORK CENTRAL has issued inquiries for 30 to 60 70-ft. coaches.

THE LEHIGH VALLEY has ordered 2 dining cars from the Pullman Company.

THE CHESAPEAKE & OHIO has issued inquiries for 12 express cars and 6 coaches.

THE GREAT WESTERN RAILWAY has ordered one 60-ft. all-steel postal car from the American Car & Foundry Company.

THE DELAWARE, LACKAWANNA & WESTERN has ordered 10 express cars from the Pullman Company.

THE NEW YORK MUNICIPAL, reported in the *Railway Age Gazette* of November 26 as being about to order an additional 100 subway cars for its Sea Beach Line, has issued inquiries for these cars.

THE PENNSYLVANIA RAILROAD was reported in last week's issue of the *Railway Age Gazette* as having ordered 12 combination baggage and mail cars and 6 dining cars from the Pullman Company. These cars are for the Lines West of Pittsburgh which have also ordered 22 coaches and 7 passenger and baggage cars from the Pullman Company and 24 baggage cars from the Standard Steel Car Company. Of the 12 baggage and mail cars ordered of the Pullman Company, 4 are for the Vandalia. The latter will also receive 3 of the passenger and baggage cars ordered from the Pressed Steel Car Company and 4 of the baggage cars ordered from the Standard Steel Car Company.

IRON AND STEEL

THE MISSOURI PACIFIC is reported to have ordered 25,000 tons of rails.

THE NEW YORK, CHICAGO & ST. LOUIS is inquiring for prices on 5,000 to 10,000 tons of rails.

THE INTERBOROUGH RAPID TRANSIT is in the market for 4,500 tons of running rails and 3,000 tons of contact rails.

THE ST. LOUIS & SAN FRANCISCO has ordered 43,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

THE CHICAGO & NORTH WESTERN has ordered 5,000 tons of bridge material from the Chicago Bridge & Iron Works.

THE PENNSYLVANIA LINES WEST have ordered 650 tons of steel from the Hanke Iron Works for miscellaneous steel work on the new freight house at Chicago, Ill.

THE PENNSYLVANIA RAILROAD has ordered 600 tons of steel from the Lackawanna Bridge Company for use in connection with the company's Chestnut Hill electrification.

MACHINERY AND TOOLS

THE FORT SMITH & WESTERN is reported to be preparing plans for the equipment of car and machine shops at Oklahoma City, Okla.

SIGNALING

THE WABASH RAILWAY plans during the coming year to install automatic block signals on 43 miles of its road, single track.

THE CHICAGO & NORTH WESTERN plans during the coming year to put in an electric interlocking plant at Deering, Ill., of 44 levers. This is at the crossing of the Chicago river. Another electric interlocking of 100 working levers is to be put in at Washington street, Milwaukee, to take the place of two mechanical interlockings.

THE NORFOLK & WESTERN plans during the coming year to install automatic block signals on 62 miles of line, as follows: On the new line now under construction between Burkeville, Va., and Pamplin, 37 miles; and on lines now operated under the manual block system, 25 miles, as follows: Poe to Jack, Jack to Church Road, Pepper to Belspring and Pembroke to Ripplemead. The company proposes also to install four electric interlocking plants; Burkeville, Va., 15 working levers, A. C.; Pamplin, Va., 33 working levers, A. C.; Jack, Va., 19 working levers, A. C., and Low Grade Tunnel, Va., 26 working levers, D. C. At City Point, Va., an electro-mechanical plant is to be installed, 11 mechanical and 5 electric levers.

Supply Trade News

Clifton H. Whall, senior member of C. H. Whall Company, Boston, Mass., died at Atlantic, Mass., on December 2.

Henry C. Kloos, of the electrical staff of the Pullman Company, Boston, Mass., died at Atlantic, Mass., on December 2.

The American Steel Foundries have taken over the Elliott brake beam safety hanger hitherto made by the Elliott Company of Philadelphia.

Leon S. Moisseiff, until recently chief of the division of design of the department of bridges of New York City, has opened an office for the practice of consulting civil engineering at 69 Wall street, New York.

Edward N. Lake, formerly in charge of the Chicago office of the Stone & Webster Engineering Corporation, has become a partner in the Krehbiel Company, engineers and contractors, with offices in the Marquette building, Chicago.

A new corporation has been formed with a capital of \$5,000,000, half of which will be preferred and half common stock, to take over the business and property of the New York State Steel Company, Buffalo, N. Y., recently acquired by William H. Donner, president of the Cambria Steel Company, for \$2,750,000. The new company will be known as the Donner Steel Company, and its directors will be Harry Yates, Frederick Slee and Ralph S. Kent, all of Buffalo.

Interests headed by R. B. Phillips, treasurer and general manager of the American Steam Gage & Valve Manufacturing Company, Boston, Mass., have purchased the National Acme Manufacturing Company, Cleveland, O., and the Windsor Machine Company, Windsor, Vt., two of the largest manufacturers of spindle automatic screw machines in the country. It is understood that a new company will be organized under the name of the Phillips Corporation to take over these two companies, the American Steam Gage & Valve Manufacturing Co. and the R. B. Phillips Manufacturing Co. of Worcester and Lowell, Mass.

J. Leonard Replogle, who recently acquired a large interest in the Cambria Steel Company, held a conference at Johnstown, Pa., on Wednesday last with persons representing the plans and shares of the company. The conference was called by Mr. Replogle to consider a proposition made by him to the stockholders asking for an option on the shares at \$80. It is understood that Mr. Replogle is promoting a plan for a merger of a number of independent steel companies, including the Cambria and Lackawanna Steel Companies, the Newport News Shipbuilding Company, the Youngstown Steel & Tube Company and either the Inland or the Iroquois Steel Company.

At a meeting of the board of directors of the Cambria Steel Company recently held in Philadelphia, Herbert F. Black of Pittsburgh, J. Leonard Replogle of New York and Arthur E. Newbold of the firm of Drexel & Co., of Philadelphia, were elected directors succeeding Samuel T. Bodine, Theodore N. Ely and Childs Frick, son of Henry C. Frick. Mr. Replogle is vice-president and general manager of sales of the American Vanadium Company. Mr. Black is special agent of the Cambria Steel Company and in charge of the buying and distribution of ore, coal, scrap and supplies. Messrs. Replogle and Newbold have been made members of the executive committee.

The Pressed Steel Car Company announces the following changes in its organization, effective December 1: N. S. Reeder has been elected vice-president with headquarters at New York. J. B. Rider has been elected vice-president with headquarters at Pittsburgh, Pa., and will continue to perform the duties of general manager in charge of operations. J. F. MacEnulty, formerly general sales manager, has been elected second vice-president with headquarters at New York. C. E. Postlethwaite, formerly manager of sales, central district, at Pittsburgh, has been appointed general sales manager of the Pressed Steel Car Company and the Western Steel Car & Foundry Company with headquarters at New York. H. F. Hoffstet has been appointed assistant manager of sales of the central district with headquarters at Pittsburgh, Pa.

Railway Construction

ANTHONY & NORTHERN.—Work on the extension of this road is now under way between Trousdale, Kan., and Kinsley, 24 miles, also on a line between Trousdale and Larned, 24 miles. Frank Thompson Byers is the contractor.

CANADIAN PACIFIC.—The Lake Erie & Northern, which is an electric line, leased to the Canadian Pacific, laid 31.4 miles of track during 1915. The line is now completed between Galt, Ont., and Port Dover, 53 miles.

CAROLINA, GREENEVILLE & NORTHERN (ELECTRIC).—This company which plans to build a line from Bristol, Tenn., west to Kingsport, thence southwest via Newport and Sevierville to Knoxville, about 140 miles, has sold bonds, it is said, to secure funds to build the line and to buy equipment. A contract for some of the work was let in July to A. H. Jacoby, Greeneville, Tenn. It is understood that construction work will be started soon. H. S. Reed, president, Los Angeles, Cal.; F. A. H. Kelley, chief engineer, Greeneville, Tenn. (July 2, p. 38.)

CINCINNATI, HAMILTON & DAYTON.—Ferguson & Edmonson, Pittsburgh, Pa., have been awarded a contract for double-tracking between Dayton, Ohio, and Cincinnati.

EAST ST. LOUIS & SUBURBAN.—This company has projected an extension from Alton, Ill., to the state insane asylum, one mile.

EDMONTON, DUNVEGAN & BRITISH COLUMBIA.—Grading work on the Grand Prairie branch building from Spirit river, Alta., south to Grand Prairie City, 50 miles, is about finished. The company does not expect to start track laying on the branch until next year.

FORT SMITH, POTEAU & WESTERN.—This company, which operates a three-mile line from Poteau, Okla., to Wittville, has projected an extension from Poteau south for ten miles.

GRASSE RIVER.—This company which operates a line from Childwold, N. Y., to Cranberry Lake, 15 miles, is owned by the Emporium Forestry Company, Conifer, N. Y. The company is building a line from Cranberry Lake towards the Carthage & Adirondack branch of the New York Central, on which track has been laid for one mile. The line may eventually be extended to connect with the New York Central at a point between Benson Mines and Newton Falls. Construction work has been suspended until next spring.

GREEN BAY & EASTERN.—This company has been incorporated to construct a railway from Green Bay, Wis., through Manitowoc to Sheboygan, a distance of 70 miles. Charles Frazier and Rude Stocking, Manitowoc, are among the incorporators. Capital stock, \$50,000.

GULF, FLORIDA & ALABAMA.—This company has surveys completed for an extension from Kimbrough, Ala., north to Jasper, 158 miles. (September 3, p. 448.)

GULF & INTERSTATE.—The L. J. Smith Construction Company, Kansas City, Mo., has been awarded the contract for the reconstruction of 23 miles of this road which was destroyed by the recent Galveston (Tex.) flood.

HENRYETTA, OKLAHOMA & WESTERN (ELECTRIC).—This railroad is being built from Henryetta, Okla., through Dewar, to Kusa, with a branch north to Colton and Pleasant Valley, and from Henryetta to Creek mines, making a total of 10 miles. The grading contract has been let to Ally Brothers, but the contract for track laying has not yet been awarded. The maximum grade will be about 2 per cent.; approximately 8,000 cu. yd. of material are being handled per mile. One bridge and one viaduct will be built. W. T. Croslen, president, Oklahoma City, Okla.

JEFFERSON & NORTHWESTERN.—This company which operates a line from Jefferson, Tex., to Camp, 31 miles, and a branch to Linden, 5.5 miles, has amended its charter to provide for building an extension from the present northern terminus to Kildare, where connection is to be made with the Texas & Pacific.

It is announced that construction work on the proposed extension will be started as soon as the survey is finished.

INTERBOROUGH RAPID TRANSIT.—This company during 1915 laid 2.58 miles of track which was put in operation in June, 1915, on the Queensboro subway, which is 1.47 miles long. On the Manhattan division elevated line 15.38 miles of track was added which has not yet been put in operation.

KANAWHA, GLEN JEAN & EASTERN.—This company is making surveys to build an extension from Tamroy, W. Va., south to Beckley, 8.05 miles. (June 4, p. 1181.)

KANSAS & OKLAHOMA SOUTHERN.—This company, which was organized to build a line from Caney, Kan., to Vinita, Okla., 61 miles, is now making active preparations for resuming construction work. About 35 miles of the line has been graded and is ready for track laying. There has been spent about \$320,000 for the right of way and for grading the line, also for grading the terminals in the city of Caney. The company is preparing for another trusteeship, also an issue of \$2,000,000 of bonds, and expects to use the proceeds to finish work on the 61 miles of railway. S. M. Porter, president, Caney, Kan.; B. J. Dalton, chief engineer, Lawrence.

LAKE ERIE, FRANKLIN & CLARION.—This company is building with its own forces a line from a point near Coleman's spur, Pa., to Reed Mine, 1.5 miles.

LAKE ERIE & NORTHERN.—See Canadian Pacific.

LOUISIANA & ARKANSAS.—This company has projected an extension from Wildsville Junction, La., to Vidalia, 22.59 miles. This company now operates a line from Hope, Ark., southeast to Alexandria, La., with a branch from Packton east to Wildsville Junction, and another branch from Minden west to Shreveport, in all about 278 miles.

MARLIN & TEMPLE INTERURBAN.—Organized in Texas with office at Marlin, to build an interurban electric railway between Marlin and Temple, about 30 miles. A survey for the proposed line was made recently, and arrangements for the construction work are about completed.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—An officer writes regarding the report that an extension is to be built from Centreville, Tenn., to Totty's Bend, about five miles, that this refers to an old track which has not been in use for a number of years. This track has been rebuilt recently.

NEW YORK, NEW HAVEN & HARTFORD.—This company has projected extensions of first track at various points aggregating 1.48 miles, and has also projected extensions of second, third and fourth track aggregating 69 miles.

NEW YORK SUBWAYS.—Booth & Flynn, Ltd., New York, submitted the lowest bid at \$6,631,000 for the construction of the tunnel under the East river between Fourteenth street, in the borough of Manhattan, to North Seventh street in the borough of Brooklyn. (Nov. 19, p. 986.)

PACIFIC ELECTRIC.—This company during 1915 built new main track from Arlington, Cal., to Corona, 7.77 miles, and short extensions at Highland and at Riverside, in all 8.51 miles. Work is now under way on an extension to Hawthorne, 4.77 miles. This company also laid 2.03 miles of second track during 1915.

PHILADELPHIA ROADS.—The lowest bid for building the foundations of the Frankford Elevated line from Unity street to Dyre street, Philadelphia, Pa., was submitted by Edwin H. Vare, Philadelphia. He offered to do the work for \$17,700. (Nov. 26, p. 1032.)

RADFORD-WILLIS SOUTHERN.—Grading work is now under way on the line to be built from Radford, Va., southeast to Willis, about 25 miles. J. L. Vaughan, president, Shawsville, Va. (July 9, p. 81.)

RAILWAY VALLEY.—This company, which operates a line from Roselle, N. J., to Summit, 8.8 miles, is building a three-mile extension. Grading work is in progress, also masonry work on the extension. The construction work is being carried out by the company's forces. (November 12, p. 923.)

RICHMOND, RAPPAHANNOCK & NORTHERN.—Contracts are to be let on December 13, it is said, to build from West Point, Va., northeast to Urbanna, 17 miles. (Aug. 20, p. 369.)

ROBY & NORTHERN.—Surveys are now being made by this

company for an extension to be built from Roby, Tex., to Longworth, 7 miles.

SAN DIEGO & ARIZONA.—Work is now under way on a section from Campo, which is on the international boundary between the United States and Mexico to a point two miles east of Campo. Contract let to Robert Sherer & Co., Los Angeles, Cal. Surveys have already been made to build from a point two miles east of Campo to Corriso Pass, Cal., 36 miles.

SAVANNAH & SOUTHERN.—This company, which now operates a line from Lanier, Ga., south to Willie, 12.6 miles, plans to build an extension from Willie, southwest to Glenville, about 16 miles.

SOUTHERN NEW ENGLAND.—This company, building a line from Palmer, Mass., southeastward to Providence, to give the Grand Trunk a line into Rhode Island, has petitioned the Massachusetts legislature to extend the time within which the road must be completed. Its time expires August 3, 1916, and President Edward C. Smith says the work cannot be finished by that date. (April 30, p. 955.)

ST. LOUIS & SAN FRANCISCO.—This road has awarded a contract to the J. W. Murray Contracting Company, Kansas City, Mo., for 4,000 ft. of revetment work on the Red river, above Arthur City, Tex.

TAMPICO & PANUO VALLEY.—This company has work under way on an extension from Panuco, Mexico, to El Higo, 25 miles. The work is being carried out by company forces.

TUCSON, CORNELIA & GILA BEND.—Work is now under way from mile post 35 to mile post 44, Ajo, Ariz., 9 miles. This is the last section to complete the line from Gila Bend south to Ajo. J. H. Maxey, Gila Bend, Ariz., has contracts for grading, bridges and tracklaying. R. H. Jones, chief engineer, Warren, Ariz. (August 13, p. 301.)

YANKTON & NORTHERN.—This company has been organized for the purpose of constructing a railway from Yankton, S. D., north through Turner county, through Salem, McCook county, and through Lake county to Lake Preston, Kingsbury county; thence northeast through Hamlin county to Watertown, S. D. Grading work has been deferred until the spring of 1916. President, E. S. Johnson, and secretary, D. M. Finnegan, Yankton, S. D.

RAILWAY STRUCTURES

ASHLAND, WIS.—The Chicago & North Western is about to let a contract for the extension of two coaling docks. Fifty-six pockets will be added to one dock and 44 to the other, adding 23,000 tons to their present combined storage capacity of 107,000 tons. The docks are timber structures of modern type and both carry four tracks. The improvement will cost about \$300,000.

COWAN, TENN.—The Nashville, Chattanooga & St. Louis is making extensive improvements on the Chattanooga division. Considerable enlargement of the facilities at Cowan have been authorized, and grading work has been started for new yards at Cowan. The capacity of the old yards has been increased to 100 cars, and grading is under way for laying additional tracks to bring the capacity of the yards up to 275 cars. Work has been started on a new automatic coaling station which will serve engines on three tracks. The coaling station will be operated by electricity, and the chutes will later be extended so that four tracks may be served. The company contemplates improvements on about two miles of track just north of the new yards to reduce the grade from 1 per cent to one-half of 1 per cent. This work will involve a cut of 14 ft. through the hill just north of Cowan and making an 18-ft. fill further north.

DALLAS, TEX.—The Union Terminal Company has secured building permits from the city for the following buildings, which will represent a total investment of \$102,675, divided as follows: engine house, \$42,000; turntable, \$12,000; central power house, \$8,500; boiler house, \$10,000; two service buildings, \$6,600; oil delivery tank, \$1,000; engine supply house, \$1,200; double tool house, \$500; single tool house, \$350; water tank, \$5,500; sand house, \$725; coaling dock, \$1,800; ice house, \$500; toilet building, \$1,000; hose reel house, \$100; north signal tower, \$4,000; south signal tower, \$3,500; oil pump, \$3,000; blow-off boxes, \$400.

DYERSBURG, TENN.—The Illinois Central is asking for bids on

the construction of a frame 4-stall, 100-ft. roundhouse, to cost about \$10,000. Adjoining buildings for storage, tool and locker purposes are also contemplated.

JOPLIN, MO.—The Horton Construction Company, Kansas City, Mo., has received a contract for the erection of a reinforced concrete viaduct, to cost approximately \$19,000. The structure will have a 24-ft. roadway and will be paved with wood blocks. The cost will be borne jointly by the city and the Joplin Union Depot Company.

READING, PA.—The Philadelphia & Reading has given contracts to John Donahoe, Mahanoy City, Pa., to build an overhead bridge carrying Fourth street to consist of one 33-ft. 6-in. span, also to build an overhead bridge carrying Schuylkill avenue to consist of one 28-ft. span and two 17-ft. 6-in. spans on the Lebanon Valley branch of the Philadelphia & Reading. These bridges are to be of concrete steel construction.

TWO HARBORS, MINN.—The Duluth & Iron Range will soon begin the construction of an ore dock to have 228 pockets, a total capacity of 68,400 tons and a total length from the innermost pocket to the extremity of the dock of 1,368 ft. The structure will carry four tracks and will be built of steel to rest on a concrete foundation. Concrete pocket linings have also been specified. The road has ordered 650 tons of steel from the American Bridge Company for ore spouts.

VISALIA, CAL.—E. E. Etherton, Monadnock building, San Francisco, Cal., has been awarded a contract by the Southern Pacific for the construction of a passenger depot, to cost about \$43,000.

YANKTON, S. D.—The Yankton County Bridge Company will build a combination wagon and railroad bridge across the Missouri river, to have a total length of about 1,600 ft. and an average length between piers of 350 ft. The piers will extend about 80 ft. to hard pan. Construction work will not begin until the spring of 1916. E. A. Bruce, Yankton, S. D.

A GOOD EXAMPLE.—The American Association of Passenger Traffic Officers sets a good example to all the other railway associations. We refer to the resolution looking to the elimination of the usual addresses of welcome by state and city officers and the curtailment of entertainment features. The perfunctory address of welcome and the social feature can be classed together only in that they take up time and attention. Beyond this point, they appear as entirely different things. The social feature is everywhere a wholesome prompting of nature, and the conventions can time it so it will not interfere with their work proper. The address of welcome by the mayor is under no such control. Being an official personage, compels recognition but does not make an entertaining speaker of a man. The Governor must also be invited to speak, and here hope is again blasted because when the curtain rises we usually find that His Excellency a few days ago caught a bad cold and that his Cheap Clerk has been sent to deliver the welcome on the part of the State. And thus the average convention is in for a waste of the best part, if not all, of its first morning session. An opening prayer by a local minister is sufficient. If the Lord is with us, and the hotels don't run up their rates on us, there is no need of the mayor and the Governor. And, is it a certainty that these events afford much enjoyment to the governors and mayors? Not if they are asked to be on hand promptly at 10 o'clock, and have to wait till 10:30 or 11 for the convention to be called to order. . . . —*Railroad Herald*.

ENGLISH RAILWAY CLERKS' BONUS.—The Railway Clerks' Association announces that practically all the large railway companies and a number of the lesser ones in England and Scotland have now granted additional war increases to their male clerical staffs, bringing total war bonus up to 5s. (\$1.25). The new concessions are on the same scales as those recently granted to railwaymen. Men receiving a 3s. (75 cents) bonus obtain an extra 2s. (50 cents), and those in receipt of 2s. just now are granted an additional 3s. Clerks below 18 years of age have their bonus increased to 2s. 6d. (38 cents). All the Scottish companies have also granted the bonus to their permanent women employees, while the London & North-Western and Great Western Companies have given an additional 1s. to those women previously in receipt of bonuses. None of the Irish railway companies has so far seen its way, owing to financial considerations, to make an additional grant at the present time.

Railway Financial News

BALTIMORE & OHIO.—The Ohio Public Utilities Commission has given its approval to the issue of \$60,000,000 refunding and general mortgage 5 per cent bonds which were recently sold by the Baltimore & Ohio subject to the approval of state commissions having jurisdiction over the Baltimore & Ohio.

BUFFALO & SUSQUEHANNA.—The bondholders' committee, which bought the Buffalo & Susquehanna at the foreclosure sale, has resold the property to Charles A. Finnegan of Buffalo, Theodore Hofeller of Buffalo, and A. Weber of Louisville, Ky. The price is said to be \$800,000. The road is now being operated and the purchasers are quoted as saying that they expect to be able to continue its operation at a profit. The company has trackage rights only into Buffalo, but owns 2,500 ft. of dock front and about 25 acres on the lake front.

IDAHO SOUTHERN.—The Commercial & Financial Chronicle says that this road, running from Gooding, Idaho, to Jerome, 24 miles, has been placed in the hands of D. C. McWalkers as receiver.

MISSISSIPPI, HILL CITY & WESTERN.—This road was recently sold at auction for \$200,000 to representatives of the Armour interests. The road runs from Hill City, Minn., to Swan river, on the Great Northern, 18 miles.

MISSOURI PACIFIC.—Receiver B. F. Bush, of the Missouri Pacific, has been authorized by the United States District court in charge of the receivership, to institute suit against George J. Gould for the recovery of valuable real estate in the neighborhood of St. Louis and Mt. Pleasant, Mo., title to which it is alleged had been vested in Gould as trustee for the railroad and which he had refused to turn over to the road.

NEW YORK CENTRAL.—General mortgage bonds of the Cleveland, Cincinnati, Chicago & St. Louis to the amount of \$4,000,000, owned by the New York Central, have been sold to J. P. Morgan & Company. These bonds came into the treasury of the New York Central in connection with the consolidation of the Central and the Lake Shore & Michigan Southern.

RUTLAND RAILROAD.—See an item in Court News in regard to the dismissal of the suit against the directors and former directors.

ST. LOUIS & SAN FRANCISCO.—The syndicate which is to underwrite the reorganization plan of the St. Louis & San Francisco is understood to include Speyer & Co., J. & W. Seligman & Co., the Guaranty Trust Company, all of New York, and Lee, Higginson & Co., Boston.

ST. LOUIS & SAN FRANCISCO.—In the testimony presented to the Missouri Public Service Commission in the effort which is being made to obtain their consent to the St. Louis & San Francisco reorganization plan, Frederick Strauss, a member of the firm of J. & W. Seligman & Co., New York, testified that B. F. Yoakum, formerly chairman of the board of directors of the St. Louis & San Francisco, had asked to be given the chairmanship of the executive committee or a place on the voting trust committee of the reorganized company, but the bondholders and bankers under whom the reorganization is being carried out refused to grant this request.

WABASH-PITTSBURGH TERMINAL.—It is understood that about \$4,000,000 of the \$9,000,000 that was to be raised under the reorganization plan has been subscribed for by the first mortgage bondholders on whom an assessment was made of \$300 per \$1,000 bond. A syndicate has been formed, headed by Sutro Brothers & Co. and H. P. Goldschmidt, to underwrite the remaining \$5,000,000.

LARGE RECEIPTS OF CUBAN ORES.—In three days last week five ore vessels from Cuba arrived and were unloaded at the dock of the Maryland Steel Company, Sparrows Point, Md., setting a new record. The total amounted to 29,500 tons. Part was reshipped to the Steelton plant of the Pennsylvania Steel Company.—*From the Iron Age of December 2.*

ANNUAL REPORT

REPORT OF THE DIRECTORS OF THE SEABOARD AIR LINE RAILWAY FOR THE FISCAL YEAR ENDED JUNE 30, 1915

PORTSMOUTH, VA., October 28th, 1915.

To the Stockholders of the Seaboard Air Line Railway:

The Board of Directors submits the following report of the operations of the property for the year ended June 30, 1915:

INCOME ACCOUNT
FOR YEAR ENDED JUNE 30, 1915.

	1915	1914	Decrease
Gross Revenue	\$21,280,462.79	\$25,420,503.24	\$4,140,040.45
Operating Expenses and Taxes	15,984,781.03	18,462,705.92	2,477,924.89
Net Operating Revenue (after Taxes)	\$5,295,681.76	\$6,957,797.32	\$1,662,115.56
Uncollectible Railway Revenue	8,902.94	.....	8,902.94†
Operating Income	\$5,286,778.82	\$6,957,797.32	\$1,671,018.50
Other Income	348,227.69	298,996.38	49,231.31†
Hire of Equipment.....	(Cr.) 85,616.97	(Dr.) 266,223.68	351,840.65†
Gross Income	\$5,720,623.48	\$6,990,570.02	\$1,269,946.54
Rents and Other Charges..	200,735.63	172,418.35	28,317.28†
Applicable to Interest.....	\$5,519,887.85	\$6,818,151.67	\$1,298,263.82
Fixed Interest Charges....	3,928,255.49	3,893,935.91	34,319.58†
Balance	\$1,591,632.36	\$2,924,215.76	\$1,332,583.40
Full 5% Interest on Adjust- ment (Income) Bonds....	1,250,000.00	1,250,000.00	.....
Net Income	\$341,632.36	\$1,674,215.76	\$1,332,583.40

† Increase.

NOTE.—Revenue and Expense figures for the year 1914 have been revised for comparative purposes to agree with the Interstate Commerce Commission's classification effective July 1, 1914.

The Gross Revenue decreased 16.29 per cent., Operating Expenses decreased 14.55 per cent., Taxes increased 6.33 per cent., Operating Expenses and Taxes decreased 13.42 per cent., and Operating Income decreased 24.02 per cent.

The Operating Expenses, exclusive of Taxes, were 70.12 per cent. of the Gross Revenue, as compared with 68.70 per cent. the previous year; and including Taxes, 75.11 per cent. of Gross Revenue as compared with 72.63 per cent. for the preceding year.

MILEAGE OPERATED.

The mileage of the Seaboard Air Line Railway in operation on June 30, 1914, was	3,097.55
Extensions, etc., constructed during the year as detailed on page 5	26.41
Less Spur Tracks taken up.....	.82

Mileage in operation June 30, 1915.....	3,123.14
Made up as follows:	

The owned mileage of the Seaboard Air Line Railway and branches on June 30th, 1914, was.....	3,021.83
Extensions, etc., constructed during the year.....	26.41
Less Spur Tracks taken up.....	.82

Mileage Owned June 30th, 1915.....	3,047.42
------------------------------------	----------

LEASED LINES

Meldrim, Ga., to Lyons, Ga.....	\$7.65
---------------------------------	--------

TRACKAGE

Howells, Ga., to Atlanta, Ga.....	3.00
Hilton, N. C., to Navassa, N. C.....	2.40
At Birmingham, Ala.....	.07
Freight Yard Jct., Birmingham to Bessemer, Ala.....	14.88
At Bessemer, Ala.....	.16
Near Mulberry, Fla.....	1.46
	79.62
	3,127.04

DEDUCT

Amelia Beach branch, leased to City of Fernandina, Fla.....	2.00
Silver Springs, Fla., branch, leased to the Ocala Northern Railway	1.90

Total mileage operated June 30, 1915.....	3,123.14
Average miles of road operated during the year.....	3,105.59
Average miles of road operated shows an increase over previous year of	00.69%
Sidings (including 21.83 miles on Leased Lines and Trackage	867.05

SECOND TRACK

Hamlet, N. C., Northwardly.....	9.61
At Birmingham, Ala.....	3.05
Between Raleigh, N. C., and Cary, N. C.....	7.59
At Tampa, Fla.....	1.32

TOTAL	21.57
-------------	-------

CAPITAL STOCK

There has been no change in the capital stock during the year.

FUNDED DEBT UNMATURED

There has been no change in the funded debt during the year.

EQUIPMENT

An Equipment Agreement, Series "Q," was entered into July 1st, 1914, for the purchase of:

10 Mountain Type Passenger Locomotives,	
19 Mikado Type Freight Locomotives,	
7 All Steel Passenger Coaches, with reclining chairs,	
8 All Steel Passenger Coaches, with Walkover Seats,	
5 All Steel Mail and Baggage Cars,	
7 All Steel Postal Cars,	
9 All Steel Passenger and Baggage Cars,	
9 All Steel Express Cars,	
462 Steel Upper and Underframe Ventilated Box Cars,	

for which \$160,043.81 was paid in cash and equipment trust obligations aggregating \$1,440,000.00 were issued, payable in twenty consecutive semi-annual instalments of \$72,000.00 each, bearing interest at the rate of 5% per annum. All of this equipment was received during the fiscal year.

EXTENSIONS

Extensions to the Company's lines in Florida were completed during the year as follows:

From Bartow, Fla., to Baynard, Fla. (Lake Wales Extension)...	22.04
Connor & Shallenberger Spur off Lake Wales Extension.....	0.78
Pembroke, Fla., to Jumeau Phosphate Plant.....	3.59

Spurs Removed during the year.....	26.41
Net Increase	25.59 Miles.

MAINTENANCE OF WAY AND STRUCTURES
ROADWAY, TRACK AND STRUCTURES

Roadway, track and structures of the railway have been properly maintained at a cost of \$2,414,866.20, which represents an expenditure per mile of road of \$777.59. (See general remarks page 8.)

SIDE TRACKS

13.07 miles of new sidings and extensions of existing sidings were constructed, and there were deducted by removal and changes of old sidings, 5.33 miles, making a net increase over previous year of 7.74 miles.

There were also added 1.75 miles leased sidings.

TIE RENEWALS

Tie renewals were 1,328,761 cross ties and 745 sets of switch ties, and the cost, \$583,594.83, was charged to Operating Expenses.

RAIL

11.67 miles of new 85-lb. steel rail were laid in the main line, releasing therefrom 68 and 80-lb. worn rail, and there was charged net to Operating Expenses therefor \$8,904.66, and to Capital Account \$21,906.86.

In addition, 11.31 miles of released 80-lb. steel rail were laid on branch lines, releasing 60-lb. and lighter rail, and there was charged to Operating Expenses therefor, \$3,117.62, and to Capital Account, \$14,898.98.

There has also been received and distributed along the main line ready to lay 34 track miles of new 90-lb. and 26.5 track miles of new 85-lb. steel rail.

BALLAST

73,269 cubic yards of gravel and slag ballast were put under main line track and of the total cost thereof \$27,108.11 was charged to Capital Account.

TRESTLES FILLED

990 lineal feet of wooden trestles were filled in during the year and of the total cost thereof, including culverts, \$11,141.48, was charged to Operating Expenses.

TRESTLES REBUILT AND BALLAST DECKED

There were built during the year out of creosoted timber, 2,904 lineal feet of ballast decked trestles, replacing old open deck trestles, and the cost thereof, \$40,427.95, was charged to Operating Expenses.

TRESTLES STRENGTHENED

Additional stringers were put in 19 trestles between Columbia, S. C., and Jacksonville, Fla., on the South Carolina Division, during the year to provide for use of heavier power, the cost of which, \$1,768.37, was charged to Capital Account.

BRIDGES

Work has been done on sixteen bridges, repairing, adding signals, replacing with steel or strengthening them for heavier power. Of this number, fourteen have been completed.

Seven of the above bridges were authorized during this year and five of the seven have been completed. One of the uncompleted bridges is a reinforced concrete viaduct for highway and street railway traffic, on Duval Street, Jacksonville, Fla., over Hogan's Creek, and the tracks of the Seaboard Air Line Railway and the St. Johns River Terminal Company. This viaduct will be completed during the coming year and will be approximately 1,418 feet long, with a total width of 42 feet.

Of the bridges completed the principal ones are:

	Length.
Fourth Street, Wilmington, N. C., reinforced concrete highway overpass	70 feet.
Alston Avenue, Durham, N. C., highway underpass, deck girders on concrete masonry	90 "
Eleventh Street, Charlotte, N. C., highway overpass, creosoted timber, concrete foundations	89 "
Armour, Ga., reinforced concrete double-track extension, Southern Railway overpass	78 "
Whitford Avenue, Atlanta, Ga., highway underpass, eyebeams on pile foundations	56 "
Howells Mill Road, near Atlanta, Ga., highway overpass, plate girders on creosoted timber foundations.....	120 "
Gaston Street, Chester, S. C., highway overpass, timber construction with concrete masonry.....	80 "

The total expenditures for bridge work during the year were \$72,776.47, of which \$71,046.92 was charged to Capital Account and \$1,729.55 to Operating Expenses.

RAIL IN MAIN LINE

The total operated main line single track mileage of the system, 3,123.14 miles, are laid with steel rails of the following weights:

Miles.	Weight.
11.45	90 lb. rail.
361.08	85 "
84.41	80 "
1,211.76	75 "
163.48	70 "
201.05	68 "
18.87	65 "
60.48	63.5 "
3.05	60 5 "
493.55	60 "
34.95	60 "
221.38	58 "
256.73	56 "

The above does not include second track, etc. (next page).

SECOND TRACK

Northward from Hamlet, N. C.:	
9.06 Miles	90 lb. rail.
.52 "	75 "
At Birmingham, Ala.:	
1.43 Miles	75 "
1.62 "	60 "
Raleigh, N. C., to Cary, N. C.:	
5.88 Miles	85 "
1.71 "	75 "
At Tampa, Fla.:	
1.32 Miles	75 "

LEASED LINES

Silver Springs Branch:	
1.20 Miles	60 "
.70 "	56 "
Amelia Beach Branch:	
2.00 Miles	50 "

MAINTENANCE OF EQUIPMENT

The equipment of the Railway was properly maintained during the year at a cost of \$3,175,642.45. (See general remarks, page 8.)

Included in the cost of maintenance is \$28,614.49, representing value of equipment destroyed or retired from service during the year and credited to Cost of Equipment.

There was also included in the Cost of Maintenance \$412,626.00 for depreciation, which was credited to Reserve for Accrued Depreciation.

The cost of maintenance per article owned was as follows:

Average cost per annum per Locomotive owned.....	\$2,095.69
Average cost per annum per Passenger car owned.....	733.77
Average cost per annum per Freight car owned.....	54.11

GENERAL REMARKS

On account of the European war the important agricultural and industrial activities served by your lines were affected, resulting in a decrease in gross revenues of \$4,140,040, or 16.29 per cent. as compared with the previous year.

This decrease was largely caused by the interruption of the exportation of certain commodities consisting principally of cotton, phosphate rock and naval stores, and the importation of fertilizer materials. The business depression resulting from the war also caused decreases in movements of lumber, fertilizer, general merchandise and practically all other commodities. Weather conditions in Florida unfavorable to trucking also caused a decrease in the perishable vegetable shipments.

The general business depression caused also a decrease in passenger business.

As an offset against the decrease in revenue above shown, a reduction was made in Operating Expenses amounting to \$2,541,172, or 14.55 per cent. The greatest item of reduction was made in Transportation Expenses, consisting of \$1,577,776, or 16.8 per cent.

Realizing at the outset of the European war that there was a necessity for the greatest possible economy consistent with safety and proper upkeep, a careful and searching analysis was made of the proposed expenditures for Maintenance of Way and Structures and Maintenance of Equipment for this fiscal year, and a plan laid out by which only such expenditures were made as were absolutely necessary to comply with the conditions above outlined. By these means your property has been fully maintained.

Extensive improvements and additions have been made to the General Office building at Portsmouth, Va., which consisted of remodeling, with fireproof construction, the original building, adding two stories thereto, and thereby providing modern office facilities. No promise has been made for the occupancy of these offices for any stipulated period, but it is felt that as long as the present conditions last the arrangement is of advantage to the company.

During this year a contract was entered into with the Southern Railway providing for the joint use of the Seaboard Air Line and the Southern Railway's tracks between Raleigh, N. C., and Cary, N. C., as a double track, these tracks being immediately parallel for the entire distance.

1.32 miles of double track has been put into service at Tampa, Fla., from Tampa Northern Junction to Twigg Street.

A Union Station at Bartow, Fla., has been built during the year, and the one at Hartsboro, Ala., mentioned in last year's report, has been completed.

A passenger station has been completed at Marston, N. C., and the one at Rockingham, N. C., mentioned in last year's report, has been finished.

Combination passenger and freight stations have been constructed during the year at North, S. C., Terra Ceia, Fla., and Kingsland, Ga.

The freight depot at Carrsville, Va., has been extended, providing passenger facilities therein. A freight depot has been built during the year at Hawthorne, Fla.

At Apex, N. C., both a passenger station and a freight station have been provided, together with necessary track changes and additions to serve same.

The passenger shelter shed and granolithic walks at Portsmouth, Va., mentioned in last year's report, have been completed.

At Wake Forest, N. C., an umbrella shed has been provided in connection with present passenger facilities.

A passenger shed has been provided at South Clinton, S. C.

A car repair shed has been provided at Cayce, S. C., in connection with other shop facilities.

Necessary dredging has been done at Jacksonville, Fla., in slip between Warehouse No. 2 and No. 3, to maintain proper depth of water, and necessary dredging is now in progress in slips 1, 2 and 3, and river front, at Hutchinson's Island, Savannah, Ga.

The reinforced concrete coal elevator with 300-ton storage bin at Savannah, Ga., mentioned in last year's report, has been completed.

The 100,000-gallon capacity steel tank, together with pipe lines for auxiliary fire protection at Hutchinson's Island, Savannah, Ga., mentioned in last year's report, has been completed and put into service.

Modern interlocking plants have been provided at Burroughs, Ga., and Bartow, Fla., and the one at Pembroke, N. C., mentioned in last year's report, has been completed.

A wooden cotton platform has been provided at Greenwood, S. C., and a reinforced concrete cotton platform at Maxton, N. C.

Paving and street work has been done at Henderson, N. C., Columbia, S. C., Cordele, Ga., Columbus, Ga., Manatee, Fla., Bradentown, Fla., and at several other points on the system, to comply with municipal requirements.

Crossing gates have been installed at Hermitage Road, near Richmond, Va., and on Elmwood Avenue, Columbia, S. C.

A coal trestle has been built jointly with the Durham & Southern Railway at Durham, N. C., during the year.

Additional storage tracks have been provided during the year at Nitro-lee, S. C.

Interchange tracks have been provided with the Maxton, Alma & South-bound Railroad at Alma, N. C., with the Norfolk Southern Railroad Co. at Charlotte, N. C., and the Southern Railway at Franklin, Va.

Three track scales were rebuilt with concrete foundations and steel "I" beams replacing wood.

Three old water tanks at McKenny, Va., Collins, Ga., and Palmetto, Fla., were replaced with modern 50,000-gallon tanks and suitable pumping facilities provided.

New water station has been provided at Schofield, S. C. 65 industrial sidings and extensions to industrial sidings already existing have been constructed or are in process of construction.

40 depots and freight stations have been constructed or substantially added to during the year.

17 passing tracks have been constructed or extended or are in process of construction.

The use of creosoted piling has been continued in maintenance work on docks, wharves and trestles.

The work of the Valuation Committee, created in connection with Section 19-A of the Federal Act to Regulate Commerce, referred to in the last annual report, was continued during the year at a cost of \$57,215.39, which was charged to General Expenses,—an increase of \$42,232.10 over the preceding year.

The accounts for the fiscal year were examined by Messrs. Haskins and Sells, whose certificate appears on page 11.

There were no changes in the organization during the year.

The Directors wish to record herein their appreciation of the loyalty, efficiency and co-operative spirit displayed by the officers and employees of the company during this trying year.

By order of the Board:

W. J. HARAHAH,
President.

TABLE No. 9

CAPITAL EXPENDITURES FOR ROAD AND EQUIPMENT

YEAR ENDED JUNE 30, 1915.

SUMMARY OF EXPENDITURES:

Additions and Betterments on Existing Mileage.....	\$346,603.78
Equipment Acquired	1,419,342.90
Expenditures for Extensions.....	255,834.13
TOTAL	\$2,021,780.81

TABLE No. 10

TRAFFIC STATISTICS

YEAR ENDED JUNE 30, 1915, COMPARED WITH YEAR ENDED JUNE 30, 1914.

	1915	1914	Increase or Decrease
Average miles operated....	3,105.59	3,084.21	21.38

FREIGHT TRAFFIC

Revenue Freight	8,478,585	10,410,986	—1,932,401
Number of tons carried....			
Number of tons carried one mile	1,340,255,262	1,575,008,722	—234,753,460
Number of tons carried one mile per mile of road....	432,206	510,668	—78,462
Average distance hauled each ton	158.08	151.28	6.80
Total Freight Train Revenue	\$14,324,670.24	\$17,307,034.45	—\$2,982,364.21
Average amount received from each ton.....	\$1.68.951	\$1.66.238	\$.02.713
Average receipt per ton per mile	\$.01.069	\$.01.099	—\$.00.030
Freight Train Revenue per mile of road.....	\$4,612.54	\$5,611.50	—\$998.96
Freight Train Revenue per train mile	\$3.08.715	\$2.89.127	\$.19.588
Average number of tons per train mile	288.84	263.12	25.72
Average number of tons per loaded car mile.....	14.81	14.96	—15

ALL FREIGHT (Including Company's Material, hauled free).

Number of tons carried....	9,738,763	12,379,847	—2,641,084
Number of tons carried one mile	1,481,822,816	1,791,417,676	—309,594,860
Average number of tons per train mile	319.35	299.27	20.08
Average number of tons per loaded car mile.....	16.38	17.00	—62

PASSENGER TRAFFIC

Number of Passengers Carried	4,223,727	5,146,791	—923,064
Number of Passengers Carried one mile.....	211,817,463	247,690,882	—35,873,419
Number of Passengers Carried one mile per mile of road	68,205	80,309	—12,104
Average distance carried each Passenger	50.15	48.13	2.02
Total Revenue from Passengers	\$4,576,795.11	\$5,430,531.28	—\$853,736.17
Average Amount received from each Passenger....	\$1.08.359	\$1.05.513	\$.02.846
Average receipt per Passenger per mile.....	\$.02.161	\$.02.192	—\$.00.031
Passenger Revenue per train mile	\$.78.112	\$.88.974	—\$.10.862
Total Passenger Train Revenue	\$6,001,580.49	\$6,867,489.05	—\$865,908.56
Passenger Train Revenue per mile of road.....	\$1,932.51	\$2,226.66	—\$294.15
Passenger Train Revenue per train mile.....	\$1.02.429	\$1.12.519	\$.10.090
Average number of Passengers per train mile.....	36.15	40.58	—4.43
Average number of Passengers per car mile.....	6.79	7.86	—1.07

REVENUE AND OPERATING EXPENSES

Passenger and Freight Train Revenue	\$20,326,250.73	\$24,174,523.50	—\$3,848,272.77
Passenger and Freight Train Revenue per mile of road	\$6,545.05	\$7,838.16	—\$1,293.11
Gross Revenue	\$21,280,462.79	\$25,420,503.24	—\$4,140,040.45
Gross Revenue per mile of road	\$6,852.31	\$8,242.14	—\$1,389.83
Gross Revenue per train mile	\$2.02.572	\$2.10.089	—\$.07.517
Operating expenses.....	\$14,922,534.35	\$17,463,705.92	—\$2,541,171.57
Operating expenses per mile of road	\$4,805.06	\$5,662.29	—\$857.23
Operating Expenses per train mile	\$1.42.050	\$1.44.330	—\$.02.280
Net Operating Revenue....	\$6,357,928.44	\$7,956,797.32	—\$1,598,868.88
Net Operating Revenue per mile of road.....	\$2,047.25	\$2,579.85	—\$532.60
Net Operating Revenue per train mile	\$.60.522	\$.65.759	—\$.05.237

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WE GUARANTEE, that of this issue (the monthly Engineering & Maintenance Edition) 10,850 copies were printed; that of these 10,850 copies 7,327 were mailed to regular paid subscribers to the weekly edition, 1,871 to subscribers who get the Engineering & Maintenance Edition only, 244 were provided for counter and news companies' sales, 1,039 were mailed to advertisers, exchanges and correspondents, and 369 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 470,500, an average of 9,225 copies a week.

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GENERAL NEWS SECTION.....

*Illustrated.

A combination of the splendid showing which the Baltimore & Ohio has been making and an improvement in the railroad bond market made it possible for Daniel Willard, president of the Baltimore & Ohio, recently to sell \$60,000,000 of his company's bonds at a price that was advantageous to the railroad. This provided

A Contrast in State Regulation

the company with \$40,000,000 to refund notes which will fall due in the near future and new capital for additions and betterment work. The negotiations for the sale of these notes were carried on between Mr. Willard and the bankers rapidly, as this kind of negotiation so often is. Mr. Willard found on a certain day that he could get his price for the bonds. The deal was closed. If he had stopped to get the consent of the state public service commissions, which was necessary before the bonds could be issued, he would in all probability have lost his market. Another set of negotiations would have had to be begun and the price might have been by no means so advantageous for the company. Mr. Willard went personally before the Maryland Public Service Commission and the Ohio Public Service Commission and explained the situation to them. Both commissions gave their approval to the issue. There was, of course, no reason why they should not. However, the spirit in which the approval was given was highly praiseworthy. Co-operation of this kind from state commissions is rare and when it occurs deserves notice and commendation. Contrast this with the attitude of the Missouri commission in the Wabash reorganization. Security holders of the Wabash have accepted very heavy sacrifices. The new company has been formed on a sound and conservative basis and it is of the utmost interest to the territory served by the road as well as to its security holders that the new company should have every opportunity to make good. The secretary of state of Missouri has refused to give permission to the road to operate at all for a reason, which if valid, is entirely technical and trivial. This is the danger that is continually inherent in the control of interstate railways by the states.

Window dressing is a term applied to a good showing made by a corporation preparatory to the sale of an issue of securities to the public. Probably a majority of American railway presidents have been under the necessity of window dressing at some time in their lives in order to sell through their bankers a large new issue of securities. When a good showing in net is made at the expense of maintenance appropriations, or when dividends are paid that are not justifiable in order to strengthen the market for the company's securities, the effect of window dressing is objectionable. When it is simply a marshaling of the facts it is part of the art of salesmanship which every seller has to resort to to some extent. The Seaboard Air Line has sold to a syndicate headed by the Guaranty Trust Company and the National City Bank, both of New York, \$22,894,000 first and consolidated mortgage, series A, 6 per cent bonds of September 1, 1915-1945. This is the first issue of bonds under the new mortgage which is to provide for the comprehensive future financing of the property. The bonds are offered to the public at 99½. The annual report of the Seaboard for the fiscal year ended June 30, 1915, was recently reviewed in these columns. Properly interpreted, the report was a remarkably good demonstration of what the property could be made to earn even in a year of wholly extraordinary depression in every line of industry in the South. Taken superficially, however, it showed a great loss of revenue as compared with the previous year. The railroad bond market is now good. In the fiscal year ending June 30, 1916, there is every prospect that the Seaboard will make a showing which will contrast in a strikingly favorable way with that made in 1915. The fact that the bankers were willing to undertake the sale of a large issue of new bonds without window

dressing of any kind in the showing made by the railroad company, when this showing was superficially not favorable, speaks a confidence which has not in the past generally been shown by bankers in the intelligence of investors. The underlying conditions of the Seaboard Air Line are sound, and by making an offering of bonds now, the bankers are relying on investors to make more than a superficial study of the company's showing and to appreciate what these underlying conditions really are.

President Ripley of the Santa Fe has written a strong letter advocating the creation of a permanent tariff commission. The

**For a Non-
Partisan Tariff
Commission**

railways do not sell anything that is directly affected by the tariff; but their prosperity is greatly, although indirectly, affected by tariff-making. Every important revision of the tariff compels a general

readjustment in business affairs; and such readjustments almost always cause periods of depression which seriously reduce the traffic moved and curtail railway earnings. The railways, therefore, have as much reason for wanting to see tariff-making taken out of politics as any other large business interest. The reasons for turning the framing of tariff schedules over to a permanent, expert commission are as numerous and convincing as the reasons for delegating the regulation of railway rates to such a commission. It is true that the Interstate Commerce Commission can actually fix rates, while a tariff commission could only recommend to Congress the schedules it ought to adopt; but a permanent commission could at least do much better than committees of Congress the preliminary work of investigating conditions and framing the tentative schedules. The Tariff Commission League, which recently has been organized, deserves, we believe, the support of business men in all lines, including railway men.

WORK FOR A COMMISSION ON REGULATION

THE recommendation of President Wilson for the creation of a federal commission to investigate fully the subject of railroad regulation shows that the President is alive to the unsatisfactoriness of the present situation. Regulation has come to stay. It will never be made less firm and comprehensive than it is now. But it can and must be made more consistent, scientific and fair. Its past and present deficiencies are largely due to the fact that the legislation providing for it has been adopted by a large number of different bodies piecemeal and without any co-operation; that the legislation usually has been enacted without any real investigation, and that its administration often has been neither consistent, expert nor fair. The experiment of effective regulation will soon have been carried on for 10 years. In view of the large mileage of railways in the hands of receivers and of the fact that new construction is now at the lowest ebb for at least 50 years, the results cannot be regarded as entirely satisfactory. The end of the first decade of effective regulation will be a good time to pause, take stock, and, having taken stock, adopt measures for a more constructive, enlightened and salutary policy.

If a commission, such as that suggested by the President, is created it should have no difficulty in selecting the subjects to which it should devote most of its attention. One of these would naturally be the relations of state and federal regulation. When state and federal regulation conflict one of them must go down. Under present conditions, especially in the regulation of rates, it is usually federal regulation which goes down. But, obviously, the one which should give way is state regulation. The constitutional authority of the federal government over interstate commerce is paramount to that of the states over state commerce. The welfare of the nation is paramount to the selfish interests of the people of any state. Therefore, our system of regulation should be so altered that no state regulation

which directly or indirectly conflicts or interferes with regulation by the federal authorities will be permitted. The states will, of course, retain control over their local public utilities. Probably they will be allowed to continue to regulate railway matters of merely local consequence. But a commission which thoroughly investigated the situation could hardly fail to conclude that the existing relations between state and federal regulation are unwholesome in their effect upon both the railways and the public, and should be radically changed.

The proposed commission would naturally investigate the subject of suspensions of advances in rates by the Interstate Commerce Commission. It is extremely doubtful whether the authority to suspend should ever have been given to the commission. Probably it cannot now be taken away, but the length of the periods during which rates are kept under suspension should be reduced. The law, as it now stands, does injustice to the railways. If an advance in rates goes into effect and is subsequently found to be unreasonable the shippers and travelers affected can secure reparation. But if an advance in rates is suspended and subsequently found to be reasonable the railways have no means of obtaining redress. There have been numerous cases where the Interstate Commerce Commission has suspended rates for long periods and finally found them reasonable. In these cases taken together the losses unjustly inflicted upon the railroads in the United States have amounted to millions of dollars. The law and the procedure regarding the suspension of rates need to be reformed.

While this is being done the fact should be recognized that rates may be made too low as well as too high, and that, therefore, the Interstate Commerce Commission should be given authority to suspend reductions and fix minimum rates, in addition to its present authority to suspend advances and fix maximum rates.

The proposed commission would naturally go into the subject of regulation of the issuance of securities. The *Railway Age Gazette* believes that the Interstate Commerce Commission should be given this authority, but only on condition that it will thereby be entirely taken from the states. Regulation of the issuance of securities is too delicate a function to be performed by 48 different state commissions, and the situation certainly will not be improved by having it performed by both the state and the interstate commissions. If it is to be performed at all it should be by the Interstate Commerce Commission alone.

The proposed commission would naturally give great consideration to the necessity for a reorganization of the Interstate Commerce Commission. One of the most important steps needed is a separation of the legislative, the judicial and the prosecuting functions now united in the commission. The salaries of its members should be increased, their terms should also be lengthened, and either their functions should be so changed as to lighten their work or the number of commissioners should be increased.

One of the most important and difficult problems now confronting the country is presented by the relations between the railways and their employees. At this moment the four strongest of the railway brotherhoods are co-operating in a movement to secure a maximum working day of eight hours without any reduction in pay. This movement follows others which in the last decade have caused increases in wages aggregating over \$300,000,000 a year. The employees are publicly announcing that they will not arbitrate their new demands, but will strike and tie up all the roads in the country unless they are granted. The public would be very seriously affected by such action. Does it intend to take no step to prevent it? The proposed commission would find plenty of work ready to its hand—work of such a character that the ablest men in the country will be none too big for it. Senator Newlands, who advocates President Wilson's policy in a general way, seems to favor the creation of a joint committee of Congress to deal with the matter. Doubtless the commission should include some members of Congress. Perhaps, also, it should include some members of the Interstate Commerce

Commission. But it ought also to include some representatives of the railroads and other business interests. It should be a commission with a personnel that would deserve as much respect and confidence as did the personnels of the Railroad Securities Commission, the National Monetary Commission and the commission that arbitrated the controversy between the eastern railways and their engineers and firemen in 1912.

TO PROMOTE SAFETY AT HIGHWAY CROSSINGS

THE railroads of the United States, through the American Railway Association, have undertaken a campaign for the prevention of accidents at highway crossings. President Mudge, on the recommendation of the executive committee, has appointed a special committee, consisting of seven railroad officers representing the railroads of the country territorially, to consider the entire question.

The members of the committee are: James A. McCrea, general manager, Long Island, chairman; J. Q. Van Winkle, assistant to general manager, Cleveland, Cincinnati, Chicago & St. Louis; C. L. Bardo, general manager, New York, New Haven & Hartford; L. E. Jeffries, general attorney, Southern; Howard Elliott, inspector of transportation, San Pedro, Los Angeles & Salt Lake; W. J. Towne, assistant general manager, Chicago & North Western, and W. R. Scott, vice-president and general manager, Southern Pacific.

This committee will present recommendations, after a thorough investigation, for action to bring about a reduction of one of the most numerous classes of railway casualties, and one which is rapidly increasing in spite of the many millions that have been expended by the railroads for the elimination of grade crossings.

The importance of the problem is indicated by the fact that in the last 10 years for which the statistics are available the Interstate Commerce Commission has reported a total of 9,479 persons killed and 21,917 injured by being struck or run over by cars or locomotives at highway crossings. The figures by years are as follows, with those for 1910, when the Interstate Commerce Commission did not report them, estimated by taking the average of the figures for 1909 and 1911:

Year.	Killed.	Injured.
1905	837	1564
1906	926	1884
1907	933	1797
1908	832	1755
1909	773	1830
1910	882	2132
1911	992	2434
1912	1032	2506
1913	1125	3080
1914	1147	2935
Totals	9479	21917

These figures show an increase fairly consistent with the development of railway traffic, although the increase in the number of persons killed is less in proportion than the growth of the railway business, but since 1909 there has been a steady increase unaffected by the falling off in traffic in 1914. This is doubtless largely due to the increase in the use of automobiles, especially in the rural districts, and this phase of the situation will necessarily assume an important place in the committee's investigation.

Naturally, the chances for grade crossing accidents increase with the number of trains run, and the railroads by heavier trainloading have prevented the number of trains run from increasing in proportion to the traffic, thereby holding down the chances of grade crossing accidents. Nevertheless, many legislators during the past year voted for bills to require the railroad companies to run shorter, and consequently more trains, because the labor leaders told them that it was in the interest of safety.

The standard remedy of the public authorities for crossing accidents is elevation or depression of the tracks—if the railroads can be made to stand the expense. If there is a chance that the community may be required to share the cost of an im-

provement made for its benefit, the zeal of the public officials for grade separation frequently wanes. The separation of grades as rapidly as practicable is much to be desired, but at an average cost of probably \$50,000 per crossing even the most affluent railroad corporation can afford to eliminate only a small part of its grade crossings. Complete separation of grades would cost most roads more than they are worth and in many places the expense is so great as to raise the question whether the same amount of money would not bring about a greater reduction of accidents if expended in other ways.

In Chicago the roads have been required to spend about \$80,000,000 to date for the elevation of their tracks, with practically the sole object of reducing the danger of accidents at crossings, and the work is hardly more than half done. As was shown in a recent issue of this paper the number of people killed by trains at street crossings in Chicago has been reduced from 99 in 1905 to 31 in 1914, while the number of people killed by vehicles in the city streets has increased from 34 to 143, and in 1914 100 other persons were killed by trains at points not on the city streets, practically all of them while trespassing and many of them while trespassing on the elevated tracks of the railways.

A common reply of public officials to the objections of railroads to grade separation work because of its cost is that the improvement will save the roads large sums they would otherwise have to pay for damages. The amount thus saved will not go far toward paying the interest on the expenditure involved. If, however, the public authorities would co-operate with the roads to eliminate some of the accidents for which the victims themselves are chiefly responsible they might cause a saving that would contribute a considerable amount toward the cost of grade separation.

Mr. McCrea, the chairman of the American Railway Association committee, is especially qualified for the position by reason of experience gained by him in prosecuting a vigorous campaign to instill safety first ideas into the motorists of Long Island. The committee can undoubtedly accomplish some results well worth while by working along the lines followed by the Long Island and some other roads that have made special efforts to reduce crossing accidents. The Long Island, after having spent \$15,000,000 for the elimination of grade crossings, still has a large number, and had experienced so much trouble with reckless automobile drivers that it has installed signs as large as 50 ft. by 10 ft. to warn drivers of the necessity for carefulness in approaching some of its crossings. It has even found it necessary to install some crossing gates the size of telegraph poles because automobilists persisted in breaking through ordinary gates when set against the highway traffic on account of the approach of a train.

Many roads have placed large warning signs or signals at approaches to their crossings, but even where protective devices are in service they depend for their efficiency largely on the attitude of the public using the highways. Enginemen are trained to be careful and are impressed with the importance of sounding whistle signals at crossings, but many automobilists approach railroad tracks without any effort to ascertain whether it is safe to cross.

To what a large extent highway crossing accidents are due to carelessness is demonstrated by observations, made by the Southern Pacific, of the actions of the drivers of 17,021 motor vehicles on approaching railroad crossings in a number of widely separated localities. Of the total, 11,836 drivers, or 69½ per cent, looked neither to right nor left before crossing the tracks; 2.7 per cent looked only one way and only 27.8 per cent looked in both directions, while 3.301, or 19.3 per cent, ran over the crossing at a reckless rate of speed, and only 35 stopped before crossing. Of 4,889 drivers of teams, 39.4 per cent looked in neither direction, 8.6 per cent looked only one way and only 52 per cent looked in both directions. Similar observations taken a year later at the same places, after the road had given a great deal of publicity to its efforts to reduce this kind of acci-

dents and had appealed for the co-operation of local authorities and automobile clubs, showed a considerable improvement.

The Baltimore & Ohio has had similar observations made, and at Uniontown, Pa., on September 12, when 729 automobiles crossed the tracks at one street in 12 hours only 28 stopped to ascertain whether or not a train was approaching, and 505 were not even slowed down. There were but 135 drivers who looked in both directions, while 542 did not look at all before crossing.

As the country develops it will be necessary for the railways to continue to eliminate grade crossings as rapidly as they can, and the increases of population and industry that make such expenditures necessary should naturally tend to so increase earnings as to enable the roads to meet them, but meanwhile a great deal can be accomplished to make conditions safer if the roads can secure the interest and co-operation of the public and of its representatives.

HIGHER PASSENGER FARES APPROVED

THE decision of the Interstate Commerce Commission allowing increases in western passenger fares is one of the most favorable the roads have ever received at its hands. This was to be expected from its previous utterances as well as from the evidence in the case, but it is gratifying to find that the commission has so clearly sustained the position taken for a long time by railroad men as well as by most others who have studied the subject.

The commission has not given the roads all that they asked for, but it has come near to doing so. In Illinois, Wisconsin, the upper peninsula of Michigan, Minnesota, Iowa, Nebraska, Missouri north of the Missouri river, and Kansas on and north of the main line of the Union Pacific, where the tariffs filed by the roads proposed a basis of 2.5 cents a mile, the commission authorizes a basis of 2.4 cents; in Missouri south of the river and in Kansas south of the Union Pacific, where the roads had asked for 3 cents a mile the commission authorizes 2.6 cents.

Proposed increases in fares from the territory described to the east, which may be arrived at by combination of the rates authorized and the existing fares in eastern territory, now on a basis of 2½ cents, are justified, but to points outside the territory directly involved on the main lines of the respondent carriers in California, Utah, Nevada, Colorado, Wyoming, Arizona, New Mexico, Arkansas, Oklahoma and Texas, the commission limits the proposed increases to the combination of the 2.4 and 2.6 cent basis and a basis of 2.5 cents in North and South Dakota, and a basis of 3 cents a mile west and south of the territory described.

However, the commission has approved the full advance asked on mileage books from 2 to 2¼ cents in the northern territory described and from 2 to 2½ cents in the southern territory.

There is nothing in the opinion to explain why the commission finds a rate of 2.4 or 2.6 cents reasonable and 2.5 and 3 cents too high; it simply states that the carriers have "failed to justify" the higher rates proposed. Nor is any reason given why lower rates are approved for the western states than were allowed in the east. The commission points out that "on all sides of the territory principally affected the standard fares are generally upon a higher level" and that in the territory to the east the population per square mile and per mile of railroad, as well as the density of passenger traffic "are notably greater" But while finding that "there is some justification for a lower basis of fares in this territory than in the states west and south thereof" it does not apply this remark to the eastern states, although using language from which it may be inferred that the various factors tending to reduce the average receipts per passenger mile in the east are considered as not conflicting with a higher standard rate in the east.

Many of the commission's findings of fact completely support the contentions long made by the railroads. For example, it says:

"All these influences (higher expenses and lower rates) have been reflected in the diminished rate of return per dollar of investment in the

railroad property of the railroads here affected. These railroads, like other industries, have felt the rising cost of living, to a certain extent due to an increased price of some of the articles necessarily required in the conduct of their business, but to a large extent due also to the increased wage paid to their employees and to increased taxes."

The commission finds that substantial improvements in passenger service have been made at large expense, that the conditions under which the passenger service is performed do not admit of economies in operation corresponding to all those that have been effected in the freight service, that the increased cost of service is entitled to consideration and that the passenger business in the territory affected is less profitable than the freight business.

With reference to statements regarding the alleged operation of a greater number of passenger trains between competitive points than the necessities of the public require, the commission calls attention to the fact that the intermediate territory must be considered. "Neither competition nor the unreasonable demands of the public," however, must be made the excuse for waste and extravagance in the passenger service.

As the official announcement that a rate higher than 2 cents a mile in the west is not unreasonable hardly brings much of a surprise, after the commission had allowed the eastern 2½ cent fares to go into effect last year without suspension, interest in the decision naturally turns at once to the effect it will have on intrastate rates. That the commission has also had this phase of the question in mind is indicated by the following significant paragraph in the opinion:

"This increased revenue which apparently should come from the passenger traffic should not, however, be altogether imposed upon the interstate traffic. Manifestly a person journeying by rail within the boundaries of a state cannot expect to travel at the expense, in any degree, of the interstate passenger. . . . The revenue of respondents from intrastate passenger traffic within these states is approximately 96 per cent of that from the interstate traffic. While we should permit reasonable interstate fares, we cannot sanction fares that are higher than are reasonable for the service performed because intrastate fares are alleged or shown to be unduly low."

Of the states included in the territory directly involved in the case, Wisconsin, Michigan, Illinois, Iowa, Missouri, Minnesota, Nebraska and Kansas now have 2-cent intrastate fares, and the interstate rates in effect are generally on a 2-cent basis. In North and South Dakota the general basis for both state and interstate fares is 2½ cents; Louisiana and Texas have 3-cent intrastate rates and the interstate rates through these states and Arkansas, Missouri and Oklahoma are generally 3 cents, the latter rate having been approved by the Interstate Commerce Commission in a previous decision.

In the face of these two decisions, approving rates ranging from 2.46 to 3 cents a mile for interstate fares it is difficult to see how the 2-cent fare states can maintain their present low rates. In Missouri the restriction to 2 cents, except for mileage books, will be removed by the recent decision of the state commission.

The railroads have been planning to use the Interstate Commerce Commission's decision as a lever to raise some of the state rates, but just what form the procedure will take will undoubtedly depend on the outcome of the case now pending before the commission on the complaint of the Business Men's League of St. Louis, asking the removal of the discrimination created by the interstate freight and passenger rates between Illinois points to St. Louis higher than the intrastate rates and fares between the same points and East St. Louis and other border points. If the interstate fare of \$7.50 from Chicago to St. Louis is reasonable the St. Louis man is certainly discriminated against by a fare of \$5.62 from Chicago to East St. Louis for a distance only four miles less.

Outside the territory directly affected the only states that have maximum 2-cent fares are Oklahoma, Indiana and Ohio; and in all these states the Interstate Commerce Commission already had permitted higher interstate fares to go into effect.

Annual Report of the Interstate Commerce Commission

Commission Recommends the Enlargement of Its Membership and Extension of Its Powers

The following is a very much condensed abstract of the report of the Interstate Commerce Commission, which was submitted by the commission to Congress on December 13. The report covers the period from November 1, 1914, to October 31, 1915. There were 6,500 informal complaints received during the year as compared with 7,880 in the previous year. There were 6,690 applications filed by the roads to make refunds, an increase as compared with the previous year of 1,176. The number of formal complaints filed during the year was 964, a decrease as compared with the previous year of 190. There were 902 cases decided and 205 dismissed, a total of 1,107 cases disposed of, comparing with 864 disposed of in the previous year. The decrease in the number of complaints filed during the year has been more than offset by the complex nature of the cases that have been presented. The rate structures between various communities are now more often the subject of complaint than was the case in earlier years.

The number of proceedings under the suspension of schedules, part of the act, was 199, a decrease of 4 as compared with the previous year. There were 210 cases disposed of, an increase of 51 as compared with the previous year. In 56 instances the tariffs were voluntarily withdrawn by the carrier; in 3 instances protests were withdrawn and suspension order vacated; in 1 instance reductions were made in the proposed rates and then suspension vacated; in 50 instances proposed changes were allowed; in 38 instances they were allowed in part; in 59 instances they were disallowed, and in 3 instances orders of suspension were vacated.

The commission refused to suspend schedules in respect to 368 cases, an increase of 157 as compared with the previous year. The commission's duty is to determine as fully as possible whether the proposed tariff schedule represents an appropriate exercise of the carrier's right to initiate rates or whether it appears to go beyond the legitimate exercise of this function.

[The principal investigations made by the commission have been covered in these columns at the time they were made public.]

THE FOURTH SECTION

There were 673 applications for a suspension by the commission of the long and short-haul clause, a decrease of 277 as compared with the preceding year. There were 822 orders entered, 260 of which were permanent and 562 were temporary. Since the opening of the Panama Canal, water carriers have materially reduced their rates, shortened the time of transportation and increased the frequency of sailings. There were 49 ships, with a capacity of 380,000 tons in service between the Atlantic and Pacific coast. The total tonnage from the Atlantic to the Pacific coast and Hawaiian Islands was 397,974 tons in 1911, 451,592 tons in 1912, 434,115 tons in 1913, and for the month of September, 1914, the tonnage was 77,915 tons, or more than twice the average monthly tonnage for the preceding year. The tonnage handled by water lines included a great deal originating in the interior. Thirty-two cars of cast iron pipe moved by rail from Birmingham, Ala., to New Orleans, La., and thence by water to the Pacific coast. Catsup moved from Rochester, N. Y., by rail to New York and thence by water to the Pacific coast. It was evident that the degree of competition between the rail carriers and water carriers was greatly increased and it was necessary for the rail lines to make material reductions in their rates if they expected to obtain any considerable percentage of the coast to coast traffic. The reductions extended to Pittsburgh, Chicago and Missouri river territory and the commission granted additional relief in respect to the rates on commodities included in schedule C, but in addition to this a second application has been filed with the commission for further modification of the orders relating to trans-continental rates.

RATE SCHEDULES

There were 149,449 tariff publications containing changes in rates filed. This is an increase of 418 over the previous 11 months. Complaints have been received of failure to post tariffs at stations at which freight and passengers are received, and it appearing that no uniform or adequate plan was being followed, an order was issued requiring the agent at every station to stamp on a new tariff the date received and to keep a record showing the date posted at the station. The rate work of the division of tariffs continues to increase, notwithstanding the fact that, due to the commission's regulations, tariff publications are far more understandable than heretofore. This increase is largely accounted for by the fact that during the last two years a great many changes in rates and fares have been made.

CLASSIFICATION OF FREIGHT

The Western classification committee has now been in continuous session for 21 months demonstrating the practicability of placing freight classification in the hands of a limited committee whose members represent no particular lines and are not interested in soliciting traffic. Progress has been made in getting state commissions to adopt western classification.

The official classification committee is to be reorganized along the lines on which the western committee is organized. At present it consists of 15 members who meet quarterly and whose recommendations are submitted to individual lines for approval. A permanent committee is to be appointed but, unlike the western committee, its action will not be final. The southern classification committee holds fewer meetings than either of the other committees.

A committee of the carriers has been working for several years to bring about uniformity of classification, and since this involves changes in ratings and rates on practically all articles moving under class rates, it must apparently come slowly, and after uniformity has been attained with regard to rules, packing requirements and minimum carload rates. The following table shows the uniformity as of October 20, 1915:

	Total items in classifi- cation.	Uniform classifi- cation tec has	classifi- comit- passed—	Uniform classifi- cation com- mittee has written but not yet passed.	Uniform classifi- cation com- mittee has not written.
		Number.	Per cent.	Per cent.	Per cent.
Official classification	5,765	4,582	80.00	5.00	15.00
Southern classification	4,780	4,181	87.50	3.50	9.00
Western classification	6,917	5,291	76.50	5.00	18.00

The commission has previously suggested that it be given authority to require uniformity in classification, which authority could be exercised so as to hasten the adoption of uniformity and at the same time do no harm to any interests.

EXPRESS COMPANIES

After one year's experience under the new rates for express companies ordered by the commission, effective February 1, 1914 the four principal companies doing 95 per cent of the express business filed a petition for a modification of the order, which petition if granted they estimate would increase their gross revenue 3.86 per cent. The number of shipments handled under the commission's rates increased 2,225,000, but gross transportation revenues decreased \$13,680,810. The modification sought the commission thought, would not result in unreasonable rates and was therefore granted, the new rates becoming effective September 1, 1915. A universal block system of express rates was not adopted because it would increase rates materially in

some sections and decrease express company revenues materially in other sections.

DIVISION OF INQUIRY

This division has to do with the investigation of seeming violations of the commerce act or the Elkins act. About 90 per cent of the matters investigated were disposed of without resort to the courts. There were 72 indictments, and the number of defendants is much greater than this, many indictments being against two or more defendants. Of these, 22 were against carriers or carriers' agents and 50 against passengers, shippers or other interested parties. During the year 48 cases were concluded. These included 31 cases in which pleas of guilty or *nolo contendere* were entered. In 7 cases verdicts of guilty were rendered and in 2 cases verdicts of not guilty. The principal court decisions have been summarized from time to time in the *Railway Age Gazette*. Various indictments were found against roads for granting to individuals favors or free passenger service. Several instances were discovered where large shippers were affiliated with carriers and were thus enabled to secure advantages from other shippers. A tendency to revise all leases at less than a fair rental in order to avoid granting concessions to shippers in this indirect way has been observed. Several prosecutions have arisen as a result of the failure of carriers to observe strictly their tariffs.

False billing of shipments by shippers has continued to require much attention. In misbilling cases it is common for shippers to plead guilty and thus escape with a smaller fine than would result if the case were contested. The courts, however, have recently imposed substantial fines in cases of this kind where the defendant admits his guilt. Thus, in an indictment of 20 counts brought against the Standard Brewing Company for false billing of a carload of beer a plea of guilty was entered and the court fixed the fine at \$16,000. A large number of shippers have also been prosecuted for filing false claims for loss and damage. This practice has been most prevalent in the case of shippers of perishable articles who, on suffering damage, frequently file excessive claims against the responsible carrier. Several prosecutions have also been instituted against shippers who claimed that their property had been damaged when no damage occurred. There have been evidences that the laxness of the carriers in recognizing and paying such false claims sometimes amounts to granting rebates. This question is now under review.

The larger part of the field investigations made by the division did not disclose violations of law. It is proper to state that in many instances investigations of complaints made by shippers and others against carriers disclosed that the complaint was groundless and that the carrier's practice was beyond criticism. Indeed, in one or two cases it was found that the carrier was not only complying with the law but that the very efficiency of its policing arrangements was the real reason for the complaint. As to several other matters investigated, while the practice involved was found to be questionable, the subject was handled by correspondence or conference and the objectionable features thus eliminated. As the strict requirements of the law become more completely appreciated it may be anticipated that the number of cases in which questionable practices can be corrected by conference rather than prosecution will increase.

The practice of carriers in having their fuel coal so billed as to effect a discrimination in their favor against other purchasers of coal has been the subject of numerous prosecutions in previous years. An unlawful practice in connection with the purchase of fuel coal by carriers has been the subject of several field investigations. This practice consists in the carrier buying its fuel coal from large coal producers at a higher price than the fair market price in order to influence the routing of the preferred operator's commercial shipments. Certain attendant circumstances in each case suggest the conclusion that the price paid by the carrier included a bonus which was intended to reduce the published rates. Of course such a practice is unquestionably a device for defeating the lawfully established rates on commercial shipments of the favored coal producer,

DIVISION OF LAW

The division of law, as at present organized, represents the commission in injunction and other proceedings brought by carriers in the federal courts against orders of the commission and in such civil actions as the commission approves to enforce statutory forfeitures incurred by failure to comply with its orders. It co-ordinates and supervises the work of the valuation attorneys in the several districts, and participates, when so directed, in special investigations instituted by the commission.

Since the period covered by the last annual report eight cases involving orders or practices of the commission have been decided by the Supreme Court of the United States. Of these, five, the New Castle switching case, two Meeker reparation cases, the Nashville grain case, and the Nashville coal rate case were decided in favor of the commission. In two others, the Louisville & Nashville mandamus case and the Erie pass case, the decisions were adverse to the commission, while in one, the Ellis compulsory testimony case, the decision of the Supreme Court was substantially in favor of the commission, although adverse in certain respects.

Since the period covered by the last annual report decisions involving orders or requirements of the commission have been rendered in courts other than the Supreme Court of the United States in 14 cases, 13 in favor of the commission and 1 adverse. Of these, 13 were decided in district courts of the United States and 1 in the court of appeals of the District of Columbia. In addition, motions for interlocutory injunctions against orders of the commission have been denied by district courts in 2 cases, and 6 cases have been dismissed in district courts, 5 on motion of complainant carriers and 1 at the instance of the commission. One case was dismissed in the court of appeals of the District of Columbia on motion of the appellant.

During the same period 23 cases involving orders or requirements of the commission have been instituted in district courts of the United States. One of these was an action against a carrier to recover the penalty prescribed by section 16 of the act to regulate commerce for failure to obey an order of the commission.

Twenty-six cases involving orders or requirements of the commission are now pending, 8 in the Supreme Court and 18 in district courts of the United States.

DIVISION OF CARRIERS' ACCOUNTS

During the constructive period in which the systems of carriers' accounts have been developed it has been necessary to revise and reissue a number of accounting classifications for the purpose of more nearly meeting the practical needs of the carriers and the requirements of the commission. The underlying principles of the systems, however, are now well established, and it is believed that no extensive revision of the classifications will be required for some years to come.

The regulations to govern the issuing and recording of passes of steam roads will be revised and amplified to include instructions for the guidance of electric railway companies and carriers by water. Material progress has been made toward standardization of accounting practices. Examinations of carriers' accounts, an important function of the division, are being carried forward by the corps of examiners. Studies of particular phases of accounting practices have been made through the medium of special reports required of carriers. These have proven so satisfactory as an auxiliary to the work being done by examiners of accounts in the determination of accounting practices that it is the intention to increase the number of studies during the coming year. The special work done by examiners and the results derived from the studies mentioned have yielded information of great value which has materially contributed to enhancing the good effect and beneficial results accomplished through examinations of carriers' accounts. The establishment of branch offices at New York, Pittsburgh, Chicago, St. Paul, St. Louis, New Orleans, and San Francisco has resulted in considerable economy of time and in sufficient reduction of traveling expenses to permit a substantial increase in the number of employees.

CLAIMS AGAINST CARRIERS

Since the last annual report the complete results of the special inquiry as to the time required by steam railway carriers to investigate and adjust claims received by them from shippers have been obtained. There follows a tabulation of claims presented to carriers having annual revenues exceeding \$1,000,000, and the number of these claims adjusted by them during the period indicated.

Claims presented to carriers during the calendar year 1914.

Interstate:	Loss and damage.	Over-charge.	Total.
Local	\$713,245	\$219,404	\$932,649
Interline	1,615,494	757,406	2,372,900
Total	2,328,739	976,810	3,305,549
Interstate:			
Local	765,764	224,894	990,658
Interline	181,087	86,144	267,231
Total	946,851	311,038	1,257,889
Grand total	3,275,590	1,287,848	4,563,438

Number of above claims that were adjusted by carriers between Jan. 1, 1914, and March 31, 1915.

Character of claims.	Paid.	Manner of adjustment. Declined.	Withdrawn.	Total.
Loss and damage.....	2,800,399	298,189	56,858	3,155,446
Overcharge	1,003,824	207,217	22,611	1,233,652
Grand total	3,804,223	505,406	79,469	4,389,098
Percentage	86.674	11.515	1.811	.....

Division of time in which the adjustments were accomplished between Jan. 1, 1914, and Mar. 31, 1915.

After receipt: Period of adjustment.	Loss and damage claims.	Over-charge claims.	Total.	Percentage relation of each period.
Within 15 days.....	1,574,712	548,140	2,122,852	48.366
Within 30 days.....	532,982	248,401	781,383	17.803
Within 60 days.....	456,213	208,201	664,414	15.138
Within 90 days.....	236,056	97,276	333,332	7.595
Within 120 days.....	155,883	61,240	217,123	4.947
Within 6 months.....	112,358	39,567	151,925	3.461
Within 1 year.....	83,421	29,608	113,029	2.575
Over 1 year.....	3,821	1,219	5,040	.115
Total	3,155,466	1,233,652	4,389,098	100

Claims that remained unadjusted on March 31, 1915.

Loss and damage.....	120,144
Overcharge	54,196
Total	174,340

It will be observed that of the 4,563,438 claims presented to carriers, 4,389,098, or 96 per cent, were adjusted. Of the claims adjusted nearly 50 per cent were adjusted within 15 days after receipt by carriers, more than 65 per cent within 30 days, and all but 6 per cent within 120 days. From these figures it appears that much progress has been made by carriers in the matter of handling claims, and there are reasons for believing that their claims' departments are now organized on a more efficient basis than formerly.

DIVISION OF STATISTICS

In addition to its usual work of the past few years the division has devoted considerable time to other important matters, the principal results of which are here stated. In this connection the commission held general hearings and sought the co-operation of committees, representatives of the American Railway Association, state commissions, and other interested parties.

The annual report forms pertaining to steam and electric railway companies were recast for the year ended June 30, 1915. In this revision many changes were necessary to provide for returns in accordance with the revised accounting classifications that became effective at the beginning of the year. Various other changes resulted from new requirements or modifications, the purpose of the changes being to secure information that would be of greater usefulness.

The preparation of annual report forms pertaining to carriers by water having annual operating revenues above \$500,000 and to telephone companies having annual operating revenues above \$250,000 was completed, and these two classes of carriers made

annual reports to the commission for the first time covering the year ended December 31, 1914.

Rules governing the classification of steam-railway employees with respect to occupation and compensation were prescribed by the commission, effective July 1, 1915. As the number of classes of railway employees concerning which returns are now required in the annual reports of steam railway companies was increased from 18 to 68, the need of a detailed classification became urgent in order to secure uniform returns.

Revised rules governing monthly reports of railway accidents were also prescribed by the commission to take effect July 1, 1915, and suitable forms were devised for the required reports of such accidents. These rules, superseding those of 1910, pertain to both steam and electric railway companies, and were deemed necessary principally to obtain more comprehensive and uniform returns of railway accidents.

Following the developments in connection with the separation of operating expenses, described in the last annual report, a new circular outlining a method for separating operating expenses between freight and passenger services was prepared. An order was issued, effective as of July 1, 1915, requiring all carriers having operating revenues in excess of \$1,000,000 to classify each of its various items of disbursement relating to operating accounts according to the relation which such item bears to the freight service or to the passenger and allied services of the carrier, rules being given for apportioning items of expense common to both classes of service, except as to certain items under maintenance of way and structures, which are for the present to be left undivided. Decision as to these items was reserved until a further study of them could be made. The data resulting from this order will not be available until after the close of the fiscal year ending in 1916. It is expected that this class of information will be of assistance not only in rate cases but also in making comparisons of changes in operating costs from year to year and among various railroads in a given year.

The commission has always considered it inadvisable to make publication of statistical matters in permanent form until after the reports on which such publications are based have had, as far as practicable, the benefit of careful scrutiny and correction of errors.

The monthly bulletins of revenues and expenses of steam roads with annual operating revenues above \$1,000,000 were discontinued with the publication of Bulletin No. 69 for the month of August, 1914, but the issuance of a daily bulletin of revenues and expenses of this same class of carriers by railway, chiefly for the benefit of the press, has been continued. This press bulletin shows the cumulative revenues and expenses of the more important railways as reported for the latest current month for which reports are received.

DIVISION OF SAFETY

This division has continued its work as in previous years, and the usual separate report will be issued. During the fiscal year 161 cases of violations of the safety appliance act were prosecuted in the courts, and as in former years, a large majority of the prosecutions were successful. A considerable number of cases appealed to the Circuit Courts of Appeals were decided in favor of the government, as were cases appealed from the latter tribunals to the Supreme Court. Carriers confessed judgment as to 613 counts. The number of violations of the safety appliance act during the year was nearly 50 per cent less than in the preceding year, indicating better inspection and more efficient repair facilities; but there is still much room for improvement. The commission is considering the propriety of extending beyond July next the time within which carriers must equip freight cars with the standard appliances prescribed in 1911. About 900,000 freight cars still remain deficient, in some respects, as related to these requirements. A summary is given of the court decisions recently issued interpreting the safety appliance acts.

Prosecutions for violation of the hours of service act have been begun in 125 cases, involving 1,050 counts. In the cases

brought to trial during the year, 187 counts resulted in verdicts in favor of the government and 138 against. The carriers confessed judgment as to 1,189 counts. Suits before the Circuit Court of Appeals were decided in favor of the government in a large majority of cases. The total number of instances of men working beyond the statutory period during the year was 78,940. This is less than half the number reported in the preceding year, and only about one-third the number in the year before that. Penalties for violations have ranged from one cent to \$250, and the commission again recommends that the minimum penalty be \$100. A summary is given of the decisions of the Circuit Courts of Appeals interpreting the hours-of-service act.

The inspectors of the commission investigated 66 train accidents during the year; 40 derailments and 26 collisions. Eight of the collisions occurred under the block system. Attention is called to the fact that collisions are very much less numerous, as compared with derailments, than in former years. The commission believes that the decrease in collisions has been due largely to the work of safety committees and to public investigations of accidents. Bad operating conditions still prevail, however, in too many cases. The former recommendation that train rules be described by law, is repeated, as is that for more thorough investigation of the causes of broken rails. Derailments caused by malicious tampering with track, now, as heretofore, are so numerous as to furnish cause for alarm. Six accidents under this head, during this fiscal year, caused the death of 20 persons and the injury of 92.

The inspectors of the commission have examined, during the year, 342 plans of devices intended to promote safety, of which 35 were considered to possess some merit. Two automatic train control devices have been tested and reported on, and another is now being tested. Arrangements have been made for testing still another, and also an automatic straight air-brake system. The use of the block system increases year by year, but this increase has not kept pace with the increasing need.

BOILER INSPECTION

The work of the division of locomotive boiler inspection will be the subject of a separate report. The number of engines inspected during the year, 73,443, is 19,273 less than the number in the preceding year, and the number found defective, 32,666, is only about two-thirds as many as were found defective in 1914. The number ordered out of service was 2,027, as compared with 3,365 in the preceding year. The number of accidents reported was 424, which is a fourth less than the number in the preceding year, and 50 per cent less than the number in 1912. The casualties connected with these accidents in 1915 were 13 killed and 467 injured, as compared with 23 killed and 614 injured in the preceding year. During the year 284 roads presented 1,099 applications for extension of time for the removal of flues, of which 638, or 58 per cent, were granted. The remaining 42 per cent were refused or granted only after defects disclosed by inspection had been properly repaired. This division is preparing rules for the inspection of locomotives and tenders (other than the boiler and its appurtenances) in accordance with the law passed this year.

DIVISION OF VALUATION

The report contains a six-page review of the work of this division. Twelve roadway and track parties have now been continuously at work since June 1 last in each of the five districts. For five months the mileage covered has exceeded 4,000 miles a month. This rate will be maintained, except in December, when the field men have their vacation. By the first of next month surveys will have been finished on nearly 50,000 miles of road, and it is estimated that in four years more the whole country will have been covered. For the valuation of bridges, buildings, signals, cars and engines, separate parties are organized, and these are now able to carry on their work in proper relation to that of the survey parties.

Some details are given concerning the method of carrying on

the work. It is desirable that a single district organization shall attend to the valuation of the whole of any given company's line, and, for example, the Chicago, Rock Island & Pacific, which extends into two or three districts, cannot be finished until next spring, although work was begun in November, 1914. After the surveys are completed, a further time will be required for collating the facts in the office. In the winter the field parties in the colder regions have to go to the southern states; so that although the work, as a whole, is proceeding at a satisfactory rate, the valuation of particular railroads is not finished.

A great amount of work has been done toward fixing unit prices, and other items of valuation, and accountants have examined the records of the carriers, but no attempt has yet been made to put an actual money value on the inventories, which have been prepared. The valuation of land has not kept pace with the work of the engineers, largely because it has been impossible to obtain suitable land appraisers through civil service channels; but it is not believed that this will result in ultimate delay.

MISCELLANEOUS

The report summarizes the work of the division of indices, the condition of the library of the Commission, in which there are now 13,000 bound volumes and 10,000 pamphlets, and the doings of the commission in Porto Rico. The commission holds that the safety-appliance act should be complied with in Porto Rico, except that cars used in trains exclusively for the transportation of sugar cane might be excepted from the requirement for the use of power brakes. The report ends with a summary of the expenditures of the commission for the fiscal year ending June 30, 1915; total, \$3,933,925.

RECOMMENDATIONS

"The variety and volume of the work already devolved upon the commission necessitate, in its opinion, early enlargement of its membership and express statutory power to act through subdivisions designated by the commission to perform its duties with regard to specified subjects or features of its work, subject, of course, to retention by the commission of its control, as a commission, of all duties and powers delegated to the commission. This recommendation is submitted pending, and without prejudice to, deliberation appropriate to more comprehensive and constructive legislation which the Congress may later deem it wise to consider. The recommendation for enlargement of the membership of the commission is directly connected with and dependent upon the authority to act through subdivisions.

" . . . for the purpose of uniformity and to prevent injustice, there should be provided by law one period, which in the commission's opinion should be three years, for the beginning of all actions relating to transportation charges subject to the act.

"The commission . . . should have right of access to the carriers' correspondence files.

"There should be appropriate and adequate legislation upon the subject of control over railway capitalization.

"In the interests of economy and efficiency and proper protection for records, the commission should be authorized to enter into a lease arrangement, covering a term of years, for suitable quarters, which can thus be secured through the construction of a building for that purpose.

"The use of steel cars in passenger train service should be required, and the use in passenger trains of wooden cars between or in front of steel cars should be prohibited."

BRITISH COAL ABROAD.—The British export trade in coal in October, 1915, amounted to 3,530,546 tons, as compared with 3,944,497 tons in October, 1914, and 6,739,473 tons in October, 1913. In the ten months ended October 31, this year, British coal was shipped to the extent of 36,944,758 tons, as compared with 62,000,846 tons and 61,257,261 tons in the corresponding periods of 1914 and 1913 respectively.

The Cost of Electrification of Chicago Terminals

A Summary of the Items Entering Into the Expenditure for New Equipment. Effect on Operating Expenses

The general conclusions of the committee of the Chicago Association of Commerce on Smoke Abatement and the Electrification of Railway Terminals in Chicago were presented in the *Railway Age Gazette* of December 3, page 1047. The engineering problems involved in this project, the mileage of tracks included and the amount of traffic handled in this area, were given more in detail in the issue of December 10, page 1089. In the present article the estimated cost of this work and also the effect of electrification on operating expenses, as determined by the commission, will be given somewhat in detail.

Detailed estimates were prepared on the basis of the overhead contact system with 2,400 volts direct current and with 11,000 volts single phase alternating current. Estimates of cost were also made for the electrification of the Chicago & North Western by the third rail system with 600 volts direct current, as well as by the two other systems. By the relations found to exist between the total cost of electrification of this one road by the third rail system and by the two other systems, an estimate of the total cost of electrification of all the terminals by the 600-volt third rail system was obtained.

For the purpose of estimates, after the trackage to be electrified had been determined, it was assumed that the work would proceed under a single administration, regardless of the ownership of tracks, and the power and substations were located on this basis. If electrification were to proceed under the management of individual roads, the expenditures would undoubtedly be considerably larger than those shown here. All estimates of the costs of labor and material were based upon figures for 1912. For the purpose of estimates, it was assumed that actual work would begin in December, 1916, and that six years would be required for the completion of the project. All figures given below are, therefore, for the complete cost of electrification on December 31, 1922, making proper allowances for the normal growth in traffic expected during the period of construction. Because of the many elements of uncertainty, such as the possible increases in the costs of labor and material, an allowance of 20 per cent was added for contingencies. An allowance of 10 per cent was added for engineering on all items of the work except rolling equipment, where 5 per cent was added and a flat rate of 1.75 per cent per annum for the entire construction period was allowed for interest.

ELECTRICAL FACILITIES

The load center of the power requirements falls within the limits of the Union Stock Yards. The commission decided that a single power station should be built and selected a location near the south branch of the Chicago river in the vicinity of Ashland avenue, close to this center of power demand. The details of the power station design for both the 2,400-volt d. c. and the 11,000-volt a. c. systems are the same in all essential characteristics. It was estimated that seven 20,000-kw. steam turbine generating sets would be required in each plant.

Estimates for the transmission system provide for 33,000 volts on all circuits; for duplicate circuits between the power station and all substations; for interconnection of substations with transmission lines to a reasonable extent; for overhead wire construction located on the rights of way of the railroads; for 3-phase circuits for the 2,400-volt system and single-phase circuits for the 11,000-volt system, and for supporting the transmission conductors on the structures of the contact system.

The estimates for the substations provide for 11 substations for the 2,400-volt d. c. system and for 31 substations for the 11,000-volt single-phase a. c. system.

The overhead contact system for main track construction for the 11,000-volt a. c. system was designed with a $\frac{5}{8}$ -in. stranded

steel messenger cable of extra high strength, supporting a secondary messenger cable of No. 4/0 steel wire, which in turn supports a No. 4/0 grooved solid copper contact wire. In yards, the overhead construction consists of a $\frac{3}{8}$ -in. stranded steel messenger cable supporting a No. 00 grooved copper contact wire. For the 2,400-volt d. c. system a $\frac{3}{4}$ -inch. stranded steel messenger cable will support a No. 4/0 steel secondary messenger cable, which in turn carries two No. 4/0 grooved copper contact wires for main track construction. For yard tracks a single No. 4/0 copper contact wire will be supported from a 7/16-in. stranded steel messenger cable.

Before determining upon the number of locomotives required, a careful study was made of the schedules of trains and of the number of locomotives now used. On roads having 20 or more scheduled passenger trains, one locomotive for each 12 schedules was regarded as sufficient to provide against exigencies outside of ordinary inspections and repairs. It was also assumed that an electric passenger locomotive would be available for service 20 hours per day and that it would be sent to the shops for heavy repairs and overhauling after running 60,000 miles. On this basis such a locomotive would be in service 80 per cent of the time.

It was assumed that an electric freight locomotive would be available for service 20 hours per day and that it would require heavy repairs and general overhauling every 44,000 miles. To provide for these periods and also for the exigencies of special service demands and the bunching of trains, the daily freight locomotive requirement was increased 25 per cent. An allowance of 20 per cent was added to the daily locomotive requirements for yard and transfer service to provide for ordinary inspections, cleaning and repairs, and for extra service and accidents.

On these bases the commission determined that, to handle the traffic existing in 1912, would require 688 yard, 100 freight and 228 passenger locomotives, or a total of 1,016. In addition, the suburban traffic would require 470 motor and 251 trailer cars. Of this number the Chicago & North Western would require 156 locomotives and 248 motor and trailer cars, the Chicago, Milwaukee & St. Paul would require 105 locomotives and the Illinois Central would require 55 locomotives and 203 motor and trailer cars.

ALTERATIONS IN EXISTING FACILITIES

Coincident with electrification, numerous changes in existing facilities would be required. To secure the minimum clearance of 16 ft. 6 in., 70 overhead structures must be modified either by raising the structures and their approaches or by depressing the tracks. It was also assumed that all existing wires and cables which cross above or parallel the tracks in such a manner as to threaten physical interference with the contact system or transmission line would be removed or re-arranged to eliminate any possibility of this interference. All estimates were based upon plans for carrying underground all cross wires except those carrying 11,000 volts or more, while no wires paralleling the tracks were to remain where, if the supporting pole were broken at the ground surface and the wires fell toward the tracks, they would not clear the contact and transmission wires by 3 ft. This latter requirement would make necessary the changing of 197.16 miles of parallel lines.

The installation of electrification would also make necessary the adaptation of the existing signal systems to the use of alternating currents, while it would be necessary to raise many existing signal bridges to give the required overhead clearance.

The elimination of the steam locomotives from the Chicago terminals would result in the dismantling of all engine houses, coaling stations, cinder pits, turntables, water tanks and other

\$10,302,104	\$1,618,693	\$2,024,736	\$573,073	\$28,141,188	\$1,071,080	\$4,446,033	\$906,727	\$272,052	\$91,703,557	\$485,343	\$834,261	\$3,028,007	\$6,111,407	\$96,383	\$37,197,363	\$178,127,230
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equipment incident to the operation of steam locomotives. In determining whether a facility should be entirely abandoned or transferred to a new location, it was necessary to consider not only the character and condition of the facility, but also the conditions on the individual roads. A road like the Chicago & Western Indiana, for instance, which would operate all of its trackage electrically, would have no further use for any such equipment, while the trunk lines would continue to operate with steam beyond the limits of the electrification, and might transfer portions of such facilities to new locations. However, the extent to which such procedure may be applicable to individual roads cannot be determined without considerable investigation, and no allowance was made for such facilities beyond a salvage value. It was, however, assumed that much of the machinery now used for steam equipment could be transferred to the new locations at considerably less than the cost of new equipment, and that a considerable portion of such equipment might be retained in its present location for the maintenance of electrical equipment. The first cost of such facilities as would be abandoned was estimated at \$3,502,530, the present value, \$2,596,837, and the salvage value, \$278,880, leaving a net amount of \$2,317,957 which would be lost. This latter amount could not be charged to capital and must therefore stand as an independent item representing property wholly dissipated.

The electrification of the Chicago terminals would necessitate a considerable amount of new construction of facilities, such as engine houses, ash pits, machine shops, water tanks, coaling stations and other equipment at transfer yards at the limits of complete electrification. It would be necessary to provide entirely new facilities at 18 such transfer points, while some facilities exist at 15 other points which could be remodeled and enlarged. In all, 54 yards would require some modifications of track arrangements to meet the new conditions imposed by electrification.

From a study of operating conditions, it was determined that approximately 2½ hours would be saved per passenger locomotive daily by the shortening of the steam locomotive run. From a study of the scheduled requirements, it was considered possible to reduce the number of steam locomotives required for this service by 37. Similarly 20 freight locomotives, 151 suburban locomotives and 742 suburban passenger coaches would be released in addition to the 140 locomotives now required for transfer service and 612 for yard service. On the basis of the increased traffic and the increased amount of equipment thus necessary to handle this traffic, on December 31, 1922, the release value of this equipment on that date would be \$9,496,806.

The costs given above cover only the equipment necessary for the electrical operation of the facilities included in the zone under consideration with the normal growth which may be expected up to December 31, 1922. For operating reasons, many of the railroads would deem it expedient to extend the electrification zone further from the city, thus increasing the cost. Likewise, any improvement of this magnitude would precipitate other betterment work, such as track elevation, which might otherwise be deferred for a number of years.

EFFECTS ON OPERATING COSTS

The electrification of the railway terminals of Chicago would introduce a new system of operation over all electrified trackage. Those roads with trackage entirely within the city would discontinue all use of steam locomotives. Those operating beyond the proposed limits of electrification would, however, continue to use steam locomotives outside the city after the electrification had been accomplished in Chicago. The changes in operating conditions which would result are of a three-fold character: (1) Those incident to the introduction of electric operation on trackage within the proposed limits of electrification; (2) those incident to the operation of transfer stations at which a change in motive power would be made from steam to electric and vice versa; (3) those resulting from the shortening of the steam-operated divisions at present terminating in Chicago.

To arrive at an accurate comparison of the cost under steam and electric operation, the commission analyzed the expenses in

accordance with the classification of the Interstate Commerce Commission. Considering only the 2,400-volt d. c. and the 11,000-volt a. c. systems, the effects on the expenditures for maintenance of way are negligible except for the item of buildings, fixtures and grounds, for there is a heavy increase resulting from the greater expenditures for the power house, substations and other buildings required for electric operation.

The comparison of steam and electric locomotive repairs shows a reduction of over \$700,000 in favor of the latter. In arriving at this figure the cost per locomotive mile for repairs to steam locomotives was ascertained from reports furnished by 25 roads for a period of five years, the data furnished by these roads being applied to the respective locomotive mileages of those roads. For comparative purposes, unit figures per locomotive mile for electric locomotives were assumed as \$0.055 for passenger and freight locomotives, and \$0.050 for yard and transfer locomotives.

With the operation of multiple unit equipment for suburban passenger service, it was estimated that 50 per cent of the present locomotive switching in connection with the handling of suburban passenger trains would be eliminated, causing a reduction of nearly \$27,000 in the transportation account for yard conductors and brakemen, and \$21,000 in the account for yard enginemen. The elimination of steam locomotives would, of course, also remove all charges for fuel and water for locomotives.

Based upon reports furnished by the roads, it was determined that the average expense for enginemen and firemen for suburban passenger locomotives in 1912 was 8.54 cents per locomotive mile. The estimated expense of a motorman on suburban multiple unit trains was fixed at 4.675 cents per mile, or \$4.25 per hundred miles, with 10 per cent for overtime and terminal delay. This was based on present rates of pay of engineers on self-propelled cars. This is equivalent to a reduction of \$163,842 in this account.

Based on figures furnished by the roads, showing engine-house expenses for road locomotives per locomotive mile in comparison with data for similar expenses on electrically-operated roads, it was assumed that the expense chargeable to this account for electric locomotives and electric multiple-unit motor cars would be one-fifth of the present enginehouse expense involved in caring for steam locomotives, showing a saving of over \$525,000 in favor of electric equipment. A summarized comparison of these accounts for steam and electric operation for the items affected is shown in the following table:

SUMMARY OF ANNUAL OPERATING EXPENSE UNDER AFFECTED ACCOUNTS, FOR STEAM AND FOR ELECTRIC OPERATION

(Basis of 1912)

Acct. No.	Item	Steam	2,400-volt d. c.	11,000-volt a. c.
3	Ties	\$463,183	\$463,183	\$463,183
6	Roadway and track	243,663	243,663	243,663
7	Removal of sand, snow and ice	240,740	240,740	240,740
11	Grade crossings, fences, cattle guards and signs	42,608	42,608	42,608
13	Signals and interlocking plants	405,512	431,090	430,060
14	Telegraph and telephone lines	39,864	44,384	44,384
15	Electric power transmission .....	.....	997,879	986,710
16	Buildings, fixtures and grounds	139,116	642,623	642,623
25	Steam and electric locomotive—			
28	repairs	1,746,395	1,036,852	1,036,852
31 A	Passenger train trailer-cars—			
31 B	repairs	207,313	67,041	67,041
31 B	Multiple-unit motor cars—repairs .....	.....	168,909	167,515
37	Electric Equipment of motor cars—			
37	repairs .....	.....	106,439	106,439
47 A	Substations—operation and main			
86	tenance of equipment .....	.....	90,000	17,050
47 B	Power station—operation and			
86	maintenance of equipment ..	.....	2,065,827	1,932,894
68	Yard conductors and brakemen ..	53,636	26,818	26,818
71	Yard enginemen	42,539	21,270	21,270
72	Engine house expense—yard ..	633,482	126,696	126,696
73	Fuel for yard locomotives	4,076,978	.....	.....
74	Water for yard locomotives	147,044	.....	.....
79	Road enginemen (steam) and			
80	motormen (electric) in subur			
80	ban passenger service	362,020	198,178	198,178
81	Engine house expense road	659,912	131,982	131,982
82	Fuel for road locomotives	1,206,178	.....	.....
94	Telegraph and telephone opera			
94	tion	117,373	209,589	213,789
	Totals	\$10,934,064	\$7,355,771	\$7,140,495

In studying the effect of the operation of transfer stations for

the changing of motive power from steam to electric and vice versa, it was found that in 1912, 704 passenger trains and 488 freight trains would be required to stop at these transfer stations to change power daily. The principal expense would be that involved in the operation of these terminals, although a value was also assigned for delay and damage incident to such stops, this being fixed at 45 cents for passenger trains and \$1.28 for freight trains. The cost of the operation of these terminals was estimated as follows:

	Per Annum
Increased cost of handling supplies.....	\$30,000
Handling locomotives, supplying water, inspecting trains and exchanging motive power, and maintaining tracks, contact system and bonding.....	1,126,587
Telegraph and telephone operation at transfer stations.....	45,900
Delay and damage incident to stops at transfer stations.....	343,626
Total	\$1,546,113

The electrification of the railroad terminals of Chicago would have the effect of creating additional operating divisions. Where the engine districts as now operated are short, this would have the effect of creating constructive mileage. The conditions existing on the individual roads were considered to ascertain to what extent this would be reflected in increased operating cost. This was placed at \$450,000. The estimated net operating result of electrification on the basis of the traffic of 1922 is shown in the table below.

ESTIMATED NET OPERATING RESULT OF ELECTRIFICATION (Basis of 1922)

All Services		Increase in operating expenses due to the new transfer stations and to the reduced length of steam-operated divisions immediately beyond the limits of electrification	
System of Traction	Expense under affected accounts for operation within the proposed limits of electrification		Net decrease as compared with the cost of steam operation.
Steam	\$14,214,283		
11,000-volt a. c. overhead..	9,282,644	\$2,594,947	\$2,336,693
2,400-volt d. c. overhead..	9,562,502	2,594,947	2,056,834
600-volt d.c. third rail..	10,974,987	2,594,947	644,349

There are also certain indeterminate results of electrification which should be considered, as, for instance, the increased capacity of those terminals which are now approaching their limit under steam operation. The commission also stated that another benefit to be expected is increased reliability of service. From the standpoint of safety, electrification introduces an added hazard, while it also permits the introduction of compensating influences, with a net result so slight as to be negligible.

SUMMARY

As stated previously, the estimated cost of electrification on the basis of a 11,000-volt a. c. system was \$178,929,241. Applying no depreciation to those accounts for alterations to bridges and buildings, changes in line wires and changes in signals, and allowing 4 per cent depreciation on power house and substation equipment, and 5 per cent on rolling equipment, on the transmission and overhead contact system, and also on the new transfer and locomotive facilities, gives total depreciation charge of \$7,808,278. The net result of electrification as determined by the commission is, therefore, as follows:

ACCOUNTING STATEMENT FOR DISCLOSING THE FINANCIAL PRACTICABILITY OF ELECTRIFICATION

I. Annual Charges:	
1. Interest	\$8,906,362
2. Depreciation	7,808,278
3. Replacement of dissipated assets.....	231,796
Total charges	\$16,946,436
II. Annual Revenues:	
1. Increase in net revenues.....	\$2,336,693
2. Indeterminate benefits	
Balance, annual deficit on investment.	\$14,609,743

SETTLING RAILROAD WAGES*

By ELISHA LEE

General Superintendent, Philadelphia, Baltimore & Washington.

A serious problem confronts both the railroads and the public today. It is a subject upon which much statesmanship must be expended in the next few years if the problem is to be solved to the credit of our nation. It is a problem that you younger men will have to wrestle with as citizens. I refer to the labor problem and particularly the railroad labor problem. . . . The arbitrators between the locomotive engineers and the Eastern railways, in 1912, gave a warning to which the public has been singularly indifferent. They said:

"The food and clothing of our people, the industries and the general welfare of the nation, cannot be permitted to depend upon the policies and the dictates of any particular group of men, whether employers or employees, nor upon the determination of a group of employers' and employees combined. The public utilities of the nation are of such fundamental importance to the whole people that their operation must not be interrupted, and means must be worked out which will guarantee the result."

Adjustment of working conditions has been considered a matter of private concern affecting only employer and employed. Yet the railway provides a service which is a necessity of the entire people, and the interruption of this service would prove to be a national calamity. Wage increases are sooner or later shifted to the shoulders of the people and the public's interest in railway labor controversies is supreme and should assert itself far more effectively than it has thus far.

At the present time we see very little in the papers about labor movement on the railroads, but as a matter of fact the pot is seething hot. A movement is now on foot to secure the association of all the train organizations in one united demand upon the roads. On many of the railway systems federation of the four brotherhoods is in effect and on others working agreements exist between two or three of the organizations. Faced by this new idea of a united labor force in an undivided country, the public may well give heed and devote its best thought to a consideration of its own interest in the outcome.

In recent negotiations and arbitration proceedings, among other arguments, a demand for standardization has been more or less vigorously pressed—the same pay for the same work in the same class of service, whether train operation is on single or double track, in mountainous or level country, in branch or main line service, on lines of heavy or light traffic. But the standardization wanted is standardization upward, as was very frankly stated in a recent controversy by one of the labor leaders, and leaves the high spots plainly in view.

The result of such standardization is to raise the lower end of the wage scale regardless of work performed or responsibility incurred. Results obtained under such conditions have been attained in a haphazard fashion and are attended by much discrimination.

There has been little in the process up to the present time that could be designated as scientific, such questions often being settled from the standpoint of immediate expediency.

No final solution of so perplexing a problem as that of the relations of capital and labor is expected within the near future, but we should begin at once to give serious thought to the whole question and thus lay the foundation for a larger participation on the part of the public in the settlement of disputes in which its interest is paramount.

Do not understand me as criticizing the individual or the great mass of railroad employees. I know of no finer body of men generally than the employees of the railroads today. They are hard-working, conscientious men, who are sincerely and devotedly doing their work. I would venture the guess that we have very slight, if any, fault to find with 98 per cent of the employees, and I am proud of the fact that it is my good fortune to work with them.

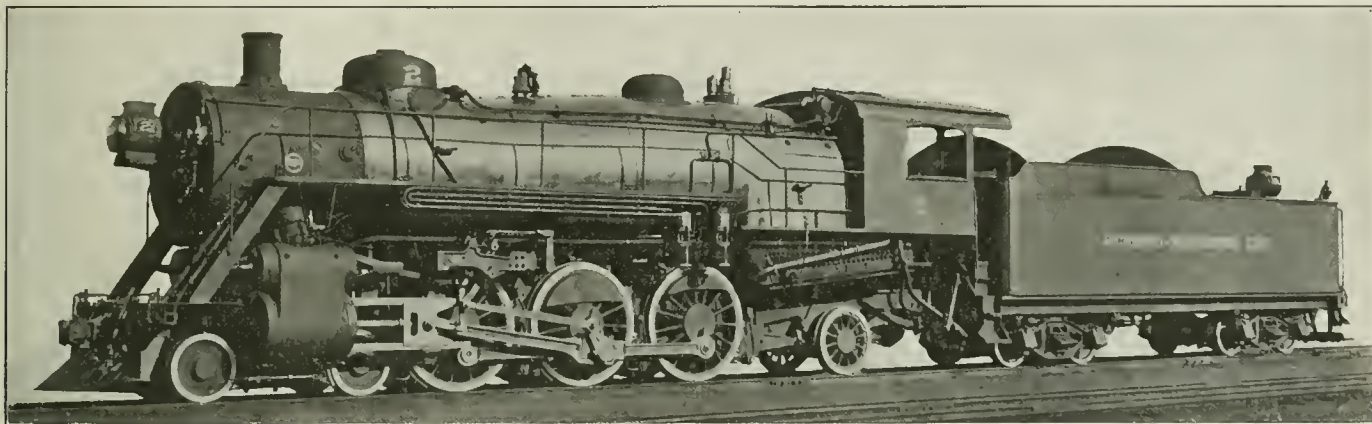
*From an address delivered at Delaware College, Newark, Del., December 9.

Powerful Pacific Type Locomotive for the R., F. & P.

Exceeds All Previous Pacific Type Engines in Tractive Effort and is Among the Largest in Boiler Capacity

The Baldwin Locomotive Works has recently completed for the Richmond, Fredericksburg & Potomac two Pacific type locomotives which are the most powerful of their type in hauling capacity thus far constructed by the builders. They have a

board Air Line and the Atlantic Coast Line. These trains, especially during the winter tourist season, are frequently very heavy, and are hauled at an average speed, including from two to six stops, of 36 to 42 miles an hour. Including the new



Richmond, Fredericksburg & Potomac Heavy Pacific Type Locomotive

tractive effort of 47,400 and a comparison of their principal dimensions with those of several other large Pacific type locomotives exerting a tractive effort of about 42,000 lb. or over, is given in the table.

engines, four classes of Pacific type locomotives have been built for this service by the Baldwin Locomotive Works. Compared with the first of these, which were built in 1904, the new locomotives show an increase in tractive effort of 82 per cent.

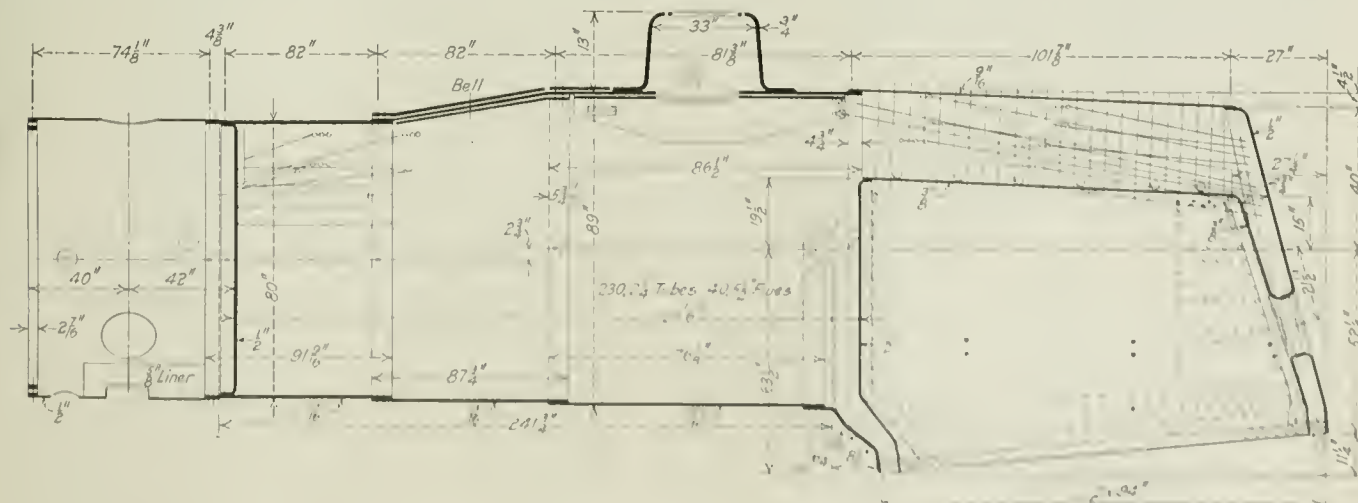
COMPARISON OF RECENT PACIFIC TYPE LOCOMOTIVES EXERTING OVER 42,000 LB. TRACTIVE EFFORT

	R. F. & P.	C.&O.	C.C.&O.	C.&O.	B.&O.	D.,L.&W.	Erie.	C.,B.&Q.	Penn.
Builder	Baldwin.	A.L.Co.	B'ldw'n.	B'ldw'n.	B'ldw'n.	Lima.	B'ldw'n.	B'ldw'n.	Penn.
Cylinders, dia. and stroke, in.	26x28	27x28	25x30	27x28	24x32	25x28	25x28	27x28	27x28
Driving wheels, dia, in.	68	69	69	73	74	69	69	74	80
Boiler pressure, lb. per sq. in.	200	185	200	185	205	200	200	180	205
Heating surface, evaporating, sq. ft.	4,205	4,478.8	3,982	3,786	3,936	3,960	3,966	3,364	4035.4
Heating surface, superheater, sq. ft.	975	991	955	879	833	740	879	751	1153.9
Grate area, sq. ft.	66.7	80.3	53.8	59.6	70	60	58	58.7	70
Weight on drivers, lb.	188,000*	191,000	176,900	179,900	166,200*	184,600	184,300	169,700	305,000
Weight, total engine, lb.	293,000*	312,600	280,300	282,000	263,800*	297,600	281,600	266,400	200,000
Tractive effort, lb.	47,400	46,600	46,000	44,000	43,400	43,200	43,200	42,200	41,845

* Weights estimated.

The Richmond, Fredericksburg & Potomac is a double-track line connecting the cities of Washington, D. C., and Richmond, Va. The distance is 116 miles, and besides local traffic, the road handles all the through northern connections of the Sea-

The boiler is of the extended wagon-top type, measuring 80 in. in outside diameter at the first ring and 89 in. at the dome ring. It is fitted with a one-piece pressed steel dome, measuring 33 in. in diameter by 13 in. in height. The longitudinal seams



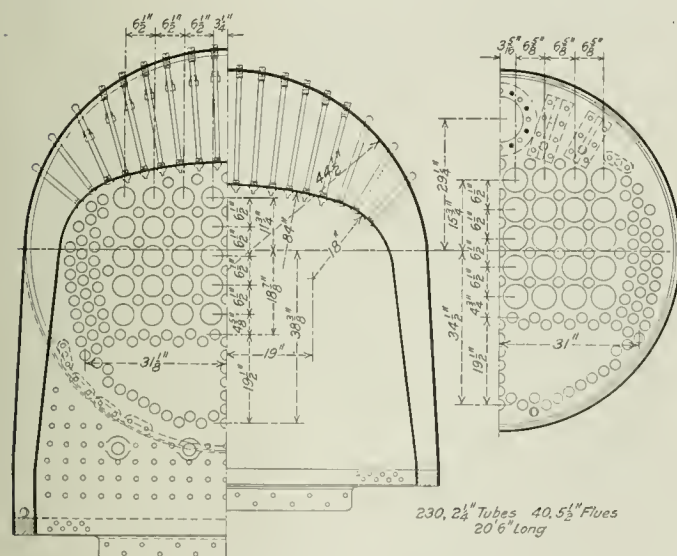
Boiler of the Richmond, Fredericksburg & Potomac Pacific Type Locomotive

are welded at the ends and have a strength equal to 90 per cent of the solid plate. A complete installation of flexible stay bolts is used, and the front end of the firebox crown is supported by three rows of Baldwin expansion stays. The firebox is carried on expansion plates at the front and back, and the boiler barrel is supported by waist sheets at three intermediate points. A Security sectional arch, a 40-element Schmidt superheater and a Chambers throttle valve are included in the boiler equipment.

The steam distribution is controlled by "Jack Wilson" piston valves, 14 in. in diameter, driven by the Baker valve gear, and the engines are equipped with the Lewis power reverse gear, furnished by the Compensating Specialties Company, Richmond, Va. Graphite lubricators are applied to the steamchests.

Special material is used quite extensively in the construction of these locomotives. The driving and engine truck axles are of heat-treated steel. Nikrome steel is used for the main and side rods, the crank pins and the cross-head pins, and Hunt-Spiller metal for the cylinder and steam chest bushings, as well as the piston and valve packing rings.

The main frames are of vanadium steel, 5 in. wide, each being cast in one piece with a single front rail, and are spaced transversely 42 in. between centers. The rear frames were fur-



Cross Sections of the Boiler

nished by the Commonwealth Steel Company, and are cast in one piece with the back foot-plate, trailing truck pedestals, radius-bar cross-tie and other projections and braces. This constitutes an elaborate casting, with an over-all length of 15 ft. 4 1/4 in. It has a slab fit in recesses formed in the main frames, and is secured to the latter on each side by 13 horizontal bolts, each 1 1/4 in. in diameter. Throughout the greater part of its length on each side this casting has a Z-section with walls 12 in. deep and 1 1/2 in. thick. A transverse brace is placed over the rear truck pedestals. The holes for the trailer truck radius-bar pin, equalizing beam pins, etc., are bushed.

The main frames are braced transversely by the guide yoke, valve motion bearer and waist-sheet cross-tie, the latter being a broad casting placed between the main and rear pairs of driving-wheels. The front and main driving pedestals are also transversely braced, the brace at the front pedestal being used as a fulcrum for the driving-brake shaft.

The rear truck is of the Rushton type, with inside journals. In this design the truck swing links are pinned to a pair of yokes which constitute part of the equalization system, the yokes being prevented from moving laterally by the truck pedestals. The pedestals on each side are fitted with renewable wearing plates 3/16 in. thick. There is no cross-connection in the driving equalization system, as the driving and truck journals are in line and the equalizers between the rear drivers and the trailer connect directly with the spring hangers.

The arrangement of the running-boards and hand-rails is suggestive of the practice followed in certain parts of Continental Europe. The hand-rails are placed outside the running-boards, the total width over the latter being 10 ft. 3 in., and a flight of steps leads from the running-boards to the front bumper. This arrangement adds materially to the convenience and safety of the engine crew.

These locomotives, owing to their high tractive effort and steam capacity, are among the most notable of their type thus far built. Their leading dimensions are given in the following table:

General Data	
Gage	4 ft. 8 1/2 in.
Service	Passenger
Fuel	Bituminous coal
Tractive effort	47,400 lb.
Weight in working order	293,000 lb.
Weight on drivers	188,000 lb.
Weight on leading truck	53,000 lb.
Weight on trailing truck	42,000 lb.
Weight of engine and tender in working order	472,000 lb.
Wheel base, driving	13 ft.
Wheel base, total	34 ft. 1 in.
Wheel base, engine and tender	72 ft. 4 in.

Ratios	
Weight on drivers ÷ tractive effort	3.96
Total weight ÷ tractive effort	6.18
Tractive effort × diam. drivers ÷ equivalent heating surface*	5.69
Equivalent heating surface ÷ grate area	85.0
Firebox heating surface ÷ equivalent heating surface*, per cent	4.1
Weight on drivers ÷ equivalent heating surface*	33.2
Total weight ÷ equivalent heating surface*	51.7
Volume both cylinders	17.2 cu. ft.
Equivalent heating surface* ÷ vol. cylinders	329.4
Grate area × vol. cylinders	3.9

Cylinders	
Kind	Simple
Diameter and stroke	26 in. by 28 in.

Valves	
Kind	"Jack Wilson" Piston
Diameter	14 in.

Wheels	
Driving, diameter over tires	68 in.
Driving journals, main, diameter and length	11 1/2 in. by 13 in.
Driving journals, others, diameter and length	11 1/2 in. by 13 in.
Engine truck wheels, diameter	33 in.
Engine truck, journals	6 in. by 10 in.
Trailing truck wheels, diameter	42 in.
Trailing truck, journals	8 1/2 in. by 14 in.

Boiler	
Style	Wagon top
Working pressure	200 lb. per sq. in.
Outside, diameter of first ring	80 in.
Firebox, length and width	114 5/8 in. by 84 3/4 in.
Firebox plates, thickness	Tube, 1/2 in.; others, 3/8 in.
Firebox, water space	Front, 5 in.; sides, 4 1/2 in.; back, 4 1/2 in.
Tubes, number and outside diameter	230—2 1/2 in.
Flues, number and outside diameter	40—5 1/2 in.
Tubes and flues, length	20 ft. 6 in.
Heating surface, tubes and flues	3,942 sq. ft.
Heating surface, arch tubes	31 sq. ft.
Heating surface, firebox	232 sq. ft.
Heating surface, total	4,205 sq. ft.
Superheater heating surface	975 sq. ft.
Equivalent heating surface*	5,667.5 sq. ft.
Grate area	66.7 sq. ft.

Tender	
Weight	179,000 lb.
Wheels, diameter	33 in.
Journals, diameter and length	6 in. by 11 in.
Water capacity	10,000 gal.
Coal capacity	15 tons

*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

NO STEEL CORPORATION REBATES

The following is the full text of the report of the Interstate Commerce Commission in the matter of alleged rebates to the United States Steel Corporation:

On February 2, 1914, the Senate of the United States passed the following resolution:

Resolved, That the Interstate Commerce Commission is hereby requested to conduct an examination and inquiry for the purpose of ascertaining whether the United States Steel Corporation, or any of its subsidiaries, has been guilty of giving or receiving any unlawful rebates, offsets, or preferences, especially within the last six years; and if said commission finds that such unlawful rebates, offsets, or preferences have been given or received, then the commission is directed to report the dates and amounts thereof to the Senate for its information.

Shortly after a copy of the resolution had reached us the commission, by appropriate order instituted an investigation for the purpose of ascertaining whether the United States Steel Corporation, or any of its subsidiaries, has been guilty of giving or receiving any

unlawful rebates, offsets, or preferences, especially within the last six years; and to report the dates and amounts thereof to the Senate for its information in case the commission finds that such unlawful rebates, offsets, or preferences have been given or received.

It appears that one David H. Lamar and one William H. Green had claimed to be in possession of information showing violations of law on the part of the steel corporation through the receipt by it of secret rebates amounting to millions of dollars, and it is understood that the resolution of the Senate was based upon their representations. It further appears that Mr. Lamar had previously made similar intimations to a member of this commission and had inquired whether the commission would undertake an investigation and permit him to direct the form and manner in which it should be carried on. He was advised that upon being put in possession of any definite information of any such violation of law it would be the duty of the commission to investigate, but that it would do so only in its own way, pursuing such course as the facts disclosed might require. Repeated efforts having failed to elicit any statement from Mr. Lamar in support of his assertions, further conference with him was declined.

After the passage of the resolution by the Senate and after the order of investigation had been entered by the commission, Mr. Lamar and Mr. Green were requested at a personal conference with a member of the commission to state the facts within their knowledge so that the scope of the investigation might be outlined by the commission and affirmative steps taken, through public hearings and by the commission's examiners, to ascertain whether any unlawful rebates and preferences had been received by the steel corporation or by any of its subsidiary companies. But they declined to reveal their information except at a public hearing. They were accordingly served with subpoenas and a public hearing was had on March 3, 1914, Mr. Green being first sworn and called as a witness. The questions put to him at once developed the fact that he had not been a student of transportation matters; that he had attended some of the hearings before the so-called Stanley committee of the House of Representatives, the report of which he had read; that he had also read reports of the bureau of corporations and of this commission in which matters relating to the steel corporation were considered; that he had also examined the record in the government's suit to dissolve the steel corporation; but that he had no independent information, or indeed any information respecting the affairs of the steel corporation and its subsidiaries that was not already of public record in one form or another. Having referred during his testimony to an individual who was in possession of facts not heretofore known, he at first declined to name him, but being required to state who he was he finally named Mr. Lamar.

Mr. Lamar was then called as a witness and, being put under oath, was subjected to examination as to his information about the relations of the steel corporation with the railroads of the country. His testimony shows that he knew nothing that was not already generally known to the public, and that such information as he had was of a perfunctory and superficial nature and had been derived from reading the reports of various public bodies, and especially of this commission, in which the affairs of the steel corporation are discussed. He named several of the subsidiaries of the steel corporation and asserted that "offsets," by which it is understood he meant rebates, had been received from the carriers by the steel corporation in the form of dividends on its holdings of stock in these companies, the stock being based, as he asserted, upon an entirely fictitious valuation.

In *Pittsburgh Steel Co. v. L. S. & M. S. Ry. Co.*, 27 I. C. C., 173; *Vulcan Iron Works Co. v. A., T. & S. F. Ry. Co.*, 27 I. C. C., 468; *Industrial Railways case*, 29 I. C. C., 212, 32 I. C. C., 129; *Coal and Oil Investigation*, 31 I. C. C., 193; *Lum v. G. N. Ry. Co.*, 33 I. C. C., 541; and *Joint Rates with the Birmingham Southern R. R. Co.*, 32 I. C. C., 110, the relations of the steel corporation to various of its subsidiary railroad and steamship companies have been made a matter of public record. An even more complete record of all such facts has been made in the

proceeding by the government, heretofore mentioned, in which it was sought to dissolve the United States Steel Corporation under the so-called anti-trust law. *United States v. United States Steel Corporation*, 223 Fed., 55. The commissioner of corporations has also made an extended investigation, the results of which are incorporated in three printed volumes entitled "Report of the Commissioner of Corporations on the Steel Industry."

The commission comes into constant contact with the records and accounts of railroads and other public carriers through its examiners of accounts, and has reason to believe that there is no basis for the allegation that wholesale rebates have been paid to the steel corporation during the period of six years mentioned in the resolution; apparently in alleging that "offsets" and rebates have been received by the steel corporation during that period the witnesses mentioned had in mind the dividends on the stock of the numerous subsidiary railroad and steamship lines owned by it, and as to this all the facts have been ascertained and are accessible in the various public records just mentioned. Under these circumstances we venture to believe that the resolution of the Senate is sufficiently complied with for all practical purposes by the reference to those investigations in connection with the foregoing statement. (36 I. C. C., 559.)

THE LABOR DEPARTMENT AND THE RAILROADS

BY W. L. STODDARD

Washington, December 14, 1915.

Hardly a branch of the Federal Government fails to come into some sort of contact with the railroads. Congress legislates for or against them, the courts decide their cases, a special commission adjusts their rates and values their property, a postmaster general negotiates for payment to them for carrying mails, the military arm of the executive plans for the utilization of the roads in case of war, and this week along comes Secretary of Labor Wm. B. Wilson with several suggestions about the railroads which show that their functions are appreciated from the head of the President's cabinet table down to the foot.

During the last fiscal year, no less than six important railroad cases were adjusted through the mediators of the Labor Department. These cases were those of the freight clerks of the New York, New Haven & Hartford, the car builders of the Pennsylvania Lines West of Pittsburgh, the shopmen of the Seaboard Air Line Railway, the shopmen of the Kansas City Terminal Railway, the clerks of the Chicago & Eastern Illinois, and the terminal clerks of the Southern Railway. In the first named instance it is interesting to know that besides effecting a settlement with the railroad and its freight clerks, the commissioners of mediation, at the request of the railroad company, brought about an arrangement with the officials and employees of the New England Steamship Company whereby conferences are to be had between the company and its clerks over any future differences that may arise between them.

Commenting on this work, Secretary Wilson declares that it has "furnished further proof of the value of the act of Congress under which the department operates in behalf of industrial peace. . . . In administering this authority I have regarded it as contemplating a development of diplomatic duties with reference to labor disputes analogous to those of the Department of State with reference to international controversies."

Secretary Wilson is not content with recounting history—he has a new scheme which involves the railroads. This is to secure from Congress an authorization such that the Interstate Commerce Commission may charge "exceptional rates of railroad fare" so as to enable the department to place the unemployed in employment, particularly in the harvest fields. According to the plan as outlined at considerable length, the idea is that if low railroad rates could be secured, it would be possible to ship large groups of workers to the grain belt at the season when they are most needed there. The department uses the phrase, "labor vacations" to describe the excursions which

it wishes to inaugurate for the relief of the harvest labor situation. An experiment would have been made this year, it seems, but for the expense of transportation.

"Inasmuch as railroads," says the Secretary, "can not give special rates to this department for the promotion of its labor-distribution work without thereby making those rates universal, the department found it impossible to arrange for transporting workers on practicable terms, no matter how willing the railroads themselves might have been to co-operate. This is one of the reasons the department is asking in its recommendations for an amendment to the interstate commerce law enabling the commission in its discretion to approve such special arrangements as the department may find it possible to make between itself and railroad companies for the transportation of workers under its official charge or guidance."

It is expected that a bill will be introduced into Congress embodying the department's suggestions.

Also of interest to the railroads in the Labor Department's report is the request for legislation for the utilization of large areas of land hitherto held by the land-grant railroads, but now, under a decision of the Supreme Court, about to return to the Government. This decision both empowered and obligated Congress to treat with the land-grant railroads regarding the terms of the restoration of the very extensive tracts said to be easily available for farming. In these areas the Labor Department sees a possible outlet for the unemployed, and to this end quite an elaborate scheme has been drawn up, the fundamental idea being to stimulate "back-to-the-land" movement for the relief of congestion in the cities and for the revival of the old era of homesteading.

Up to the present writing Congress has given little promise that it will tackle railroad legislation, or any legislation at all, till after the Christmas recess. Not much hope is held out by leaders at the Capitol for any enactments except appropriations and national defense bills. Some incline to make an exception of the Administration's shipping bill. But in general it is true that few believe that even a small percentage of the many departmental suggestions and recommendations will be considered by Congress with the attention that they deserve.

The personnel of the three Senate Committees which have to do with railroads, as announced early this week, is as follows:

On Railroads: Messrs. Phelan (chairman); Reed, Smith, of Arizona; Williams, Smith of South Carolina; Lewis, Oliver, Norris, Goff, du Pont, and Clark of Wyoming.

On Pacific Railroads: Messrs. Brandegee (chairman); Callinger, McCumber, Jones, Townsend, Shively, Reed, Stone, Johnson of South Dakota, Robinson and Thomas.

On Interstate Commerce: Messrs. Newlands (chairman); Smith of South Carolina, Pomerene, Myers, Robinson, Saulsbury, Thompson, Lewis, Gore, Underwood, Clapp, Cummins, Oliver, Lippitt, Townsend, La Follette and Poindexter.

FOUR-WHEEL TRUCKS FOR PASSENGER CARS

The paper on four-wheel trucks for passenger cars, which was presented at the annual meeting of the American Society of Mechanical Engineers last week by Roy V. Wright, was discussed by several members. An abstract of the paper appeared in the *Railway Age Gazette* of December 3, 1915, page 1055. Extracts from the more important parts of the discussion follow:

C. D. Young, Pennsylvania Railroad.—The railroads have been too prone in recent years to use six-wheel trucks, based upon their experience with wooden trucks. Due to the flexure in these trucks, it was necessary to go to the six-wheel truck, simply on account of the wheel load. Obviously, as far as cost, and probably maintenance, is concerned, due to the fewer parts, the four-wheel truck is preferable to the six-wheel truck, provided it gives satisfactory service. With the advent of the steel truck, I believe that the total weight of the car which will be satisfactorily carried on the four-wheel truck can be materially increased. The practicability of this is proved by

the use of four-wheel trucks under, say, 98 per cent of the heavy passenger locomotive tenders in this country.

Axle loads as high as 45,000 lb. are permitted on passenger tenders, yet when we design a passenger car it is with fear and trembling that we put 31,000 lb. on the same axle.

In order to ascertain what effect on the train's resistance the two extra axles of the six-wheel truck would have we made three round trips each, with a dynamometer car on a ten-car train, using four-wheel trucks, and a ten-car train using six-wheel trucks, the car bodies being the same in both trains. The difference in total weight per car was due entirely to the difference in weight of the trucks, the cars with six-wheel trucks weighing 66 tons and those with four-wheel trucks weighing 59 tons. The tests indicated that the only material difference in resistance was due entirely to the difference in weight of the vehicles. With the cars in question we would have the same resistance in 13 cars with six-wheel trucks as would be offered by 14 cars, with four-wheel trucks.

The development of the clasp brake outlined in the paper was the result of observation of the clasp brakes used on the Philadelphia & Reading. They were tested in 1912, a complete report of the tests already having been made to the American Society of Mechanical Engineers by S. W. Dudley, of the Westinghouse Air Brake Company.* The single shoe brake had a total weight of 3,682 lb. per car, and the movable parts weighed 3,084 lb. The clasp brake had a total weight of 4,433 lb. per car, the movable parts weighing 2,852 lb., showing an increase in total weight of the clasp brakes of 24 per cent., whereas there is a decrease in the weight of the movable parts of the clasp brakes of 8 per cent. It was developed in our brake tests that it was desirable to have as low weight in the moving parts of the brake rigging as possible, to overcome the effect of inertia, for obviously the heavier the moving parts the more inertia and the longer time it takes to get full braking pressure at the wheel with a given pressure in the cylinder. By reducing the weight of the parts of the clasp brake we therefore have the right to expect that we develop the full braking power slightly quicker than we do on the single-brake car.

At sixty miles an hour, with 125 per cent nominal braking power, the clasp brake car made a stop in the brake shoe tests in 808 feet, which I believe is the shortest stop ever made on a passenger car under that braking power. The corresponding length of stop with single shoes is about 1,250 feet, showing a distinct gain in the length of stop by the use of two shoes per wheel, with an increase in the total weight of the brake rigging of only about 24 per cent.

The use of the clasp brake is economical in shoe brake material. We have recently made a series of road tests of brake shoes, considering the wear under single and clasp brake conditions. On the five different runs on which the test was made the clasp brake shows a saving in brake shoe material of about 30 per cent as compared with the single brake.

S. G. Thomson.—The Philadelphia & Reading has had one hundred cars equipped with clasp brakes in service for a number of years. The brake is very highly efficient; the stops with the clasp brake seem to be very much shorter than where the higher pressures are used to get nearly equal braking power.

G. R. Henderson.—It is well known that the Pennsylvania track is nearly perfect and it is a question whether the Pennsylvania four-wheel passenger trucks would give satisfactory service on average track with the loads which they now carry. The abandonment of the equalizers accounts for considerable saving in weight, as the equalizers and spring seats are quite massive for heavy cars. It is still the practice of many roads to use equalizers under tenders of passenger locomotives and also under high speed electric cars, and it is an interesting question as to just how far we can go in abandoning them and still not interfere with the comfort of the passengers. The condition of the track is a very important factor and should not be overlooked when considering this question.

*See *Railway Age Gazette*, February 13, 1914, page 311; also February 20, 1914, page 352.

Six-wheel trucks have been developed more generally in the West than in the East and it is only in recent years that their use has become general on ordinary passenger coaches. I desire to speak particularly with reference to passenger coaches, not sleeping cars or diners or heavy weight cars.

Some of the reasons why the six-wheel truck was applied to cars which would be considered quite light today were that from 60-lb. to 70-lb. rails with very light gravel ballast, in some cases nothing but gumbo ballast, were used, and further because of the use of cast-iron wheels. At one time the Chicago, Milwaukee & St. Paul was using cast-iron wheels even on parlor cars, these wheels being considered absolutely safe under six-wheel trucks, but not under four-wheel trucks.

Under ordinary conditions of service there is no justification for a six-wheel truck under a suburban car, and yet there are a great number of suburban cars which are running on six-wheel trucks. I will go further. I have never yet seen a 70-ft. car of the ordinary passenger coach type where the six-wheel truck was justified with the track we have today.

The following instance is given because of its bearing upon the difficulty from hot boxes. On a certain railroad, where, from the weight point of view, the 5 in. by 9 in. journal was perfectly satisfactory, and they were maintaining their journals in good shape, they were having trouble from hot boxes. They substituted the next larger M. C. B. axle, and still had trouble from hot boxes. An analysis of the situation brought out the fact that with the new form of high-speed brake the pressure with one shoe per wheel was such that it caused the brass to tilt and prevented the proper contact on the journal. When the clasp brake was applied no trouble was experienced with the 5 in. by 9 in. journal.

Mr. Pomeroy presented data showing the weights of a number of typical four-wheel and six-wheel trucks, the former varying from 26,400 lb. per car for 5 in. by 9 in. journals, to 31,400 lb. per car for 5½ in. by 10 in. journals and the latter varying from 41,200 lb. to 45,900 lb. per car. Using an average weight of 27,000 lb. per car for the four-wheel trucks he called attention to the saving in weight which could have been effected on a number of coaches with six-wheel trucks now in service, had four-wheel trucks been used.

S. G. Thomson.—We made some tests on the Atlantic City Railroad to determine the cause of hot boxes in very high speed service, up to 80 or 90 miles an hour on some parts of the road. We took some temperature readings of the boxes and were led to believe that there was not much of a film of oil between the journals and brasses. The trains would come into the terminal with the boxes almost at the flashing point. In the rush season we had to turn these trains back on the reverse trip at once, and no doubt the accumulated heat in the wheels and journals had something to do with the hot boxes on the way back. We ran these trains sometimes six trips during a day and occasionally the boxes would heat up, without any apparent reason, having had careful attention at both ends of the route on all trips. The cars were all-steel, weighing about 118,000 lb., and in my judgment were about at the limit for the four-wheel truck for that speed. We took the same cars on our New York division, where we have a couple of stops, and do not run at such high speeds, and they gave us no trouble whatever. The speed seems to be a factor in the question of using the four-wheel truck, and when our last cars were designed we considered very seriously the use of six-wheel trucks. We concluded to stick to the four-wheel truck and have done so with fairly good results.

G. W. Rink (C. R. R. of N. J.).—I would like to ask Mr. Thomson whether it was with the type of truck with the springs directly over the journal boxes that the trouble with hot boxes occurred. We had a few cars built with trucks of that type, and eventually went to the one-piece Commonwealth truck, because of trouble from hot bearings. On the trucks without equalizers, having the coil springs placed directly over the journal boxes, there is a tendency for the boxes to tilt and bind in the pedestal, producing uneven distribution of bearing pressure and wearing the box flanges. These trucks weighed 15,200 lb.

each and the Commonwealth trucks, which we now use, weigh 17,000 lb. each. Both types of trucks have clasp brakes, with beams across the truck.

S. G. Thomson.—The trucks we made our test on were not the ones with the springs over the journal boxes, although that type has given us more trouble than the other type.

INCREASES ALLOWED IN WESTERN PASSENGER FARES

The Interstate Commerce Commission, in a decision given out last Monday, holds that the carriers in western territory have justified certain increases in their interstate passenger fares, but the increases approved are not as great as those proposed. The decision appears in 37 I. C. C. 1 and is rendered "by the commission." Briefly, the commission's findings are as follows:

The carriers are allowed to increase from 2 cents to 2.4 cents a mile their interstate fares in Illinois; Wisconsin, the upper peninsula of Michigan, Minnesota, Iowa, Nebraska, Missouri north of the Missouri river and in Kansas on and north of the main line of the Union Pacific from Kansas City to the Colorado state line. The tariffs had proposed rates of 2½ cents.

In Missouri south of the Missouri river and in Kansas south of the Union Pacific, an increase from 2 cents to 3 cents a mile is not found justified, but a rate of 2.6 cents is allowed.

Proposed increased fares from points in the territory in which these fares are authorized to points on the main lines of the carriers in California, Utah, Nevada, Colorado, Wyoming, Arizona, New Mexico, Arkansas, Oklahoma and Texas are held not justified in those instances where such proposed increases result in higher fares than would be obtained by using for the construction of such fares the bases now authorized in Michigan, Illinois, Wisconsin, Kansas, Minnesota, Iowa, Nebraska, and Missouri, and a basis of 2½ cents a mile in the states of North and South Dakota, and a basis of 3 cents a mile in the states south and west thereof.

Proposed increased charges for mileage tickets in the territory north of the Missouri river in Missouri and on and north of the main line of the Union Pacific in Kansas to 2¼ cents a mile, and in territory south of the Missouri River in Missouri and the main line of the Union Pacific Railroad in Kansas to 2½ cents a mile are found justified.

Proposed increased fares from points in Michigan, upper peninsula; Illinois, Iowa, Minnesota, Wisconsin, Nebraska, Missouri and Kansas, to points in states east thereof, which result from the construction of such fares by the use of the bases herein found reasonable and the use of the existing fares in eastern territory are held to be justified.

The increased tariffs were filed to become effective on or about March 1, 1915, but were suspended until June 29, 1915, and subsequently resuspended until December 29, 1915.

This case may be considered as in large part complementary to the 1915 Western Rate Advance Case, 35 I. C. C., 497.*

To the 41 roads concerning which testimony was developed by the carriers in the freight case there were added six other roads, the Great Northern, Northern Pacific, Union Pacific, Toledo, Peoria & Western, Duluth, South Shore & Atlantic and the Texas Midland, and one road, the Chicago, Indiana & Southern, has been eliminated, for the reason that interstate fares on this line have been recently increased. Some of the railroads included in the 46 roads or systems lie largely or wholly without the territory in which the increases in basing fares are sought.

In the decision considerable attention is paid to the data used in the Western freight rate decision, the figures for the 41 roads being revised for the 46 roads and reference being made to the roads in group in particular. Increase in cost of operation and decrease in income for the past 12 years are set forth.

The evidence of both carriers and protestants is adduced to show an increase in the ratio of operating expenses to operating revenue, a rising scale of taxes and diminished compensation for service as measured by the average return per ton-mile or the average return per passenger-mile.

*Abstracted in the *Railway Age Gazette* of August 13, 1915, page 285.

SEPARATION OF EXPENSES BETWEEN FREIGHT AND PASSENGER

The separation of maintenance of equipment, transportation and traffic expenses, as between passenger and freight, presents no insurmountable difficulties. The separation of the expenses incident to the maintenance of way and structures, however, is more difficult. The weight and length of freight trains necessitate a certain degree of compactness of roadbed, weight of rail, strength and stability of bridges, culverts and other structures. The weight and speed of passenger trains have also necessitated in the interest of safety a higher degree of excellence as indicated in the strengthening of track structures, and a certain higher degree of upkeep of the track and structures, while both alike have induced the installation of block signals. The maintenance of way and structures expenses are large and form a great proportion of the total expenses. * * * To this problem a large part of the testimony of both carriers and protestants has been directed.

One of the interrogatories sent out by the commission inquired as to methods used by each carrier in the separation of passenger and freight expenses. The carriers were invited to make this apportionment for 1913 and 1914. Replies were received from 32 carriers making the apportionment for 1914; and 28 also made the apportionment for 1913.

We shall discuss first the method proposed by the carriers for the apportionment of these expenses. The commission here reproduces pages 67 and 68 of Exhibit No. 1 filed by L. E. Wettling, who was a witness for the carriers in this case as

WETTLING EXHIBIT NO. 1, 46 ROADS			
Operating expenses	Per cent freight	Per cent passenger	
Basis I:			
Maintenance of way and structures.....	56.23	43.77	
Total operating expenses.....	66.90	33.10	
Basis II:			
Maintenance of way and structures.....	54.89	45.11	
Total operating expenses.....	66.62	33.38	
Basis III:			
Maintenance of way and structures.....	56.74	43.26	
Total operating expenses.....	66.97	33.03	
Basis IV:			
Maintenance of way and structures.....	63.17	36.83	
Total operating expenses.....	68.26	31.74	
Basis V:			
Maintenance of way and structures.....	58.62	41.38	
Total operating expenses.....	67.35	32.65	
Basis VI:			
Maintenance of way and structures.....	57.93	42.07	
Total operating expenses.....	67.22	32.78	

well as in the freight case. The table herewith gives the several bases used in the apportionment and the resulting per cents for maintenance and total operating expenses respectively.

The first basis shown is that ordinarily used by these carriers in the division of maintenance of way expense accounts for their own purposes. Basis 2 rests on the claim that the greater speed of the passenger trains creates a greater degree of wear upon the track and other structures. Inasmuch as this greater speed necessitates more power it is asserted that the weights of the passenger locomotives bear some direct relation to both the weight and the speed of the trains they draw. The locomotive ton-mile therefore to a certain extent measures the work done by the engines in each class of service, and the wear on track and structures. There is, however, a large proportion of the expenses incident to the maintenance of way and structures that is influenced only to a small extent and certain expenses are not influenced at all by the weight and speed of the trains that pass over the track. The action of the elements and deterioration of materials will go on whether trains pass over the tracks or not. It is uncertain how much of any particular item of expense is due to action of the elements and how much to wear. Various assumptions are indulged, as that 60, 70 or 80 per cent of such expenses are due to action of the elements and the remainder to wear. These assumptions rest on uncertain ground.

The testimony of a number of operating and accounting officers of long experience supports the locomotive ton-mile method as in their judgment the most logical and practical method for the division of these expenses. The results of apportionments

upon this basis compare closely with the results obtained by the use of basis No. 3, shown on the same exhibit. This basis proposed the division of the maintenance of way and structures expenses between passenger and freight in the proportion which the revenue passenger train-miles bear to the revenue freight train-miles. This basis may be said to rest in the main on the assumption that these expenses should be divided according to the use that is made of the track. It does not directly take account of the fact that passenger trains move faster than freight trains, nor does it take account of the fact that freight trains are heavier and longer than passenger trains.

Basis No. 4 is an attempt to separate these expenses between passenger and freight upon the proportion existing between the direct train costs as represented by repairs to locomotives, fuel, water, lubricants and supplies for trains and the wages of enginemen and trainmen.

Basis No. 5 is the same as the engine ton-mile basis except that it includes a proper proportion of switch or yard engine ton-miles, while basis No. 6 is the average of the five foregoing bases.

But little testimony was directed to support basis 4. Bases 2, 3 and 5 were criticised by protestants upon the ground that the results thereby reached vary so widely from the division of the expenses which are directly allocated. It may be said that practically all of the maintenance of equipment, transportation, traffic and general expenses are either directly allocated or no material difference of opinion appears to exist concerning their proper division. These expenses assignable to the passenger service are approximately 30 per cent of the total expense included in these three divisions, while on the revenue train-mile or the locomotive ton-mile method the amount of expenses of maintenance for ways and structures assignable to the passenger service is usually more than 40 per cent of the total of these expenses. It is asserted that these unallocated expenses of maintenance of way and structures should be divided between passenger and freight upon some basis which more nearly accords with the known ratio that exists between the other expenses. . . . We are not prepared to approve in its entirety any of the methods offered.

The protestants through their witnesses, Hillman and Warren, have made a division of the operating expenses for 1913 and 1914 on the Chicago & North Western and a number of other roads. Six different bases are presented. The first method uses the product of the total weight of passenger trains multiplied by the distance moved as compared with the product of the total weight of freight trains times the distance moved. This method assumes the proper relation between these expenses to be due solely to the weight and distance moved. In other words, the total tons moved 1 mile in a passenger train is compared with the total tons moved 1 mile in a freight train. The second method is the locomotive ton-mile method as used by the carriers and heretofore explained. The third method is called the locomotive tractive power method; the sum of the products of the tractive powers of the locomotives used in the passenger service multiplied by the number of miles moved is compared with the result obtained by a like computation for the freight service. Inasmuch as the tractive powers of locomotives are nearly proportional to their weights, the results derived by this method in most instances are not materially different from those derived by the locomotive ton-mile method.

The fourth method is called the car-mile method; it divides these common expenses on the ratio that exists between the total passenger car miles and the total freight car-miles.

The fifth method proceeds to make certain assumptions that of some of these expenses one part constituting an assumed proportion of the total expenses is due to action of the elements and the balance is due to wear. The expense due to wear is distributed upon a gross ton-mile basis and expense due to weather is distributed on a car-mile basis.

The sixth method entertains the same presumptions as to the amount due to wear and weather of the various items and proceeds to distribute the wear on a gross ton mile basis as in

the fifth method, but the expense due to weather is distributed upon a net ton-mile basis.

Herewith is shown the results of the application of these six methods to the maintenance of way and structures expenses on the Chicago & North Western for 1913. The total amount of these maintenance of way and structures expenses for 1913 was \$11,501,186.

Protestants; assignment of M. W. expenses to passenger service, C. & N. W., 1913.

Method of assignment.	Portion charged to passenger service.	Per cent.
Gross weight basis.....	\$3,299,072	28.68
Locomotive ton-mile basis.....	4,666,768	40.58
Locomotive tractive power basis.....	4,719,703	41.04
Car-mile basis.....	2,475,570	21.52
Wear on gross ton-mile, weather on car-mile basis.....	2,771,701	24.10
Wear on gross ton-mile, weather on net ton-mile basis...	1,961,269	17.05

Out of a total of \$45,158,736 for transportation, traffic, and maintenance of equipment expenses for the year 1913 there was assigned to the passenger business on the gross weight basis \$13,258,743, or 29.34 per cent. Approximately the same proportion of the expenses under these three general accounts was assigned to the passenger business under the remaining five methods. There was no material difference of opinion between carriers and protestants regarding the division of expenses in these three groups.

Methods 5 and 6 rest on unverified assumptions concerning the amount of expenses in the various items due to the action of the elements. This record is not convincing as to the accuracy of these various assumptions. Method No. 4, the car-mile basis, takes no account of speed, and would charge to the average freight train, say 24 cars, four times as much of the maintenance of way and structures expenses as to the average passenger train, say 6 cars, although the service performed by track and structures in carrying the passenger train may be as great or nearly as great as that performed in carrying the freight train.

Methods 2 and 3 may be considered as the methods advocated by the carriers. Method No. 1 is urged by protestants. We have some difficulty in accepting the locomotive ton-mile method, for while it does to a certain extent give consideration to the speed of the trains as well as to their weight, we are not convinced that this is in all respects more certain in its foundation than is the gross ton-mile method.

These expenses for maintenance of way and structures should be divided between passenger and freight as nearly as possible upon the basis of their respective utilization of this part of the plant. What is the best measure that can be obtained of this utilization of the track by these respective services? In the absence of any certainty that the scale of passenger fares and that of freight rates is properly proportioned, the revenue derived from the respective services can not form a fair measure of this utilization. The absence of such a known relation between these charges, however, leads to an examination of certain expenses as probably indicative of the utilization of the track and structures. The fuel consumed by road locomotives; the lubricants, water, and other supplies for these locomotives; the train supplies; the wages of trainmen and engineers, are all separated between passenger and freight, and each by itself, or the aggregate of all will constitute an index of the utilization of the tracks by these two branches of the service. Other accounts such as the repairs to locomotives might also be regarded as indicative of the proper apportionment. This expense, however, is not segregated as between road and yard locomotives. We shall, therefore, for the purpose of obtaining a basis for division, regard only the items which are shown below as per our classification of operating expenses in effect during the fiscal year ended June 30, 1914.

80. Road enginemen.	85. Other supplies for road locomotives.
82. Fuel for road locomotives.	86. Road trainmen.
83. Water for road locomotives.	87. Train supplies and expenses.
84. Lubricants for road locomotives.	

The common expenses are divided on this method between the two services in the proportion of the actual division of the seven preceding accounts. Our decision to use this method in this case must not be regarded as conclusive on our part of

the method that should ultimately be used for the division of maintenance of way and structures expenses between passenger and freight. The objections that may be urged against the direct charge method are known and appreciated.

From the 32 carriers which in answer to our interrogatories supplied information concerning methods of division of expenses between passenger and freight for 1914 we have eliminated those whose lines lie wholly or almost entirely without the territory in which the principal increases are proposed. There are 20 of these railroads whose lines lie in territory which would be directly affected by the proposed increases. For the purposes of this case the divisions furnished by carriers of all of the operating expenses have been used except those due to maintenance of way and structures. The maintenance of way and structures expenses have been divided between passenger and freight upon the basis of the allocated train expenses named above. (A table showing the results of this method for each of the 20 roads involved and a comparison of these results with the results of the division furnished by the carriers for the year 1914 has been prepared. The totals cover 20 roads which operate 80,159 miles of line.)

The record does not indicate what proportion of the total maintenance of way and structures expenses are due to the upkeep of yards, but it is easy to determine how the results shown in the above table are affected by dividing these yard maintenance expenses upon the basis of the direct yard costs. Let it be assumed, for example, that 10 per cent of the maintenance of way and structures expenses were incurred in the upkeep of the yards. It follows then that the correct formula representing the per cent of total maintenance of way expenses assignable to the passenger traffic is 0.9 of 38.5 per cent plus 0.1 of 11 per cent, or 35.75 per cent. Since on these roads the maintenance of way and structures expenses constitute almost exactly 20 per cent of the total operating expenses, it is evident that the proportion of total operating expenses which may have been improperly charged to the passenger traffic is 20 per cent of the difference between 38.5 and 35.75 per cent, or 0.55 per cent. The total operating expenses of these roads for the year 1914 were approximately \$616,000,000. A variation in the assignment of these expenses of 0.55 per cent amounts to \$3,388,000. Under the method used by witness Wettling, of dividing the property account, this affects the amount of cost of road and equipment assignable to the passenger traffic by \$27,433,000, and affects the percentage of net income from the passenger traffic to cost of property devoted to the passenger traffic by 0.29 in the percentage. It also affects the percentage of income derived from the freight business to assumed property investment by 0.15 in the percentage. The passenger traffic on these roads earns 3.39 per cent upon the value of the property assumed to be devoted to the passenger traffic, which, in round numbers, is \$1,465,000,000; while the freight traffic earns 5.07 per cent upon the value of the property assumed to be devoted to the freight traffic, which, in round numbers, is \$3,157,000,000. To allow the passenger traffic to earn the same ratio of return upon investment as the freight traffic the passenger earnings of these roads would have to be increased by \$24,600,000. If, however, these yard maintenance costs are as much as 10 per cent of the total cost of maintenance of way and structures it would then appear that the passenger traffic is earning 3.68 per cent on the cost of the property assumed to be devoted to the passenger traffic, which, in round numbers, would be \$1,438,000,000; while the freight traffic is earning 4.92 per cent on the cost of the property assumed to be devoted to the freight traffic. In order to permit the passenger traffic to earn the same percentage upon the investment as the freight traffic, it would require an increase in net income from the passenger traffic of approximately \$18,000,000.

BOOK COST OF ROAD AND EQUIPMENT DEVOTED TO PASSENGER SERVICE

The book cost of that portion of the road and equipment which is devoted to the passenger traffic has been assumed by the carriers to be the same proportion of the entire book cost as

the passenger operating expenses for the year 1914 are of the entire operating expenses. The liability of error in accepting the book cost of property as the basis for the computation of return on investment is fully realized. This arbitrary method of assignment of this or that portion of the book cost of the entire property to passenger traffic is also quite unsatisfactory. The carriers have assumed that the expenses chargeable to each of the services for the year 1914 form a measure of the value of the property devoted to such services. If, for example, the passenger operating expenses for the year 1914 were 30 per cent of the total expenses, 30 per cent of the book cost of the property is assigned to the passenger service.

The 20 lines here used have a large percentage of their mileage in territory outside the region principally affected by these increases and passing through territory where higher fares apply. This is notably true of the Atchison, Topeka & Santa Fe, Great Northern, Northern Pacific, Illinois Central and the Chicago, Milwaukee & St. Paul railroads. In the territory principally affected by these increases the carriers are seeking to increase their fares by approximately 25 per cent. The total gross passenger revenue of the 20 lines we have here taken for the year 1914 was approximately \$205,000,000, while the carriers' estimated maximum increase accruing to these lines from the increases proposed is not quite \$16,000,000, or something less than 8 per cent of their gross passenger revenue. Should these increases be permitted and the increased fares not result in any appreciable diminution in the number of passengers who travel in and through that territory, the effect would be to raise the percentage earned upon the net cost of property assumed to be devoted to passenger service by approximately 1 per cent.

DIVISION OF EXPENSES BETWEEN INTERSTATE AND INTRASTATE SERVICE

Protestants complain that the carriers have made no attempt to segregate the costs of doing the intrastate passenger service from the interstate service. The intrastate passenger service in these states is approximately 50 per cent of the total, and if this service is much more expensive than the interstate it would follow that whereas the passenger service as a whole paid from 3.39 to 3.68 per cent upon the cost of road and equipment devoted to passenger service in 1914, the interstate passenger service paid a greater per cent of return. There is no definite and convincing proof that the intrastate passenger service is much more expensive than the interstate. The intrastate and interstate passenger service is intermingled. It is largely done upon the same trains over the same roadbed, with the aid of the same employees. There are, it is true, two terminals involved in all state journeys and usually only one in any one state in an interstate journey. But the average haul for the interstate passenger is greater, and the character of the equipment used in the interstate business will average somewhat higher than in the strictly intrastate business.

The task in this case is not the fixing of fares for each kind of passenger traffic. A different and more elaborate investigation would be necessary if an attempt were being made to ascertain the appropriate relation between the various classes of passenger traffic, such as commutation, Pullman, local and through trains, long hauls and short hauls. The question here is whether an increase in the passenger fares has been justified.

Upon the whole record the carriers have sustained their contention that the business done by passenger train service is less profitable on the whole than is the freight service in this territory. A suggestion has been made that the mail service and express service may not be carrying their full proportion of the total expenses of operation of these properties. No evidence was offered, however, to show that this is a fact.

The report goes on to discuss possible economies in passenger service, quoting data presented by the carriers as to costs, and concludes that:

"Substantial improvements in the passenger service have been made since 1900 at large expense to carriers, resulting in a greater degree of comfort, convenience and safety to the traveling public.

"The conditions under which the passenger service is now performed do not admit of all the corresponding economies in operation that have been effected in the freight service.

"The increased cost of service due to greater costs for labor, materials and taxes not offset by corresponding economies which are practicable in operation is entitled to consideration.

"The passenger business in the territory principally affected by the proposed increases is less profitable than the freight business.

"The basis for the fares now applied for the transportation of interstate passengers is less in this territory than in the states south, east and west thereof.

"There is some justification for a lower basis of fares in that territory than in the states that are west and south thereof."

This increased revenue which apparently should come from the passenger traffic should not, however, be altogether imposed upon the interstate traffic. Manifestly a person journeying by rail within the boundaries of a state cannot expect to travel at the expense, in any degree, of the interstate passenger. The revenue of respondents from intrastate passenger traffic within these states is approximately 96 per cent of that from the interstate traffic. While we should permit reasonable interstate fares we cannot sanction fares that are higher than are reasonable for the service performed because intrastate fares are alleged or shown to be unduly low.

It is contended on behalf of some of the protestants that if a carrier obtains a fair return upon the whole of its business it cannot reasonably complain of a public policy affording cheap travel . . . Whatever may be said in support of this policy we can find no justification in approving it in connection with interstate passenger service under a statute which does not authorize us to prescribe rates or fares less than are reasonable for the service rendered. These words clearly point to a service which is to be rendered in consideration of the charge. We think, therefore, that the principle embodied in the law is that each class of service should bear reasonable charges therefor. . . .

Cognizant of the infirmities of alleged book value as indicative of actual investment . . . we have felt justified in using so-called book value as a basis of showing tendencies as to costs of service and net results. . . . The position that each service should be self-supporting seems substantiated by the Supreme Court of the United States. *Norfolk & Western Ry. Co. v. Conley et al.*, 236 U. S., 604; *Northern Pacific Ry. Co. v. North Dakota*, 236 U. S., 585.

Where intrastate fares in the territory principally affected by the proposed increases are compared with similar fares elsewhere it is found: First, that in practically all of the states where increases are proposed the state controlled fares are 2 cents a mile; second, that in only four or five other states, to wit, Ohio, Indiana, Illinois, Arkansas and Oklahoma, at the time of the hearing was a similarly low fare in force; third, that in Rhode Island and New York the fares range from 2 cents to 2½ cents, with a very high density of passenger traffic; that in West Virginia, Alabama, North Dakota and South Dakota the fare for intrastate travel is 2½ cents; that in Maine, Massachusetts, Vermont, Connecticut and New Hampshire the state fare ranges from 2 cents to 4 cents; that in Kentucky, Tennessee, Mississippi, Louisiana, Washington, Texas, Montana and more recently in Arkansas by reason of injunctions of a federal court, the state fare is 3 cents; that in the Carolinas, Georgia and Florida the fare is in no case less than 2½ cents a mile; and that in California, Colorado, Oregon, Utah, Idaho, Arizona, Wyoming and Nevada the range is from 3 cents to 6 cents. . . .

Commissioner Hall dissents.

ELECTRIC HEADLIGHT CASE

With the filing of the reply brief by the railroads on Tuesday, December 14, the long-fought "electric headlight case" was closed so far as the railroads are concerned. The labor union interests have until December 24 to file a reply brief and the case will then be submitted for decision to the Interstate Commerce Commission.

Labor union leaders have conducted an active campaign to induce the Interstate Commerce Commission to adopt a rule that would force the removal of all acetylene and oil-burning headlights and install a high-power electric "searchlight" on every locomotive in the country. The railroad representatives have strenuously fought the sweeping change provided by such a universal rule, contending that the dazzling glare of the electric "searchlights" is confusing and dangerous in railroad operation on double-track and four-track lines, where many fast trains are constantly passing one another, where operation now is entirely by block systems of colored signal lights, and where traffic is exceedingly dense. The high-power electric headlights are being used on parts of some western and southern single-track roads, but the big eastern lines operating multiple-track systems have refrained from installing them after extensive tests and now resist the labor leaders' effort to force their adoption by a governmental rule.

Operating experts are a unit in opposing the "searchlights" for dense traffic. So unanimous has been their opposition that 156 railroads, embracing 215,000 miles of trackage, were combined in the case before the Interstate Commerce Commission, which heard oral arguments on December 4. Extensive evidence to support their claim that the electric "searchlights" not only are *not* safety devices, as claimed by the labor leaders, but that they have repeatedly caused accidents and failed to prevent wrecks, and that they are positively dangerous on the multiple-track eastern lines, was introduced by the counsel for the railroads. This mass of evidence included testimony covering tests and experiments conducted over a period of more than five years by the Master Mechanics' Association, and showed that the high-intensity lights caused misreading of signal lights, creating "phantom" or false signals by reflection from roundels; also failure by engineers to catch classification signals. They also seriously confuse and blind engineers whenever trains bearing the searchlights approach one another, preventing observers from seeing reliably when caught between the intense opposing light beams. The railroads' counsel also cited the conclusions of the commissioners after extensive tests by the Wisconsin Railroad Commission, which supported their contentions, and enumerated many cases taken from the accident reports of the Interstate Commerce Commission itself.

Charles C. Paulding, solicitor of the New York Central lines, has led the fight against the proposed electric headlight rule as chairman of a special committee of counsel including also Stacy B. Lloyd, of the Pennsylvania, and Duane E. Minard, of the Erie.

Chief W. S. Stone, of the Engineers' Brotherhood, and President W. S. Carter, of the Firemen's Brotherhood, have had charge of the campaign for the electric headlights, making personal arguments before the Interstate Commission, submitting signed briefs and examining witnesses. Officially, the electric rule was filed by Frank McManamy, chief inspector of the Division of Locomotive Boiler Inspection of the Federal Government, but the labor leaders carried on the case and not until the final oral arguments did the chief inspector file a brief in support of the rule. Counsel Paulding was granted leave to make further reply to this late brief by Inspector McManamy, which reply has just been filed as the closing paper in the case. In this Messrs. Paulding, Lloyd and Minard merely reply to Mr. McManamy's attack on the good faith of the railroads' opposition.

The issue now submitted lies between two rules, involving also the principle of establishing reliability and definiteness in governmental inspection. The labor leaders' proposed rule provides that "each locomotive shall have a headlight which will enable

persons with normal vision, in the cab of the locomotive, under normal weather conditions, to see a dark object the size of a man for a distance of 1,000 feet ahead of the locomotive."

This language is objected to by the railroads as being utterly indefinite and worthless for the purposes of accurate inspection and for specifications by which to build headlights with certainty that they will fulfill the demand. They claim that the "eye-test" merely assures the necessity of a tremendous and excessive quantity of light, such as only a very high-intensity electric lamp would provide. They advocated an alternate rule providing for a test of headlights by "candle-power" with scientific exactness, at minimums that would not create a dangerous glare nor restrict equipment to electric lamps. The terms "normal vision" and "normal weather" vary with every individual or geographical section, as shown by repeated tests, and are valueless as guides in a legal requirement and for inspection. Many "surprise tests" of enginemen with asserted "normal vision" showed a wide disparity in the distances they could see objects under various conditions of light, color and surroundings.

As many of the government inspectors are members of the union labor organizations which occasionally are in controversy with the railroads on other matters, it is considered important that whatever rule regarding headlights is adopted should be definite and exact enough to make the matter of inspection proof simple and uniform.

Manufacturers of headlight equipment have taken much interest, inasmuch as the adoption of the rule urged by the labor leaders would involve the discarding of a vast number of acetylene and oil lamps and the purchase of electric equipment at an outlay of more than \$6,000,000. At present there are 67,869 locomotive headlights in use in the United States, of which number 42,213 are oil-burning, 2,904 are acetylene, 22,120 are electric arc and 632 are electric incandescent.

The acetylene interests, through the International Acetylene Association, represented by Oscar F. Ostby, were permitted by the Interstate Commerce Commission to intervene in the case, and strongly opposed adoption of the labor leaders' electric rule. It was urged that the acetylene headlights have been used with satisfaction to both railroads and their employees, chiefly in New England, and that "adoption of the rule restricting choice to electric lamps would stifle free competition and create a government-protected monopoly" for the electric manufacturers.

In the vigor of the railroads' rebuttal of the labor leaders' claim that the electric headlight would prove a safety device has been reflected the intense interest and pride in their extensive "safety first" endeavors of recent years, Chief Counsel Paulding contending that the tremendous strides made by the operating officers in safeguarding life and property and reducing the number of accidents, together with the responsibility for safety keenly felt by railroad officials, merits support from the government by leaving questions of operation to their experts when the possible benefits of a sweeping change are, at best, very doubtful.

An early decision in the headlight case is expected.

THE AUSTRALIAN TRANS-CONTINENTAL LINE.—The question of a uniform gage is still receiving attention in Australia and negotiations are proceeding between the South Australian and Western Australian governments with a view to the construction of railways on a 4-ft. 8½-in. gage from Kalgoorlie to Fremantle, and Port Augusta to Adelaide, in order to provide a uniform track between Fremantle and the South Australian capital. It is anticipated that the east-west line will be open to traffic by the end of 1916.

RAILWAY CONSTRUCTION IN INDIA.—The Peuch Valley section of the Itarsi-Nagpur Railway, which is expected to be finished shortly, will open up a valuable coalfield. This branch forms part of a triple project of which the northern section from Itarsi to Amla is now open throughout. As regards the third, or southern section, which is to run from Amla to Nagpur, the length from Pandurnah to Nagpur is expected to be opened for public traffic in October next year, and the length between Amla and Pandurnah some time in April in the year following.

Maintenance of Way Section

Railroads frequently lose property through adverse possession as a result of undisturbed encroachments on the right of way.

Preventing Right of Way Encroachments

These encroachments take various forms, including the shabby hut of the still more shabby squatter, the misplaced fence of the adjacent property owner, or the gradually established traveled way of the trespassing public. To a certain extent the roads may be said to encourage encroachments by failure to give this subject proper attention. The importance of the problem and the relation of the maintenance officer thereto are outlined in an article appearing on another page in this issue. As custodian of the railroad's fixed property, the maintenance officers are charged with the protection of the right of way against encroachments. Being constantly on the ground, the roadmaster and foreman are best able to detect and report encroachments. They can, however, do little without the co-operation of the real estate department in giving them proper records and of the division engineer in thoroughly establishing right of way lines. If records of sales and purchases are not properly indexed, if station maps and right of way maps are not up to date, and if monuments are not established, those charged with the protection of the right of way are handicapped. The situation is more serious in cases where changes of line have destroyed the most authentic tie to the property line, namely, the original center line of the track, or in cities, where property is acquired by lots and blocks in irregular shapes, and particularly where the lines are not established by improvements. Next to the complete monumenting of the property, complete station maps, with adequate ties from all fixed physical features to the right of way lines, are of particular value, but only a more general attention to all phases of the subject will materially reduce the losses to which railroads have been subjected in the past.

The unloading of track materials, particularly for renewals on an operated line, is commonly done in a rather loose and inaccurate fashion. Although it is given careful

The Distribution of Track Materials

and conscientious consideration by some men, the principal tendency is toward speed to the subordination of everything else. There are a number of reasons for

this. Roadmasters are admonished continually to release cars as quickly as possible and to reduce work train service to a minimum. On a line with a fairly large traffic the work of unloading materials suffers long delays because of the necessity for work trains to get out of the way of regular traffic, and in consequence an effort is made to unload as much as possible in the short periods of time available between regular trains. Another reason arises from the difficulty of controlling a large gang, composed mainly of foreigners, distributed in a number of cars. It must also be admitted that some men are given to considerable inertia of mind when it comes to making the calculations necessary for the accurate distribution of materials. It cannot be questioned that the per diem on cars and the cost of work train service will assume undue proportions unless watched very closely. However, it is very easy to lose sight of the fact that the cost of rehandling materials along the tracks as a result of improper distribution from cars may also assume undue proportions. Careful comparisons of costs will usually show that it will prove cheaper to hold a work train longer and unload the material where it is to be used than to dump it off in a haphazard manner and use an extra gang in carrying or trucking the material back and forth along the tracks to obtain the desired distribution.

Recent progress in chimney design and construction is described in an article in this issue. No phase of the subject is more

Modern Chimney Construction

notable than the rapid development which has been made in this branch of construction engineering during the last 10 or 15 years. It is not long since chimney design and building were considered entirely

within the province of the skilled brick mason or the boiler-maker, and, in consequence, chimneys usually were nothing more than high brick walls or large stove pipes, except in those cases where an architect sought to embellish them with heavy capitals or other ornamentation. To-day chimney design has been placed definitely under the jurisdiction of the engineer and the chimney specialist and the use of scientific principles of design and expert construction methods are almost universal. These things, of course, have resulted in safer chimneys, but the principal gain has been in economy, resulting partially from the healthy competition which exists between the advocates of the various materials used. While the present knowledge of the subject of wind pressure, the all-important item in chimney design, leaves much to be desired, the information available is used to the best advantage and the chimneys of to-day are at least of uniform strength throughout. This has resulted indirectly in improving their appearance, for esthetics are best satisfied in that structure which fulfills its useful purpose in the most direct and obvious manner. Exactly in so far as the advance in the art of construction has made it possible to conform to the theoretically correct outline, has it been possible to obtain the best appearance, and instead of the meaningless imitation of a classic column with a heavy purposeless capital, there has been evolved, unconsciously perhaps, the more graceful chimney of the present.

A common practice in distributing ties for renewal is to unload them along the track by work train in the fall and stack them

Distributing Ties

in piles of 50 to 75 until required. One roadmaster is planning to unload and stock his ties this year on the station grounds, where no work train service will be required. His section forces will then

distribute them with motor cars in the spring as desired. He believes that not only will his cost of distribution be no greater with this method, but that he will secure a more uniform tie renewal. With ties stored in piles at intervals along the line, it is entirely natural to expect that the renewals will be made more thoroughly near these storage piles, where the trucking distance is less, while if the ties are distributed by motor car this will not be the result. It will be interesting to note by an examination of the adjoining sections before and after the tie renewals have been completed to what extent this theory will be borne out by the facts.

Differences of opinion are to be expected among any group of men regarding any matter requiring the exercise of mature

Limiting Individual Judgment

judgment. In most cases the average of the opinions of experienced men will not be far wrong, but some individual ideas will be wide of the mark. One of the details affecting the safety of travel regarding which it is difficult to fix an arbitrary limit is the time at which worn rail should be taken out of the track. A similar problem, the effect of errors in solving which are felt directly in financial losses, arises in connection with the renewal of ties. If left to the individual foremen there will be almost as many

standards in regard to these and other details as there are foremen. To escape these variations in practice regarding important matters it is necessary that standards be prepared, that the men may be thoroughly instructed regarding them and that there be sufficient intelligent inspection to see that these standards are observed. The standards will, of course, be prepared by the supervising officer in charge of the department, the judgment of this officer thereby replacing that of the less experienced individual foreman. Such standards should not be carried too far, for it is difficult and unwise, in many instances, to limit the initiative of men directly in charge of work. On the other hand, it is a wise precaution to restrict this initiative where the results of an error in judgment may be serious.

THE QUALIFICATIONS OF A GOOD FLOOR

FLOORS are commonly selected from habit or prejudice rather than from a consideration of the adaptability of the materials to the given situation. No individual type of floor can fulfill all requirements under all circumstances. In fact, no single ideal floor is conceivable, because requirements under different conditions are conflicting. To illustrate, it is always desirable that a floor be economical, durable and easy to repair; under various circumstances it may also be desirable that it be hard, resilient, smooth but not slippery, a non-conductor of heat, non-absorbent, non-resonant, waterproof and fireproof. No floor has all these qualities; neither are they all necessary in any given case. The problem is to determine the desired qualities and then to select the material which possesses them.

There have been many floor failures, some of them the result of poor design and poor workmanship, but many have resulted from improper selection. The fact that one class of floor has been found successful under given conditions does not necessarily prove that it will be a success in different circumstances. On the other hand, one should not form the habit of associating a certain class of material with a certain class of service and leave that material out of consideration for entirely different services.

Having selected the type of floor, it becomes necessary to secure materials of a grade suited to the service to be performed and installed according to approved standards of workmanship. Foundations are frequently a cause of failures of floors, these usually being the result of lack of experience or expert knowledge. The higher cost of the newer types of high-grade floors naturally results in a tendency to substitute cheaper materials or inferior methods. These usually result in failures. All these considerations show beyond question that there is as much need of the services of a competent engineer in the selection, design and supervision of the construction of a floor as in the design and superintendence of the construction of the building of which it is to be a part.

A SYSTEMATIC PROGRAM

MAINTENANCE of way officers are unanimous in the contention that the most successful and economical work is possible only through the consistent prosecution of a well-prepared program throughout the season of good weather. Unfortunately, a number of influences interfere seriously with the efforts of the maintenance department to follow a definite plan of campaign. The effect of commencing the fiscal year on July 1 has been discussed previously in these columns and elsewhere and remains the most important obstacle to efficient track maintenance.

Another obstruction in the way of the proper prosecution of a regular program lies in the vacillating and erratic policies followed on some roads in the conduct of maintenance expenditures after the season has opened. Instead of consistent conduct of the work from month to month, according to the program outlined, frequent changes of policy take place. Orders issued to rush the work faster than the schedule are followed by others cancelling plans, and so on in infinite variety. Aside from the tangible losses accompanying such changes of policy, there is

a loss of esprit de corps, because such changes mean hardships to every member of the force. They work a hardship also on those small contractors who do ditching, bank widening, etc., which is no doubt reflected in the bids which they will tender on subsequent work.

No better example can be used to illustrate this condition than gravel pit operation. Here the same processes are repeated day after day, and with good equipment and a uniform output it is possible to obtain very low production costs. If, however, the men are rushed almost to exhaustion one month in order to obtain a maximum output and the worked on half time the next when the pit is all but shut down, it is impossible to get the best work out of them.

It is to be expected that changes in business conditions, or more particularly, in the current earnings of the railroad, must be considered in apportioning expenditures, especially when conditions have been as abnormal as in the last two years. There can be little question, however, that a too solicitous attention to the monthly showings has a harmful influence, and it has been well said that "the constant use of emergency language is an indication of poor management."

The prolonged reduction of railroad earnings naturally called for material reductions in maintenance expenses, and a number of instances can be cited where railroads have succeeded in making marked reductions in expenses and at the same time have obtained increased efficiency by taking the minor officers, and even the employees, into their confidence and making it clear to them why the curtailment of expenses has been necessary. Granting that a certain amount of fluctuation in the prosecution of the season's work is unavoidable, it would seem that much would be gained by telling the maintenance men definitely why a change in program has been necessary and letting them know, if possible, how long the new policy will remain in effect.

THE WATERPROOFING OF BRIDGES

REVISED specifications for the waterproofing of solid floor railroad bridges appeared in the August, 1915, Proceedings of the American Society of Civil Engineers. The author of these specifications has had extensive experience in this work, and the specifications as they now appear have been subject to some modifications as the result of extensive discussion of the subject by various members of the society in whose proceedings the original draft of the specifications appeared some months ago.

The present state of the art of waterproofing may be considered very largely the result of study and experimentation covering the period of 15 odd years since the introduction of the solid and ballast floor bridge. Waterproofing is not an exact science. Success has come about only through repeated trials and the diligent study of the many failures with which these years of effort have been marked. From time to time the various underlying principles have been discovered and recorded, notably by the engineers who designed and built the structures for the elevation of the many miles of railroad track in Chicago. It was there that much of the pioneer work was done.

Success in waterproofing is attained only by minute attention to details, combined with an accurate and complete trade knowledge. This is in reality a field for the specialist who has a remedy at hand for every contingency. The quality of the materials is important. Nevertheless there are materials on the market which will serve equally well, or nearly so. There is no substitute, however, for the best workmanship available, combined with the most painstaking supervision, and scrupulous care of the completed work until it is fully protected. The needs of good waterproofing must be taken into account in the design of the structure. Drainage in particular must be taken into consideration, and, in fact, all details must be such as to make good workmanship really possible.

Because of the rather extensive use of membrane waterproofing in recent years, a knowledge of the subject should have become pretty generally diffused among the railway engineers.

of the country. The observation of not infrequent instances of faulty practice at this late day is therefore somewhat disappointing, but may be explained in each case either by a lack of experience or of adequate knowledge, or by an attempt to accomplish the impossible. These instances of poor practice point to the need of employing an expert or of the engineer in charge becoming thoroughly conversant with the literature on the subject.

Much had been written about waterproofing before the preparation of these specifications. They have the advantage of presenting a concise statement of the salient features, and, while many engineers may differ as to some of the details, there can be little question as to the most important points. The specifications will be read with interest by all who have had anything to do with this perplexing subject.

Letters to the Editor

INCREASING THE SECTION FORCES

PROWERS, Colo.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In this day of advanced railway work, one of the most serious problems confronting railway managers is the increasing cost of track maintenance. In the past it has been the practice on most roads to put on a number of extra gangs in the spring to make heavy repairs and to do that portion of the track work that the section crews are unable to accomplish. I believe that if the roads would give each section foreman 25 to 30 men in the spring and permit them to do the work necessary on their own sections, they will find that the cost of maintenance will decrease considerably. A section foreman who is interested in his work will do more and better work on his own section than any extra gang foreman will, for in most cases the latter are moving from place to place and they do not take the care with their work that the average section foreman will on his own section.

R. E. PITTS

Section Foreman, Atchison, Topeka & Santa Fe Ry.

NEW BOOKS

Safety Engineering Applied to Scaffolds. 6 in. by 9 in.; 339 pages; 127 illustrations. Bound in cloth. Published by the Travelers' Insurance Company, Hartford, Conn. Price \$3.

Vital statistics available in this country contain little information concerning scaffold accidents, but data gathered by insurance companies from newspaper items show that these accidents are worthy of serious consideration. This book is written as a result of a study of the subject and with the hope that the information it contains will result in the construction of better scaffolds and more safety appliances around construction work. In scope the book is limited to building work, and the treatment is practical rather than scientific, but almost all conceivable types of scaffolds and phase of the subject are covered in detail. The illustrations and the typography deserve special notice.

Elements of Railroad Track and Construction. By Winter L. Wilson, professor of railroad engineering, Lehigh University. Size 5 in. by 7 in., 396 pages, illustrated, bound in cloth. Published by John Wiley & Sons, New York City. Price, \$2.50.

This is a revision of an earlier edition and a large portion has been rewritten. As the book covers the subjects of railroad maintenance, surveying and construction in 400 pages, the treatment is brief. About 100 pages are descriptive of the permanent way. Seventy pages are devoted to turnouts, containing the usual information given in the railroad surveying handbook, with additional descriptive matter on the details of frogs and switches. Considerable portions of the book are grouped

under the headings, Maintenance of Way, and Railroad Construction, and short sections are devoted to sidetracks, yards, terminals, signals, etc.

Practical Surveying. By Ernest McCullough. Size 5 in. by 7 in., 400 pages, illustrated, bound in cloth. Published by D. Van Nostrand Company, New York City. Price \$2.

The object and character of this book are best stated by the author in the preface: "This book is a serious attempt on the part of the author to meet the needs of students whose mathematical preparation does not extend beyond the arithmetic given in the grade schools." As a result, about 100 pages of the book are devoted to elementary algebra and trigonometry. The book may be also said to be a combination of a text on surveying and a field manual, as the chapters on chain surveying, leveling, compass surveying and transit surveying, which comprise the larger part of the book, contain many detailed examples and explanations of field methods known only to the practical surveyor of long experience. Forty pages are devoted to surveying law and practice and 32 pages to what is called engineering surveying. For subjects treated lightly in this chapter, the author refers the reader to other texts. The explanations are given with painstaking care and the language is suited to those for whom the book is intended.

Railway Maintenance Engineering. By William H. Sellev, non-resident lecturer on railway engineering, University of Michigan. Size, 5 in. by 7 in., 360 pages, 194 illustrations, bound in cloth. Published by D. Van Nostrand Company, New York City. Price, \$2.50.

This book is intended primarily for the student and the author states in the preface that it has been prepared from notes used in his classes. However, the frequent references and the extensive bibliography make it a valuable reference book for the maintenance of way officer, especially in view of the author's experience in responsible positions in the engineering department of the Michigan Central. The book treats primarily of materials, devoting 32 pages to ties, 35 pages to rails and their manufacture, 31 pages to miscellaneous track materials, etc., while it gives little information concerning methods of conducting work. The book is well prepared and gives a large amount of information concerning stations, shops, ice houses, water stations, etc., not commonly found in a book of this nature. The chapter headings include: Engineering; Land; Grading; Bridges, Trestles and Culverts; Ties; Rails; Other Track Material; Ballast; Maintaining Track and Right of Way; Station and Roadway Buildings; Water Stations; Fuel Stations; Shops and Engine Houses; Icing Stations, and Signals and Interlockers.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men to which readers of this section may wish to refer have appeared in the *Railway Age Gazette* since November 19, 1915:

Transverse Fissures the Result of Rail Galling. The cold straightening of rails is receiving considerable notice at this time. P. H. Dudley points out the relation between galling and interior transverse fissures, in an illustrated article in the issue of November 26, page 1001.

The Chicago Association of Commerce Smoke-Abatement Report. After more than four years of study and an expenditure of \$600,000, the Chicago Association of Commerce Committee of Investigation on Smoke Abatement and Electrification of Railway Terminals has presented a 1,200-page report showing electrification to be technically practical but financially impracticable. This report is abstracted in an illustrated article in the issue of December 3, page 1047. An editorial on this report appears in the same issue.

A Large Track Depression Project at Minneapolis. The Chicago, Milwaukee & St. Paul has just completed the fourth year's work on the depression of tracks for a distance of three miles in the city of Minneapolis, which will eliminate 37 grade crossings. This work is described by C. N. Bainbridge in an illustrated article in the issue of December 3, page 1059.

The Elimination of Grade Crossings in Dallas, Tex. A report by John F. Wallace on the situation in that city favors a belt line as a better solution than track elevation. This report is abstracted in an illustrated article in the issue of December 10, page 1087. An editorial note on this report appears in the same issue.

The Electrification of the Railways of Chicago. The report on this subject referred to previously is a very exhaustive treatment. The technical features as presented in this report are abstracted in some detail in the issue of December 10, page 1089. An editorial on the subject appears in the same issue.

Protecting the Right of Way From Encroachments

A Study of the Legal Protection of a Railroad and Practical Means for Retaining Title to Its Property

By W. F. RENCH

Supervisor, Pennsylvania Railroad, Perryville, Md.

Literally defined, the right of way is that by virtue of which the railroad holds its permanent way. It is usually land owned in fee simple or obtained by condemnation, but may include an easement over another's land or the right to cross or occupy the streets of a municipality or the privilege from the federal government of bridging a navigable river. Land which is not used for railroad purposes or that which is vacant and not intended for such use is not right of way and is usually in charge of the real estate department and only of incidental concern to the maintenance officer. The supervisor is the natural custodian of the right of way; the foremen are his lieutenants and the patrolmen the roundsmen. It is quite essential that all of these should know the extent of the company's ground and the rights that are otherwise enjoyed. It is further necessary that the supervisor should definitely understand the legal principles of property tenure, in order to be able to meet promptly and decisively such questions as they arise. Not infrequently while a legal question is being determined occupation is becoming established and is growing increasingly difficult to resist. It is an old adage that possession is nine points of the law and it is a legal axiom that he who would sue to dispossess another must first show a better title. The surveyor fully understands that in tracing property corners he must if possible make a location in accord with the record and yet not in conflict with possession. The importance of resisting a trespass is thus self-evident.

It is a rule of law that an individual may obtain title to land by adverse possession for a term of years, but that a corporation cannot thus gain an ownership, although a continuing easement for the use of a right of way may be so acquired. It is not correct, as is generally supposed, that lines do not under any circumstances become fixed by acquiescence in a less period than 20 years. Road lines may by statute become conclusively fixed in 10 years and there is no particular time for concluding ownership between private parties who tacitly agree to a particular line of division.

Property rights are so simple that they may nearly always be determined by the rule of common sense. There are, however, certain distinctions which can only be determined by a working knowledge of the principles of legal technology. Thus, the error is quite plain of permitting the public to gain by adverse use a right of passage over the company's land for either foot or vehicle travel, but when these ways are the approaches to public facilities of the railroads such use is not adverse and no permanent easement would result. It is very necessary to understand fully the legal meaning of the term adverse user or adverse possession. In the case of traveled ways an acquiescence without objection in the public use would indicate an intention to dedicate, and as regards possession of ground the use must be adverse to the interest of another and it must be continued in the manner prescribed by the statute as well as for the required time.

The boundaries of the right of way are usually parallel with the center line, which is then known as the center line of right of way. Although this line originally bore a direct relation to the tracks it does not, as some suppose, shift with them. Since the descriptions in the deeds are referred to it, its position is fixed and it should be permanently located by means of monuments and by reference data. In these cases where the property limit is a stream, with the single exception of navigable rivers, ownership extends to the middle of the stream, no matter what changes in its course the stream may undergo. In the case excepted, the federal government owns the bed of the stream between low water lines and the direct control is vested in the

secretary of war. The railroad as owner along an inland river can resist an attempt of a proprietor below to raise and thus set back the water lines and, in fact, possesses all the natural rights that are common to riparian owners. The matter of conserving the natural means of discharge for storm drainage is scarcely less important than the protection of title; every water course should be shown on right of way maps, to be used as evidence in case an attempt is made to close such an outlet.

When a street forms the boundary of a property, ownership ends at the house line, but certain rights in the sidewalk attach to the abutting owner, and for this reason repairs of the sidewalk are generally the duty of the owner. When a public street or road is vacated the abutting owners take by law to the middle of the abandoned highway. If local acts do not impose upon the railroad the entire burden of maintaining fences, the law requires that the expense be equally shared, but participation cannot be demanded until the owner has a bona fide need for the enclosure.

When trees or artificial objects close beside the right of way endanger the company's operation, request may be made for their removal, and in case of refusal damages could be claimed, if such result, provided the cause of the injury is not an unusual and unforeseen circumstance. The principle is the fundamental one that an owner must so use his property as not to injure his neighbor. When branches of trees overhang and threaten interference with the telegraph line the railroad has the right to trim them, but it is always best to obtain the owner's permission in writing, since in the event of damage to the tree the courts are inclined to make a liberal allowance for sentimental value.

MARKING RIGHT OF WAY LIMITS

The importance of having the limits of the right of way visibly defined is becoming better appreciated, and upon several divisions of the Pennsylvania this work is already completed and it is expected that it will be finished upon others within the present year. The plan adopted where no buildings or fences indicated the lines was to plant wooden posts at corners and 400 ft. apart on tangents and 200 ft. apart on curves. The posts are 5 in. square, 4 ft. 6 in. long and protrude 2 ft. above the ground, this portion being painted white. The posts were set after a careful survey by a party from the division engineer's office. It is the practice of many divisions to thus establish all property lines, and this is certainly safer than a location by the supervisor, since property records are seldom entirely correct outside the division offices. While it is important that the supervisor know the exact extent of the company's holding, there is always the possibility that new conveyances may not be promptly certified to him. The law in cities usually requires that street lines shall be defined by the city surveyor and it is customary for this official also to establish lot lines when so desired. Such a survey is both reliable and authoritative.

The marking of the right of way is not of maximum use unless care is taken to correct the lines for subsequent property acquisition or surrender. It is the practice on some roads to plant monuments at the corners of new conveyances. This is based on a sound principle since the existence of a monument is evidence of the original survey whether or not it is called for by the recorded plat. These marks should still be supplemented with the attention-compelling white painted post.

BENEFITS FROM THE RE-SURVEY

As a result of defining the right of way lines on the Pennsylvania a surprising number of small irregularities and several that were of greater consequence were found. Many gateways

were noted opening upon the right of way; paths were located crossing the railroad, and just as frequently extending longitudinally, a more difficult trespass to resist; and the edges of the company's land were here and there going under the plow. At one point the fence along a homestead was several feet within the line and occupation could be proven for nearly the required time. The saving of this ground allowed the cut to be widened to the standard section. Just opposite, where land is needed for this purpose, the owner names a price of \$2,000 per acre for farm land in a country district. Encroachment by permanent structures was not encountered, as there almost always is proper diligence in this respect.

Vigorous efforts were made to discontinue the intrusion through the gateways and where this could not be done agreements were insisted upon. The driveways were effectively blocked by heavy posts and signs forbidding trespass erected at the paths. Where title to the land being farmed was through purchase, leases were obtained, thus establishing the company's ownership, when ultimate recovery of possession was rendered easy. Care was taken that no land obtained by condemnation was leased, as, except for purposes incident to the company's operation, such leasing is unlawful. Where unrecorded wire crossings or other similar facilities were found they were quickly brought under agreement.

The advantages in having the lines defined are thus manifold and the disadvantages are few. In addition to the main object of preventing encroachment there are economic benefits which are quite measurable. In rugged country where the right of way is usually unfenced, the mowing and cutting of brush whose main object at such points is the maintenance of a clean right of way as a defense against fire claims is usually done over a wider swath than necessary because the property limits are not known and this increase of roadway expense accrues year after year. The performing of work outside the property limits is not only wasteful, but such action sometimes leads to embarrassing complications. The fact of work having been done upon a private roadway by company forces, even though done by misconception, would in the event of an accident operate to deprive the railroad of a non-suit.

The expense incident to a property survey is, of course, widely different for dissimilar situations. But there can be no doubt that the advantages derived exceed the cost many times over. Then there is the fact of stewardship, which alone would justify the means taken to guard the company's holding even if not one irregularity were uncovered.

THE EFFECT OF ENCROACHMENTS

The great difficulty that is experienced in dislodging squatters should emphasize the importance of preventing encroachments and, if they should occur, of removing them as expeditiously as possible. The consequence of an occupation permitted to continue until title is endangered or perhaps lost is sometimes quite far-reaching. The case of an important grade separation project being held up for two years during which the million dollar investment was inactive is a striking illustration in point. Cases are not uncommon wherein the railroads have had to buy back for important work land that the right of way sheets indicated as already owned. There have, indeed, been cases where it was impossible, by reason of the lost property having become part of a homestead, to repossess at any price. Important improvements are thus prevented by lack of attention on the part of those who should protect the company's possession.

There is the other item of encroachment by the railroad upon the property of adjoining owners. Such encroachment is undesirable from all standpoints, and the moment it appears should be effectually remedied. The old saying of a stitch in time is aptly illustrated in such cases. If the means are afforded promptly to observe the approach of an erosion to the line a simple construction may arrest its progress, but if it is allowed to continue nothing short of money compensation or the purchase of additional width generally at an exorbitant price will settle the claim.

THE PARTY WALL LAW

A party wall is a wall upon the line between the premises of adjoining proprietors which each has a right to use as a support for his structure. It is a form of exercise of police power for the economic use of property, and is mainly applied in cities. While the regulation is of ancient origin it is in most states distinctly defined by statutes. These usually provide that it shall be built equally upon the lands of the adjoining owners, with its maximum width limited by different conditions, and its original expense of construction borne by the proprietor who first uses it, but with half the expense a charge against the adjoining owner when he builds to it.

The application of the law is sometimes misunderstood since not all walls between adjoining properties are included. In fact, the only wall to which it applies is that supporting a building. A wall forming or supporting a fence or one used to retain the ground is not within its purview.

There can be no question of the equity of the statute as between owners presumed to hold for a common object. But it cannot be held to apply against the property of a railroad owned and intended to be used for a right of way for tracks. To thus apply the law with no reciprocal benefit possible to the railroad would plainly amount to confiscation. In the writer's somewhat extensive acquaintance with conditions surrounding a considerable section of the city of Philadelphia only one case is known of occupation of the right of way under the party wall law, and this is recognized as an error. The mistake is a serious one, as the use of present facilities necessitates the operation of one track with a limited clearance. A knowledge of this point may serve to avoid other disadvantages of similar nature. In those cases wherein the acquirement of property for a right of way necessarily involves the continuation of an existing party wall it is well to know that the adjoining owner could be enjoined from making use of it for displaying a sign of any kind, even one painted thereon.

LATERAL SUPPORT

The common law requires that an owner shall be protected in the use of property at the contour that nature has provided, or that which it held at the time of his purchase. An adjoining owner is thus prohibited from raising or lowering the level of his ground without supplying adequate support for his own or the adjacent land, and this support must be provided without any sacrifice whatever by the neighbor. No act of a municipality can abridge or change this duty. Such a circumstance in railroad practice most commonly occurs when an adjoining owner lowers the contour of his yard to obtain increased storage capacity. For whatever depth there is below the natural level of the ground he could be compelled to provide a sufficient retaining wall entirely upon his own ground.

The obligation between a municipality and the railroad company is not so clearly defined, and such cases are usually disposed of by a mutual agreement. It may safely be stated that in the absence of such understanding the railroad company must be afforded the advantage of its day in court.

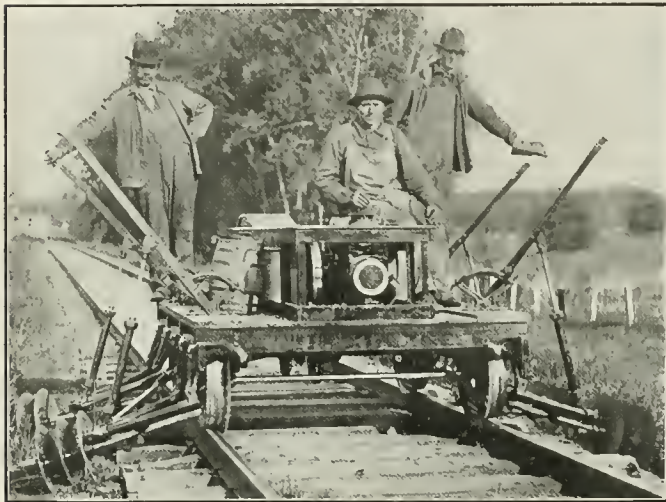
THE DAY IN COURT

When it is necessary for the municipality to take property for public use a day is appointed for a hearing before the jury of view or the commission, as such bodies are now more generally constituted. At this hearing both the damages and benefits are assessed. If an owner suffering damage fails to appear he is prevented ever after from bringing forward his claim and must also accept his assessment for benefits. It therefore becomes a matter of great consequence to the railroad not only to have its representatives present, but to delegate this duty to those who are familiar with all the various questions involved. Counsel is most essential, but the real estate expert is an important participant, and the supervisor, who, by reason of his intimate detailed knowledge of the local situation, is generally selected as the engineer, will have a responsible function in the proceeding.

MOTOR CARS FOR WEEDING AND MOWING

The Fairmont Gas Engine & Railway Motor Car Company, Fairmont, Minn., has developed special motor car attachments during the past season for mowing and weeding on railroads.

The mowing machine consists of a motor car equipped with mowing knives on each side capable of cutting a 6-ft. swath outside of the ballast line on each side of the track. It is operated by three men, one to run the car and two to handle the knives, which may be raised and lowered readily to conform to the contour of the banks to avoid obstructions. The machine is geared to run about three miles an hour when operating the



The Weeding Car at Work

mowers and 15 miles an hour on the high gear with the cutter bars raised.

The weeding car is equipped with four sets of disc plows of three discs each, attached to the four corners of the car. The machine is also operated by three men, but the absence of power connections make it somewhat simpler. The position of each set of discs is controlled by a lever to which it is attached by a rod working in a 2½-in. tube 2 ft. long. This contains a compression spring to maintain a "give and take" pressure between



The Mower Car With Knives in the Cutting Position

the lever and the disc shaft. If the discs strike a stone the spring allows them to raise and then pushes them back again.

A fender keeps gravel from being piled too high at the ends of the ties and three drag chains smooth down the disc furrows and pull out the uprooted weeds. With the discs working, this car operates at three miles an hour, but when they are raised, the car is capable of making 20 miles an hour on the high gear. By removing the disc arms and levers the car is available for ordinary motor car service.

Both of these machines have been in use on the Chicago, Milwaukee & St. Paul during the past season. A mower made two cuttings over a division 150 miles long at a total cost of \$170 for labor and fuel, or \$0.57 per mile of cutting. Three cuttings were made over the same division with the discer at a cost of \$196 for labor and fuel, or \$0.44 per mile of cutting.



The Mower Car With Knives Raised

The results obtained with these machines are said to be as good, if not better, than those obtained by hand work. The discing machine cleans out the weeds thoroughly and gives a straight, uniform grass line. The mower cuts weeds and heavy stalk vegetation as well as grass.

BRIDGE AND BUILDING ASSOCIATION COMMITTEE APPOINTMENTS

The following subjects have been selected for committee work for the American Railway Bridge & Building Association for the ensuing year, and the president has appointed members on these committees as indicated:

Water Supply. (A) Intakes and Intake Lines; (B) Internal Combustion Engines. Chairman, C. R. Knowles, I. C.; C. A. Lichty, C. & N. W.; James Dupree, C. T. H. & S. E., and J. J. Murphy, S. P.

Floors for Shops, Etc. Chairman, D. Rounseville, C. & N. W.; J. S. Robinson, C. & N. W.; G. A. Mitchell, G. T.; R. M. Bowman, L. E. & W., and G. E. Boyd, D., L. & W.

Paint and Its Application to Railway Structures. Chairman, C. E. Smith, Mo. Pac.; F. E. Schall, L. V.; J. E. Greiner, B. & O.; H. B. Stuart, G. T., and C. Ettinger, I. C.

Caring for and Handling Creosoted Material. Chairman, E. T. Howson, *Railway Age Gazette*; F. D. Mattos, S. P.; D. A. Shope, A. T. & S. F., and J. S. Lemon, Southern.

Blank Forms for Bridge and Building Department Use. Chairman, R. C. Sattley, C. & N. W.; G. W. Hand, C. & N. W.; B. F. Ferris, S. P., and G. A. Rodman, N. Y. & N. H. & H.

Modern Method of Driving Piles. Chairman, Maro Johnson, I. C.; J. P. Canty, B. & M.; R. H. Reid, N. Y. C.; J. P. Wood, P. M., and O. F. Dalstrom, C. & N. W.

Fireproofing Roofs of Wooden Buildings. Chairman, J. N. Penwell, L. E. & W.; Niles Searls, S. P.; E. C. Morrison, S. P., J. W. Miller, C. & N. W., and F. O. Draper, I. C.

Efficient Methods of Handling Work and Men. Chairman, F. E. Weise, C. & N. W.; E. R. Wenner, L. V.; S. C. Tanner, B. & O., and J. F. Pinson, C. & N. W. & St. P.

Station Buildings for Passenger Service Only. Chairman, M. A. Long, B. & O.; E. B. Ashby, L. V.; G. W. Andrews, B. & O., and J. B. Gaut, G. T.

Economical Handling of Concrete on Smaller Jobs. Chairman, L. D. Hadwen, C. & N. W. & St. P.; J. W. Wood, A. T. & S. F.; C. F. Green, S. P., and G. H. Stewart, B. R. & P.

Small Coaling Stations. Chairman, Lee Jutton, C. & N. W.; W. F. Strouse, B. & O.; J. H. Nuelle, N. Y. O. & W., and G. W. Kinney, D. & R. G.

OIL FUEL IN INDIA.—Tests to determine the economy of oil as fuel for railway service have now been going on in India for over a year, with results so favorable that the question of substituting oil for coal is merely a question of comparative prices.

Creosoted Wood Block Floors for Railroad Buildings

Precautions Which Are Being Observed and Results Which Have Been Secured With This Modern Material

The successful use of treated wood block street pavement dates back to 1874, when 75,000 sq. yd. of creosoted long leaf pine blocks was laid in Galveston, Tex. These blocks remained in use 29 years. Since that time this type of pavement has come to be widely used throughout the country, particularly in dense traffic business sections of large cities where the paving requirements are the most exacting. In recent years this material has also been given extensive use for the floors of buildings devoted to a variety of industrial purposes. The wide range of its usefulness in buildings is indicated by its use in machine shops, foundries, print shops, fire stations, bakeries, stables, hotels and hospitals. On railroads they have given favorable

or the proper manner of laying wood block pavement had been developed. Under traffic the fibre ends of the timber flatten out, forming a compact wear-resisting cushion which tends to close up the joints between adjacent blocks and also effectively protects the body of the blocks. The many advantages of this pavement arise from the peculiar texture of the surface, which while it is sufficiently hard to class high among high-grade pavements from the standpoint of small rolling resistance, possesses a resilience which makes it particularly valuable for industrial use. It is quiet, and it does not tire the feet like the hard surfaces of concrete or steel plates. Brittle objects dropped on it are not so easily broken as on the harder floors, nor is the



Wood Block Floor in South Chicago Freight House of Pennsylvania Lines, Laid in 1912

results in freight stations, shop buildings and roundhouses, the Chicago & North Western having used them in 19 separate buildings, aggregating in excess of 31,000 sq. yds. of floor.

The use of properly treated and laid creosoted block floors in railroad buildings has extended over a period of only five or six years, by far too short a period to demonstrate even approximately the total useful life to be expected of them. While unfortunately, a number of the oldest installations are so inferior as to material and manner of laying that they do not represent good work according to the present standards and have long since been discredited, all of the floors laid according to proper specifications are giving excellent service.

The resistance which even a soft wood offers to compressive or abrasive agencies on the ends of the fibres was recognized long before methods of wood preservation had been discovered

floor subject to chipping or cracking from the dropping of heavy objects on it. Two other advantages from a physiological standpoint result from its insulating quality which makes it warm to the feet in cold weather and the fact that it is a poor reflector of light, thus doing away with the glare experienced with many classes of floor.

The cost of the block floor as built for interior use with blocks not over three inches thick and a stone concrete base ranges from \$1.75 to \$2.50 per sq. yd. in place. Floors with a 4-in. cinder concrete base have been laid for \$1.65. These figures are based on installations under average conditions. Very small installations with unfavorable conditions would cost more. Wood block floors have been built on sand and gravel foundations at prices somewhat lower, but in general the omission of the concrete base is to be recommended only in cases where

the floor is subject to foot traffic alone. Attempts to reduce the cost by resorting to inferior methods and materials have usually resulted in dismal failures. The service exacted of floors used for diverse industrial purposes is subject to such variations that there is as much if not more need of expert super-

other hand, blocks supported on a concrete or earth foundation are exposed only to the upper face, which has been found to be highly fire-resistant. This was demonstrated in the Baltimore fire, where a section of experimental wood block pavement withstood the conflagration with an inconsiderable



Block Floor in Locomotive Erecting Shop of Michigan Central at Jackson, Mich.

vision than in the case of the street pavement. Difficulty has been experienced at different times with swelling from the absorption of water on one hand and from the presence of oil or pitch on the surface of the block on the other hand, conditions which could have been avoided, without question, if the blocks had been prepared and placed under the direction of an expert

charring on the surface, while the adjacent sections of brick and granite block pavements were spalled and cracked by the heat. A severe fire test of wood block pavement took place in the burning of the Philadelphia & Reading pier No. 36 at South Wharves, in October, 1914, which is reported as follows: "This fire was so hot that a large portion of the structural steel was



Severe Service on a Floor in the Allegheny Shops of the Pennsylvania Lines

having adequate knowledge of the service to which the floor would be subjected.

A number of disastrous fires in the creosoted wood block floors of bridges, which have received considerable publicity during the past year, have caused no little apprehension in the minds of many as to the fire hazard of creosoted floors in buildings. While creosoted lumber is highly inflammable once it becomes ignited, ignition does not take place as readily as in untreated lumber. Investigation has shown that in all the bridge floor fires reported the creosoted blocks were supported on wooden planking, a condition highly favorable to fires. On the

fused, the whole pier shed was destroyed and the greater portion of the burnt wreckage was thrown down on the wood block floor. After the removal of the debris, it was found that the wood blocks, which had been subjected directly to the flames were only charred $\frac{3}{8}$ to $\frac{1}{4}$ in. deep, but where the fused structural steel had come into contact with the wood blocks, they were charred from $\frac{3}{4}$ in. to 1 in. deep.

WOODS USED

A number of varieties of woods have been used in block floors. The report of the Committee on Wood Block Paving of

the American Wood Preservers' Association for 1915 records the use of long leaf and short leaf pine, yellow pine, black gum, tamarack, Washington cedar, Norway pine and red fir. Tests made by the city of Minneapolis included Norway pine, tamarack, birch, larch, Douglas fir, long leaf pine and eastern hemlock. The use of hard maple has also been reported in one or two instances. The principal requirement in a wood is resistance to wear, compressive strength of fibres endwise and susceptibility to impregnation by preservatives. Hard woods such as maple, which are peculiarly adapted to use in flooring



Installation of Wood Blocks in Lackawanna Roundhouse at Elmira, N. Y.

because of resistance to wear and compression perpendicular to the grain, seem to possess no advantage over the softer woods when subjected to conditions of end grain wear obtaining in a block floor.

Southern pine, particularly long leaf, enjoys the most extensive use for this purpose. Specifications for the use of southern yellow pine usually provide definite limits as to the amount of sap wood and frequently specify definitely the use of long leaf pine only. From the following quotation from a report on wood paving in the United States by C. L. Hill, assistant forester, United States Department of Agriculture, it would seem that these restrictions are not warranted. "The true long leaf pine has usually so narrow a sap wood that it could be neglected without danger to the life of the pavement. In loblolly, the sap wood is often very wide, but loblolly pine is one of the species for which it has been proved that sap wood under equal conditions of moisture contents is as strong as heart wood. Therefore, when effective seasoning of paving material can be assured before the creosote treatment, the prohibition of sap wood in Southern pine material is needless and should be omitted from specifications." It would seem that a specification establishing the density of the timber along the lines recently adopted by the Southern Pine Manufacturers' Association by limitation of the minimum number of rings per inch would be all that is necessary. Soundness is of prime importance and blocks must be inspected rigidly to detect knot holes, decay, bark, large or loose knots, shakes and checks. The blocks must also be truly rectangular and free from irregularity in sawing.

Many sizes of block have been used. As a rule commercial blocks are from 3 to 4 in. wide and from 4 to 10 in. long. A single thickness for a given piece of work is, of course, essential, but uniformity in the length of the blocks is not necessary, though occasionally specifications provide for a definite

length as well as width. In a number of cases railroads have been making their own blocks by sawing up the ends of waste lumber, and, under those circumstances, almost any size of timber has been used. In depth, blocks vary from $2\frac{1}{4}$ in. to 6 in., but for ordinary interior use there seems to be little call for a thickness greater than 3 in. There are on the market blocks $2\frac{1}{4}$ in. thick for use under light service. Aside from the service to which the blocks are subjected, the depth of blocks is governed by the ratio between depth and greatest dimension across the grain. Owing to the characteristic weakness of timber in shear and tension in planes parallel to the grain, there is danger of a high percentage of broken blocks whenever the length of the block exceeds three times the depth. For this reason a reduction in the thickness should be accompanied by a limitation of the length. Most specifications permit the variation of $1/16$ in. in the depth and thickness of the blocks. Manufacturer's specifications sometimes call for a tolerance of $1/8$ in. in the thickness. A small variation in the depth is readily adjusted in the cushion bedding, but variation in the width affects the width of the joints and the regularity of the laying.

TREATMENT

The subject of timber treatment is too broad for more than a brief discussion here. It suffices to say that creosoting under pressure is the only preservative process seriously considered at this time for the treatment of blocks. Some railroads have reported favorably on the use of dipped blocks, but their use has covered so short a time that it does not constitute a real test. The treatment of blocks for interior use is a matter of



Creosoted Block Floor in Lackawanna Car Repair Shops at East Buffalo

greater complexity than is the case with blocks in street pavement, because of the diversity of service to which the former are subjected and while the methods of treating the blocks for street pavement have been widely discussed, little publicity has been given to the detailed method of treating blocks for interior use.

Block pavement on open freight house platforms is subjected to much the same condition as in street pavement. This is true to a certain extent also of floors in roundhouses and in certain classes of shops where much water is frequently spilled, particularly around hydrants. In such cases security against swelling is an important consideration. In warehouses, on the other hand, the blocks have a tendency to shrink. In general, bleeding of creosote and pitch is much more objectionable in

building floors than on streets. This is true particularly of freight house floors, where, for instance, flour may be stored. In general blocks for interior use receive a lighter treatment, hence, open-cell processes rather than full-cell processes of treatment are the rule and the admixture of coal tar or other ingredients than creosote oil must be done with the exercise of much greater care than is necessary with street pavement blocks.

FOUNDATION AND CONSTRUCTION

To be a success, any pavement must have an unyielding foundation. A concrete base is almost universal with the creosoted block pavement, though there have been cases where the blocks have been used successfully on a well-packed sand and gravel bed. Similarly, instances may be cited where certain cities have built brick pavements which have stood years of traffic with no other foundation than the natural sandy soil, but these are exceptional cases where the soil conditions were ideal and it cannot be considered good practice in connection with either brick or creosoted block pavements. This is particularly true in building work, where the ground surface usually has been disturbed for the purpose of installing pipes, drains, etc., just previous to the placing of the floors. For floors subjected to loads not exceeding 1,500-lb. concentrations, cinder concrete foundations may be used with safety and economy.

Practice in placing a concrete foundation needs little comment here, as it is governed by the principles covering the use and production of good quality of concrete. For ordinary interior use the base need not exceed 3 to 5 in. in thickness. Precaution should be taken to insure a well-compacted foundation bed with special attention to places where the ground has been disturbed recently. In addition, care should be exercised to secure a level and reasonably smooth surface at the desired grade.

In European practice, the surface of the concrete foundation is finished with such exactness that the blocks may be and generally are laid directly on the concrete. While this practice has never prevailed in this country for street pavements, it is used for interior floors in connection with the use of a thin bitumen cushion. In other cases a sand cushion $\frac{1}{2}$ in. to 1 in. in thickness is used between the base and the blocks. The primary object of the cushion is to provide a smooth surface which is sufficiently soft to allow adjustment for slight variations in the depth of the blocks. Incidentally, the layer of sand is said to serve as a resilient bed for the blocks, with a resulting decrease in surface wear. Its disadvantage lies in its tendency to shift under condition of saturation, heavy gradients and heavy load on restricted areas.

In certain localities the use of a dry mortar, usually 1 part cement to 4 parts sand, has come into use. This is sprinkled with water just before or after the blocks are placed. The advantage of a bitumen cushion is not so much in its superiority as a cushion but results from the fact that it works up between the blocks when pressure is applied and serves as a filler. The usual method is to apply one coat of pitch to the concrete and squeegee to give it a smooth surface. A second coat is applied just before the blocks are placed, so as to be soft when the blocks are laid down.

Expansion joints ordinarily are required only along the walls of a building and around machine foundations or other obstructions which project through the pavement. The following specification represents good practice: "Expansion joints shall be formed by placing a 1 in. by 4 in. board on edge against the sides of the building and around foundations. After the blocks are laid, and after tamping or rolling, the strips shall be removed and the voids filled with a low-melting-point pitch to within $\frac{1}{4}$ in. of the wearing surface of the floor."

Because of the difficulties encountered with the swelling and contraction of the blocks under different circumstances the filler is an important item in a successful pavement. Three materials commonly used for this purpose are sand, cement grout and pitch. The latter is the most commonly used and is

giving the best satisfaction. The following quotation from the proceedings of the American Wood Preservers' Association for 1915 expresses the views for and against the bituminous filler: "Those favoring the bituminous filler argue that the joints filled with a tar or asphaltic preparation constitute individual expansion joints between each block, thereby allowing for expansion throughout the pavement. Moreover, it is claimed that the pavement is made waterproof and that no moisture can enter between or under the blocks. On the other hand, advocates of the other fillers argue that a bituminous material becomes soft and sticky from the oils that exude from the blocks and may add to the bleeding trouble." Sand filler is said to have a tendency to work down under the blocks and thus leave the joints open. The pitch filler is usually applied by pouring it between the blocks at a temperature sufficiently high to make it thoroughly fluid. After the joints are filled, squeegees are used to force pitch into the cracks and scrape away the surplus from the surface of the blocks. The latter object is also accomplished readily by an application of hot sand. In cases where a bitumen cushion is used under the blocks all that is necessary is to tamp or roll the blocks thoroughly, which will press the cushion up and completely fill the joints from below.

Practice as to a sand dressing does not differ from ordinary outdoor pavement work.

EXPERIENCE WITH WOOD BLOCKS

Railroads have used creosoted block floors extensively in erecting and machine shops, boiler shops, and in some cases in wood-working shops. Among installations for this purpose have been those of the Pennsylvania Lines at Allegheny and Conway, Pa., the Baltimore & Ohio at Mt. Clare, Md., the Illinois Central at Memphis, Tenn., the Chicago, Milwaukee & St. Paul at South Minneapolis, Minn., the Michigan Central at St. Thomas, Ont., the Central of Georgia at Macon, Ga., the Lackawanna at Scranton, Pa., and East Buffalo, and the Northern Pacific at Brainerd, Minn.

The Central of Georgia has an extensive installation of creosoted wood blocks in its engine terminal buildings at Macon, which has been in service for 5 and 6 years. The machine shop and boiler shop together contain 12,140 sq. yd. of 3-in. blocks laid on a concrete base 5 in. deep with a $\frac{1}{2}$ -in. sand cushion. All of the blocks are 3 in. by 8 in. and the joints are filled with a sand and cement grout. This floor cost \$2.70 per sq. yd. complete in place. The round house contains 5,000 sq. yd. of 4 in. blocks laid on a concrete base $4\frac{1}{2}$ in. thick with a $\frac{1}{2}$ -in. sand cushion. The cost of this floor in place was \$3.05. All of the blocks are long leaf yellow pine treated with 18 lb. of creosote oil per cu. ft. No expansion joints have been provided and no trouble has been experienced with swelling. The blocks in the round house were laid in 1909 and those in the other buildings in 1910, and have been subjected to hard usage, particularly from falling castings. They show little wear, no sign of decay and the surface is excellent.

The Michigan Central placed a block floor in its general locomotive repair shops at St. Thomas, in 1913, using creosoted hard pine blocks 3 in. by 8 in. by 14 in. They were laid on a concrete foundation with a 1-in. sand cushion and expansion joints 1 in. wide, spaced 50 ft. apart and filled with asphalt. The floor is subject to heavy usage from the dropping of heavy castings, etc., but has thus far shown little wear. Some trouble was experienced with swelling of the blocks in places where they became wet.

The Northern Pacific has several installations of blocks made of the waste ends of Douglas fir lumber in the shops at Brainerd, comprising about 2,164 sq. yd. These are cut 4 in. long, but are not sized up to any particular dimension, leaving the blocks as they come from the timber, to save as much labor as possible. After accumulating about a car load of blocks they are sent to the tie-treating plant for and given about a 12-lb. treatment. They are laid on a concrete base from 3 to 4 in. thick with a 1-in. sand cushion. The first installation of these floors was made in 1911, no repairs have been made up to the present time and the floors are said to be in perfect condition. The area

of this type of floor is being extended as fast as the material is available.

The Lackawanna has used the blocks in a machine shop at Scranton, Pa., since 1912, a car repair shop at East Buffalo and in a roundhouse at Elmira, N. Y., containing 30 stalls. In 10 stalls the blocks were laid with a cement grout filler and in the other 20 with a coal tar filler, the latter giving the best results.

The Oregon-Washington Railroad and Navigation Company installed a creosoted block floor in a new 10-stall roundhouse in 1912 that is giving very good service.

In the Mt. Clare boiler shops of the Baltimore & Ohio, 4,700 sq. yd. of 3-in. by 4-in. by 8-in. blocks were used on a 6-in. bed of concrete, which is holding out better than any type of floor previously used. This floor has been in service about two years. A machine shop at that place contains 1,940 sq. yd. of the same type of construction. This road has also used wood block floors in freight houses, the largest installations being at the terminal freight house at Cincinnati and the inbound freight house at Washington, D. C., which have been in service for four years. The Washington installation covers an area of 50 ft. by 300 ft., on a sand bed, and while not giving as good service as blocks placed on concrete, it has given better service than the ordinary type of flooring. The blocks used on earlier installations on this road were treated with 16 lb. of creosote per cu. ft., but it was found that the oil came out of the blocks and damaged freight, especially flour. In subsequent installations the treatment has been reduced to 10 lb. and the results are very satisfactory.

There is an installation of wood block floors in the Allegheny shops of the Pennsylvania Lines, placed on a 6-in. concrete base with a sand cushion of the unusual thickness of 2 in., the joints being filled with pitch. This floor has been in use for seven years and is in good condition. Around boring machines where pieces of metal are frequently dropped, some repairs have been found necessary. At the Conway shops, wood block floors were laid with a 4-in. concrete base and a ½-in. layer of fresh cement, the joints being filled with pitch. This floor has been in use since 1913, and is in excellent condition. Blocks are also used in the South Chicago and Erie freight houses, the former laid in 1912 and the latter in 1914. Both floors are giving entire satisfaction. On the South Chicago floor, some trouble was experienced at first on account of excessive pitch, but this has since been remedied. The floor in the Erie house was laid on a 6-in. concrete base with a 1-in. sand cushion. Expansion joints were provided around the walls one inch wide, filled with pitch. The floor cost \$2.53 per sq. yd. in place.

An installation previously mentioned is that of the Philadelphia & Reading in ferry houses and wharves at Philadelphia. In the Chestnut street ferry house the blocks were laid on a creosoted plank floor embedded in cement mortar and thoroughly grouted with sand and cement. The paving has been in service for three years and stands up well under traffic. At freight pier No. 8, South Wharves, the driveways are paved with wood blocks cut from old car sills which were treated with Carbo-lineum and dead oil of coal tar by the open tank process. At piers 34 and 36, South Wharves, the blocks are laid on a concrete base. These blocks are creosoted and the experience with the blocks on pier 36 when that pier was destroyed by fire has been described previously.

COMMITTEES OF THE ROADMASTERS' ASSOCIATION

The following committees and subjects have been selected by the Roadmasters' and Maintenance of Way Association for the ensuing year:

Recommended Practice Regarding the Anchoring of Track, the Uniform Spacing of Ties and the Elimination of the Slot Spiking of the Joints: P. M. Dinan, L. V., chairman; P. H. Madden, C. M. & St. P.; L. C. Ryan, C. & N. W.; G. H. Prentice, L. S. & M. S.; G. A. DeMore, N. Y., N. H. & H.;

J. G. Hutchinson, C., R. I. & P.; W. E. Davin, P. & L. E.; A. E. Hansen, A., T. & S. F.; M. J. Connerton, C. N. O. & T. P., and L. Coffell, C. & E. I.

Seasonable Distribution of Maintenance Work and Forces: M. P. Condon, N. Y., N. H. & H., chairman; J. H. Cummings, B. R. & P.; John Shea, D. & I. R.; J. B. Oatman, B. R. & P.; J. Dougherty, St. L. & S. F.; D. McCooe, G. T.; F. H. Hansen, C. & A.; N. McNabb, M. C., and J. B. Killy, M., St. P. & S. M.

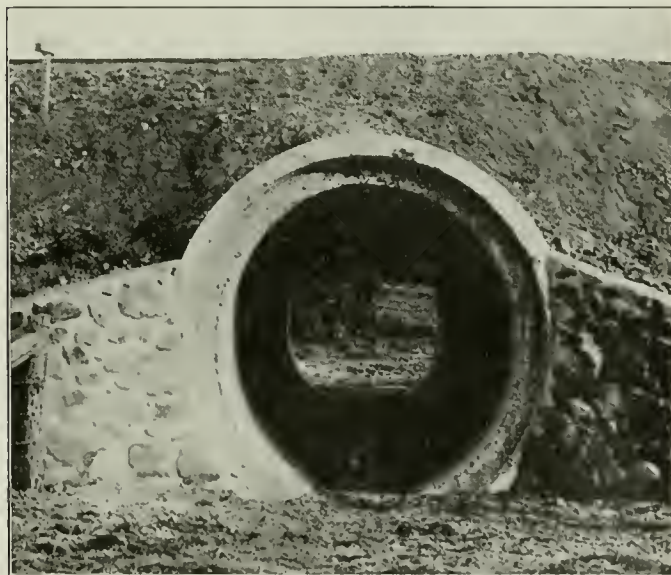
Equating Track Values: A. Grills, G. T., chairman; P. J. McAndrews, C. & N. W., vice-chairman; W. Shea, C. M. & St. P.; C. J. Coon, N. Y. C.; A. J. Neafie, D., L. & W.; A. E. Hansen, A. T. & S. F.; D. McNabb, M. C.; C. E. Erwin, A. C. L.; J. O'Connor, M., St. P. & S. S. M.; M. Donahue, C. & A., and George Beckingham, G. T.

Paper on Standard Report Forms for the Roadmaster's Office, by E. T. Howson, *Railway Age Gazette*.

Paper on Brooms for Snow Service, by T. Thompson, A. T. & S. F.

CONCRETE CULVERT PIPE FOR CATTLE PASSES

In the extensive use of concrete culvert pipe for openings under railway embankments a diameter of 5 ft. has usually been the maximum size used and for this reason these culverts have served almost exclusively for waterways. As a departure from this practice, P. Swenson, bridge engineer of the Minneapolis,



One of the Culvert Cattle Passes

St. Paul & Sault Ste. Marie, has recently conceived the idea of using reinforced concrete pipe of adequate inside dimensions to satisfy the usual contract requirements as a substitute for the usual box or arch culvert for cattle passes. Ten installations of this kind have been made thus far on the line between Minneapolis and Superior, one of which is shown in the accompanying photograph. The opening consists of several sections of culvert pipe 6 ft. 5 in. long with bell and spigot joints. The inside diameter is 7 ft. horizontally and about 7 ft. 5 in. vertically. A flat surface 2 ft. wide at the bottom serves as a walk. The structure is finished off at each end by rubble masonry wing walls; these units were designed and constructed to resist the loads imposed due to the usual dead load and a live load equal to Cooper's E 60 loading. The pipes were installed by company forces at a cost of \$7.50 to \$9.00 per lin. ft., not including manufacturer's price, freight or train service. They were manufactured and furnished by the C. F. Massey Company, Chicago. We are indebted to C. N. Kalk, chief engineer of the Minneapolis, St. Paul & Sault Ste. Marie for the above information.

HINTS FOR THE ORDERING OF LUMBER*

By T. O. Wood

Purchasing Agent, Gulf, Colorado & Santa Fe, Cleburne, Texas

Don't order everything 16 ft. long. Remember almost everyone makes this mistake and orders that length. Consequently about seven-eighths of the orders on mills call for 16-ft. lumber, and all logs are not 16 and 32 ft. long. As a matter of time, your requirements, if made in lengths 12, 14, 16, 18 or 20 ft. long can be filled by a mill in less than half the time required if 16-ft. lengths only are called for. If you cannot possibly use all those lengths, use as many as you can.

Don't order any lengths longer than 20 ft. if two shorter lengths will do; especially try to avoid ordering such expensive lengths as from 28 to 40 ft. if two shorter lengths can possibly be made to answer. Remember that all lengths over 20 ft. cost additional, the present rate of increase on a 20-ft. basis being as follows:

20 ft.....	\$20
22-24 ft.....	21
26 ft.....	22
28 ft.....	23
30 ft.....	24
32 ft.....	25
34 ft.....	26
36 ft.....	27
38 ft.....	29
40 ft.....	31
Over 40 ft.....	Special prices

These additional prices do not cover car sills.

Don't order boards and dimension lumber 12 in. wide if less will do; remember the price increases on lumber over 8 in. wide. This can perhaps be shown better by giving an illustration as follows:

100 pc., 1 in. by 12 in. by 16 ft., 1,600 ft., at \$17.....	\$27.20
120 pc., 1 in. by 10 in. by 16 ft., 1,600 ft., at \$14.....	22.40
150 pc., 1 in. by 8 in. by 16 ft., 1,600 ft., at \$13.....	20.80

While getting the same quantity in board measure, the above shows the difference in cost to the company.

Don't order boards and timbers over 12 in. wide if you can avoid it, because the price increases rapidly with the extra width as follows, using the former figures as a basis:

On less than 2 in. thick.	On 2 in. thick and over.
12 in. wide.....\$17	12 in. wide.....\$17
14 in. wide.....20	14 in. wide.....19
16 in. wide.....23	16 in. wide.....21
18 in. wide.....26	18 in. wide.....24

The higher price for timber less than 2 in. thick is owing to the loss in manufacture, from splits, breaks, handling, etc. It would be much better to use two pieces if possible, and you may find it possible in a great many cases.

In ordering surfaced lumber for buildings, if possible order all in rough sizes, or all in finished sizes, the latter being much preferred. Sometimes requisitions show both, and in succeeding lines, and it is very difficult for the person purchasing it to know what to obtain.

Don't forget in all cases of surfaced lumber to state whether S1S, S2S, S1S1E, etc., is desired, as the case may be. Calling for it as dressed, finished or surfaced without stating how this is required, is like calling for boards and giving no size. Where grades are not known by those ordering lumber, the purpose for which the lumber is required should be stated on the requisition. In recent years the cost of surfacing lumber has been reduced somewhat, and to-day the extra cost over rough sizes on 1-in. and 2-in. lumber of standard widths and lengths is 50 cents, and on timbers \$1.00 per M ft. It would help immensely also if those ordering lumber to be furnished by mills in the southwestern territory would remember that the S1S, S2S or 1-in. lumber is 13/16 in. instead of 7/8 in. This latter size is the old northern standard, and is not standard in southern pine.

In ordering lumber for stations, dwelling houses, hotels, etc., don't order the flooring all of one kind. To do this is expensive, and results in having some lumber unnecessarily good and other perhaps not sufficiently good for the purposes required. It will be well to remember that 4-in. flooring runs

on an average \$2 per M less than 6-in., and in my opinion makes a better floor. Never order 6-in. flooring edge grain. It is almost impossible to get it, and if obtained at all, is exceedingly expensive. Also remember edge grain costs \$9 per M more than flat grain of the same grade.

I will venture the suggestion here that for repairs of buildings, houses, etc., good judgment may suggest that something less than the best grade of lumber be used, especially for flooring, on the ground that it is not worth putting in 25 to 50-year lumber as repairs to any building. Also it is well not to use too expensive lumber in a building that may not be in existence in 10 to 20 years' time.

When 1-in. or 2-in. lumber is required, and where wane and sound red heart are not objectionable, by all means order No. 1 Common. No. 1 Common is known at the mills as yard stock, and millions of feet are always on hand, therefore, almost immediate shipment can be obtained. All square edge and sound lumber has to be sawn especially, and no stock is kept on hand at the mills; therefore, it comes much more slowly. No. 2 Common follows the same rules as to thickness as No. 1, but, of course, carries more defects. At the same time it can be used to advantage for many purposes where No. 1 is sometimes ordered, as, for instance, for snow fencing, and it costs from \$1 to \$2 less per M than No. 1, according to the stock on hand at the mills. Of course, there is not as much No. 2 on hand as No. 1.

Just one more little kink about No. 1 Common. You frequently order No. 1 Common S1S up to and including 1 in. by 12 in. Next time you start to do this, don't do it, but order it S2S. You will get more even lumber, just as thick and get it more promptly, and also sometimes at a shade lower price. You will also get more lumber per M ft. than if ordered S1S. A mill prefers to work lumber S2S because that thickness is in accordance with commercial requirements, while S1S is not. Therefore, any degenerates will naturally fall into commercial lumber No. 2 grade, without reworking. Be sure and remember that this only covers No. 1 Common up to 1 in. by 12 in.

All stacks should be from two to three feet above ground, to allow free circulation of air, and should be pitched on a slope of one inch per lineal foot, with the front end higher than the rear end; thus in piles of 16-ft. lumber the front end would be 16 in. higher than the rear end. Each piece should be exactly over the piece underneath it and from 1 in. to 1½ in. apart from pieces on each side, for say 4-in. lumber, increasing this space up to 3-in. or 4-in. in lumber up to 12 in. wide. Cross pieces should be the same as the balance of the stack in lumber and timber 1 in. to 4 in. thick; in timber 6 in. thick and over this plan would run the stack too high, and 1-in. or 2-in. strips of waste lumber can be used. These cross pieces should be put on every layer, about 4 in. apart, and the front piece should project ½ in. to ¾ in. over the ends to protect the stack from sun and rain.

Be sure that the center bearings of each stack are not lower than the end bearings. The lines should be straight to avoid sagging and the consequent accumulation and retention of dampness. Be sure that the cross pieces are exactly over each other, else you will have crooked lumber. And be sure and don't use decayed or rotten lumber for cross pieces or foundations, as doing so will contaminate the good lumber.

WORK ON THE BAGDAD RAILWAY.—The American vice-consul at Aleppo, reports that despite the great crisis prevailing there has been no diminution in the railroad progress of the country. The Jaffa-Jerusalem line, controlled by a French company, but whose 25 years' lease is about to expire, was taken over by the military authorities at the outbreak of the war. Work was immediately begun to connect this line with the Haifa-Damascus line, and in this way link the system with Aleppo (on the Bagdad line), and eventually connect with Constantinople. Equal energy has been displayed in the extension of the line from Aleppo toward Bagdad, on the German or Bagdad Railway.

*Abstracted from a paper presented before the storekeepers of the Atchison, Topeka & Santa Fe at Albuquerque, N. M., September 28, 1915.

Tables for the Distribution of Track Materials

Information Enabling a Gang to Unload Ties, Bolts,
Spikes and Other Supplies from a Moving Train

By KENNETH L. VAN AUKEN

While unloading material cheaply and easily is important, it is equally important that the correct quantities be unloaded and that they be distributed so as to require a minimum of rehandling later. This is especially true when relaying rail, laying second track or putting in switches. A correct distribution can be obtained by noting the standard length of track rails and spotting the work train each time with respect to the rail joints; or by reference to the location of telephone or telegraph poles. The poles usually afford the more accurate and ready means for gaging distribution.

When unloading rails, whenever the work train is on the siding waiting for trains the gang should be kept busy setting the rails up end to end. If it is possible to have all the rails set up in this way, the distribution of angle bars and base plates, or joints can be gaged by the newly distributed steel. The tables given in this article have been worked up to give figures which can be used in distributing material by noting either the telegraph poles or the rail joints, for both 30- and 33-ft. rails. The figures in most cases have been carried out only to the nearest quarter keg, box, etc., so that they can be easily used by men who are not used to handling fractions.

Table 1 is for distributing ties for a new track. It is customary to take out several carloads at once and distribute the

should be on that basis; then, if it is unnecessary to replace all of the joint ties, the new ties can be kept for ordinary renewals near the same location.

Possibly the best method of distributing ties for relaying (unless some parts of the section need more renewals than others) is to count the number of ties and distribute them uniformly over the entire section. Or the number per telegraph pole may be computed and that number should then be thrown off one at a time at approximately equal intervals between every two poles.

Table 2 gives the number of angle bars required per rail length, and per telegraph or telephone pole whether located 150 ft. or 200 ft. apart. It is sometimes easier to gage the distribution by telephone poles than by rail lengths, but if the rails have already been distributed, the best method is to throw off four angle bars and two joint plates, or two joints, for each rail.

TABLE 2: DISTRIBUTING ANGLE BARS OR JOINTS.

	Per Rail Length	Per Telephone Pole 150 ft. Apart	Per Telephone Pole 200 ft. Apart
Angle bars.....	4	20	18*
Joints (or joint plates for angle bars).....	2	10	9†
			14
			12††

* 2 extras at every 10th pole.

† 2 extras as every 20th pole.

** 2 extras at every 8th pole.

†† 2 extras at every 16th pole.

TABLE 1: DISTRIBUTING TIES ACCORDING TO TELEPHONE POLES.

No.	per rail Length	30-ft. Rails. Telephone Poles 150 ft. Apart	30-ft. Rails. Telephone Poles 200 ft. Apart	33-ft. Rails. Telephone Poles 150 ft. Apart	33-ft. Rails. Telephone Poles 200 ft. Apart
15	75	100	...	...	...
16	80	107	...	...	...
17	85	114	78	103	...
18	90	120	82	109	...
19	95	127	87	115	...
20	...	...	91	121	...
21	...	...	96	128	...

gang on the various cars. The train is generally moved about one train length for each spotting, a man being sent ahead to make a chalk mark on the rail joint at intervals which give the nearest

It is not necessary to distribute any extra pieces, because these appliances are not so easily lost as spikes or bolts.

Table 3, for the distribution of track bolts, gives in its various columns the number of joints which one keg will full-bolt for either 30 or 33-ft. rails, and for either 4-hole or 6-hole joints. For instance, if 4 3/4-in. by 7/8-in. bolts are to be used on 100-lb. 33-ft. rails with 6-hole angle bars, column 2 in the table shows that there are 141 bolts to the keg, and column 8, that these will full-bolt 11 3/4 joints, and column 9, that it will bolt the joints between 2 1/2 telephone poles 150 ft. apart, or column 10, 1 3/4 telephone poles 200 ft. apart. In making the distribution

TABLE 3: DISTRIBUTING TRACK BOLTS.

Kind	No.—per 200-lb. Keg	4-hole joints—one keg will full-bolt				6-hole joints—one keg will full-bolt			
		33-ft. rails		30-ft. rails		33-ft. rails		30-ft. rails	
		Joints	Telephone Poles 150 ft. Apart	Joints	Telephone Poles 150 ft. Apart	Joints	Telephone Poles 150 ft. Apart	Joints	Telephone Poles 150 ft. Apart
3/4 in. x 3 1/2 in.	255	31 3/4	7	5 1/4	6 1/4	20	4 1/2	3 1/2	4 1/4
3/4 in. x 4 in.	237	39 1/2	6 1/2	4 3/4	5 1/4	19 3/4	4 3/4	3 3/4	3 3/4
7/8 in. x 4 in.	168	21 1/2	5 3/4	3 1/2	4 1/4	14	3 1/2	2 3/4	3 1/4
7/8 in. x 4 1/4 in.	162	20 1/4	5 1/2	3 1/4	4	13 1/2	3 1/4	2 1/2	3 1/2
7/8 in. x 4 3/4 in.	141	16 1/2	4 1/2	2 3/4	3 1/2	11 3/4	2 1/2	2 1/4	3 1/4
1 in. x 4 3/4 in.	119	14 3/4	4	2 1/4	2 3/4	9 3/4	2 1/4	2 1/4	3 1/4
1 in. x 4 1/2 in.	114	14	3 3/4	2 1/4	2 3/4	9 1/2	2 1/4	2 1/4	3 1/4
1 in. x 4 3/8 in.	109	13 1/2	3 3/4	2 1/4	2 3/4	9	2 1/4	2 1/4	3 1/4
1 in. x 5 in.	106	13	3 1/2	2 1/2	2 3/4	8 3/4	2 1/4	2 1/4	3 1/4
1 in. x 5 1/2 in.	103	12 3/4	3 1/2	2 1/2	2 3/4	8 1/2	2 1/4	2 1/4	3 1/4
1 in. x 5 3/4 in.	100	12 1/2	3 1/4	2 1/2	2 3/4	8 1/4	2 1/4	2 1/4	3 1/4
1 in. x 5 1/2 in.	98	12	3 3/4	2 1/2	2 3/4	8	2 1/4	2 1/4	3 1/4
1 in. x 6 in.	94	11 3/4	3 3/4	2 1/2	2 3/4	7 3/4	2 1/4	2 1/4	3 1/4
1 in. x 6 1/4 in.	91	11 1/4	3	2 1/4	2 3/4	7 1/2	2 1/4	2 1/4	3 1/4
1 in. x 6 1/2 in.	87	10 3/4	2 3/4	2 1/4	2 3/4	7 1/4	2 1/4	2 1/4	3 1/4

Sizes of Bolts to go with Plain Bars of the Following Sections:
45 to 67 lb. 70 and 75 lb. 80 and 85 lb. 90 and 100 lb.
3 3/4 x 3 1/4 in. 4 x 3 1/4 in. 4 1/4 x 7/8 in. 4 1/4 x 7/8 in.

Sizes of Bolts to go with Patented Joints.
45 to 67 lb. 70 and 75 lb. 80 and 85 lb. 90 and 100 lb.
Continuous 3/4 in. x 3 1/4 in. 7/8 in. x 4 in. 7/8 in. x 4 1/4 in. 7/8 in. x 4 1/4 in.
Bonzano 1 in. x 4 1/4 in. 1 in. x 4 1/4 in. 1 in. x 4 1/4 in. 1 in. x 4 1/4 in.
Walhaupter 1 in. x 4 1/4 in. 1 in. x 4 1/4 in. 1 in. x 4 1/4 in. 1 in. x 4 1/4 in.
100 per cent. 1 in. x 4 1/4 in. 1 in. x 5 in. 1 in. x 5 1/2 in. 1 in. x 5 1/2 in.
Weber 1 in. x 5 1/4 in. 1 in. x 6 in. 1 in. x 6 1/4 in. 1 in. x 6 1/2 in.

equivalent to the train length. The number of ties to be unloaded from between telephone poles for various spacings can be determined from Table 1. The table is not directly applicable to the distribution of ties for relaying. It is rather general practice to provide new ties for every joint, and the distribution

it is impossible to divide up the kegs, so that with telephone poles 150 ft. apart, one keg should be thrown off first with an interval of two telephone poles and then with an interval of three telephone poles, alternating this way throughout the distribution. The table provides for a small surplus in each case

The kegs should be thrown off as nearly as possible at equal intervals, and should be rolled off the car endways; if they hit on the sides they may run down the embankment into the ditch. Nut locks are usually furnished in boxes of 1,000. Table 4

TABLE 4: DISTRIBUTING LOCK NUTS.						
Nut locks—1,000 in a box—one box will furnish nuts for						
4-hole joints—8 nut locks			6-hole joints—12 nut locks			
Joints		Telephone Poles 150 ft. Apart	Telephone Poles 200 ft. Apart	Joints		Telephone Poles 150 ft. Apart
33-ft. rail..	124	27½	20½	83	18½	14½
30-ft. rail..	124	25	18½	83	16½	12½

gives the number of joints, measured by telegraph poles, for which one box will provide nut locks, the left half for 4-hole joints requiring 8, and the right-hand half for 6-hole joints requiring 12. A few nut locks are likely to be lost, so it is advisable (for instance in columns 3 and 4, top row of figures) to unload a box of nut locks every 27 telegraph poles 150 ft. apart, or every 20 telegraph poles 200 ft. apart.

Table 5 gives the number of track spikes, of the sizes commonly used, in an average keg of 200 lb. The number of rail lengths which one keg will full-spike is shown in columns 4 to 10, inclusive. This is for building a new track. For relaying it is the practice to provide new spikes for only part of the work and to require the gangs to use many of the old spikes.

TABLE 5: DISTRIBUTING TRACK SPIKES.										
Size, Length Measured Under Head		Average No. per keg of 200 lb.	Rail Used. Weight per Yd. lb.	One keg will full spike-rail lengths						
				15 ties per rail	16 ties per rail	17 ties per rail	18 ties per rail	19 ties per rail	20 ties per rail	21 ties per rail
5½ in.	x ¾ in.	300	75 to 100	5	4½	4¼	4	3¾	3½	3¼
5½ in.	x 9/16 in.	375	45 to 75	6¼	5¾	5½	5	4¾	4½	4¾
5 in.	x 9/16 in.	400	40 to 56	6½	6¼	5¾	5½	5¼	5	4¾

It is best to make the distribution in the same way as for ties—to count up the number of kegs and distribute them at equal intervals. If, however, it is planned to provide all new spikes except for the one row which was left in the ties, one keg will spike a third more rail lengths than is given in the table.

For relaying, the cheapest and best way to distribute the joint ties, spikes, angle bars and base plates or joints, bolts and nut locks, is to make up one train and do all this work at once. With careful work it is possible to make all this distribution without stopping, with the train traveling at a speed of 8 or 10 miles an hour. The cars of ties should be placed in the rear to reduce the damage of a possible derailment resulting from the ties falling on the track. The writer has used this method many times, however, without a single derailment.

Sometimes it will be policy to include the joint ties in the general tie distribution and wait until after rail is relaid to make tie renewals. In this case the section foreman will probably distribute the ties where needed previous to relaying.

WOOD PRESERVERS' CONVENTION

The annual convention of the American Wood Preservers' Association will be held at the Hotel Sherman, Chicago, January 18-20, 1916. The indications are that this convention will reflect the continued growth of this association.

Reports will be presented by standing committees on: Preservatives, Specifications for the Purchase and Preservation of Treatable Timber; Wood Block Paving; Plant Operation; Service Tests of Cross Ties; Service Tests of Wood Block Paving; and Service Tests of Bridge and Structural Timbers.

In addition, individual papers will be presented on the subjects of Wood Block Floors by Clyde H. Teesdale, Forest Products Laboratory, Madison, Wis., and also by F. W. Cherrington, chief engineer, the Jennison-Wright Company, Toledo, Ohio; Woods Suitable for Cross Ties by R. VanMetre, the Joyce-Watkins Company, Chicago; The Quantity of Zinc Chloride Required per Tie or Per Cubic Foot of Timber and the Method of Determining the Strength of the Solution by W. F. Goltra, president of the

W. F. Goltra Company, Cleveland, Ohio; The Types of Fungi Which Attack Railroad Ties by Herman Von Schrenk, consulting timber engineer, St. Louis, Mo.; The Creosote Oil Situation by G. A. Lembcke, Lembcke, Von Bernuth Company, New York City; The Zinc Chloride Situation by William Townsley, Jr., the Grasselli Chemical Company, Cleveland, Ohio, and Creosoted Douglas Fir Bridge Stringers by O. P. M. Goss, consulting engineer, Seattle, Wash.

The annual banquet will be held on Wednesday evening. F. H. Newell, professor of civil engineering, University of Illinois, and formerly chief engineer, United States Reclamation Service, will be the principal speaker.

THE VALUE OF ORGANIZATION AND SYSTEM FOR MAINTENANCE OF WAY GANGS

By J. T. BOWSER

Maintenance of Way Dept., Queen & Crescent Route, Danville, Ky.

The success or failure of a maintenance of way department foreman, as of any other man in charge of men, probably depends as much on his ability to organize the forces under his supervision and to systematize their efforts, as it does upon his knowledge of the work to be undertaken. That being true, is not a great field being neglected through the lack of systematic effort on the part of operating officers to cultivate the organizing and systematizing ability among their foremen. There are, of course, many railroad officers who have adopted a definite policy along this line, and many more who handle their foremen along similar lines, but have no definite and clear cut motive, following habit and instinct rather than clearly established reasons.

It is the purpose of this article to attempt to crystallize what is, very probably, the general impression or opinion as to the value of having foremen who organize their gangs for the work at hand and systematize routine. What railroad officer has not a familiar mental picture of the straggling, hesitating manner in which many section gangs resume work after the passage of a train, or the confusion and multiplicity of orders when the gang arrives at the work. Compare this picture with one of the gang, the foreman of which knew or had been taught the value of system. Each laborer then has a definite duty in each class of work, and he starts by force of habit. There is no loss of time arranging men, and there is no interference with each other. The foreman probably states what class of work is to be done and the laborers drop naturally into their places.

The work of an organized gang is not only done faster but better. Who will say that a man who has plenty of room to work, who knows what he is doing and what he is going to do, will not do better work than the man crowded up through lack of proper spacing, who skips from one thing to another, and who never knows or cares what comes next. From these men come the foremen and such training is invaluable. Discipline is better; a man is more contented and takes more pride in his work when his efforts are well directed and when he is accomplishing something.

Many foremen handle their gangs in this manner without really knowing what they are doing. They simply know they can accomplish more. Explain it to them, get them to thinking. If first efforts come spontaneously they should be able to make a great deal more progress when they know the reason, and begin to think about it. Such men are valuable and should be cultivated carefully. Watch apprentices and young foremen, get them started right, and explain; the whys are often as important as the hows.

The foremen's meetings afford excellent opportunities for officers to explain such methods to the foremen. It cannot be expected, however, that the seed planted at such a meeting will bear fruit without cultivation. It is probable that the supervisors are more or less gifted along this line. With a few talks and some encouragement the idea will crystallize in their minds and they will then be able and anxious to create and foster the growth of organized and systematic work among the foremen.

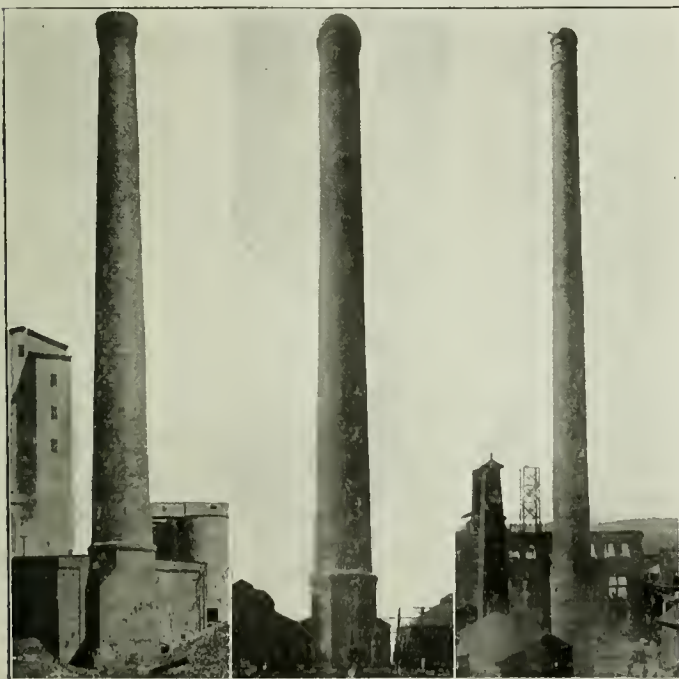
Design and Construction of Chimneys for Railways

Discussion of Types in Use and Points Considered in Deciding on Details of Chimneys for Boiler Plants

A great deal of power is generated by railways in steam plants exclusive of that in locomotive boilers. These stationary installations at engine terminals, docks, stations, shops, pumping plants, elevators, etc., depend on chimneys for the necessary draft, so that, in the aggregate, the problem of selecting a type of construction for such chimneys that will be dependable under all conditions and will have the lowest annual charge becomes one of considerable importance. On account of the special features involved in the design of chimneys and the relatively small number built by any one road, few railway men consider the subject thoroughly, depending to a considerable extent on the reputable builders of chimneys for details. It is hoped, therefore, that the following discussion will be of interest and value.

TYPES

In general, chimneys for the purpose considered are of three types, steel, brick and concrete, although at least one combination type has been developed, utilizing masonry and reinforced



- (A)—A Tapering Radial Brick Chimney 163 ft. High and 7 ft. in Diameter, Built for the Atchison, Topeka & Santa Fe Grain Elevator, Chicago, by the Heine Chimney Company, Chicago.
(B)—A Radial Brick Chimney 175 ft. High and 9 ft. 6 in. in Diameter, Built for the Consolidated Gas, Electric Light & Power Company, Baltimore, Md., by Bergen & Lindeman, New York City.
(C)—A Radial Brick Chimney 200 ft. High and 7 ft. 6 in. in Diameter, Built at the Chesapeake & Ohio Shops at Huntington, W. Va., by the Wiederholdt Construction Company, St. Louis, Mo.

concrete. Of these, steel and brick date back the farthest. Independent chimney structures were developed about the beginning of the nineteenth century at practically the same time in several European countries. The early structures of brick were usually square and were designed by "rule of thumb," in spite of which condition chimneys 90 years old are not uncommon in some parts of Europe. In the development of this type of construction, octagonal and later circular designs were adopted, the latter being the most economical in the use of material and the most advantageous in producing draft, as all dead air space in the corners is eliminated. It also offers less resistance to wind and has a greater moment of resistance than the square section.

The radial brick was a natural result of the development of circular chimneys in order to facilitate the construction of a

satisfactory wall. Also, an account of wide variations in the quality of ordinary brick, some of the builders began making special brick with perforations to insure thorough burning and the elimination of soft centers, resulting in a product of uniform quality. The various companies building such chimneys date the beginning of this type from 25 to 50 years ago, the first ones in this country being built about 15 years ago. Among the first in the United States are four 287-ft. by 17-ft. chimneys built about 1900 by the Alphons Custodis Chimney Construction Company, New York, for the Manhattan Elevated Railway in New York and still in service. Brick chimneys are generally recognized to be thoroughly satisfactory when properly designed and built.

Guyed sheet iron chimneys without lining are the cheapest type in use and are also the least durable. They can frequently be set directly over the boilers, being carried by a breeching hood. Permanent, self-sustaining, brick-lined steel chimneys are also used, being more expensive and requiring a flue of some sort to connect the boiler and the chimney. There is no definite dividing line as to size between guyed steel plate chimneys and self-supporting steel or masonry chimneys, according to the experience of George I. Bouton, consulting mechanical engineer, New York City. Some 5,000 to 6,000 hp. plants use the former, while others with only 500 or 600 hp. use the latter. Considering individual chimneys, the upper limit for a guyed steel chimney is about 7 ft. by 150 ft., the great majority of such installations being of a size not to exceed 5 ft. by 125 ft. In some locations it may be impossible to guy a chimney of large size, thus eliminating that type, or in other cases, it may be necessary to use a strut or stiff leg if the location and construction of adjacent buildings is favorable and the chimney is not too large.

In considering the advantages of steel chimneys in comparison with the more permanent types, it is important to estimate the probable life of the plant. For example, it might not be economy to install a permanent chimney with a life of more than 30 years in a plant which will be abandoned or entirely remodeled in 10 or 15 years. The average life of a guyed steel chimney is variously estimated up to 10 years. In some cases such chimneys built of 3/16-in. or 1/4-in. plates have failed in six or seven years, while in other cases chimneys with even lighter metal have been in service for 12 to 15 years. It is not customary to paint a chimney on the inside after it is put in service, and for this reason one used continuously will have a longer life than one which is out of service during a part of the year, or for considerable periods at a time. A chimney should be painted externally at least every two years. Local atmospheric conditions must also be considered in adopting a steel chimney as under certain conditions, such as proximity to salt water, the steel plates are attacked more quickly.

Concrete chimneys have been built in this country for about 25 years, although it is only in the last 12 to 15 years that their use has been extensive, and only during the last 7 years that tapering concrete chimneys have been developed. In general, the cost of concrete construction is from 10 to 30 per cent less than brick and about the same as self-supporting steel. On account of the thinner walls, concrete is lighter than brick, making it easier to provide suitable foundations under some conditions. In order to secure greater permanence, concrete chimneys have been used in some cases to replace steel stacks where brick could not be considered on account of its cost. When properly built, concrete has proved entirely satisfactory, some of the oldest chimneys still being in service and having withstood windstorms, fires, etc.

A combination type built of special fire clay tile filled with

concrete and reinforced with horizontal and vertical steel bars, is built by the Wiederholdt Construction Company, St. Louis, Mo. The advantages claimed for this chimney are that it does away with forms used in building concrete chimneys and has the advantage of steel reinforcement over many brick chimneys. This type has been built for about eight years.

The size of a chimney depends on the size of the boiler plant and the amount of draft required. For the average flue gas temperature the height of a chimney should be about 160 ft. for each inch of draft. The cross section is fixed by the amount of gas to be passed at a velocity that will not be excessive. This area varies directly as the weight of coal burned per unit of time and the number of pounds of air supplied per pound of coal and inversely as the square root of the draft. It is customary in figuring on the capacity of a chimney to assume a 2-in. film of gas lining the stack. Ordinarily no difference in dimensions is made between the different types, although the advocates of steel and concrete construction lay stress on the absence of leakage and in addition the builders of steel emphasize the decreased friction in that type, while those who favor brick call particular attention to the low factor of radiation and convection in a masonry wall, tending to reduce the loss of heat in this way. Municipal regulations, particularly where smoke departments are maintained, occasionally govern chimney sizes and must be investigated. As the details of design are comparable only for chimneys of the some general type, the following discussion is divided to cover the three forms of construction in most general use.

STEEL

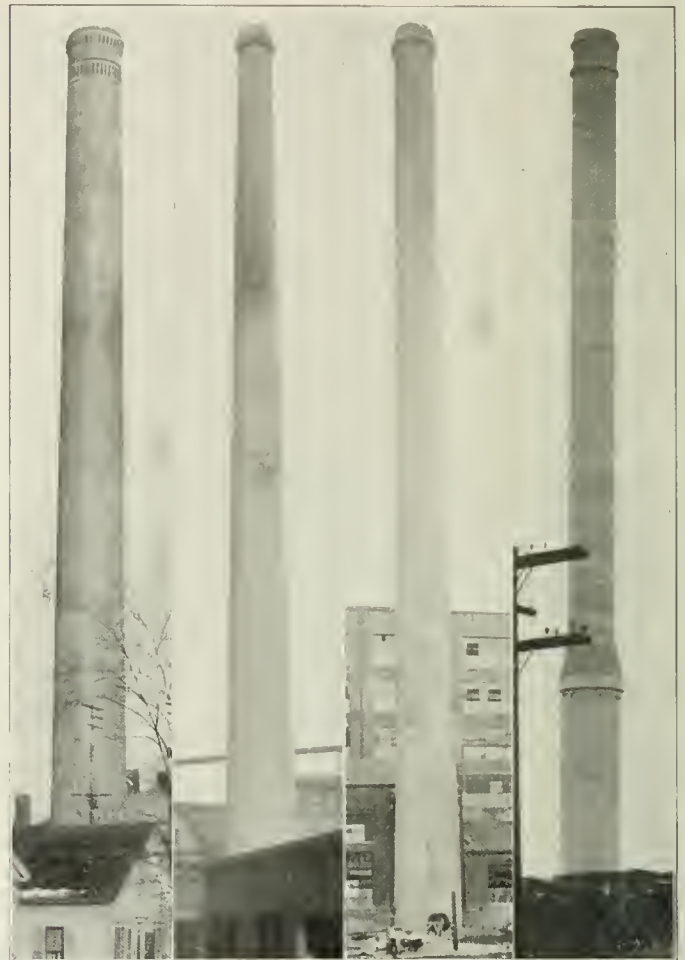
The thickness of the plates used in guyed steel chimneys varies with the diameter. Ordinarily good practice fixes this standard at No. 12 B. W. G. for 30-in. to 36-in. diameters, No. 10 B. W. G. for 42-in. to 54-in. diameter, 3/16-in. for 60-in. to 72-in. diameters and 1/4-in. for 78-in. diameter and larger. Lighter plates may be used if the plant is of a temporary nature, but the saving is inconsiderable, as, for instance, the difference between 3/16 in. and 1/4 in. plates for a 6-ft. by 150-ft. chimney would only amount to about \$250. The wind pressure is ordinarily assumed at 30 lb. per sq. ft. of exposed area. The load on the guy wires can be readily calculated on this basis from the diameter of the chimney, the exposed height, the distance from the base to the center of pressure and from the base to the connection with the guy and the angle of inclination of the guy with the horizontal. A 6-ft. by 150-ft. chimney with the lower 25 ft. protected, for example, would require two sets of guys placed 90 ft. and 120 ft. from the base, each set having four wires. For such a chimney the ordinary 1/2-in. galvanized steel wire strand frequently used for chimney guys, having an ultimate strength of about 8,500 lb., would be rather light and it would be advisable to use special strands of high tensile strength steel. On small chimneys, one set of three or four guys is sufficient.

The method of anchoring the lower ends of the guys varies widely and faulty anchorage has been the cause of many failures of chimneys of this type. Parts of buildings are frequently used for anchorage, in which case the details vary with local conditions. When a guy is anchored by connection to the ground but it is necessary to attach it above the surface, a stub, usually consisting of a heavy timber with planking across it, is used. This stub may be placed 7 to 10 ft. in the ground as required by local conditions. Where the guy can be brought to the ground a convenient anchorage is a block of concrete perhaps 3 ft. by 3 ft. and 6 ft. deep with an eyebolt projecting from the upper surface. If the chimney is not carried on the boiler setting, a concrete slab is usually used for the foundation, this slab ordinarily being 12 in. greater in diameter than the chimney and extending about 6 in. above the adjacent surface. Its depth, of course, depends on local conditions, a total thickness of 4 or 5 ft. being common.

BRICK

For brick chimneys the perforated radial brick has come into wide use. The blocks are ordinarily much larger than common

brick, thus reducing considerably the number of mortar joints which are the critical point in this type of construction. Various sizes of these blocks allow a wide range in wall thicknesses and radii and the perforations, in addition to securing a more even burning of the interior of the blocks, provide a means of locking the blocks together as the mortar is worked into them in laying up the wall, and they also provide a dead air space in



- A B C D
- (A)—Tapering Concrete Chimney 225 ft. High and 12 ft. in Diameter, Built by the General Concrete Construction Company, Chicago, for the Indiana & Michigan Electric Company, South Bend, Ind.
- (B)—A Tapering Concrete Chimney 185 ft. High and 6 ft. in Inside Diameter at the Top, Built by the Weber Chimney Company, Chicago, at the Nonconah Shops of the Illinois Central, Memphis, Tenn.
- (C)—A Tapering Concrete Chimney 184 ft. High and 7 ft. in Inside Diameter at the Top, Built by the John V. Boland Construction Company, St. Louis, Mo., for the Excelsior Manufacturing & Supply Company, Chicago.
- (D)—Cylindrical Concrete Chimney 175 ft. High and 6 ft. in Inside Diameter at the Top, Built by the John V. Boland Construction Company, St. Louis, Mo., for the American Box, Board & Paper Company, Grand Rapids, Mich.

the wall, decreasing the rate of heating and cooling. A radial brick chimney weighs less than one of ordinary brick.

Frequently an engineer or architect desires a chimney to conform to the architecture of the station or other building for which it is constructed and in such instances other than circular shapes may be adopted. While this introduces difficulties especially with the use of radial brick the improved appearance frequently justifies the added trouble. The inside lining of the chimney is laid in the ordinary manner.

The large builders of radial brick chimneys either operate or control the brick yards in which their product is manufactured. In general, the clay used in the process must be highly refractory, and be low in iron and lime content and the blocks must be burned until well vitrified, producing a hard, non-porous material of high crushing strength. The crushing strength required by various makers ranges from 4,000 to 7,000 lb. per sq. in. One company has tried burning them until their crushing

strength was increased to about 11,000 lb. per sq. in., but this discolors the surface and makes them so hard that they will absorb no water, thus preventing the mortar from adhering well. H. R. Heinicke, Inc., New York City, uses bricks of four different lengths, 4, 7, 8 and 10 in., with a uniform height of $6\frac{1}{2}$ in. and a width of $4\frac{1}{2}$ in. at the face, this dimension varying at the back with the diameter of the chimney. These bricks absorb less than 10 per cent of water in 24 hours immersion. In the base, at least every fourth course is a header and in the shaft every second layer interlocks to break the joints in every layer. Horizontal steel bands are used in the base.

Bergen & Lindeman, New York City, use brick $4\frac{5}{8}$ in. high and $6\frac{1}{2}$ in. wide in five lengths, ranging from 4 in. to $10\frac{5}{8}$ in. Each size is made with different radii for use in chimneys of different size. The Alphons Custodis Chimney Construction Company, New York City, makes bricks ranging from 4 in. to 13 in. deep, having holes not to exceed 1 in. square, so that the mortar cannot fill up and destroy the air space. These bricks are made both with and without corrugations.

The Heine Chimney Company, Chicago, use a brick $4\frac{5}{8}$ in. high, made in six sizes, four of which are ordinarily used, the dimensions varying by 1 in. These bricks are made to interlock and are laid with horizontal reinforcing bands and vertical mortar pins, alternate courses being headers.

The stability of a chimney depends upon the assumptions made in design as to the wind pressure and allowable stresses in the material. The most generally recognized standard of wind pressure, 50 lb. per sq. ft. on a flat surface, is quite commonly

and 20 tons per sq. ft. for a height of 300 ft. This variation is made on the ground that in tall chimneys the rate of progress is slower and the mortar sets harder. The maximum allowable compression used by other companies varies between 15 and 25 tons, some of them allowing as high as 3 tons per sq. ft. in tension, while others are more conservative in this respect. On account of the variations in assumed pressures and allowable stresses the factor of safety in the various designs of radial brick chimneys ranges from $8\frac{1}{2}$ to more than 20.

Chimneys are designed according to ordinary principles of mechanics, making a tentative selection of the taper and determining the required thickness of the walls at intervals of about 20 ft. The selection of the taper giving the most economical design is a matter of repeated trial designs and experience, and the various chimney companies have evolved empirical rules for tapers and thickness for use in preliminary designs.

The minimum thickness of a brick wall is ordinarily fixed at $7\frac{1}{4}$ or $7\frac{1}{8}$ in., this thickness being increased one or two inches in steps which are ordinarily 20 ft. apart. The variable sizes of perforated blocks allow almost any desired thickness of wall to be built. One company uses a minimum wall thickness of $7\frac{1}{4}$ in. for diameters of 6 ft. and less, $8\frac{1}{4}$ in. for diameters between 6 and 12 ft., and $10\frac{1}{4}$ in. above 12 ft. The thickness of the wall at the base of the chimney when radial

brick is used is determined by this company by the rule $\frac{H}{9} + 6$

in. where H equals the total height of the chimney.

Chimneys from 100 to 200 ft. high are tapered, the amount of this taper varying considerably. One company adds from 20 to 60 per cent of the top diameter to secure the bottom diameter; another increases the outer diameter $\frac{1}{4}$ in. per ft. when the ratio of height to top diameter is 10, and increases this increment as the ratio increases, up to $\frac{5}{8}$ in. per foot for a ratio of 40. Another company figures an average taper of about 4 ft. per 100 ft. for both sides, and another uses from 3 to 6 per cent taper on both sides. A variable taper has been used in several cases in order to improve the appearance and save material. The weight of a wall laid up with perforated radial brick averages 120 lb. per cu. ft.

Linings in vitrified brick chimneys are only required to protect the chimney walls from the extreme differences in temperature where the gases impinge against it. This leads to the general practice of lining only the lower part of the chimney and the space around the flue opening, though building ordinances in some cities definitely specify the height of lining to be used. It is common to use radial brick for the lining with an air space between the lining and the wall, though fire brick is sometimes specified.

The breech opening is a source of weakness. For this reason, one company tries to make the width of the breech opening less than one-third the diameter of the chimney at that height, while another finds that this width should not exceed 0.6 of the clear diameter at the top, while the height of the opening is usually made 1.45 times that diameter, giving an area about 10 per cent larger than the top opening. This takes care of the greater volume of gases at the bottom of the chimney than at the top, due to the higher temperature.

Independent chimneys are ordinarily set on concrete foundations, which may be square, octagonal, round or of various other shapes. For round shaft, a round foundation gives the most uniform support, but, on account of the expense of building forms for such foundations, an octagonal shape is ordinarily preferred. One company usually builds square foundations, only cutting off the corners to form an octagon when the chimney is round from top to bottom. In order to minimize the danger of damage from lightning, chimneys are frequently equipped with lightning rods, differing greatly in detail. An ordinary rod costs \$200 to \$300, while some of the more elaborate forms exceed this cost greatly. Platinum tipped points, copper rods and cables leading down to a plate buried in the ground are some of the details frequently adopted. In some cases, interior



- (A)—Composite Brick Chimney Consisting of a Brick Facing, a Reinforced Concrete Filler and a Hollow Refractory Clay Tile Lining, Built for Kendrick Seminary, St. Louis, by the John V. Boland Construction Company, St. Louis, Mo.
- (B)—An Octagonal Common Brick Chimney 100 ft. High and 8 ft. in Internal Diameter, Built by Bergen & Lindeman, New York City, for Peabody College, Illustrating the Possibility of Harmonizing Chimney Design with Surrounding Buildings.
- (C)—Radial Brick Chimney Built by H. R. Heinicke, Inc., New York City, for Magill University, Toronto, Ont.

adopted although this is modified in many instances. One company uses 30 lb. per sq. ft. on the projected area, reducing this by 29 per cent for octagonal surfaces and 33 per cent for round. Another uses 50 lb. for flat surfaces, 35 lb. for octagonal and 25 lb. for round, while still another varies the assumed wind pressure and stresses with the height, the limiting figures for a round surface being 17 lb. per sq. ft. for a height of 50 ft., and 23 lb. per sq. ft. for a height of 300 ft. This company varies the allowable stress between 7 tons per sq. ft. for a height of 50 ft.

ladders are provided when the chimney is built to gain access to the top and clean-out doors are usually required in the base.

CONCRETE

Concrete chimneys are ordinarily built with a minimum wall thickness of 4 to 8 in. at the top, depending on the size of the chimney. This thickness is increased toward the bottom at a rate depending on the stresses, one company using ratios of 3/16 in. to 1/2 in. for every 5 ft. of height. The companies building concrete chimneys figure the batter in different ways, one using an average of 3/4 in. for 4 ft. in height, another 0.3 in. to 0.45 in. per ft., and another a batter of 1 to 56 for small chimneys and 1 to 80 for large ones.

The design of the section and the reinforcement required in the wall are ordinarily based on an allowable compression in the concrete of 350 lb. per sq. in., and a tension in the steel of 16,000 lb. per sq. in. One of the companies keeps the ratio of steel to concrete below 1 per cent.

The John V. Boland Construction Company, St. Louis, never places the vertical reinforcement more than 12 in. apart at the top, and usually from 3 to 4 in. center to center at the base. This company uses a horizontal reinforcement of one or two layers of A. S. & W. No. 23 triangle mesh or 1/2-in. or 5/8-in. rods laid 10 or 12 in. center to center, and provides additional reinforcing at the foundation, around the breech opening and at the top of the lining. Another company uses wire mesh for the horizontal reinforcement, the concrete being of a 1:2 1/2:3 mixture, placed wet. The assumptions as to the wind pressure and the designs of foundations are practically the same for concrete chimneys as those described above for brick.

Concrete chimneys are ordinarily lined, although some have been built without lining, special provision being made in the design of the reinforcement to take up the temperature stresses. One company recommends a reinforced concrete lining built at the same time as the chimney wall, with a 4-in. air space at the bottom. Some linings of this type have been in service as much as 10 years with satisfactory results. Such a lining, however, costs more than a brick lining which is ordinarily used for one-third to one-half the height of the chimney and is covered by a concrete cap. The breech opening is ordinarily made with a width less than two-thirds the top diameter of the chimney, when wider openings are required, buttresses may be used. One company estimates that lightning rods for concrete chimneys cost from 2 1/2 to 7 1/2 per cent of the total cost of the chimney.

CONSTRUCTION

In the construction of brick chimneys, inside scaffolds are ordinarily used, the material being hoisted either inside or outside the chimney. If inside, a temporary opening must be provided at the bottom for entrance of material. In most cases the scaffolding is supported by cross pieces laid in niches in the wall, or by vertical timbers. These scaffolds are raised as soon as the walls have been built up to a height of 4 to 6 ft. above the platform. Brick chimneys can ordinarily be built at the rate of 6 to 8 ft. a day, although as much as 18 ft. has been completed by some companies. Specifications often limit the rate of construction to prevent application of too great a load on new brickwork. A maximum rate as low as 5 ft. per day has been specified.

In the construction of concrete chimneys, either wooden or steel forms may be used in addition to a scaffold similar to that described. The General Concrete Construction Company uses a scaffold of 4-in. by 4-in. or 6-in. by 6-in. verticals and 2-in. by 4-in. or 2-in. by 6-in. cross bracing and steel forms made in sections 5 ft. or 7 ft. 6 in. high according to the size of the chimney. This form is adjusted to the desired diameter by radial bolts, a new joint being formed for each move by punching the plates and bolting up the sections. As soon as one of the small plates which form the ring entirely overlaps the adjacent plate it is thrown out and the joint made with the next plate. These small plates are 33 in. wide and the adjustment is made with two bolts in each plate. These forms are practically

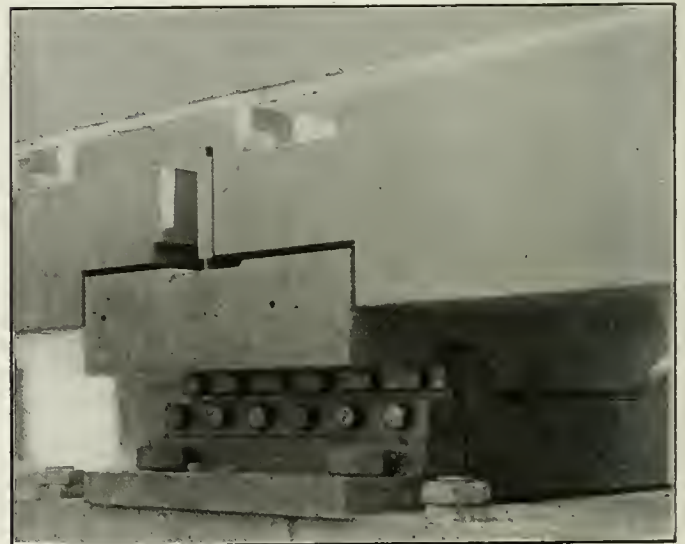
water-tight, allowing the use of a wet mixture. The surface is ordinarily washed with cement to give it a uniform color.

The Weber Chimney Company, Chicago, which has built many reinforced concrete chimneys, uses a unit form consisting of a series of wooden staves held together by castings and cables. Two complete forms are used, each 4 ft. 6 in. deep, which are placed one above the other alternately. Ordinarily the forms are moved once a day, although in the best weather on a single wall two moves may be made in one day. An inside scaffold is carried up with the work and the material is hoisted on the inside. The concrete is placed wet and spaded away from the face, the slight irregularities being finished off and the surface washed with Portland cement. A mixture of 1:2 1/2:4 is used in the shaft, the gravel having a maximum size of 1 in., while in the foundation 1:3:5 concrete is used with 2-in. gravel. The work on concrete chimneys can be carried on successfully during the winter by covering the concrete with heavy canvas until it has set and providing heaters under the canvas and at the bottom of the shaft.

A PLATE FULCRUM TRACK SCALE

The Pennsylvania Railroad has installed in its gravity yard at East Tyrone, Pa., a track scale of a new type, which is a radical departure from previous practice in that neither pivots, knife-edges, bearing steels, loops or links are employed in the vibratory system to transmit the platform load to the indicating poise beam. The design of the scale was worked up jointly by A. H. Emery, of Glenbrook, Conn., and the engineering departments of E. & T. Fairbanks & Company and the Pennsylvania Railroad.

While this scale was installed as a matter of experiment, it has been in daily service since August 16, weighing from 400 to 500 cars a day, and the results so far obtained indicate the suc-



Connection Between Main and Longitudinal Levers

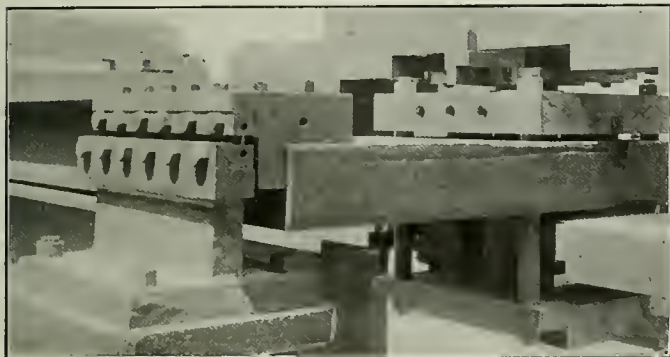
cess of the design. What is known as the "plate fulcrum" has been substituted for the regular knife-edge, pivot and bearing. This form of construction has been used successfully for years in large testing machines and in the dynamometer of the locomotive testing plant of the Pennsylvania Railroad at Altoona, but its application to a track scale is evidently new.

Since the scale has been completed a series of exhaustive tests, under both concentrated and distributed loads, have been conducted, and surprisingly accurate results have been obtained. The experiments thus far seem to have demonstrated that the plate fulcrum construction possesses many advantages, principal among which is the fact that the sensibility does not materially change under varying increments of load, it being almost the same under maximum load as under an empty balance.

The possibility of change in the power or adjustment of the

lever system of this scale is very remote, as there is no breaking down of the members forming the fulcrums, so that changes which ordinarily result from wear are eliminated, and after a scale of this type has once been properly installed and adjusted it is expected that little or no change will occur from usage. It should be understood that there is no motion whatever, either transverse or longitudinal, to the bridge or platform supporting the weighing rail, and, as a result, the action of the lever system is not affected by change in repose of the weighing platform, as the latter does not oscillate under moving loads.

The checking of the bridge is a unique feature. It is accomplished through the medium of massive stay-plates, instead of check-rods, the bridge being stayed from one end only to



Connection of Longitudinal Levers to Fifth Lever

take care of the longitudinal thrust and from one side only to take care of the transverse thrust. Hence the lengthening or shortening of the stay-plates (due to expansion or contraction) will not be reflected in the indicating poise beam by a change of balance, to the extent that is possible in a pivot and knife-edge scale with the generally accepted form of checking. The effect of the elastic bending of these stay-plates is not apparent in the calibration of the scale.

Another departure from previous construction, as ordinarily applied to track scales, is found in the fact that no parts of the scale are permanently bolted to the scale bridge proper. The bridge is supported by rollers which engage hardened plates, the rollers being placed intermediate between the bridge and the lever system, so that the load is centrally distributed on the plate fulcrums in the main levers. This feature also eliminates to a large degree the change in balance which is ordinarily manifested in a knife-edge and pivot scale as the result of change of position of the bearings when permanently bolted to the bridge. Another advantage is that the plate fulcrum is not disturbed by traffic over the platform, consequently neither dead-rail nor relieving gear are necessary, and the elimination of these factors simplifies the installation of the track arrangement, greatly reducing the element of danger, especially where motion weighing is practiced.

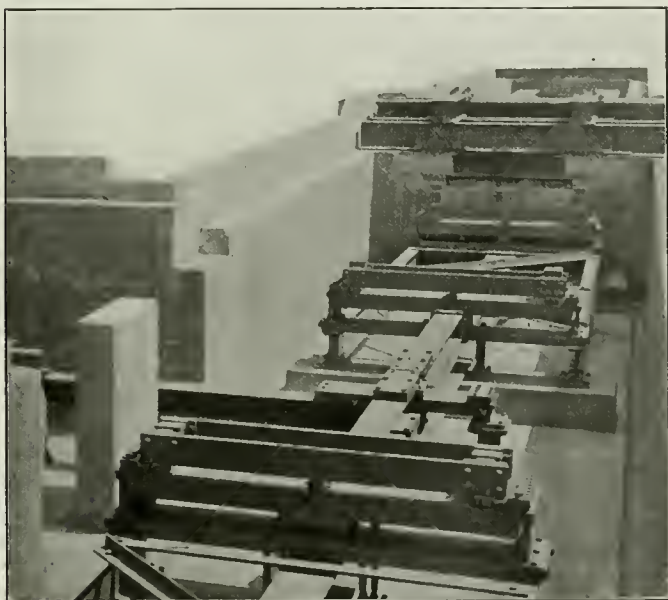
The scale installed at East Tyrone is 54 ft. long. It is located on a grade of 0.8 per cent. There are four sections in the scale, the primary system or main levers being arranged transverse to the direction of traffic, while the secondary system is arranged longitudinally. The total multiplication of the lever system up to the butt of the beam is 1,000, and the arrangement of the lever system is such that the load from each pair of main levers is transmitted independently to the fifth lever through the medium of the longitudinal levers, while the fifth lever is connected direct to the indicating poise beam. There are no compound levers in the scale which perform the function similar to what is known as the middle extension lever, a feature which simplifies the adjustment when calibrating the scale leverage.

The poise beam is directly connected to an indicator which moves over a graduated arc, the total travel of the indicator being about $2\frac{1}{2}$ in. on either side of zero. This facilitates the work of the weighmaster in obtaining a true position of the main poise when weighing cars in motion, the vibration of the

indicator being largely controlled by a dash-pot with liquid displacement. The main beam is graduated to 240,000 lb. by 1,000-lb. subdivisions and the fractional beam to 1,000 lb. by 50-lb. subdivisions. An ingenious device has been applied to the beam, so that its capacity can be increased from 240,000 lb. to 440,000 lb. by the simple action of a lever, without the addition of loose weights.

The main girders are provided with slotted openings in the web, through which pass the girders for supporting the deck or platform. This is of the rigid type to permit the top flanges of the girders to project through the scale platform, thereby furnishing a continuous rail support, as well as a suitable water table, the aim being to secure a waterproof deck.

It remains to determine the effect of continued usage on the action of the scale, but its operation to date and the results so far obtained seem to justify the experiment to such an extent that the Pennsylvania Railroad has worked up another design of track scale of the plate fulcrum type having only two sections. This will not only simplify the design by the elimination of many levers and fulcrums, but is expected to determine the



The Scale Mechanism in Place in the Pit

relative merits of continuous articulated bridge girders. It will also simplify the methods at present employed when testing scales of four or more sections, where the distributing effect must be taken into account in connection with the final result.

ARGENTINE FLOODS.—The past two years have been a time of flood trouble in Argentina. Rain has generally been regarded as a great desideratum in the Argentine Republic, but during the past year the Argentine had far too much wet, with the result that the rivers and ordinary channels could not carry it off, and great lakes were formed. This did not tell adversely upon the track of the railways so long as there was no wind, but when high winds arose they raised the flood-water into waves, and the track was rapidly undermined and washed away. The engineering staff of the Buenos Aires Western Railway grappled with energy with the difficulties which had arisen, piling with wood laying sheets of galvanized iron where the banks were most exposed, and filling in washouts with cement in bags and brick-bats in wire netting. They managed in consequence to keep trains running in most cases, but this was done at considerable expense, the works carried out involving the company in a loss of \$64,125. What was done upon the Buenos Aires Western system was also done, more or less, upon the Buenos Aires Great Southern and the Central Argentine Railways.—*Engineering, London.*

Repairing a Tunnel Lining Under Difficult Conditions

Seepage Through a Disintegrated Brick Lining Prompted Repairing It, Using a Concrete Atomizer

The Chicago Great Western recently solved a difficult tunnel lining problem by means of the concrete atomizer. The tunnel is one-half mile long and is located at Winston, Ill., at the crossing of the divide between the Mississippi and Rock river drainage areas. Originally lined with timber, it was relined in 1886 with a semi-vitrified red brick without completely packing the space between the shell of brick and the old lining. The soft clay through which the tunnel was driven contains much water and, because of the extensive voids behind the brick work, the lining is subjected to considerable hydrostatic pressure. This resulted in excessive seepage and dripping of water. Weep holes were provided at various places to eliminate the water pressure and carry the water away, but, nevertheless, the bricks of the arch were constantly saturated. The portals are located favorably for the formation of drafts through the tunnel with the prevailing winds and for the last two years a fan ventilating system has been in service. As a result, freezing temperatures prevail within the tunnel throughout the winter months, as evidenced by the formation of great masses of ice.

Whether the result of freezing or of the chemical action of the combination of locomotive gases and water, the brick work has seriously disintegrated throughout the entire length of the tunnel, particularly in the arch, in certain portions of which large sections of the inner ring have been completely destroyed. The problem of remedying this condition was a matter of serious consideration on the part of the railway officers for some time. The present lining gives only the normal vertical and horizontal clearance, so that a new lining inside of the old one was out of the question. At the same time, the removal of the old lining, preparatory to replacing it with a new one, would have been a very expensive and hazardous undertaking because of the treacherous character of the ground through which the tunnel was driven.

As previously described in the *Railway Age Gazette* on March 19, 1915, page 675, the concrete atomizer is a device for the application of concrete in the form of finely separated particles in a blast of superheated steam, producing a concrete unusually hard, dense and impervious. The superheat prevents condensation of the steam in the presence of the wet concrete and hastens the chemical action of the cement. The atomizer consists of a mixer drum containing revolving paddles, which communicate by means of a piston valve with an "atomizing chamber" where the concrete and steam are brought together. A discharge pipe leads from this chamber to the place of application of the concrete. The concrete materials: 1 part cement, 3 parts sand and 2 parts pebbles to which 10 per cent. by weight of water is added, are placed in the mixing drum, where they are subjected to the ordinary agitating process by means of the paddles.

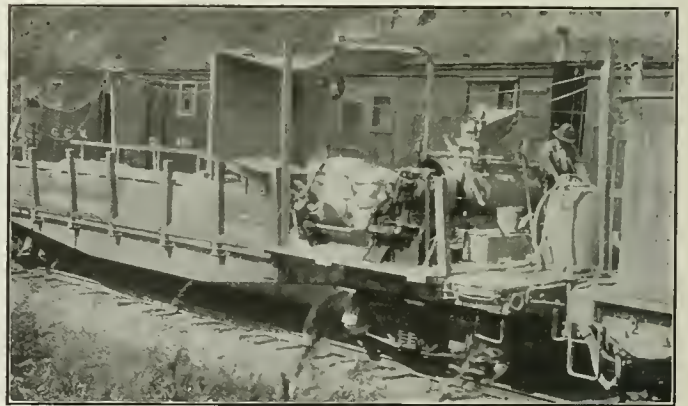
During the process of mixing, steam is admitted at a pressure of 80 lb. per sq. in. superheated about 50 deg. F. When the contents of the mixer drum are ready to be discharged, steam is admitted to the atomizing chamber from which it discharges freely through the discharge pipe. With steam pressure in the atomizing chamber at 30 lb. per sq. in. also superheated, the valve on the mixer drum is opened and the greater steam pressure within the drum, together with the worm-action of the paddles, causes the contents of the drum to discharge into the atomizing chamber. The latter is arranged in such a way that the concrete is "atomized" in the steam at an equalized pressure of about 40 lb. per sq. in. and immediately discharged into the discharge line. One interesting feature of the machine is the piston valve between the drum and the atomizing chamber, which is arranged in such a way as to give a minimum opportunity for the accumulation of small quantities of concrete which can set when the machine is not in use. Another feature is the con-

nection of small steam pipes to the shaft glands at each end of the mixer drum. By means of these the glands are kept at a higher pressure than the pressure within the drum, hence there is no tendency for the concrete materials to work outward along the shaft into the bearings.

The mixer is operated by a direct-connected V-type, 4-cylinder single acting steam engine. Wire-wound rubber hose of 1 3/4 in. inside diameter is used for transmitting the material, the hose couplings also being rubber lined. The use of this material seems especially suitable for wet concrete, as the wear is inconsiderable.

As the work on the Winston tunnel had to be carried on without interruption to traffic, it was necessary to place the entire plant on a construction train so that it could be taken in and out of the tunnel as required. This, of course, necessitated continuous work train service. The presence of a signal tower at the east portal, which was used in connection with the operation of a staff block through the tunnel, greatly expedited the movements of the work train.

The construction train consisted of three cars besides the engine and caboose and is illustrated in a number of the accompanying photographs. The mixer was located on the forward end of a

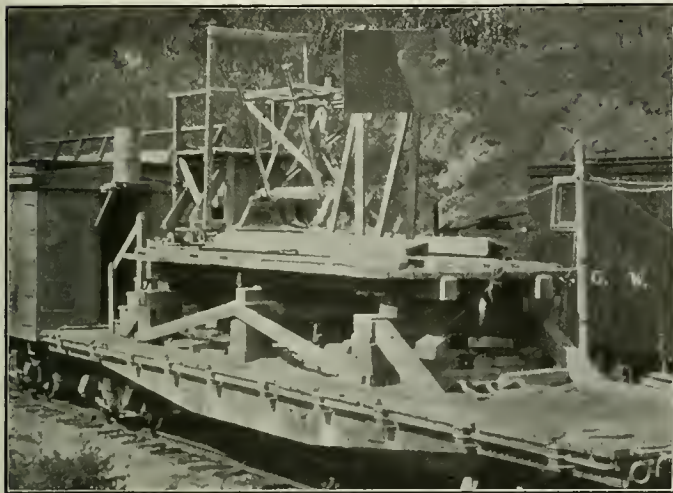


The Atomizer Car

flat car adjacent to the engine for convenient steam connection steam being supplied at 90 lb. by means of a reducing valve. The larger part of this car was utilized for the storage of the concrete materials which were measured and supplied by hand into the hopper of the mixer. Behind the mixer car was another flat car rigged up for the application of the concrete to the tunnel lining. A wooden platform about 20 ft. long was raised about 4 ft. above the floor of the car by means of blocking. Two light rails secured to this platform served as a track for a carriage containing the apparatus for the discharge of the concrete. On this carriage was a platform for the operator and a nozzle consisting of a piece of straight wrought pipe attached to a piece of reinforced rubber hose connected to the discharge line which ran along the side of the flat car. The nozzle was supported on a framework pivoted on a horizontal axis coincident with the center line of the car. By means of a small 2-cylinder reciprocating steam engine, this framework supporting the nozzle was made to swing from side to side in the arc of a circle. The entire carriage was also arranged for a longitudinal travel of about 10 ft. along the platform track by means of a windlass and rope which were operated by hand. A box car at the rear of the nozzle car was equipped with a platform protected by a wooden hand railing. This was used to clean the roof of the tunnel before the concrete was applied. Wire brushes and light pneumatic hammers were employed for this purpose, with the assistance of

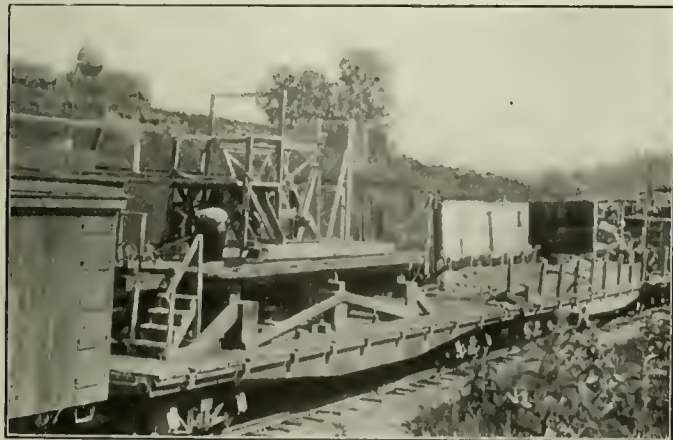
water which was supplied by a steam pump on the engine tank.

With the exception of an expert furnished by the owner, the work was carried on by the division carpenter crew of the railroad, which consisted of a foreman, three men cleaning the roof, one man at the nozzle, one at the carriage windlass, one at the atomizer and two loading and measuring materials. The concrete was applied on a 10-ft. length of the tunnel for a single position of the train. Water was run through the pipe and nozzle as a



The Nozzle Car

preliminary operation to clean the discharge pipe and wash off the soot deposited from the passage of the trains after the roof had been cleaned by the men on the box car. Steam was then run through the line to heat it to the required temperature and to insure flow through the pipe before the concrete was admitted. As soon as the flow of concrete was started, the nozzle operator started the engine which controlled the swing motion of the nozzle, while the windlass man slowly turned the windlass which moved the nozzle carriage along its track. The concrete was



The Construction Train. Nozzle Car and Part of Cleaning Car in the Foreground

thus deposited uniformly over a given width of the tunnel arch for the length of 10 ft. The nozzle operator controlled the flow of concrete, steam or water by means of a set of steam whistle signals.

In application the sand blows away until enough neat cement is deposited on the surface to make the sand stick. In a like manner, the pebbles bound off until enough mortar has been deposited to permit them to imbed slightly upon striking the surface. The pebbles and sand, however, perform an important office, even though they do not stay upon the surface. The impact resulting from the high velocity of the particles serves to compact the material solidly. This is evidenced by the manner

in which the fresh concrete was made to adhere to the dripping saturated surface of the old tunnel lining.

The speed of the concrete blast was controlled by the rate at which the hoppers in the mixer could be filled by hand, which was about one batch in five minutes. At this rate the concrete was applied as fast as three men could clean the old lining. The actual progress made in the tunnel was dependent almost entirely on the time that the tunnel was available for working between trains. A typical record was 262 ft. of lining for a width of 11 ft. in 6 hours. This required the use of 35 bags of cement. The entire work was completed in 41 days and has proven entirely



Placing SteamJetted Concrete on the Tunnel Lining

satisfactory thus far. The concrete presents a smooth surface and the leakage is negligible. The total cost of the work was \$4,600, of which \$1,700 represents rental of the machine and expert services and \$2,900 covers the labor, material, repair parts, work train service and expense of plant.

The concrete atomizer process is owned by Harold P. Brown, New York City, who leased the apparatus to the Chicago Great Western and had general supervision over the work. For the railway company, the work was under the direction of C. G. Delo, chief engineer, and I. F. White, division engineer, maintenance of way.

TURKEY'S RAILWAY STRATEGY.—According to an article in a recent issue of the *Journal des Debats*, Meissner Pasha, the German engineer who built the Hedjaz Railway, has been entrusted with the construction of a new strategic line, which it is hoped to use in connection with a second attack on Egypt. As far back as last May, this railway was already said to have reached Lydda, on the Jaffa-Jerusalem line. Rapid construction has been made possible by taking up tracks already laid on other railways, and 270 miles of track intended for the Medina-Mecca section of the Hedjaz Railway have similarly been "lifted" for the construction of this line. Green eucalyptus sleepers have been used.

Efficiency in the Bridge and Building Department*

A Discussion of Some of the Important Principles Governing the Successful Prosecution of this Work

BY GEORGE W. REAR

General Bridge Inspector, Southern Pacific, San Francisco, Cal

The work of the bridge and building department is of such great variety that it covers almost all of the building trades and some of the mechanical trades as well. As the work is scattered over a large territory it is hardly to be expected that as great efficiency can be secured as where the work is concentrated.

THE MAN IN THE GANG

Before going into the conditions of labor, let us look at the personnel of the department, beginning with the men in the ranks. The mature man one hires usually has some drawback: He is a wanderer, or a chronic kicker, or has one or more of the many faults human nature is heir to. He often expends more energy hunting a job than he does in doing it after he secures it. He has probably made up his mind that a railroad job is a snap and tries to make it one. When men are scarce and work must be done, these men must be tolerated, but at a great loss of efficiency in the work.

The only alternative is to keep the good men that we have and hire young men and train them ourselves. This is the foundation on which we must build the department.

Why do men leave us? Assuming that we have trained the man, what do we lose when we lose his services? Perhaps the railroad does not lose much in dollars and cents, as he has probably earned all he received while being trained, but it has lost a very material part of the organization and the benefit of his service in the years to come.

One reason his training has not cost much is because no special pains have been taken to train him. He begins as a laborer, works a year or two and becomes a handy-man, then secures a few tools and becomes a mechanic. Is he encouraged to advance? Probably not. If he is energetic, smart or likely to become a valuable man, is he dropped or "hidden under a bushel" for fear he will displace some older man? Is he kept away from home for weeks at a time and considered a nuisance if he asks for transportation home often enough to keep up an acquaintance with his family or associates? Are his wages anywhere near what they ought to be? Are his living conditions good or even fair? Is he laid off whenever work is slack? In other words, is his job worth having? These are questions that must be looked squarely in the face. They have little or nothing to do with what work a man will accomplish, but they are of vital importance in determining whether or not we have any men at all.

Thousands of young men of fair education are looking for a start on a life career every year. Are we getting our share of them? Have we anything to offer them? On the answers to these questions depends the future efficiency of the Bridge and Building Department.

It is efficient now, probably more so than other departments, but it is so largely in spite of conditions, except where proper methods are in force. Conditions are nowhere ideal, but much has been done, mainly by individual effort.

If we are to get and keep good men we must: hire young men of good health, good habits and fair education; we must put them at unskilled work (if there is such a thing) and give them a chance to learn the work, for it is a trade or profession of its own; we must also pay them proper wages. What proper wages are, is open to discussion, but it does not help the department to have boys leave the farm and get more pay as brakemen to begin with than bridge and building men ever hope to get.

We must make their living conditions agreeable. If required to be away from home they should have good living accommodations. Some of these men spend half their lives in an outfit car. Don't crowd too many men in a car, but provide some privacy and arrange so that men who are congenial can be grouped together. We must not forget to feed them. Quantity and variety of provisions are not the only things to consider, for the way that they are served is an important item.

Let the men go home often. The man who sticks closest to civilization is the best citizen and the most valuable man. If circumstances permit, let him go home every night; don't keep him away for fear that the boarding camp will lose money or to save some clerk the trouble of writing passes. Consider transportation as a man's right and do not try to make him think that he is getting it as a favor. Treat the man as a human being and as an equal in everything except responsibility and authority, and make his job as secure as that of any other employee. He will be proud of his job and it will be easy to keep him.

Do not drive too close a bargain with him and do not expect to get more than you pay for. Men should be hired with as great care as those for any other department. A fair education should be insisted upon and a physical examination given. This examination should be governed somewhat by the trade he is to follow, without blindly turning down all applicants who are not perfect, but it should be strict enough to cull out all those not physically fit to do a day's work.

These employees should be considered as employees of the railroad and not of a gang. They should be transferred frequently from gang to gang and given an opportunity to learn the standards of work and the methods used by different foremen. The man himself should show a desire to become a real railroad employee, to learn the business and to put up with its inconveniences without "growling."

If the men in the gang are not congenial and willing to work together as a team, an effort should be made to locate the reason and change the men around or discharge those who are not willing to pull with the rest. When there is friction in a gang there is always some cause, and this should be located and removed.

It is not to be expected that any method of handling men will eliminate all dissatisfaction, for the millenium is not yet at hand, and while human nature is what it is there will be men who look on every action of their superiors with suspicion. However, if the gang is treated in the spirit of fair play, the majority of the men will play fair.

THE FOREMAN

The gang must be made to pull together, for co-operation is the real reason for working men in gangs. The older men should be given charge of the apprentices, and if the gang is large enough it should be divided into groups of five or six men each, each group in charge of one of the older men, who, in addition to being a good workman, has shown some of the qualities of leadership.

The foreman looks to these leaders to keep their fellow workers properly employed while they themselves are in training for positions as foremen and should be given an opportunity to familiarize themselves with the bookkeeping required of foremen. It is not to be expected that all of these men will make good foremen, but enough of them will have the proper qualities to provide a plentiful supply, and it will not be necessary to go outside of the employees to secure them.

In picking men for foremen those should be selected who are

*A paper presented at the annual convention of the American Railway Bridge and Building Association held in Detroit, Oct. 19-21.

fair-minded, patient and good judges of human nature, in order that they may treat their men properly and secure their respect and confidence. A foreman should have the courage of his convictions, be energetic, resourceful, and have sufficient red-blood to be a leader. At the same time he should be quiet, firm and cool-headed so that neither he nor his men will "blow up" in an emergency. The loud-mouthed, profane driver may be necessary with mules and oxen, but is out of place with intelligent human beings.

A foreman should be honest, loyal, painstaking, reliable, sober and willing, so that he may be a fit representative of the company that employs him and command the confidence of his superiors. He should be studious and observing, that he may advance in his profession and become capable of added responsibility.

In considering the handling of men it may be well to remember a few established principles. There is a limit to the amount of work that can be got out of him. The value of a man does not lie in his physical force, but in his mental capacity or ability to co-operate with other men using heads as well as hands. The system of handling men and work should be such that it would not depend on any individual to carry it out. There is no use in keeping a man who is not satisfied with the job and whose work is not congenial.

Foreman should be developed along definite lines, and where the system is in proper effect this will be accomplished by making the future foremen understudy the regular foremen. It is also advisable to have the future foremen placed directly under the eye of the supervisor for a time, so that he may be advised and instructed in details that otherwise might be overlooked.

In educating men for foremen, the following points should be given consideration:

He should know that he cannot do all of the work himself, and that it would be useless to try, neither should he think that because he is foreman he should not do any manual labor. The amount of manual labor that a foreman should do has always been a matter of argument, but common sense will show that this depends on the number of men in the gang and the class of work that is being done. The foreman in the gang is employed to see that each man in the gang does his share of the work and the nearer this result is attained the more efficient is the gang.

It is neither possible nor desirable that a foreman be given strict rules and instructions for every class of work, because this results in making him a mere machine. A foreman should be given enough leeway so that he will not lose his enthusiasm, but will feel that the work depends on him and not on the fact that he is carrying out some one else's ideas and instructions.

The successful foreman is one who keeps harmony among the men. His men work "for him" and not "because of him." A good foreman does not have to stand over his men and drive them with threats, neither does he have to discharge a man occasionally to make the others fear him. No man has ever accomplished much through fear.

A foreman should arrange the work so that there will be competition among the men. Have groups of men at the same kind of work so there will be a speed contest. This contest may only be subconscious, the men hardly realizing that there is a contest or rivalry, but it will result in an increased amount of work. It must be remembered, though, that it is the steady, regular work that counts and that spectacular bursts of speed usually "fizzle" before long. These "high-speed plays" are all right if the work is of an emergency character and will be over in a few hours, but as a steady thing they are out of place. A man may be ambitious enough in the morning, but a few hours' steady work with a "number two" will serve to subdue his energy. It is the man who can select a gait at which he can keep all day who accomplishes the most.

TOOLS

A foreman should realize that he is not being paid for muscle or a strong back, but for his head and what there is in it, and should employ every opportunity to use his head to save hard

work. Human energy uselessly expended cannot be replaced and it should be conserved where possible or economical. To conserve and make human energy effective, tools have been developed. Without tools little can be accomplished, so it is a waste of labor to try to work without them.

These tools are two general kinds, hand and mechanical. The hand tools may not be exactly labor-saving, but their use makes labor effective and they should be of the best class obtainable. Keeping them in proper shape is a great aid to efficiency.

Mechanical tools are labor-saving devices, permitting the employment of steam or other power for work which would otherwise have to be done by men.

The locomotive crane is too expensive a tool for the ordinary bridge gang, but there should be enough of them on each supervisor's district to provide this equipment where needed. The modern car pile driver is a very efficient machine and each railroad should have enough of them to do their ordinary work and take care of emergencies. These drivers should be placed in the hands of efficient men and worked to as nearly full capacity as possible, as it does not pay to have them idle. With suitable attachments they can be used as light car derricks and their sphere of usefulness enlarged.

Almost every bridge gang can find efficient uses for a hoisting engine and their use should be encouraged. The gasoline engine has been developed to such an extent that it is very reliable. The present-day workmen are so well acquainted with them that there is no difficulty in finding someone to run them. They are very satisfactory for operating pumps, concrete mixers, etc.

Probably the greatest labor-saving device of the present day is the concrete mixer. An average bridge gang, doing ordinary work, will have considerable concrete to mix and to do it by hand, especially with men not used to it, is a back-breaking job. It is impossible to keep good mechanics if they are put at this kind of work very often. The small mixer taking a one-bag batch is the best for an average bridge gang. It should be self-contained and require no great amount of time to set it up. A mixer mounted on wheels or skids with a gasoline engine directly connected to it is best. It is almost criminal to mix concrete by hand when power is available.

Pneumatic riveting and boring tools are not used by the average bridge gang, but every gang doing work on steel bridges must use these tools to do good work. They are not only economical, but rivets driven by pneumatic hammers are better than those driven by hand and greater dependence can be placed on them. The motor car also adds greatly to the efficiency of a bridge gang, as the men can be taken to their work in less time and are in better physical condition when they get there. A bridge gang should be supplied with good jacks of proper size. The modern, ball-bearing screw jack is probably the best all-around jack, but each gang should also have some ratchet jacks for such work as they are suitable for.

Furnishing the tools is the duty of the superior officers, but their up-keep depends on the foreman. With proper tools and men, a gang is ready to go to work and its efficiency depends on how the men go at it. Where a gang is employed on one kind of work it is easy to get the job under way, but where the work varies in character it is usually hard to get it started so as to keep all hands profitably employed. This is where a competent foreman can make a good showing, and on the amount of headwork he uses will depend the efficiency with which he starts his work.

A foreman will soon realize that although all men are born free and equal they do not remain so. Although all of his men may be good, some of them may be better than others. Neither are all men equal in the variety of work they can accomplish. Having men of different characters and propensities, it is the foreman's duty to see that, as far as possible, each man is put at the work most suited to him, and on his ability to do so his efficiency will greatly depend.

A foreman should be careful to avoid doing one of his men an injustice. It is not enough to be just. Some things are better forgotten or overlooked.

THE SUPERVISOR

The department must have a head, and on this officer depends the efficiency of the division. To fill this position properly, a man must have special training and experience. He must be familiar with all the building trades, must keep up to date in the use of tools and labor-saving devices, and be an expert in the art of handling men. He must have all of the qualifications required of a foreman and in addition he should have the necessary qualifications to enter the diplomatic service.

His success depends on the regard in which his subordinates hold him, much more than that of his superiors. In handling men the most successful supervisor is the one who knows each man under him well enough to call him by his given name. He should see that his foremen understand his desires as to how the work is to be done, and, as few foremen are mind-readers, he should tell them explicitly.

It is always best to let a foreman handle the details of the work in his own way, if his way is anywhere near right, but there should be a clear understanding in regard to it, so that the work may go on properly from the beginning. Once the work is outlined, proper material and tools should be provided and enough material for a good start should be on hand before the gang begins work. Much inefficiency is the result of not having material and tools when required. A supervisor should go over the plans with the foreman and see that they are understood. He should see that the foremen are provided with all equipment to protect the men from injury and see that it is used. Men do much more work if they have safe stagings, stairways, etc., and are relieved from anxiety while at work. It is useless to expect a man to swing a hammer over his head if he is afraid of falling off a plank. He must have good footing to do good work.

A system of cost accounts tends greatly to efficiency. Each foreman should be required to report the labor cost of each job done and costs of similar work by the same or other foremen should be compared. It is not sufficient that these costs be taken from the auditor's accounts. They should be furnished by the foremen, as the fact that the foreman must work up the statement will cause him to be more careful in the handling of the work.

A supervisor should have gangs of proper size, properly equipped and located at the most convenient points, so that there may be no great loss of time in moving them around. These gangs should be organized to do all work of an ordinary character in their territories. Special gangs should be provided and specially equipped to handle the larger jobs of construction and reconstruction and such other special jobs that require special training and equipment.

The greatest incentive for men to do a good day's work is to have plenty of work in front of them. It is almost impossible to do efficient work when the job is about finished and no other work in sight.

The most important of all points tending to efficiency is regularity of employment. It is useless to try to perfect an organization if it is to be broken up every winter or as soon as the earnings fall off temporarily. When it is arranged so that the work can be carried on continuously and employment made permanent then, and then only, will there be a real foundation on which to build an efficient organization.

Finally, we must not lose sight of the fact that the real business of a railroad is to provide transportation, and that all other work is only incidental thereto. We must not allow our efficient methods to interfere with the running of trains. We have no money to waste, but it is nearly always necessary to depart from the most economical methods to avoid delays to trains, consequently we must consider efficiency to mean—the most satisfactory method of conducting a railroad as a whole.

INCREASED WAGES IN VICTORIA.—A request made by the Victorian Railways Union for an increase of 25 cents a day to employees, has been definitely refused.

A CROSS SECTION INSTRUMENT

The cross section work now being done on an extensive scale in connection with the federal valuation of railways has led to the invention of an instrument especially designed for the rapid taking of cross sections. This instrument consists of a telescope revolving in a plane parallel to a vertical aluminum board which carries cross section paper, and a graduated scale bearing on the surface of the paper and rotating with the telescope. The axle of the telescope is in a standard mounted on a leveling base, which also supports the frame of the board. The lower plate has a circular level, the upper one a tubular level, parallel to the plane of the board, and the instrument is mounted on a tripod with a quick leveling head. The legs are provided with shoes to rest on track rails.

The telescope is equipped with stadia wires spaced double the usual interval and readings are made from the center cross wire to the upper wire, thereby making one pointing of the instrument suffice both for direction and distance. A special rod used with the instrument eliminates corrections. It consists of a short rod hinged at the target to a longer rod, which is provided with a sight by means of which the rodman can always keep the rod



The Cross-Section Instrument and Rod

perpendicular to the line of sight. The instrument complete weighs about 18 lb.

To take a section, the instrument is set up and leveled, and the board and paper are adjusted to make the zero of the scale come to a convenient line on the cross section paper. A sight is taken on the rod, the telescope is clamped and the reading plotted on the scale. This is repeated for as many points as is necessary. When more than one setup is necessary, the procedure is to adjust the paper so that the zero of the scale will correspond to the point on which the instrument is set up.

Only two men are required to do the work, the instrument man and the rodman, thus at least one man is saved in the field party, and as the cross sections are plotted in the field, the time of plotting them in the office is saved. The instrument may also be used with a tape in place of the stadia, and with slight variations can be applied readily to tunnel cross sections. Although designed primarily for taking earthwork cross sections it would probably serve as well for topography. The instrument is being put on the market by Hoge & Flint, Louisville, Ky., and is now undergoing a test by valuation engineers of the southern district of the Interstate Commerce Commission.

General News Department

Two grain elevators of the Pennsylvania Railroad at Erie, Pa., were destroyed by fire December 10, together with about 500,000 bushels of wheat; estimated loss \$750,000.

The State of Pennsylvania has a new workmen's compensation law, and at a conference of the state board with railroad officers in Philadelphia on Monday, of this week, all of the principal railroads of the state announced their intention of accepting the provisions of the law.

The management of the Cleveland, Cincinnati, Chicago & St. Louis and the telegraph operators employed on the road have reached an agreement providing for increases in wages and changes in working conditions, which were made effective on December 1. The increase in wages will amount to about \$45,000 a year.

At Otisville, N. Y., on Monday evening last, a considerable number of passengers who had alighted from westbound passenger train No. 179, of the Erie road, were struck by east-bound passenger train No. 2, opposite, or nearly opposite, the station, and six or more were injured. Most of the passengers were thrown into a snow-bank. None of the injuries were fatal.

Senator Lea, of Tennessee, has sent to the Interstate Commerce Commission a petition asking for the investigation of charges that the Louisville & Nashville and the Nashville, Chattanooga & St. Louis furnish free passage to public officers in Tennessee, citing the report of the investigation which was made by the Interstate Commerce Commission in that state; and charging also that influential shippers receive favors.

Switchmen's Strike at Chicago

The enginemen, trainmen and switchmen of the Belt Railway of Chicago struck, on Tuesday of this week, causing a serious interruption of freight traffic. The reason given for the strike is that the railroad company had refused to run a train to carry employees to and from their work at the new clearing yard, southwest of the city; though the officers of the road had offered to provide a temporary train until such time as the men could move their homes to houses near the yards. The company had applied to the federal mediation board to take up the grievances of the men.

Newspaper "News" About a Railroad President's Salary

"SAN FRANCISCO, Dec. 10.—E. P. Ripley, president of the Atchison, Topeka & Santa Fe Railroad, whose salary is reported to have been raised from \$75,000 to \$100,000 a year, is now the highest steam railroad executive in the United States. Mr. Ripley's salary is said to have been increased on the occasion of his seventieth birthday, celebrated by a banquet of railroad officials at Chicago Oct. 30."—*Chicago Examiner*, December 11.

"E. P. Ripley, president of the Santa Fe Railroad, when questioned yesterday at his home in Santa Barbara, Cal., by a Herald representative regarding the report that his official salary had been raised from \$75,000 to \$100,000 a year, said that he knew nothing about any such increase."—*Chicago Herald*, same date.

St. Paul Electrification Tests

The Chicago, Milwaukee & St. Paul has been conducting elaborate tests during the past two weeks on its 2 per cent grades crossing the Rocky mountains east of Butte with the three electric locomotives which have been received. These tests included trials to ascertain the tonnage the locomotives would haul as well as the application of regenerative braking. Among the final tests was one on December 8, at which time two electric locomotives took a train of 48 loaded cars, 3,000 tons, from Butte up the 2 per cent grade to the summit of the Rocky mountains at a speed of 16 miles an hour and then continued down the descending grade on the opposite side. An interesting comparison with steam operation was secured by fol-

lowing this train with a steam train made up as regularly operated with 37 cars, 2,000 tons. This train was hauled by two road engines with a Mallet pusher. It ascended the grade at a speed of 9 miles an hour. The tests were conducted in the presence of President Earling and other officers and directors of the St. Paul. Until other locomotives have been received the three now on hand will be employed in pusher service over the 2 per cent grades between Piedmont at the foot of the eastern slope of the Rocky mountains and Butte on the west.

Trainmen's Brotherhoods Prepare for Eight-Hour-Day Campaign

The general chairmen of the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Firemen and Enginemen, after a two-day meeting in Chicago, announced on December 11, that they had decided to join forces with the eastern and southern engineers and firemen and with the Brotherhood of Railroad Trainmen and the Order of Railway Conductors in the movement for an eight-hour day with time and a half for overtime. A general conference of the executive committees, including delegates from the eastern, southern and western organizations of the four brotherhoods was called to be held in Chicago on December 15, to frame the demands to be presented to the railroads.

The meeting of the western enginemen and firemen was presided over by Warren S. Stone, president of the Brotherhood of Locomotive Engineers, and W. S. Carter, president of the Brotherhood of Locomotive Firemen and Enginemen. It is understood that W. G. Lee, president of the Brotherhood of Railway Trainmen, and A. B. Garretson, president of the Order of Railway Conductors, participated in the meeting.

Timothy Shea, assistant president of the Brotherhood of Locomotive Firemen and Enginemen, who was a representative of the employees in the arbitration of the controversy between the western enginemen and firemen and the railroads, was quoted in the Chicago papers as follows:

"This time there will be no arbitration. The principle of arbitration is excellent, but it has been abused. There is no secret about what we are after. We will flatly demand an eight-hour day and time and a half for overtime. We may add other demands at our conference. If we do not get what we want we will walk out. Every railroad in the United States—more than 350,000 men—will be affected. At our meeting we will arrange details of the plan and will set a date for final action."

The New Haven Trial

The cross-examination of former president Charles S. Mellen was continued during the past week in the trial of the eleven New Haven directors in the Federal Court in New York. On December 9 Charles F. Choate, for the defense, asked of Mr. Mellen the question: "Did you at any time conspire with any one whatever to effect a monopoly?"

"I never conspired in any way, shape, or manner. I was trying to build up for New England an efficient system of transportation to obtain mileage so as to make it possible to distribute the cost of the terminals, which was tremendous, over as large a mileage as possible. We had no preconceived idea as to how this was to be brought about. It was a process of evolution. I do not know but that we should all have been scared to death if we had appreciated in our first step what the last step was to be."

On Friday the government counsel tried to offset the effect of some of the evidence brought out in the cross-examination of Mr. Mellen by the defense by showing the influence the railroad had with the state government of Massachusetts. Mr. Butts, for example, showed that Governor Draper showed T. E. Byrnes, then vice-president, a tentative draft of a message, but Mr. Mellen emphatically denied that he had helped Mr. Draper prepare the message.

Mr. Choate on Monday brought out that in May, 1908, E. H. Harriman, who then had an interest in the Delaware & Hudson

and the Erie, made Mr. Mellen an offer to buy the New Haven's interest in the Boston & Maine. Mr. Mellen at first was willing to consider the offer, particularly as at the time there was much popular opposition to the New Haven's control of the road. According to this testimony on Monday, however, he did not really want to sell the Boston & Maine, but it did occur to him that if the New Haven was not able to get from the Massachusetts legislature the legislation it required, it might find Mr. Harriman a convenient purchaser. The negotiations lasted until May, 1909, the New Haven finally declining to sell because it secured the necessary legislation.

Mr. Mellen took occasion to say at this point that if the Boston & Maine had ever fallen under the domination of Mr. Harriman, New England would have found that there are harder railroads to deal with than the New Haven. "There would have been no more independence of the trunk roads for New England if the Harriman system had managed to acquire the Boston & Maine. It would have become impossible for the New Haven to maintain its independence. New England would have come under the trunk lines."

Mr. Mellen was finally excused as a witness on Tuesday, having completed 36 days on the stand.

Wednesday, Samuel Hemingway, president of the Second National Bank of New Haven, through which institution was handled the financing of the New England Investment & Securities Company, was on the stand. He was followed by L. H. Fitzhugh, vice-president of the Grand Trunk at New London, and by Thomas B. McGovern, a shipping broker, who testified concerning the acquisition of the Metropolitan Steamship Co.

Operating Revenues and Expenses of Express Companies for August, 1915

The following statement, which is subject to revision, has been compiled by the Interstate Commerce Commission from the monthly reports of operating revenues and expenses of the principal express companies for August, 1915.

A Record Snowstorm

A snowstorm which prevailed on the Atlantic Coast from Philadelphia northward to Boston and beyond, on Monday and Tuesday of this week, caused serious delay to passenger traffic on all of the roads in that territory; and on the New York, New Haven & Hartford between New Haven and its New York City terminus electric traffic was entirely suspended for two days, the electric power line having been disabled; and the telegraph, telephone and signaling wires were broken down by the weight of snow and ice in many places. This four-track line, running 18 express trains to Boston daily, and about 70 passenger trains altogether, to and from New York, suffered an interruption more serious, probably, than any since the time of the notable storm of March, 1888 (when the traffic was much smaller in volume than now).

The storm began with rain; by Monday noon it began to snow and the snow and rain combined froze to wires and posts, the coating being three inches thick, and more, on nearly all wires. On Tuesday morning the storm had abated and the depth of snow on the ground was about 12 inches.

The New Haven road, using steam locomotives, ran about one-tenth the usual number of passenger trains on Tuesday, and not many more on Wednesday, all movements being much behind time. The block signals were out of service all the way from New Haven to the connection with the New York Central at Woodlawn, about 60 miles, and trains had to be run by time interval or with speed under control. Freight trains had been moved clear of the main track early on Tuesday at nearly all points west of New Haven.

By Wednesday evening the block signals had been restored between Woodlawn and Stamford, 20 miles, and electric motive power was available to a limited extent; but the passenger service was very deficient on Thursday.

On roads other than the New Haven, the delays were due mainly to the snow, and were serious on all lines except the Pennsylvania. At Poughkeepsie, on the New York Central, 75 miles north of New York, and at Albany, 70 miles farther

A. FOR THE MONTH OF AUGUST.

	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
	Adams Express Co.	American Express Co.	Canadian Express Co.	Globe Express Co.	Great Northern Express Co.	Wells Fargo & Co.	Western Express Co.	Total for Companies Named		
Mileage of all lines covered (miles).....	44,930.22	44,781.78	74,260.80	73,537.65	10,238.13	9,676.50	2,839.78	9,582.80	9,568.79	
Charges for transportation.....	\$3,041,197	\$2,753,255	\$4,207,623	\$3,775,365	\$325,941	\$291,320	\$302	\$78,447	\$326,408	\$320,570
Express privileges-Dr.....	1,498,955	1,481,109	2,106,437	1,897,026	170,060	147,683	44	39,185	197,723	194,098
Operations other than transportation.....	45,793	49,317	248,645	174,185	5,370	5,494	9	803	5,066	4,871
Total operating revenues.....	1,588,035	1,321,464	2,349,831	2,052,524	161,250	149,131	266	40,065	133,752	131,343
Operating expenses.....	1,445,440	1,494,028	2,136,784	2,167,776	133,942	140,064	1,036	31,260	89,940	93,477
Net operating revenue.....	142,595	172,564	213,046	115,251	27,307	9,066	769	8,805	43,811	37,866
Uncollectible revenue from transp.....	571	658	365	91	13	.....	.....	48	.....	.....
Express taxes.....	17,012	17,671	35,422	38,430	4,200	4,000	700	1,100	4,221	4,678
Operating income.....	125,010	190,895	177,258	153,773	23,094	5,066	1,469	7,705	39,541	33,188

	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
	Adams Express Co.	American Express Co.	Canadian Express Co.	Globe Express Co.	Great Northern Express Co.	Wells Fargo & Co.	Western Express Co.	Total for Companies Named		
Mileage of all lines covered (miles).....	8,233.03	8,118.34	34,728.60	34,703.60	114,622.94	112,185.02	5,252.87	5,174.26	301,829.39	300,585.72
Charges for transportation.....	\$301,913	\$273,161	\$977,176	\$968,669	\$3,355,619	\$3,130,989	\$124,655	\$99,765	\$12,660,838	\$11,691,546
Express for transportation.....	162,260	144,433	498,225	494,565	1,733,318	1,613,524	57,815	53,993	6,424,842	6,065,621
Operation other than transportation.....	3,999	3,398	22,617	22,890	90,228	58,254	3,200	2,737	424,930	321,956
Total operating revenues.....	143,651	132,127	501,568	496,994	1,712,529	1,575,720	70,039	48,509	6,660,926	5,947,881
Operating expenses.....	92,260	93,001	485,440	614,410	1,556,328	1,506,358	53,840	53,269	5,995,016	6,093,649
Net operating revenue.....	51,391	39,125	16,127	17,416	156,201	69,361	16,198	4,760	655,910	145,768
Uncollectible revenue from transp.....	16	21	46	.....	1,307	672	.....	9	2,370	1,454
Express taxes.....	5,000	5,000	12,943	14,803	34,944	37,302	930	1,126	115,375	124,113
Operating income.....	46,375	34,103	3,137	32,219	119,949	31,386	15,268	5,896	548,165	271,335

B. FOR THE TWO MONTHS ENDING WITH AUGUST.

	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
	Adams Express Co.	American Express Co.	Canadian Express Co.	Globe Express Co.	Great Northern Express Co.	Wells Fargo & Co.	Western Express Co.	Total for Companies Named		
Charges for transportation.....	\$6,140,316	\$5,653,778	\$8,554,163	\$7,834,639	\$633,515	\$610,078	\$1,119	\$153,210	\$640,257	\$663,776
Express privileges-Dr.....	3,031,609	2,860,260	4,293,436	3,903,846	327,162	310,850	436	76,559	387,499	401,905
Operations other than transportation.....	93,709	90,677	460,406	356,372	10,632	10,636	10	1,601	10,026	9,818
Total operating revenues.....	3,202,417	2,884,195	4,721,132	4,287,165	316,966	309,864	692	78,251	262,785	271,688
Operating expenses.....	2,895,032	3,036,327	4,218,756	4,424,900	270,763	282,815	2,358	61,158	181,162	186,227
Net operating revenue.....	307,384	152,132	502,375	137,735	46,202	27,049	1,665	17,093	81,623	85,458
Uncollectible revenue from transp.....	852	713	1,002	110	13	.....	.....	.....	68	.....
Express taxes.....	32,613	35,002	70,845	74,054	8,400	8,000	1,400	2,200	8,505	8,859
Operating income.....	273,918	187,848	430,527	211,900	37,789	19,049	3,065	14,893	73,050	76,600

	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
	Adams Express Co.	American Express Co.	Canadian Express Co.	Globe Express Co.	Great Northern Express Co.	Wells Fargo & Co.	Western Express Co.	Total for Companies Named		
Charges for transportation.....	\$630,821	\$600,961	\$2,030,672	\$2,142,749	\$6,833,082	\$6,384,455	\$246,921	\$207,600	\$25,710,870	\$24,251,246
Express privileges-Dr.....	337,265	318,405	1,035,849	1,093,318	3,539,612	3,282,573	114,007	111,683	13,066,899	12,359,404
Operations other than transp.....	7,726	6,601	44,721	46,370	182,862	120,059	6,627	5,680	816,725	647,818
Total operating revenues.....	301,283	289,156	1,039,545	1,095,801	3,476,331	3,221,940	139,540	101,596	13,460,696	12,539,660
Operating expenses.....	186,559	193,547	984,050	1,050,126	3,132,594	3,025,925	109,809	109,021	11,981,088	12,370,050
Net operating revenue.....	114,723	95,609	55,494	45,675	343,737	196,015	29,730	7,424	1,479,608	1,691,610
Uncollectible revenue from transp.....	49	30	117	.....	2,189	716	12	25	4,305	1,596
Express taxes.....	10,000	10,000	26,736	29,589	69,655	74,847	1,855	2,255	230,012	244,809
Operating income.....	104,674	85,579	28,641	16,085	271,892	120,452	27,862	9,705	1,245,291	76,795

1. Discontinued operations on April 30, 1915.

north, the depth of snow was 24 inches. Passenger trains were many hours late and freight trains were not moved.

The milk dealers of New York City, receiving milk on all of the roads entering the city, reported on Tuesday evening that they had been able to deliver only about one-half the usual quantities of milk on that day.

At Philadelphia the depth of snow was about 7 inches. All roads suffered moderate delays.

Railway Earnings for September Break Record

Operating revenues, net operating revenues and net operating income per mile of the railways of the United States having annual operating revenues above \$1,000,000 were all greater than for any September in their history, according to the figures shown in the monthly bulletin issued by the Bureau of Railway Economics.

As shown by the Bureau of Railway Economics, the net operating income for September increased \$73 per mile, or 20.9 per cent, as compared with September, 1914. However, September, 1914, largely because of conditions in the South, was the lowest September in the last six years. A comparison of September, 1915, with the average September of the preceding five years, shows an increase of 17.4 per cent.

Total operating revenues amounted to \$286,403,834, an increase from 1914 of \$16,842,784. Operating expenses were \$177,140,771, a decrease of \$814,846. Net operating revenue amounted to \$109,263,063, an increase of \$17,657,630. Taxes amounted to \$11,783,145, an increase of \$336,003. This left \$97,412,193 of net operating income, available for rentals, interest on bonds, appropriations for improvements and new construction and dividends. Operating revenues per mile of line averaged \$1,251, an increase of 5.6 per cent; operating expenses averaged \$774, a decrease of 1.1 per cent; net operating revenue per mile averaged \$477, an increase of 18.6 per cent, while net operating income per mile was \$426, an increase of 20.9 per cent. Taxes per mile increased 2.3 per cent. Railways operating 228,775 miles of line are covered by this summary, or about 90 per cent of the steam railway mileage in the United States.

Operating revenues of the Eastern railways per mile show an increase of 7.9 per cent as compared with September, 1914, operating expenses decreased 0.7 per cent, net operating revenue increased 26.1 per cent, taxes decreased 1.6 per cent and operating income increased 29.9 per cent.

Operating revenues of the Southern railways per mile increased 7.8 per cent, operating expenses decreased 3.5 per cent, net operating revenue increased 41.0 per cent, taxes increased 6.4 per cent and operating income increased 48.0 per cent. But September, 1914, was far below the average. Compared with the average September of the preceding five years, the operating income for the month of September, 1915, increased 21.6 per cent.

Operating revenues of the Western railways per mile show an increase of 2.8 per cent, operating expenses decreased 0.2 per cent, net operating revenue increased 7.7 per cent, taxes increased 4.8 per cent and operating income increased 8.0 per cent.

The three months of the current fiscal year show an increase in total operating revenues per mile of line of 2.4 per cent, as compared with the corresponding period of the preceding year, a decrease in operating expenses per mile of 2.9 per cent, an increase in net operating revenue per mile of 13.6 per cent, an increase in taxes per mile of 1.9 per cent and an increase in operating income per mile of 15.4 per cent.

Operating income per mile increased 24.3 per cent in the East, increased 25.7 per cent in the South, and increased 5.0 per cent in the West.

September operating income per mile was 20.9 per cent greater in 1915 than in 1914, 19.6 per cent greater than in 1913, 9.9 per cent greater than in 1912 and 15.9 per cent greater than in the year 1911.

The American Society of Mechanical Engineers

The following is the list of the newly elected officers of the American Society of Mechanical Engineers for the coming year: D. S. Jacobus, president; W. B. Jackson, J. Sellers Bancroft and Julian Kennedy, vice-presidents; J. H. Barr, J. A. Stevens and H. deB. Parsons, managers, and W. H. Wiley, treasurer.

REVENUES AND EXPENSES OF STEAM ROADS—SEPTEMBER, 1915												
Compiled from monthly returns of the railways to the Interstate Commerce Commission and covering roads of Class I, i. e., roads with annual operating revenues above \$1,000,000.												
ACCOUNT	UNITED STATES			EASTERN DISTRICT			SOUTHERN DISTRICT			WESTERN DISTRICT		
	Per mile of line			Per mile of line			Per mile of line			Per mile of line		
	1915	1914	Increase over 1914	1915	1914	Increase over 1914	1915	1914	Increase over 1914	1915	1914	Increase over 1914
Total Operating Revenue	\$1,251	\$1,185	5.6	\$2,182	\$2,022	7.9	\$930	\$862	7.8	\$929	\$904	2.8
Freight	867	814	6.5	1,500	1,364	10.0	690	616	11.9	81,002,906	624	1.6
Passenger	272	266	2.1	466	463	0.8	176	184	d 4.1	27,297,916	202	5.6
Mail	22	21	4.8	32	29	9.5	15	15	1.8	2,566,669	20	2.4
Express	28	26	10.9	52	45	15.6	20	19	3.3	2,603,535	20	8.5
All other	14,242,932	13,740,938	3.6	132	121	8.7	29	28	2.4	5,285,429	42	5.3
Total Operating Expenses	774	783	d 1.1	1,364	1,373	d 0.7	621	643	d 3.5	70,706,810	553	d 0.2
Maint. of way and struct.	154	151	1.7	240	242	2.9	126	129	d 2.3	15,230,176	119	2.1
Mairs. of equipment	192	193	d 0.2	349	346	1.0	169	173	d 2.4	16,234,413	127	d 0.3
Traffic	21	21	1.0	31	31	...	21	22	d 8.1	2,226,006	18	6.1
Transp.	373	385	d 3.0	675	694	d 2.8	278	293	d 5.1	33,911,320	265	d 2.1
General	27	27	1.5	45	44	1.9	24	24	d 1.0	2,588,161	20	2.3
All other	7	6	8.1	15	16	d 4.7	3	2	102.2	516,734	4	3
Net Operating Revenue	477	402	18.6	818	649	26.1	309	219	41.0	48,049,645	376	7.7
Taxes	51	50	2.3	78	80	d 1.6	39	37	6.4	5,513,981	43	4.8
Uncollectible Revenues	...	...	...	...	...	...	...	...	...	...	...	...
Operating Income	426	352	20.9	740	569	29.9	270	182	48.0	42,503,344	333	8.0
Operating ratio—Per cent	1915	1914		62.5	67.9		66.7	74.6		59.5	61.4	
Average mileage represented	1915	1914		58,890	41,942		42,094	126,653		127,791	126,653	

* Less than one d Bar a Less than one-tenth of one per cent. d Decrease.

The Railway Club of Pittsburgh

At the regular meeting of the Railway Club of Pittsburgh, to be held on Tuesday, December 21, at the Monongahela House, Pittsburgh, Pa., Samuel Lynn, master car builder of the Pittsburgh & Lake Erie will present a paper on "The Life of the Steel Freight Car."

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, January, 1916, Atlanta, Ga.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meeting, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, January, 1916, Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRAFFIC CLUB OF NEWARK.—Roy S. Bushy, Firemen's Bldg., Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings, October to May.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—E. N. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The Union Pacific has requested shippers routing freight through Seattle for export to arrange for steamer space before shipping.

From April 1, 1914, to November 16, 1915, the daily Oriental Limited express train of the Great Northern in 593 consecutive westbound summer and winter runs arrived at Seattle on time 561 days.

The Chicago & Alton freight department announces a through package car from Chicago to Shreveport, La., in connection with the Kansas City Southern via Kansas City, giving fourth morning delivery from Chicago.

The express companies have made arrangements to keep their Chicago offices open for the receipt of packages until 9:00 o'clock every evening and their depot stations all night, during the month of December, for the purpose of preventing congestion.

Figures compiled by the American Railway Association's committee on relations between railroads show that the total freight car surplus on December 1 was 60,793, as against 55,793 on November 1. The total shortage on December 1 was 22,594, and on November 1, 27,525.

The Official Classification Committee, which has recently been reorganized with four permanent members, has issued an announcement of the plan under which it will operate for the present. Requests for changes in the classification must be filed in writing with the committee. Dockets for subjects involving changes to be considered at regular meetings will be issued with reasonable advance notice and will be mailed to subscribers at a charge of \$1 per year. The committee will hear those interested in docketed subjects at meetings in Chicago and New York in January, March, May, July, September and November, as announced in the docket. Conference with the committee may be had by appointment respecting subjects not on the docket.

Additional Embargoes at New York

C. C. McCain, chairman of the Trunk Line Association, announced this week that the number of cars of freight waiting at New York to be unloaded, including those on the way, east of Buffalo and Pittsburgh, was about 45,000, or approximately 3,500 more than one week before; and that with all facilities fully engaged, including all lighters and car floats, not over 1,500 cars can be delivered daily.

The Pennsylvania Railroad, on Tuesday, put embargoes on all carload and L. C. L. freight from points off its own lines, when consigned to New York to be lightered, except perishable freight, flour and other foodstuffs for local consumption; excepting also coal for delivery at Jersey City, coal to supply railroad with fuel, and coal for public service corporations. Through freight for New England over the New York, New Haven & Hartford is not covered by the embargo. The statement says that the congestion at New York has been largely due to mills and factories shipping their products without regard to facilities for unloading. On freight not embargoed, the company will try to induce shippers to send out only such freight as can be promptly unloaded. A separate embargo includes Newark, N. J., and Waverly, the freight transfer station west of New York and all shipments going through Waverly except for the New Haven road.

The New York Central has embargoed all flour and grain products for export through New York; also lumber and hay to be lightered.

The Erie has embargoed flour for export, not only that on through bills of lading, but all other.

The Baltimore & Ohio has embargoed lumber from the South, destined to New York for export.

The Central of New Jersey has embargoed all freight for delivery to coastwise steamers at New York; all freight for delivery at New York to go to the Pacific Coast by steamer; and all freight to be delivered at Brooklyn terminals. The Baltimore & Ohio has embargoed all grain for export via Baltimore, about 4,000 carloads being now held for the elevators at that port.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Pipe Line Transportation of Petroleum

In re conditions affecting the production, transportation and marketing of crude petroleum. Opinion by the commission:

In accordance with a resolution by the United States Senate adopted in September, 1914, the commission made an investigation of the control of pipe line companies and a discontinuance of running and purchase of petroleum in 1914 and the reasons therefor. It was found that certain pipe line companies had directors and officers common with other pipe line companies. The Federal Trade Commission is making an investigation of the oil industry, and the Interstate Commerce Commission, not having jurisdiction to investigate the records of industrial concerns, leaves the subject of what disposition the purchasing agencies have made of crude oil purchased and to whom it has been turned over for refining and manufacture, in so far as such information cannot be obtained from the pipe line companies' records, to appear in the reports of the Federal Trade Commission.

As to the discontinuance of running and purchase of petroleum in 1914, the commission puts on record the letters from pipe line officers to their subordinates showing that this was done because of the conditions in the crude petroleum market caused by the war and in order to guard against having storage tanks full to capacity with no assurance of being able to get rid of the stored oil. (36 I. C. C., 429.)

Rates on Lumber to Points in Texas

Oklahoma Traffic Association et al. v. Abilene & Southern et al. Opinion by Commissioner Daniels:

The commission finds that the carriers have not justified a proposed cancellation of the application of rates on lumber to sash, doors and blinds, in carloads, from Oklahoma City and Okmulgee and other points in Oklahoma, and from Shreveport and other points in Louisiana, to points in Texas, and proposed carload rates on sash, doors and blinds from Oklahoma City and other points in Oklahoma to certain points in Texas.

The present rates on sash, doors and blinds and other wooden building materials rated with sash, doors and blinds, in carloads, from Oklahoma City and Okmulgee to points in Texas are found unreasonable and reasonable rates are prescribed for the future.

The maintenance of narrower descriptions of building materials, higher minimum carload weights and less extensive schemes of joint rates from Oklahoma City and Okmulgee, Okla., to points in Texas than from Kansas City and St. Louis, Mo., Waco, Tex., and other competing points, is held to be discriminatory.

The present relationship between rates on wooden building materials, in carloads, from Oklahoma City and Okmulgee, Okla., to Texas, and from Texas producing points to the same points is also held discriminatory.

Fourth section relief is denied. (36 I. C. C., 329.)

Eastern Live-Stock Case

Opinion by Commissioner Meyer:

In tariffs filed to become effective March 15, 1915, and later dates, suspended by the commission to January 13, 1916, the carriers proposed changes as follows:

First, a general revision of rates on live-stock, except horses and mules, between points in central freight association territory, with certain increases in carload minimum weights. A related revision of rates on fresh meat and packing house products has been made the subject of an investigation: Central Freight Association Territory Fresh Meat and Packing-House Product Rates.

Second, increased rates on live stock, except horses and mules, on fresh meat and on packing-house products, packed and loose, from points in central freight association territory to points in

trunk line and New England freight association territories, with certain increases in carload minimum weights.

The rates here sought to be increased were increased 5 per cent at the time of the decision in the Five Per Cent Case. (31 I. C. C., 351; 32 I. C. C., 325.)

The commission's findings are as follows: The carriers may establish new rates on live stock, except horses and mules, in central freight association territory higher than those at present in effect, but the increases are not as great as those proposed by the carriers. Certain of the increased carload minimum weights are also allowed. In connection with these live-stock the carriers introduced evidence intended to show that the transportation of live stock is more expensive than the transportation of other kinds of freight, because (a) the number of tons of equipment hauled per ton of live stock is greater than that for other freight; (b) greater engine energy is required to haul live stock with consequent greater cost; (c) the car efficiency of live-stock cars is less than that of other equipment; (d) terminal facilities for live stock are more expensive; (e) live stock is peculiarly subject to state and federal regulations, compliance with which directly involves additional operating expenses; (f) the expedited service afforded live stock is more expensive than slow freight service; (g) the free transportation of attendants is a source of expense peculiar to live stock; (h) the terminal expense of handling live stock is high; (i) the cost of cleaning and disinfecting stock cars and pens is high; (j) the road movement for short hauls of live stock is particularly expensive; (k) quarantine regulations applying to live stock are burdensome; (l) delay to other trains is caused by live stock, both on the road and at terminal points; (m) the live-stock movement entails special work connected with dispatching.

The commission also finds that the carriers have justified the following: Proposed increased rates on cattle and on hogs and sheep or goats in single-deck and in double-deck cars from points in central freight association territory to points in trunk line and New England freight association territories; certain proposed increased carload minima applicable to live stock shipped between the same points, certain other proposed changes not being allowed; proposed increased rates on fresh meat from points in central freight association territory to points in trunk line and New England freight association territories; and proposed increased carload minima applicable to fresh meat and packing-house products, loose, from points in central freight association territory to points in trunk line and New England freight association territories.

It is found that the carriers have not justified increased rates on packing-house products, packed, and packing-house products, loose, from points in central freight association territory to points in trunk line and New England freight association territories, which would exceed the classification rates on these commodities, nor have they justified proposed increased rates and carload minima applying on live stock and packing-house products between points in trunk line territory east of the western termini of the trunk lines. (36 I. C. C., 675.)

STATE COMMISSIONS

The Tennessee Railroad Commission has suspended new tariffs recently filed by the railroads in Nashville increasing rates for switching cars in that city.

The Illinois Public Utilities Commission has ordered a hearing on January 4 on tariffs filed by the railways imposing a charge for cleaning and disinfecting stock cars.

The New York State Public Service Commission, First district, has postponed to February 1, 1916, the time within which the Interborough Rapid Transit Company must install and experiment with automatic block signals on the elevated lines of the company, where speeds are always low; and the road is required to report the results of its test by August 1, 1916.

The Railroad Commission of New Hampshire, at Concord, December 8, continued its investigation into the acts of the Boston & Maine, in 1912, when the Grand Trunk was threatening to build a line southeastward through New Hampshire to Boston. Testimony was presented to the effect that the total expenditures of the Boston & Maine and its subsidiary line, the Concord & Montreal, to thwart the Grand Trunk, were \$78,565.

PERSONNEL OF COMMISSIONS

Hon. Oscar S. Straus, of New York City, formerly secretary of commerce and labor, and later ambassador to Turkey, has been appointed by the governor to the position of chairman of the New York Public Service Commission, First district, in place of E. E. McCall, removed by the governor last week.

Hon. Francis M. Cockrell, formerly a member of the Interstate Commerce Commission, died at his home in Washington, December 13, at the age of 81. Mr. Cockrell was an officer in the Confederate army, rising to the grade of brigadier general; and after the war was for 30 years United States senator from Missouri.

COURT NEWS

The United States court at San Francisco has issued an injunction restraining the Interstate Commerce Commission from enforcing that part of its order of April 30, on west-bound transcontinental freight rates, which removes the cities of Sacramento, Stockton, San Jose and Santa Clara from the list of cities taking terminal rates. The order became effective on July 14, and a temporary injunction at that time was denied by the court.

The Pennsylvania Company, and the Pittsburgh, Cincinnati, Chicago & St. Louis pleaded guilty in the United States Court at Chicago last week to indictments charging them with having allowed rebates by refunding \$2 a carload on shipments of grain from the B. A. Eckhart Milling Company, Chicago, to eastern points during 1912 and 1913. Counsel for the roads contended that the payments were lawful as representing switching charges which had previously been paid by the shippers on the grain, inbound. Judge Landis found the roads guilty under two indictments of five counts each, while permission was granted to present further evidence, that the court may determine the degree of guilt and fix the penalty.

Written Notice of Damage Provision Must Be Pleaded

The Nebraska Supreme Court holds that the provisions of a bill of lading requiring written notice of damage to be given to the carrier and fixing a time less than that fixed by the statute in which action shall be commenced, in order to be available as a defense, must be pleaded as such; otherwise they are deemed waived.—*Gilinsky v. Illinois Central* (Neb.), 154 N. W. 730.

Assessment of Uncompleted Right of Way

The West Virginia Supreme Court of Appeals holds that a county assessor has no authority to assess any part of a public railroad company's right of way, not so far completed as to be fit for use, unless and until the land acquired therefor has been transferred to it from the former owner on the land books; and such assessment by him is unlawful and void.—*Clarksburg Northern v. Morris* (W. Va.), 86 S. E. 893.

Hours of Service Act—Operator in Emergency Service

The federal District Court, Northern district of West Virginia, holds that the words "towers, offices, places and stations" in the provision in the hours of service act as to telegraph operators refer to telegraph offices generally; and that operators engaged in wrecking or relief service, though technically not members of "the crews of wrecking and relief trains" expressly excepted from the provision of the act, are engaged in emergency work, and are therefore excepted.—*United States v. Baltimore & Ohio*, 226 Fed. 220.

White and Negro Accommodations—Intrastate Trains Only

The Louisiana Supreme Court having held that the Louisiana statute requiring separate accommodations for white and negro passengers applies to intrastate passengers only, the Mississippi Supreme Court holds, in an action by a passenger on an interstate train for being forcibly deprived of his seat in a comfortable car to accommodate a negro excursion, and to ride in the caboose, that the giving an instruction on the statute in such an action was error.—*O'Leary v. Illinois Central* (Miss.) 69 So. 713.

Killing Animals—No Presumption of Negligence

Action was brought for the loss of a mule which had strayed upon a public crossing in the night time and was first seen by the enginemen when it was utterly impossible to avoid striking the animal. The Oklahoma Supreme Court reversed a judgment for the plaintiff. The plaintiff's right of recovery depends on the defendant's negligence, and there was no circumstance from which negligence might be reasonably inferred; so it is the duty of the court to direct a verdict for the defendant.—*Ft. Smith & Western v. Dixon* (Okla.), 152 Pac. 350.

Penalty Under Hours of Service Act

The federal District Court, Northern district of West Virginia, holds that a railroad company which permits telegraph operators to work a greater number of hours than is prescribed by the hours of service act, and fails to make report of the extra hours of service rendered, is liable to but one penalty for each employee, and not for a further sum per day for each of the days the reports have been in default, where it denied liability, and where the omission was made in good faith, and under the belief that such report was not required.—*United States v. B. & O.*, 226 Fed. 220.

Liability of Intermediate Carrier for Delay

Prior to the existence of the Carmack amendment the different state courts by their decisions had adopted different rules relative to actions for damages by shippers against railroads. The purpose of the amendment was to secure simplicity in the transportation of freight carried by several railroads by localizing the responsible carrier. The Federal District Court, D. Minnesota, holds that under the amendment an intermediate carrier cannot be sued for delay in transportation of an interstate shipment of live stock where the delay was not caused by its line, regardless of whether or not it had issued a bill of lading.—*Hudson v. Chicago, St. P. M. & O.*, 226 Fed. 38.

Powers of Railroad Commission

The Louisiana Supreme Court holds that neither the Constitution nor any statute, either directly or by fair implication, confers on the Railroad Commission of Louisiana jurisdiction to assess or award against a railroad company, damages alleged to have been sustained by a shipper or consignee by reason of its observance of a freight rate authorized by the commission, but subsequently declared to be unreasonable. Whether such damages are recoverable in an ordinary action in a court is a question which was not involved in the case.—*Texas & Pacific v. Railroad Commission* (La.), 69 So. 837.

Abandonment of Highway in Railroad's Possession

A railroad company agreed with highway commissioners of a town that it would dedicate a new road and pay \$300, which was done, in return for the abandonment of an old road on land where the railroad desired to excavate. For years no public right was exercised in the old road, but it was held (adversely to such rights) by the railroad, and with the acquiescence of the public. The highway commissioners then sought to compel the railroad to construct crossings and approaches over its tracks for the old road. The Illinois Supreme Court held that the public was bound by the doctrine of equitable estoppel, and the old road must be regarded as abandoned.—*People v. C. C. C. & St. L.* (Ill.), 109 N. E. 1064.

Yard Accident—Assumption of Risk

A fireman was required to check in on return from each trip. Incoming engines were stopped over a cinder pit. Beside the track was an ash pit which had never been lighted. One night the fireman's engine stopped short of the cinder pit, another engine being over it. He started to the roundhouse to check in and fell into the ash pit. He had always known of the location of the ash pit and that it was never lighted, and he admitted that he knew he might fall into the pit by going the way he did. The Utah Supreme Court held that he could not recover against the railroad, since he assumed that hazard of his employment, regardless of whether the danger was ordinarily incident to it.—*Laub v. San Pedro, L. A. & S. L.* (Utah), 152 Pac. 467.

Railway Officers

Executive, Financial, Legal and Accounting

R. E. Berger, auditor of freight accounts for the Wabash, has been promoted to assistant auditor. S. J. Parks, auditor of passenger accounts, has been appointed auditor of freight accounts. P. E. Purcell has been appointed auditor of disbursements and J. H. Rueger, auditor of passenger accounts. They will all have headquarters at St. Louis, Mo.

John D. Caldwell, whose election as secretary of the Chicago, St. Paul, Minneapolis & Omaha has been announced in these columns, was born on July 4, 1863, at Lynn, Mass. He received



J. D. Caldwell

a common school education and entered railway service in 1880, as a telegraph operator for the Delaware & Chesapeake. Later he became a clerk in the motive power department of the Northern Central and the Baltimore & Potomac, and in 1884, went to the Denver & Rio Grande as a telegraph operator, and subsequently as secretary to the superintendent of motive power. He entered the service of the Chicago & North Western on July 20, 1885, as secretary to the president, and remained in that position until January 12, 1909, when he was elected secretary of the road. For several

years he has also been assistant secretary of the Omaha. By virtue of his recent election Mr. Caldwell becomes secretary of both railroads, with headquarters as heretofore, at Chicago, Ill.

William C. Maxwell, whose election as vice-president of the Wabash in charge of traffic has been announced, was born at Keokuk, Iowa, on February 20, 1865, and entered railway service in 1881, as a messenger for the Chicago, Burlington & Quincy.



W. C. Maxwell

Later he became a clerk in the local freight offices of the same road at Keokuk, and in 1884 entered the service of the St. Louis, Keokuk & Northwestern. From 1884 to 1889, he was employed in the general freight and ticket office of this road, and from 1889 to February, 1890, was chief clerk in the general freight office. From February, 1890, to December 1, 1902, he was general agent for the Chicago, Burlington & Quincy at Keokuk; from December 1, 1902, to June, 1904, he was assistant general freight

agent of this railroad at St. Louis, Mo., and from June, 1904, to September 1, 1905, assistant general freight agent at St. Joseph, Mo. On September 1, 1905, he was appointed assistant general

traffic manager of the Wabash, and on August 1, 1908, was promoted to general traffic manager, the position he held up to the time of his recent election to the vice-presidency.

The title of George B. Elliott, assistant general counsel of the Atlantic Coast Line, has been changed to general solicitor. Mr. Elliott is also assistant secretary, with headquarters at Wilmington, N. C.

William O. Bunger, whose appointment as general superintendent of freight claims for the Chicago, Rock Island & Pacific was announced last week, was born on June 4, 1870, at Terre



W. O. Bunger

Haute, Ind. He was educated in the public schools at Burlington, Iowa. He entered railway service in October, 1884, and until 1889, was consecutively clerk in the local and general freight departments of the Burlington, Cedar Rapids & Northern at Cedar Rapids, Iowa. From 1889 to 1892, he was chief claim clerk in the general freight department of the same road; from 1892 to 1893, he was tariff clerk in the general freight department of the Illinois Central at Chicago, Ill.; from 1893 to 1902, he was chief clerk in the freight claim department of the Burlington, Cedar Rapids &

Northern Railway at Cedar Rapids, Iowa. From 1902 to 1903, he was stationed at Little Rock, Ark., as freight claim agent of the Choctaw, Oklahoma & Gulf. In 1903, he came to Chicago as assistant freight claim agent of the Rock Island, and in 1907 was appointed freight claim agent of the same railroad.

William Little Seddon, whose election as vice-president of the Seaboard Air Line, with headquarters at Norfolk, Va., has already been announced in these columns, was born on October



W. L. Seddon

14, 1862, in Stafford county, Va. He graduated from the University of Missouri in July, 1881, and from 1881 to 1898 was engaged in civil engineering. Part of this time he served as United States assistant engineer at work on the Missouri and Mississippi rivers; chief engineer of the St. Louis Electric Railway & Power Company; contracting street railway construction in Kansas and as secretary and treasurer of the Atlantic Traction Company. He entered the service of the Seaboard Air Line in 1898, in the engineering department, and was consecutively to 1905

instrument man, resident engineer, and assistant engineer. In September, 1905, he was appointed chief engineer, and in January, 1913, he was made assistant to the president. On April 1, 1914, he became first assistant to the president in charge of operation, which position he held at the time of his recent election as vice-president of the same road, as above noted.

Thomas A. Polleys, whose appointment as tax commissioner

of the Chicago & North Western and the Chicago, St. Paul, Minneapolis & Omaha was announced in our columns last week, was born at Trempealeau, Wis., on January 31, 1865. After graduating from the law school at the University of Wisconsin, he practised law at Madison, Wis., from 1888 to 1896—the larger part of that time with the firm of Bashford, O'Connor, Polleys & Aylward. On January 17, 1896, he became an attorney for the Omaha. In June, 1901, he was appointed assistant general attorney of the Chicago Great Western and remained with this road until July 1, 1903, when he returned to the Omaha, as tax commissioner. In October, 1907, he became secretary, right of way commissioner and tax commissioner of the same road. He continued to discharge the duties of these positions until December 1, 1915, when his recent appointment took effect.



T. A. Polleys

Operating

H. D. Emerson has been appointed general manager of the New Orleans Southern & Grand Isle, with office at New Orleans, La.

F. J. McKee, superintendent of the Sarnia tunnel terminals of the Grand Trunk, at Pt. Huron, Mich., has been appointed assistant superintendent of the Detroit terminals, with office at Milwaukee Junction, Mich.

D. R. Campbell, superintendent of construction for the Canadian Northern, western lines, has been appointed general superintendent of the Pacific division, with office at Vancouver, B. C. B. T. Chappell, superintendent district 2, at Saskatoon, Sask., has been appointed superintendent of the Pacific division, with office at Kamloops Junction, B. C. T. J. Brown, chief dispatcher of district 1, central division, at Pt. Arthur, Ont., has been appointed superintendent of district 2, western division, at Saskatoon, vice Mr. Campbell. J. W. Crane, chief dispatcher, district 2, Saskatoon, has been appointed chief dispatcher, Pacific division, with office at Kamloops Junction, B. C.

George Leon Candler, who has been appointed general superintendent of the Central of Georgia, with office at Savannah, Ga., was born in Talbot county, Ga., and was educated in the public schools. He began railway work on August 1, 1880, with the Louisville & Nashville, and was in the freight agency department of that road at Montgomery, Ala., until 1887. He entered the service of the Central of Georgia in February, 1887, as chief clerk to the superintendent of the Columbus division at Columbus, Ga. From 1890 to 1892 he was chief clerk to the superintendent of the combined Southwestern and Columbus divisions at Macon. In 1894 he was appointed freight agent at Columbus, and from 1898 to 1902 was trainmaster of the Southwestern division at Macon. He was then promoted to superintendent of the Savannah division at Savannah, and on March 17, 1906, was appointed superintendent of transportation at Savannah, serving in that capacity until his recent appointment as general superintendent of the same road, with office at Savannah.

Charles H. Doorley, whose appointment as superintendent of the Gary division of the Elgin, Joliet & Eastern has been announced, was born at St. Catherine, Ont., on March 24, 1866. He received his education in the public schools of Chicago, and entered railway service with the Grand Trunk as a wiper in March, 1884. He was soon made a foreman, and in April, 1886, was promoted to engine hostler. In May, 1886, he left the mechanical department to become a switchman for the

same company, and in January, 1887, entered the service of the Chicago & Alton in the same capacity. He was promoted to yardmaster in 1889, and remained in that position until 1896. In February, 1896, he entered the employ of the Chicago, Hammond & Western as general yardmaster, and continued in that capacity until March, 1898. In April, 1898, he became a switchman for the Chicago, Lake Shore & Eastern; in August, 1899, he was promoted to assistant yardmaster; in September, 1901, he was appointed night general yardmaster; in August, 1903, general yardmaster; in December, 1908, assistant superintendent; in April, 1915, superintendent of terminals of the Elgin, Joliet & Eastern at Joliet, Ill. (the E., J. & E. having absorbed the C. L. S. & E. on June 1, 1909); in September, 1915, acting superintendent of the Gary division; and on December 1, superintendent.

Traffic

W. A. Hopkins, general live stock agent of the Wabash, has been promoted to assistant general freight agent, with headquarters at St. Louis, Mo.

A. Brostedt, district freight agent of the Canadian Northern at Calgary, Alta., has been appointed district freight and passenger agent at Vancouver, B. C. B. R. Marsales, district freight agent at Regina, Sask., has been transferred to Calgary, vice Mr. Brostedt. W. A. Whyte, city freight agent at Calgary, has been appointed district freight agent at Regina, succeeding Mr. Marsales.

William M. Hardin, whose appointment as assistant general freight agent of the Minneapolis & St. Louis has been announced in these columns, was born at Independence, Mo., on May 3, 1878. He received a high school education, and early in 1895 entered railway service as a station helper for the Chicago & Alton at Independence. In the fall of the same year he was transferred to the train service of the same railroad. During November, 1897, he entered the employ of the Chicago, Milwaukee & St. Paul as a telegraph operator, and in September, 1898, took a similar position with the Minneapolis & St. Louis. He continued in the employ of this road as telegraph operator and subsequently as relief agent, until April 1, 1903, when he was appointed traveling freight agent. On January 1, 1909, he was promoted to commercial agent, with office at Kansas City, Mo., and on January 1, 1912, he was transferred in the same capacity to Minneapolis, Minn., where he has remained up to the time of his recent promotion. As assistant general freight agent he will continue to have headquarters at Minneapolis.



W. M. Hardin

William Alexander Hopkins, who has been appointed assistant general freight agent of the Wabash, with office at St. Louis, Mo., was born on February 9, 1866, at Roxboro, N. C. He attended the common schools until September, 1882, and entered railway service in April, 1883, with the Wabash Western. In 1887 he entered the employ of the Missouri Pacific at Kansas City, Mo., as a bill clerk; in 1888, he was a station agent for the Chicago, Milwaukee & St. Paul at various places, and from 1888 to 1897 worked in a similar capacity for the Wabash. From 1897 to 1907 he was live stock agent for the Wabash at Kansas City, Mo.; and from 1907 to 1909 he was commercial agent for the same railroad at Salt Lake City, Utah. From 1909 to 1912 he was division freight and passenger agent at Toledo, Ohio. He was then stationed at St. Louis, Mo., as general live stock

agent, and on December 6 was promoted to assistant general freight agent.

Ogden F. Scudder, who has been appointed land and industrial commissioner of the Chicago, Burlington & Quincy Lines East of the Missouri River, was born at Galesburg, Ill., on

December 24, 1871. He received his education in the public grade and high schools at Galesburg. On October 1, 1887, he entered the service of the Chicago, Burlington & Quincy as an office boy, and has been continuously in the employ of the same railroad ever since. For several years he worked as an office boy and clerk in different departments; from 1890 to September, 1906, he was employed consecutively as stenographer and claim adjuster in the law department. Since 1906, he has been in the real estate department as right of way agent and later as assistant real estate and industrial commis-



O. F. Scudder

sioner, the position he held up to the time of his recent appointment. Mr. Scudder's headquarters will continue to be at Chicago, Ill.

Stanley H. Johnson, whose appointment as freight traffic manager of the Chicago, Rock Island & Pacific has been announced, was born at Bunker Hill, Ill., on February 2, 1872. He was

educated in a high school at St. Louis, Mo. In 1888, he entered railway service as a stenographer of the Southern Interstate Association at St. Louis. From that time until 1894, he held similar positions in the freight traffic department of the Missouri Pacific at St. Louis, in the offices of the East Tennessee, Virginia & Georgia at Knoxville, Tenn., and with the Chesapeake, Ohio & Southern at Louisville, Ky. From 1894 until June, 1902, he was employed in the Southwestern Freight Bureau at St. Louis, in various positions, including that of secretary. From June,



S. H. Johnson

1902, to 1904, he was chief clerk to the third vice-president and freight traffic manager of the Rock Island; from 1904, to 1906, he was assistant general freight agent of the same railroad at Little Rock, Ark. From 1906, to February 14, 1909, he held the same position at Chicago, Ill. From February 14, 1909, to December 1, 1915, he has been assistant freight traffic manager. His headquarters will continue to be at Chicago, Ill.

William S. Burley has been appointed assistant land and industrial commissioner of the Chicago, Burlington & Quincy lines east of the Missouri river. Mr. Burley was born at Aurora, Ill., and received his education in the public schools and at a business college. He also studied law for two years. In 1883 he entered railway service as a messenger in the office of the Chicago superintendent of the Burlington. In 1890 he

was appointed chief clerk in the superintendent's office at Chicago. In 1902 he was promoted to chief clerk in the general superintendent's office at Burlington, Iowa. In 1905 he was transferred to the land and industrial department at Chicago as chief clerk and right-of-way agent. His office will continue to be at Chicago, and his appointment was effective December 1.

C. H. Stinson, whose appointment as freight traffic manager of the Wabash has been announced, was born at Beaver Falls, Pa., on November 19, 1871. He entered railway service in



C. H. Stinson

1885, as a messenger boy in the local freight office of the Chicago, Milwaukee & St. Paul, at Chicago, Ill. In 1888, he left the St. Paul to enter the employ of the Wabash, as a clerk in the office of one of the Wabash fast freight lines. Subsequently he filled the positions of chief clerk to the general manager of the Hoosac Tunnel Line, contracting freight agent, traveling freight agent, and agent of the Hoosac Tunnel Line, at Chicago. With the reorganization of the Wabash fast freight lines, he went to St. Louis, Mo., to become chief clerk to the general traffic manager.

Within one year he was made assistant general freight agent, and on August 20, 1908, was promoted to general freight agent. Mr. Stinson has been in railroad service for 30 years, 3 years with the St. Paul and 27 with the Wabash. His headquarters will continue to be at St. Louis.

G. H. Corse, Jr., whose appointment as foreign passenger agent of the Union Pacific system has been announced, has been in railroad and steamship service since May 11, 1890, when he



G. H. Corse, Jr.

entered the service of the Chicago, Milwaukee & St. Paul, as a telegraph operator at Davis Junction, Ill. On October 26, of the same year, he first became an employee of the Union Pacific, at Ogden, Utah. His experience in promoting foreign traffic dates from December 1, 1906, when he went to Hong Kong, China, as freight agent of the Pacific Mail Steamship Company. On February 1, 1909, he was appointed general Oriental agent for the Chicago, Milwaukee & St. Paul, at Shanghai, China. On December 1, 1911, he was appointed general passenger agent of the

San Francisco Overland Routes, comprising the Pacific Mail Steamship Company, the Southern Pacific, the Union Pacific, the Atchison, Topeka & Santa Fe, the Chicago & North Western and the St. Paul, with office at Yokohama, Japan and Hong Kong. He resigned this position on July 1, 1915, to return to the United States as special agent in the passenger department of the Union Pacific, with headquarters at Chicago, Ill. As foreign passenger agent he will continue to have his headquarters at Chicago.

William P. Hinton, whose appointment as traffic manager of

the Grand Trunk Pacific and the National Transcontinental, with office at Winnipeg, Man., has been announced, was born at Hintonburg, Ont., on August 30, 1871, and entered railway service in May, 1887. From that time until August, 1891, he was consecutively clerk of freight, passenger and car accounts, and traveling auditor for the Canada Atlantic; from August, 1891, to March, 1898, he was rate clerk for the same railroad, and accountant of the Canada Atlantic Fast Freight Line; from March, 1898, to June 30, 1901, he was assistant general freight agent of the same road, and the Canada Atlantic Transit Company; from June 30, 1901, to January 30, 1903, general freight agent of the same road; January 30, 1903, to October, 1905, general passenger and freight agent of the same railroad; October, 1905, to January, 1907, general agent, passenger department, of the Grand Trunk at Ottawa, Ont.; January, 1907, to April, 1909, assistant general passenger and ticket agent of the same road at Montreal; April, 1909, to February, 1914, general passenger agent, Grand Trunk at Winnipeg, Man.; February to October, 1914, assistant passenger traffic manager of the same railroad at Winnipeg; October, 1914, to November 11, 1915, assistant passenger traffic manager of the Grand Trunk and the Grand Trunk Pacific at Montreal, Que.

Engineering and Rolling Stock

J. W. Fox has been appointed valuation engineer of the Central of Georgia, succeeding H. D. Pollard, resigned.

Geo. Moth has been appointed district master mechanic and trainmaster of the Canadian Pacific, Alberta division, fifth district.

B. Corbett has been appointed master mechanic of the Missouri, Kansas & Texas, at Smithville, Tex., vice J. R. Greiner, resigned.

O. K. Morgan, office engineer of the Carolina, Clinchfield & Ohio at Johnson City, Tenn., has assumed the duties of the office of chief engineer.

C. N. Beckner, assistant signal engineer of the Louisville & Nashville at Louisville, Ky., has entered the service of the Federal Signal Company as superintendent of construction in western territory, with headquarters at Chicago, Ill.

C. H. Fox, assistant division engineer of the Canadian Pacific at Winnipeg, Man., has been appointed resident engineer, district 2, Manitoba division, vice E. L. Landorff, transferred. The position of assistant division engineer has been abolished.

T. L. Reed, assistant master mechanic of the Seaboard Air Line at Hamlet, N. C., has been appointed master mechanic of the North Carolina division, with headquarters at Hamlet, N. C. The position of assistant master mechanic is abolished. G. H. Langton, master mechanic at Raleigh, will have charge of the Virginia division, including Raleigh shops and roundhouse.

H. L. Vercoe has been appointed special engineer of the Canadian Northern, lines west of Port Arthur, Ont., with headquarters at Winnipeg, Man. W. T. Moodie, engineer maintenance of way, with office at Winnipeg, has been appointed division engineer, central division, with headquarters at the same city. T. Lucas, engineer maintenance of way, west of Winnipeg, has been appointed lease engineer, lines west of Port Arthur, Ont., with office at Winnipeg. A. T. Fraser, district engineer at Edmonton, Alta., has been appointed division engineer, western division, with headquarters at the same city.

G. H. Hedge, master mechanic of the central division of the Canadian Northern, has been appointed general master mechanic of western lines, with office at Winnipeg, Man. Mr. Hedge was born at Neath, Wales, on May 26, 1865, and entered railroad service in 1879 as a machinist apprentice with the Great Western in England. In 1884 he came to Canada, entering the service of the Canadian Pacific as a fitter. He worked in shops of this railroad at Ottawa, Schreiber, Montreal, Hochelaga, and again at Montreal, and in 1891 was appointed locomotive foreman at Megantic, Que. In 1893 he was transferred to Farnham, Que., and subsequently to Montreal; in 1896 he was promoted to general locomotive foreman of the same road at Farnham, Que.; from 1901 to 1902 he was locomotive foreman at Medicine Hat, Alta.; from 1902 to January, 1903, he held the same position at Brandon, Man.; from January, 1903, to June, 1908, he was locomotive foreman of the Canadian Northern at Port Arthur,

Ont.; from June, 1908, to January, 1912, he was assistant master mechanic of the same road at Winnipeg, Man.; from January, 1912, up to the time of his recent appointment, he was master mechanic of the central division of the same road at Winnipeg.

Purchasing

C. L. Bankson, has been appointed assistant purchasing agent of the Great Northern, with office at Seattle, Wash., vice A. Watson.

OBITUARY

Charles W. Lord, office engineer of the New York, New Haven & Hartford, at New Haven, Conn., died on December 11, at the age of 52.

Thomas James Hennessey, who was division master mechanic of the Michigan Central from May, 1893, to February 1, 1915, died on December 4, at the age of 70.

Ward Crosby, chief engineer of the Carolina, Clinchfield & Ohio, with office at Johnson City, Tenn., died on December 5, at his home in that city. Mr. Crosby was born on May 1, 1859, at Crompton, Que., and began railway work in March, 1880, as transitman on the Eastern Railroad, now a part of the Boston & Maine. From March, 1881, to February, 1882, he was transitman on location work of the Texas-Mexican in Texas, and then to March, 1884, was assistant engineer on the Mexican Central, now a part of the National Railways of Mexico. From September, 1885, to April, 1888, he was first assistant, and later division engineer of the Boston & Lowell, now a part of the Boston & Maine; then to November, 1889, was engineer of location and construction of the Barre Railroad, now the Barre & Chelsea. In November, 1889, he was appointed resident engineer on the Norfolk & Western, and from May, 1891, to September, 1905, was assistant and division engineer of the Concord & Montreal, and its successor, the Boston & Maine. In September, 1905, he went to the Carolina, Clinchfield & Ohio, and served consecutively as division engineer and assistant chief engineer until November, 1911, when he was promoted to chief engineer of the same road.



W. Crosby

THE KATANGA RAILWAY.—A British consular report on the trade of Katanga (Belgian Congo) during 1914 says that the railway north from Kambove to Bukama has been actively continued during the past year. The total distance, by the route now adopted, is 204 miles. December 31 the rails were laid for 69 miles, and at the time of writing, March, 1915, 86 miles have been finished. The roadbed is completed over 96 miles. The railway has now arrived on the high Biano plateau, which is free from tsetse fly, making it possible to land breeding stock there by rail. The headquarters of the construction has now been moved from Kambove to 66 miles beyond, and this section of the road is now being used for the regular transport of passengers and merchandise. It is at present impossible to say when the railway will reach Bukama, as on account of the war the construction has been very largely curtailed. Kambove is connected by rail with South Africa via Elisabethville, and when the line reaches Bukama there will be complete connection between South Africa and Boma by rail and water. The railway under construction between Kabalo, on the Lualaba river, and Lukuga, on Lake Tanganyika, a distance of about 250 miles, is now practically completed, but has not been pushed quite to the shore of the lake, as the Germans are masters of this latter at present.

Equipment and Supplies

LOCOMOTIVES

THE VIRGINIAN is understood to be contemplating the purchase of a number of locomotives.

THE BUFFALO, ROCHESTER & PITTSBURGH is contemplating the purchase of a number of locomotives.

THE DELAWARE, LACKAWANNA & WESTERN, it is reported, is considering the purchase of motive power.

THE CHICAGO GREAT WESTERN has ordered 5 Mikado type locomotives from the Baldwin Locomotive Works.

THE DEATH VALLEY RAILROAD has ordered one Consolidation locomotive from the Baldwin Locomotive Works.

THE CARNEGIE STEEL COMPANY has ordered 2 six-wheel switching locomotives from the Baldwin Locomotive Works.

THE TOLEDO, ST. LOUIS & WESTERN has ordered 5 Consolidation locomotives from the Lima Locomotive Corporation.

THE FAIRCHILD & NORTHEASTERN, noted in last week's issue as having issued an inquiry for one Prairie type locomotive has ordered this engine from the Vulcan Iron Works.

THE DELRAY CONNECTING has ordered one eight-wheel switching locomotive from the American Locomotive Company. This locomotive will have 22 by 28-in. cylinders, 51-in. driving wheels and a total weight in working order of 208,000 lb.

THE WAYNESBURG & WASHINGTON has ordered one Mogul type locomotive from the American Locomotive Company. This locomotive will have 13 by 20-in. cylinders, 41-in. driving wheels and a total weight in working order of 50,000 lb.

THE CUBA RAILROAD has ordered 10 superheater ten-wheel locomotives from the American Locomotive Company. These locomotives will have 21 by 26 in. cylinders, 60 in. driving wheels and a total weight in working order of 148,000 lb.

THE PUNTA ALEGRA SUGAR COMPANY has ordered one four-wheel switching locomotive from the American Locomotive Company. This locomotive will have 11 by 16-in. cylinders, 33-in. driving wheels and a total weight in working order of 39,000 lb.

THE PULLMAN RAILROAD, reported in last week's issue as being in the market for a switching locomotive, has ordered two six-wheel switching locomotives from the American Locomotive Company. These locomotives will have 21 by 26-in. cylinders, 51-in. driving wheels and a total weight in working order of 142,000 lb.

FREIGHT CARS

THE CHICAGO, MILWAUKEE & ST. PAUL is building 500 60-ton ore cars in its shops at Milwaukee.

THE NEW YORK, PHILADELPHIA & NORFOLK has issued inquiries for 45 to 60 steel underframe box cars.

THE RAY CONSOLIDATED COPPER COMPANY has ordered 50 ore cars from the Pressed Steel Car Company.

THE AMERICAN ZINC, LEAD & SMELTING COMPANY has issued inquiries for 50 100,000-lb. capacity tank cars.

THE UTAH COPPER COMPANY is reported to have ordered 100 ore cars from the Standard Steel Car Company.

THE ELGIN, JOLIET & EASTERN has given the Pullman Company an order to repair 300 steel hopper cars.

THE PRUDENTIAL OIL CORPORATION has ordered 50 tank cars from the American Car & Foundry Company.

THE MISSOURI, KANSAS & TEXAS has ordered 6,000 underframes from the Commonwealth Steel Company.

THE PERE MARQUETTE has ordered 200 center constructions from the Western Steel Car & Foundry Company.

THE ILLINOIS CENTRAL is inquiring for prices on 1,000 center sills for coal cars and 500 center sills for sand cars.

THE DELAWARE, LACKAWANNA & WESTERN has ordered 300 gondola cars from Barney & Smith Car Company and 200 gondola cars from the Standard Steel Car Company.

THE NEW YORK, ONTARIO & WESTERN has ordered 400 hopper

cars from the Cambria Steel Company, and 100 low-side gondola cars from the American Car & Foundry Company.

THE AMERICAN SHEET & TIN PLATE COMPANY was reported in an unconfirmed item in last week's issue as having ordered 6 tank cars from the German-American Car Company. This item has since been confirmed.

THE GRAND TRUNK, which was reported in last week's issue as being about to repair 1,500 steel coal cars, has closed a contract with the American Car & Foundry Company for repairs to 300 cars, with an option on an additional 1,200.

THE NEW JERSEY ZINC COMPANY, reported in the *Railway Age Gazette* of December 10 as being in the market for 40 hopper cars, has ordered 10 hopper cars from the Pressed Steel Car Company and another 10 from the Standard Steel Car Company.

THE NEW YORK, NEW HAVEN & HARTFORD, which has been reported in recent issues of this paper as being in the market for 25 milk and 50 refrigerator cars, has now issued definite inquiries for 25 milk and 500 refrigerator cars. As noted in last week's issue, will also buy 500 coal cars.

NATIONAL GUARD OF NEW YORK.—A group of steel makers and others under the lead of Elbert H. Gary, chairman of the Steel Corporation, and Charles M. Schwab, president of the Bethlehem Steel Corporation, are contributing toward the presentation of an armored train to the National Guard of New York. The train will have a battle car heavily protected with armor plate and six or seven lightly armored cars equipped with machine guns and capable of high speed. The steel makers have promised to contribute and to furnish the armor plate and other metal parts of the train at cost.

PASSENGER CARS

THE WESTERN PACIFIC recently ordered five all-steel baggage and mail cars from the American Car & Foundry Company.

THE CENTRAL OF GEORGIA has ordered four express cars and one combination baggage and mail car from the Pullman Company.

PENNSYLVANIA LINES WEST. In the item relative to this company's recent orders for passenger cars in last week's issue it was incorrectly stated that the company had ordered 22 coaches and 7 passenger and baggage cars from the Pullman Company. These cars were ordered of the Pressed Steel Car Company, the Pullman Company having received only the one order for 12 baggage and mail cars and 6 dining cars.

THE PENNSYLVANIA RAILROAD, reported in the *Railway Age Gazette* of November 12 as being in the market for 100 coaches, 20 passenger and baggage cars, 55 baggage cars and 5 horse-express cars for the Lines East of Pittsburgh, a total of 180 cars, has placed orders for 107 of these cars as follows: American Car & Foundry Company, 21 baggage and 5 horse-express cars; Pressed Steel Car Company, 6 coaches; Harlan & Hollingsworth Corporation, 47 coaches, and the J. G. Brill Company, 28 baggage cars. Of the 21 baggage cars ordered from the American Car & Foundry Company 11 are for the Pennsylvania itself, 7 for the Philadelphia, Baltimore & Washington, and 3 for the West Jersey & Seashore; the 5 horse-express cars are for the Pennsylvania. The 6 coaches ordered from the Pressed Steel Car Company and the 28 baggage cars ordered from the J. G. Brill Company are also for the Pennsylvania. The 47 coaches ordered from the Harlan & Hollingsworth Corporation are for the West Jersey & Seashore.

IRON AND STEEL

THE ANN ARBOR is inquiring for 1,500 tons of 85-lb. rails.

THE TOLEDO, ST. LOUIS & WESTERN is inquiring for 10,000 tons of 85-lb. rails.

THE SOUTHERN RAILWAY has ordered 10,000 tons of rails from the Maryland Steel Company.

THE MINNEAPOLIS & ST. LOUIS has ordered 7,500 tons of rails from the Illinois Steel Company.

THE TOLEDO TERMINAL RAILROAD has ordered 1,000 tons of rails from the Algona Steel Corporation.

THE CHICAGO, BURLINGTON & QUINCY is inquiring for 2,000 tons of bridge steel for 1916 delivery.

THE INTERNATIONAL & GREAT NORTHERN is reported to be in the market for 1,500 tons of 90-lb. rails.

THE NEW YORK, CHICAGO & ST. LOUIS has ordered 9,000 tons of rails from the Illinois Steel Company.

THE CAROLINA, CLINCHFIELD & OHIO has ordered 1,000 tons of rails from the Carnegie Steel Company.

THE LEHIGH VALLEY has ordered 820 tons of steel for bridge work from the Pennsylvania Steel Company.

THE CHICAGO & EASTERN ILLINOIS has been authorized by the Federal court to buy 10,000 tons of rails to apply on its 1916 requirements.

THE DULUTH & IRON RANGE has ordered 650 tons of steel for ore spouts for dock No. 6 at Two Harbors, Minn., from the American Bridge Company.

THE PENNSYLVANIA RAILROAD has ordered 450 tons of bridge material for its ore handling bridge at Erie, Pa., from the Pennsylvania Steel Company.

THE NEW YORK PUBLIC SERVICE COMMISSION, First district, has let a contract to the Ramapo Iron Works for special work on order No. 6, consisting of frogs and switches, for the new Lexington avenue subway in New York City. The company's bid was the lowest at \$46,195.

MACHINERY AND TOOLS

THE BALTIMORE & OHIO is in the market for 15 to 20 machine tools.

THE DELAWARE & HUDSON is in the market for approximately 40 machine tools.

THE PENNSYLVANIA RAILROAD will make extensive improvements to its docks at Erie, Pa., and will install a new ore-handling plant equipped with machinery made by the Mead-Morrison Manufacturing Company, Boston, Mass.

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for a second-hand shear, able to shear 1½ in. by 1½ in. or ¾ in. by 6 in. cold soft steel, or to punch a 1-in. hole in a ¾-in. plate, floor space 8 ft. 3 in. by 6 ft.; to be arranged for motor drive. It will also buy a roller straightener, or gag press for 6 in. by 6 in. angles.

SIGNALING

THE WESTERN MARYLAND proposes during the coming year to install automatic block signals on 106 miles of its line.

THE CUMBERLAND VALLEY proposes during the coming year to install automatic block signals on its line near Berkeley, six miles, single track.

CHICAGO, ROCK ISLAND & PACIFIC.—This company's plan for the ensuing year include the installation of automatic block signals on five miles of road, double track.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS contemplates the installation of automatic block signals during the coming year on its line from Bellefontaine, Ohio, to Anderson Ind., 106 miles, single track.

THE SOUTHERN RAILWAY proposes during 1916 to install automatic block signals on 178 miles of its line. The plans for the coming year include also two large mechanical interlocking plants, one at Charlottesville, Va., 48 levers, and one at Danville, Va., 40 levers.

THE ATCHISON, TOPEKA & SANTA FE plans during the coming year to install automatic block signals on seven miles of its line, double track, between Standish, Mo., and Carrollton; ten miles, double track, between Le Loup, Kan., and H. U. Tower, and between Claremont, Cal., and Arcadia, 20 miles, single track. Of these three installations, the two last named have already been begun. During 1916 the company proposes to install electric interlocking, 36 levers, at Arcadia, Cal., jointly with the Southern Pacific and the Pacific Electric; and at Los Angeles, Cal., electric interlocking, 80 levers, jointly with the Salt Lake Route and the Southern Pacific.

Supply Trade News

The Northern Pacific will purchase several million feet of lumber.

The Norfolk Southern is inquiring for 3,000,000 ft. of lumber to apply on its 1916 requirements.

The Chicago & North Western is inquiring for 5,000,000 ft. of lumber.

The Maryland Steel Company will erect an addition costing \$100,000 to its plant at Sparrows Point, Md.

Charles W. Cross has been appointed vice-president of the Equipment Improvement Company, New York.

The Chicago, Milwaukee & St. Paul is inquiring for prices on 15,000,000 ft. of fir, pine and hard wood for its 1916 requirements.

Fairbanks, Morse & Co., Chicago, have closed a contract with the Missouri, Kansas & Texas for the installation of a large capacity conveyor type coaling station at Osage, Okla.

The Burdett Oxygen Company completed a new plant at Ft. Worth, Tex., on December 15. This is the ninth plant to be erected by the company in various industrial centers of the country.

The Chicago & North Western has ordered 3,000,000 ft. of fir for dock extension work at Ashland, Wis. The order was divided between the Douglas Fir Sales Company and the Lumber Manufacturers' Agency.

C. N. Beckner, assistant signal engineer of the Louisville & Nashville, has entered the service of the Federal Signal Company as superintendent of construction in western territory, with headquarters at Chicago, Ill.

A. F. Huston, president of the Lukens Iron & Steel Company, Coatesville, Pa., has recently announced that his company has placed an order for a plate mill which will be able to roll a plate 200 to 204 in. wide and which will be the largest plate mill in existence in the world at the present time.

A majority of the stockholders of the Youngstown Steel & Tube Company voted last Tuesday to accept an offer made by the Replogle interests in the Cambria Steel Company, mentioned in last week's issue, for their stock, the price being \$300 a share for the common and \$80 a share for the preferred.

The Peyton Safety Rail Joint Company, St. Louis, Mo., has been incorporated with capital stock of \$200,000, with the following stockholders: C. W. Witwer, president; W. M. Grissom, Warren Perry and Isaac Peyton. The company will engage in the manufacture of rail joints and is reported to have contracts from two large railways.

The Crawford Locomotive & Car Company, Streator, Ill., has been taken over by its creditors and the property will be offered for sale at an early date. The property of the company includes several modern and well equipped shop buildings and 25 acres of land having connection with three railroads and easy access to two others that enter the city.

The Midvale Steel & Ordnance Company has announced that it will spend approximately \$6,000,000 for improvements in the plant of the Midvale Steel Company, Nicetown, Pa., and that of the Worth Brothers Company, Coatesville, Pa., and that it has acquired all the capital stock of the Buena Vista Iron Company, owning 300,000,000 tons of merchantable Cuban iron ore, containing 1 per cent nickel. The improvements to the two plants include the installation at the Coatesville plant of six 50-ton open hearth furnaces with a capacity of 180,000 tons of ingots a year, a blooming mill with an annual capacity of 200,000 tons, two 750 k. w. turbo generators, one 500-ton blast furnace with an annual capacity of 175,000 tons of pig iron, with sufficient auxiliary equipment for another similar furnace which may be authorized soon after the first of the year, a new forging department, consisting of a 2,500-ton hydraulic press, one 1,500-ton hydraulic press and two draw benches; the installation of 8, 12 and 15-in. bar mills, a steel tire department and a rolled

steel wheel department. The improvements at Nicetown include new steel manufacturing and machine shop equipment which in particular will enable the company to handle orders recently taken from the United States government for heavy ordnance, such as 14 and 16-in. guns. The company's announcement concludes: "The acquiring of this property (the Buena Vista Iron Company) will place the steel-making subsidiaries of the company, the Midvale Steel Company and Worth Brothers Company, in a strong position and will enable the company to proceed with the extensive additions contemplated at Coatesville and Philadelphia, with full assurance of a supply of raw material on a basis which will enable them to compete on even terms with any other producer."

N. S. Reeder, vice-president of the Pressed Steel Car Company and the Western Steel Car & Foundry Company, graduated from Cornell University with the degree of mechanical engineer in 1896. He then served as a special apprentice on the Pennsylvania Lines West of Pittsburgh, and in 1899 was employed by the Pittsburgh Coal Company as superintendent of the Montour and Moon Run Railroads. In 1902 he entered the service of the Pressed Steel Car Company as a mechanical engineer connected with the New York office, but in 1904 he went to Montreal as assistant general manager of the Canada Car Company. In 1906 he was made general manager, and in 1908 became second vice-president of the Canadian Car & Foundry Company. He

returned to the States in 1909 as vice-president of the Western Steel Car & Foundry, and in 1910 was made second vice-president of the Pressed Steel Car Company in Chicago. He is now transferred to the company's New York office, effective December 1. James Brown Rider, the newly elected vice-president and general manager of the Pressed Steel Car Company and the Western Steel Car & Foundry Company, entered the service of

the Pennsylvania Railroad in 1895, and remained with it until 1899, acting successively as messenger boy, shop order clerk, invoice clerk and stenographer. In 1899 he became connected with the Pressed Steel Car Company as stenographer and clerk to the general manager, being advanced to the position of assistant to the vice-president in July, 1905. He was appointed general manager in July, 1909, and made a member of the board of directors in Jan., 1913. He was appointed general manager of the Western Steel Car & Foundry Company August, 1913. He is now

elected a vice-president of the Pressed Steel Car Company and Western Steel Car & Foundry Company, with headquarters in Pittsburgh, Pa., and will also continue to perform the duties of general manager in charge of operations. His title is vice-president and general manager of both the Pressed Steel Car Company and the Western Steel Car & Foundry Company.

J. F. MacEnulty, who was elected second vice-president of the Pressed Steel Car Company and the Western Steel Car & Foundry Company, December 1, entered the employ of the Pressed Steel Car Company in 1899, and has been its general sales manager since May, 1912. He was first an inspector at Pittsburgh, later being promoted to the positions of chief inspector, general chief inspector and engineer of construction. He was transferred to the sales department in New York in 1904, and in 1907 was made general superintendent of the Hegevisch Works of the Western Steel Car & Foundry Company. In 1909 he was promoted to the position of general manager, and in May, 1912, returned to New York as general sales manager of both the Pressed Steel Car Co., and Western Steel Car & Foundry Co.

C. E. Postlethwaite, who since December 1 has been general sales manager of the Pressed Steel Car Company and the Western Steel Car & Foundry Company, with headquarters in New York, was until that date manager of sales for the central district at Pittsburgh, Pa. He was born in Mount Union, Huntington county, Pa., and after graduating from the Altoona high school in 1883 entered the service of the Pennsylvania Railroad, where he remained until 1890, acting successively as rodman on an engineer corps, telegraph operator and Pennsylvania Railroad division car clerk. For the following seven years he was connected with the Norfolk & Western as chief clerk to the general superintendent at Roanoke, and later as assistant to the general agent at Norfolk. He became connected with the Schoen Pressed Steel Car Company in October, 1897, shortly after the first steel freight cars were built, and remained with the company when it was merged into the Pressed Steel Car Company. Mr. Postlethwaite entered the sales department of the company in February, 1902.

The Youngstown Steel Car Company was recently organized at Youngstown, Ohio, to assume the business of the Youngstown Car & Manufacturing Company, designers and builders of industrial equipment. J. E. Tesseyman, formerly of the Ralston Steel Car Company, Columbus, Ohio, has assumed the duties of general manager, and plans are being formulated for enlarging the company's output. The company is entering the field of repairing steel cars, and is at present making prompt deliveries on pressed steel parts.

William Andrew Conner, first vice-president of the Standard Underground Cable Company, Pittsburgh, Pa., died suddenly in his office at Perth Amboy, on December 6. Mr. Conner was born in Baltimore, Md., September 12, 1859. In 1876 he entered the oil refining business, holding eventually the position of assistant manager for the Standard Oil Company. In 1885 he took charge of the first plant built by the Standard Underground Cable Company in Pittsburgh, and from then until his death



N. S. Reeder



J. B. Rider



J. F. MacEnulty



C. E. Postlethwaite

was in charge of the manufacturing business of the company. He was the one who planned and built the plants at Perth Amboy, N. J., and Oakland, Cal. As noted above, he became vice-president of the company in 1909. He was also a vice-president and director of the Standard Underground Cable Company of Canada, Ltd., whose factories were planned and built by him at Hamilton, Ont., in 1911-1912.

Henry Phipps Hoffstot, whose appointment to the position of assistant manager of sales, central district of the Pressed Steel Car Company, with headquarters at Pittsburgh, Pa., was announced in the *Railway Age Gazette* of last week, has been in the service of the company since 1910. He graduated from Harvard College in 1909, and in the same year entered the employ of the Canadian Car & Foundry Company at Montreal and Amherst, N. S. The following year he was appointed assistant to the general manager of the Pressed Steel Car Company, and on December 1 entered the sales department of the company as assistant manager of sales, central district, with headquarters at Pittsburgh, as above noted.



H. P. Hoffstot

C. W. Cross, from 1906 to 1914 superintendent of apprentices of the New York Central Lines, has been elected vice-president of the Equipment Improvement Company, with office at 30 Church street, New York. Mr. Cross started his railroad career as a machinist apprentice on the Cincinnati, Hamilton & Dayton at Lima, Ohio. From 1880 to 1890 he was, respectively, a machinist, draftsman, foreman and assistant master mechanic in the shops of the Pennsylvania Lines at Fort Wayne, Ind. In 1890 he went to the Lake Shore & Michigan Southern as master mechanic at Elkhart, Ind., and became superintendent of apprentices for the New York Central Lines, with headquarters at New York, when that railroad revised and centralized its apprenticeship department in 1900. Mr. Cross has been a representative for the Equipment Improvement Company since July, 1914. He takes up his new duties as vice-president beginning December 15.



C. W. Cross

James Mapes Dodge, chairman of the board of directors of the Link-Belt Company, Chicago, Ill., died at his home in Philadelphia, September 4. Mr. Dodge was born June 30, 1852, at Waverly, N. J. He studied three years at Cornell University and then took a special one-year course in chemistry at Rutgers. After spending a short time at the Morgan Iron Works in New York, he entered the shops of James Roach, the shipbuilder, at Chester, Pa., where, during a three years' stay, he was successively journeyman, foreman and superintendent of erection. About 1880 he became acquainted with William D. Ewart, the inventor of the Ewart link-belt, and soon after joined him and his associates in the development of the chain business, which at that time had not attained a very great importance. He later entered into a partnership with Edward H. Burr, under the

name of Burr & Dodge, who represented in Philadelphia the Ewart Manufacturing Company of Indianapolis, then manufacturing the Ewart detachable link-belt. Out of this partnership grew the Link-Belt Engineering Company, organized in 1888. In 1889 Mr. Dodge brought out the Dodge system of storing anthracite coal in large conical piles and reloading it by machinery. For this invention he received in 1907 the Elliott Cresson gold medal from the Franklin Institute. In 1892 Mr. Dodge was elected president of the Link-Belt Engineering Company and the Dodge Coal Storage Company (later called the J. M. Dodge Company). He became chairman of the board of directors of the Link-Belt Company when it was organized in 1906 through the merger of the allied companies—the Link-Belt Engineering Company, Philadelphia; the Link-Belt Machinery Company, Chicago, and the Ewart Manufacturing Company, Indianapolis, at which time Charles Piez became president of the Link-Belt Company. Mr. Dodge was a very successful inventor. He took out over 100 patents, among them, of course, being many relating to the construction and manufacture of silent chain.

Andrew J. Farley, vice-president of the Camel Company, and for many years secretary of the Chicago Railway Equipment Company, died on December 13, 1915, at the Hyde Park hotel, Chicago, Ill. Mr. Farley was born at Schuylerville, N. Y., in 1847, and spent his early life in Troy, N. Y., where he was, at one time, engaged in the retail business. His advent with the railway supply business was with the old Dunham Manufacturing Company. When he left this company he became connected with The National Brake Beam Company, now the Chicago Railway Equipment Company, with which he spent most of his business career. About five years ago he retired from active business and has lived most of each year at his summer place at Wheaton, Ill., spending the winters in Chicago and California. He was one of the organizers of the Camel Company, and at the time of his death was vice-president. He is survived by his wife and one daughter, Mrs. James M. Hopkins.



A. J. Farley

E. H. Poetter, who, as announced in a previous issue, has been appointed manager of the general railroad sales department of the Barrett Manufacturing Company, with office at New York City, was born on September 14, 1879, at Juneau, Wis. After graduating from the high school at Beaver Dam, Wis., in 1896, he took a business college course, and in the same year entered the service of the Wisconsin Central as a stenographer in the land department at Chicago. He later became successively bill of lading clerk, chief clerk, contracting freight agent and freight and passenger agent at Seattle, Wash., to which position he was appointed in 1903. In December, 1903, he returned to Chicago, and for two years was engaged in the insurance business with the Equitable Life Insurance Company. In October, 1905, he entered the service of the



E. H. Poetter

Barrett Manufacturing Company as traffic manager at Chicago, in charge of the western territory. Later, upon a change in the company's organization, his title was changed to assistant traffic manager, with office in Chicago, from which position he is to be promoted, effective on January 1.

TRADE PUBLICATIONS

TURBINES.—"The Terry Turbine" is the title of a new bulletin just issued by The Terry Steam Turbine Company, Hartford, Conn., giving a general description of the various turbine applications, and dealing particularly with various kinds of high, low and mixed pressure turbines.

MACHINE TOOLS.—The Covington Machine Company, Covington, Va., has recently issued bulletin No. 11 containing a number of illustrations of Covington punches, shears, bending rolls, etc., for all classes service. The sole agent in the United States for these machines is Manning, Maxwell & Moore, Inc., New York.

CULVERTS.—The Canton Culvert & Silo Company, Canton, Ohio, has issued a rather unique folder containing extracts from the company's files "proving the practicability and popularity of 'Acme' (nestable) corrugated anti-corrosive No-Co-Ro metal culverts. The folder contains specimen advertisements which appeared in various technical papers and specimens of typical inquiries, orders and letters of commendation.

WIRING DEVICES.—The Bryant Electric Company, Bridgeport, Conn., has issued an elaborate catalog of 168 pages containing illustrations, descriptions, list prices, etc., of the company's line of Superior wiring devices. In the catalog there are illustrated "New Wrinkle" and "Wrinklet" sockets and other fixtures and various types of switches, receptacles, plugs and similar fixtures. The book is exceedingly well gotten up and profusely illustrated.

CONSTRUCTION OF LIGHT RAILWAYS DURING THE WAR.—It is said that 70 miles of track can be laid in two weeks by the efforts of four German railway battalions on light railways in Belgium and that this period can actually be halved by increasing the number of men engaged on construction. Operating details in regard to these light railways are very meagre, but traffic would seem to be worked on much the same methods used prior to the block system, the trains being despatched with regular intervals of about a third of a mile between them. This particular form of light railway is not to be confused with the temporary lines used by the Germans for the removal of heavy guns and ammunition. The motive power of the latter lines is horse traction, and it has been found possible to lay about two-thirds of a mile of track in an hour. These figures are, of course, made possible by transporting the track in ready-laid sections which have only to be placed in position and joined up.

RAILWAY EXTENSION IN COREA.—A British consular report on the trade of Corea for 1914 states that the second railway program, which consisted in the building of lines connecting the capital with Wonsan (Gensan) on the northeast coast and Taiden on the Seoul-Fusan line with Kunsan and Mokpo in the southwest, was completed in 1914, the Kōnan (Honam) Railway being finished in January and the Keigen (Seoul-Gensan) Railway in August. Work on the Gensan-Yongheung line, which forms a part of the third program, was started on October 1, and that portion of the track which runs from Gensan to Mun-chong, a distance of 5 miles, is expected to be ready for traffic by September 15, 1915. There will be a station at Tokmon, 1 mile from Gensan, and at one other intermediate place. The reconstruction of the Seoul-Fusan line was begun on October 5, 1914, and is to be spread over five years, as is also the work on the Chongjin-Hoiryong Railway (58.6 miles), which was started during the same month. The total mileage of railways in operation in Corea is now 994 miles. During 1914 the following sections were opened: Seiyu to Kotchiri on the Kōnan line, 35.5 miles; and Kenfutsuro to Kozan on the Keigen line, 23.8 miles; making a total of 59.3 miles newly opened to traffic. Surveying is in progress on the following lines, though it has not yet been decided when the work of laying them will be undertaken: (1) Taiku to Mokpo; (2) Hanheung to Chongjin; (3) Pingyang to Gensan; (4) a line running along the Yalu river.

Railway Construction

ALTON & SOUTHERN.—This company, which operates 11 miles of railroad as a belt line, plans to gradually extend the line around the territory near East St. Louis, Ill. Right of way has been bought for the construction of about four miles additional, but construction work has been delayed by a crossing controversy. The building of this extension in 1916 depends upon the result of the controversy.

ATHABASCA & FT. VERMILLION.—Reconnaissance reports have been made by the engineers on the projected route from Athabasca, Alta., northwest to Ft. Vermillion, about 300 miles. A charter to build over this route was granted last spring by the government of Alberta. Contingent on the completion of certain negotiations, the company hopes to begin construction work in the spring of 1916. Charles F. Law, Bank of British North American building, Vancouver, B. C., may be addressed (October 15, p. 714.)

BEULAVILLE RAILROAD.—Work is now under way by the Kinston Manufacturing Company, Kinston, N. C., on an extension from Beulaville, N. C., to Chinquapin, 7 miles. The company will also build one mile of secondary track between these two places.

CALIFORNIA ROADS.—The Board of Public Works of San Francisco has let a contract to F. Rolandi, 550 Montgomery street, for the construction of a railway from Rosasco, Tuolumne county, to the Hetch-Hetchy reservoir. The contract price is \$1,543,080. (November 5, p. 879.)

CANADIAN NORTHERN.—This company has grading work finished on about 140 miles on the Island of Vancouver, from Victoria to Alberni; also on 15.25 miles, from Victoria to Patricia Bay. Surveys are now being made from Kamloops, B. C., southeast via Vernon and Kelowna to Lumby, 141 miles, and on the Island of Vancouver, from Alberni to Nootka sound, 15.6 miles.

CLINTON & OKLAHOMA WESTERN.—Surveys are now being made for an extension to be built from Clinton, Okla., southeast to Colony, 30 miles. The company now operates a line from Clinton west to Strong City, 51 miles. (September 10, p. 487.)

CINCINNATI, HAMILTON & DAYTON.—Contracts were let during 1915 for the construction of 12 miles of second track from Carlisle, Ohio, to South Dayton. The estimated cost of the work is \$175,000. (October 29, p. 828.)

FLORIDA EAST COAST.—This company has authorized the construction of an extension of the Okeechobee division from Maytown, Fla., to a connection with the main line at New Smyrna, 17.35 miles, to cost about \$200,000. The contract for the grading work has been let to J. M. Cook, Jacksonville, Fla., and the bridge work and tracklaying will be carried out by company forces. The rail, ties and other track material have already been bought and are on hand. J. W. Wycoff is resident engineer for the construction work.

GULF COAST RAILWAY.—This company has been organized by some of the officers of the Southern Investment Company, Richmond, Va., to build a railway from a point near Venice, Fla., to Placida, about 28.5 miles. The promoters expect that construction work will be started in the near future. (November 19, p. 986.)

HOUSTON, RICHMOND & SAN ANTONIO INTERURBAN.—President Edward Kennedy, of Houston, Tex., is quoted as saying that a contract for grading the first 100 miles of this line will probably be let within the next 60 days. The projected route is from Houston west to San Antonio, about 215 miles. The general offices of the company are at San Antonio. (September 17, p. 547.)

LULA-HOMER.—Grading work is now under way between Belton, Ga., and Homer on 14 miles. William J. Redmond, Atlanta, Ga., is the general contractor. The company has projected an extension from Homer northeast to Anderson, S. C., 60 miles. D. G. Zeigler, chief engineer, Lula, Ga. (October 15, p. 714.)

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has approved the plans for the construction of the Webster avenue extension of the Third avenue

elevated railroad in the borough of the Bronx. This extension will extend from the present Third avenue line near its terminus north through Webster avenue to Gun Hill road, where a connection will be made with the new rapid transit line in White Plains road. This approval of the plans will enable the Interborough Rapid Transit Company to obtain bids immediately for the work.

The commission has awarded the following contracts on rapid transit lines in New York City: For the construction of Section No. 2 of Routes Nos. 19 and 22, to Lawrence C. Manuell, the lowest bidder, for \$2,063,877. This section is a three-track elevated railroad, and extends northerly from Whitlock avenue in the borough of the Bronx to Pelham Bay Park. For the installation of tracks on the White Plains road extension of the Lenox avenue branch of the existing subway, to the Coast & Lake Contracting Corporation, the lowest bidder, at \$53,930.

The commission has approved the award by the New York Municipal Railway Corporation to Bayly Hipkins of the contract for the erection of steel, constructing tracks, station buildings, platforms, etc., for the additional tracks on the Myrtle avenue elevated railroad in the borough of Brooklyn, between Wiloughby avenue and Palmetto street, and on Palmetto street, between Myrtle avenue and Cypress avenue. Mr. Hipkins was the lowest bidder, and offered to do the work for \$352,511.

NORTHERN OHIO TRACTION & LIGHT COMPANY.—This company during 1915 laid 3.50 miles of new first track in the cities of Akron, Ohio, and Canton, and 9.4 miles of double track cut-offs between Akron and Cleveland.

RICHMOND, RAPPAHANNOCK & NORTHERN.—A contract is reported let to the Central Construction Company, Harrisburg, Pa., for building from West Point, Va., northeast to Urbana, 17 miles. (December 10, p. 1113.)

SOUTHERN RAILWAY.—The additional main track under construction on this road, but not yet completed, is as follows: In Virginia, between Orange and Charlottesville, 28.1 miles; Arrowhead and Elma, 18.2 miles; Tye river and Amherst, 7.07 miles; Sycamore and Gretna, 5 miles; Whittles and Dry Fork, 9.7 miles. In North Carolina, between Concord and Rocky river, 5.6 miles. In South Carolina, between Hayne and Central, 55.85 miles, and in Georgia, between Cornelia and Gainesville, 24.7 miles, a total of 154.22 miles.

RAILWAY STRUCTURES

ASHLAND, WIS.—The two docks which are being extended by the Chicago & North Western are ore docks and not coaling docks, as reported last week. The Barnett & Record Company, of Minneapolis, Minn., has the general contract, and the contract for the ore chutes has been awarded the Wisconsin Bridge Company, of Milwaukee, Wis.

BALTIMORE, MD.—The Baltimore & Ohio is building a one-story addition, 30 ft. by 112 ft., at the Mount Clare shops, to cost about \$4,000. The work is being carried out by company forces.

GALLUP, N. M.—The Atchison, Topeka & Santa Fe has awarded a contract to Sharp & Gannon, Topeka, Kan., for changing the course of the Puerco river and filling in a site to be used for shops, roundhouses and tracks. The work will cost about \$67,000.

HOLLOW ROCK JUNCTION, TENN.—The Nashville, Chattanooga & St. Louis plans to enlarge its yards at Hollow Rock Junction and to increase the facilities at that place. The work of strengthening the bridges on the Nashville division has already begun between Nashville and Harding, also between Bellevue and Newson. Two bridges will be replaced with ballasted deck girders, and later it is proposed to reduce the grades on this division. The survey for this work has already been made.

LUDLOW, ILL.—The Central State Bridge Company of Indianapolis, Ind., has been awarded a contract for the construction of a 90-ft. span on the line of the Kankakee & Urbana Traction Company, north of Ludlow.

TAUNTON, MASS.—The superior court has filed a decree ordering the New York, New Haven & Hartford to complete the abolition of grade crossings in Taunton within three years and six months. President Elliott has testified that the work will cost \$2,500,000.

Railway Financial News

ARKANSAS, LOUISIANA & GULF.—See Arkansas & Louisiana Midland.

ARKANSAS & LOUISIANA MIDLAND.—This is the new name of the reorganized company which took over the Arkansas, Louisiana & Gulf.

ATLANTA, BIRMINGHAM & ATLANTIC.—Following the meeting of stockholders it was announced that an application will be made early in January to the secretary of state of Georgia for an amendment to the present charter as a first step toward reorganization.

CHICAGO, ROCK ISLAND & PACIFIC.—In an interview in the New York Times Charles A. Peabody, president of the Mutual Life Insurance Company of New York, and chairman of the protective committee for the first and refunding mortgage bonds, is quoted as saying: "My own impression is, and always has been, that a foreclosure under the first and refunding mortgage is inevitable. It must come sooner or later if the Chicago, Rock Island & Pacific is to be reorganized. I shall be glad, however, if some one else can show us a better way." N. L. Amster, who represents one of the minority factions of the stockholders, is quoted as saying: "The rumor of a foreclosure suit is only another attempt to throw confusion into the shareholders' camp. It is my view that there can be no foreclosure unless there has been an actual default of interest on the refunding bonds." The tentative plans which have been given out by the Amster interests suggest an assessment of \$33 per share on the stock. The Wall Street Journal says that application has been made to the trustees by the protective committee on behalf of holders of the first and refunding mortgage bonds for foreclosure of the mortgage. This step was taken under the clause of the mortgage prohibiting the placing of a lien on the property ahead of the refunding bonds. The violation of this provision, the committee claims, consists in the issuance of receiver's certificates.

MISSOURI, PACIFIC.—Frank J. Gould has authorized the deposit of his Missouri Pacific securities under the reorganization plan proposed by Kuhn, Loeb & Co. His holdings are not supposed to be very large, and it is not thought that this is any indication of how the Gould estate will act toward the plan.

WABASH-PITTSBURGH TERMINAL.—Representative Linthicum, of Maryland, has introduced in the lower house of Congress a resolution asking for an investigation of the Wabash-Pittsburgh Terminal.

WESTERN MARYLAND.—The directors have voted to pay interest on the coupons that have been in default on the company's notes. On January 1, therefore, there will be paid a year's interest on the coupons which were due January 1, 1915, and six months' interest on the coupons which were due July 1, 1915. These are coupons of the \$10,000,000 collateral trust notes and \$3,000,000 unsecured notes.

THE PROJECTED RAILWAYS IN GREECE.—The British consular report on the trade of the Piræus and district for the year 1914 says that the construction of the railway linking up the Piræus-Athens-Larissa line with the Oriental railways has made good progress, and according to a statement made by the minister of communications in the Greek Chamber of Deputies in Athens, the line will be ready in August, 1915. The necessary material—ties, rails, etc.—is being rapidly carried to the spot, while 20 engines and the rest of the rolling stock have been ordered in America, and will be delivered shortly. Owing to the war, several iron bridges which had been ordered in France cannot be ready in time, and in such a case temporary wooden bridges will be constructed where needed. A convention has also been signed for the purchase by the state of the old railway line. The purchase price agreed upon being \$2,600,000 less the dividend for 1913—about \$120,000—altogether \$2,480,000 as against \$3,996,000, the sum for which, according to the old convention, the Greek government was to have the right to take over the railway in 1927.

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WE GUARANTEE, that of this issue 8,800 copies were printed; that of these 8,800 copies 7,342 were mailed to regular paid subscribers to the weekly edition, 143 were provided for counter and news companies' sales, 1,041 were mailed to advertisers, exchanges and correspondents, and 274 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 479,300, an average of 9,217 copies a week.

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*Illustrated.

The interruption of traffic on the New York division of the New York, New Haven & Hartford by the snow and ice storm

The New Haven's Electrical Tieup
reported last week, was very serious for 72 hours and trains continued irregular for the rest of the week. Passengers and prospective passengers have entered a multitude of complaints, but it is impossible even now to explain more than a fraction of the reasons for the delays to trains that were run and the omission of many trains that ought to have been run but were not; for the chief operating officer himself (at the time this paper goes to press) has received no full or detailed reports of the causes of the troubles. This is because of the scanty means of communication, and, more particularly, because every man and every officer who could do anything toward restoring the electrical wires has until now expended all his energies on the outdoor work. The electric

power was unavailable for about 36 hours because of the breaking at many places of the "control" wire, the wire by which the load dispatcher at the power house keeps in touch with the different sections of the line. This "control" is as important as the transmission itself; but the conductor was not so strong, physically. The steel structure, the catenary and contact conductors and the transmission wires were all of sufficient strength and withstood the snow, sleet and wind (the wind in many places blew at 70 miles an hour); except that the transmission wires failed at three places, probably from electrical disturbances; and the "control" wire failed because the load of snow and ice was too great for the physical strength of the 300-ft. spans. Those signal wires which were on wooden poles went down on long stretches of the road because of excessive weights on wires, and failures of poles; and signal wires on the steel structures went down from overweight, the same as the "control" wire above mentioned. All telegraph and telephone wires were out of service because of these same general causes, and the telephone company's lines as well as the Western Union wires at the same time failed in all directions. On a 12-mile line of the New York Telephone Company, a few miles west of the New Haven road, every pole fell. The New York division is operated largely by electric power, and there were only 25 steam locomotives (all freight engines) available on the division. Other divisions adjacent, by reason of the snow on the tracks and the delays due to the loss of communicating wires, needed all their engines and could lend none to the New York division. This, in brief, seems to be the explanation of the small number of trains in service on Tuesday and Wednesday. Only by borrowing linemen from foreign electric establishments and by getting the co-operation of a large number of Western Union men was the road able, by Thursday, to gather a force of 250 linemen; and these 250 were kept at work, as many hours as they could endure, until Monday of this week.

The Austrian reply to the United States assumes no knowledge on the part of that government of the negotiations which the

New York State Passenger Fares

United States had with Germany in regard to the Lusitania. The New York Public Service Commission, Second district, has suspended for three months, pending a hearing, the proposed increase of passenger fares from 2 to 2½ cents which was to have become effective January 1. The press bureau of the commission gave out the statement that "no date has yet been set for this hearing, but it was stated at the office of the commission that the hearing would be held as soon as the representatives of the railroads could prepare the proof which it will be necessary for them to adduce on the hearing and with due regard to the convenience of the number of civic bodies and officials," etc. Volumes of evidence have been submitted in various cases showing the cost of passenger service. The United States Supreme Court has decided that each class of service must be permitted to earn a return on the capital invested in the utilities devoted to this service; the Interstate Commerce Commission has granted the western passenger fare increases, but the New York State Public Service Commission is going to allow three months or more for the preparation of proof and the convenience of civic bodies, etc. No one can criticize the commission for proceeding in an orderly way to treat the New York state passenger fares on their own merits, but the commission is an administrative body which, unlike the Austrian government, ought to be cognizant of what is taking place in a field in which it is specifically engaged in work. Is it not a bit misleading to blame a three months' delay on the necessity for the roads to prepare proof? The roads probably made a very careful investigation long before the increase was decided on. The proof necessary to convince a fair and intelligent commission is probably already prepared. Whether it be sufficient to convince the civic bodies and officials whose convenience the commission also wishes to meet may be another question.

The strike on the Belt Railway of Chicago last week involved a question which is raised nearly every time a new classification yard is placed in operation. Clearing yard, which was placed in service last July, is located in the outskirts of Chicago about six miles west of the old yard of the Belt Railway, which was adjacent to a well built-up residential section. With the opening of the new yard at Clearing, the men demanded that an employees' train be run at frequent intervals to take them to and from work, and the continued refusal of the road to install this service permanently precipitated the strike. Whenever a road builds a new classification yard it is obviously necessary to locate it beyond the settled areas, where sufficient land can be acquired at reasonable prices and where there will be room for further expansion. Whenever such a terminal is placed in service the employees working in the yard and the train and enginemen running out of it have the alternative of moving near the new terminal or of finding some means of getting to and from work conveniently. It usually becomes necessary for the employees to move to the new location. To assist their men during the period of readjustment, a number of roads have put on employees' trains temporarily with the result that in many cases the employees have made little or no effort to relocate their homes, depending on their ability to persuade the company to keep the trains in service. Because of the difficulties which have arisen when such trains have been taken off, the roads have in numerous instances refused to put on such trains at all, leaving their men to get to work the best they could rather than face the difficulty in removing these trains after they have once been started. While local conditions differ from place to place, and while it is recognized that a temporary hardship is created for the employee involved whenever their place of employment is moved away from the vicinity of their homes, their action in Chicago and elsewhere is a strong deterrent to any co-operation on the part of the railroads.

COMFORTING DELAYED PASSENGERS

DELAYING a hundred passengers a half hour may cause more ill feeling than can be counteracted by the highest grade of politeness in all the ticket offices on the road for a whole year, even though the delay may be due to an engine failure, a fallen brakebeam or some other simple accident which every one of the hundred passengers, on reflection, would admit to be practically unavoidable. This being so, J. B. Austin, superintendent of the Long Island Railroad, may not be far out of the way when he says, in a circular to stationmen and trainmen, that "nothing will contribute so much to the popularity of the road as the giving to all concerned prompt information as to cause and probable duration of delays." This circular is so well worded that it deserves to be copied. We started to italicize the most important words in its reproduction elsewhere in this issue, but gave up the attempt because there were so many of them. We will, however, note a few of them here.

"Comfort and Convenience." Making passengers comfortable is only one feature. Consulting their convenience may mean taking time, for the passenger's benefit, to study the time tables of a rival railroad, or sending a brakeman to carry a woman's hand baggage to the other road's station. Comfort includes a mind at peace. "Suitable Announcement." How many announcements of delay are unsuitable; falling far short of giving all the information that is reasonably desired! "Trainmen are to freely answer all questions . . ." What a very high standard, as compared with what is heard on passenger trains every day! Many brakemen give answers which are so brief as to seem to indicate that they value their words at a dollar each. "Trainmen will only be expected to do the best they can." Allowing the passengers to be the judges, that will be at least a hundred per cent above the usual average. And, whether they are reasonable or unreasonable, the passengers must be allowed to be the judges. Who can make it otherwise?

"The train dispatchers will keep in touch with the agents." This is one of the chief sentences in Mr. Austin's circular. If the Long Island is like most roads it is the sentence from which the most definite improvement may be expected. Educating brakemen is a slow process. It is hard to find many roads (or divisions) where the force of passenger trainmen does not include a considerable percentage of men whom the trainmaster looks upon as rather poor material for educational processes. The Long Island itself must have its full share of educational perplexities, because of the great reduction in the volume of passenger service on its lines in the Autumn and the equally heavy increase in the Spring. To maintain efficient passenger service on that road is a great accomplishment. But to keep passengers always well informed, through the medium of the train dispatcher and his telephone lines are running to every ticket office, ought to be a simple problem. Simple, because there are comparatively few men to deal with and they are (or ought to be) men of intelligence and alert minds. But this problem, though simple, has been much neglected. We could name roads where train delays are very poorly advertised; where passengers have numerous grievances—many of them rather small grievances, it is true—which alert train dispatchers could make unnecessary.

The station agents must do their part, of course. If stationmen were more wideawake to anticipate passengers' wants they could enhance the dispatchers' efficiency by asking them more questions—provided, of course, that the superintendent employs enough extra pairs of eyes to make sure that the dispatchers give suitable responses to agents' questions. When dispatchers are rushed with work they are liable to neglect passengers' convenience, with some feeling of justification, and the superintendent needs to step in and straighten matters. Again, it is to be remembered that the shortsighted and lazy dispatchers, and those who are overbearing in their attitude to agents, are not all dead.

Is there not some way to excite rivalry in this matter among dispatchers, and also among agents? Prizes for excellence are hardly practicable; and even the prize of mention by name in "efficiency bulletins" sometimes overshoots the mark, by magnifying "merits." The man who is inclined to blow his own horn must not be encouraged, surely. But, in the nature of the case, there must always be, in any body of men, some who excel; and it is one of the plainest duties of the officer to see that these men's methods are made known to others who ought to pattern after them.

Whatever the solution of the problem of perfect satisfaction of passengers' wants, it is certain that no very marked success will be achieved except as superintendents, trainmasters, dispatchers, agents, conductors and brakemen give the subject a lot of earnest and business-like attention.

4 MILLIONS FOR AUTOMOBILES BUT NOT A CENT FOR RAILROADS

THE Interstate Commerce Commission may not have sold out to the railroads, because the railroads can hardly afford to buy luxuries these days, even if their credit is as good as Clifford Thorne says it is, but the commission must at least be working in cahoots with Henry Ford—take it from the Des Moines Register and Leader, against whose advice the commission has come to the astounding conclusion that passenger fares should be somewhat higher than those now prevailing in Iowa.

"Increasing railroad passenger fares to 2.4 cents a mile," it says, "is like handing the automobile manufacturers of the country \$100,000,000. It will give enormous impetus to the movement, already well under way, to make each man furnish his own private means of rapid transit between cities, for it is the final step in giving the automobile a definite advantage in the way of cheapness."

This somewhat broad statement is based on the assertion that "two passengers in a light automobile, or four in a heavy car, can journey for less per mile than the 4.8 cents and the 9.6

cents, respectively, which parties so constituted will pay if they travel on the railways."

The Register and Leader's figures lack something of that specific quality which might be expected to characterize, say, a calculation in its own office as to whether copies of its paper which reach Chicago could be sent the more cheaply by mail or by automobile, but the advantage in favor of the automobile is seen in the fraction of a cent per mile which is to be added to the railroad fare. It may be possible to figure the cost of automobiling at less than 2.4 cents per mile, particularly if Clifford Thorne be allowed to censor the maintenance expenses and depreciation charges; in fact, we have heard that some thousands of Iowa farmers occasionally ride in automobiles in preference to paying only two cents a mile to the railroads. We have also heard of higher rates being paid, and without interference by either state or interstate taxicab commissions.

However, we see no reason why anyone in Iowa who really can't afford to buy a new car this year need forego for the present the benefits of personal transportation just because of four-tenths of a cent per mile. The Iowa legislature has not yet repealed the beneficent law which insures to present day Iowans, if not to their posterity, the blessings of liberty to buy a separate ticket at the state line for two cents a mile. It is not much more difficult to do this on a journey to or from the surrounding states of Minnesota, Illinois, Missouri or Kansas than to change a tire, for example. In South Dakota, of course, the rate is 2½ cents and those who have occasion to go back and forth between Iowa and that state would better buy a Ford, save another tenth of a cent per mile and declare a dividend.

On the other hand, there are some infinitesimal advantages in travel by rail as compared with the joys of furnishing one's own private means of rapid transit, particularly on a trip beyond the two-cent a mile radius. If the train is late one can write to the Register and Leader or file a complaint with the Iowa Railroad Commission, whereas if the automobile is late it is late. If nightfall overtakes the weary traveler en route, the Pullman Company will provide a bed for a consideration strictly regulated by a commission and no higher than would be charged in an unregulated hotel in Des Moines. We are not informed as to the make of the light automobile in which one can travel for less than 2.4 cents a mile, but the up-to-date Pullman car is provided with springs.

In comparing the cost of automobile and rail travel our Iowa contemporary has inadvertently omitted consideration of the first cost of the car. In the case of the railroads some of the cars, of course, were found growing on the bushes on the early land grants, and, therefore, the railroads do not expect their rates to cover any return on capital investment, but in the case of automobiles, as well as of gasoline, we had understood that the price usually included some modicum of dividend, the very idea of which is usually abhorrent to the Register and Leader. We do not know how it stands on the question of peace junkets.

If the Iowa automobile owners agree with this oracle as to the cost of automobile travel, it is surprising that they should allow the railroads to continue to compete with them for intra-state business. Why not either raise the state passenger rate or let the railroads discontinue their state passenger business, tax them on their interstate business for the benefit of good roads, for which the Register and Leader now sees an increased need, and turn the state railroad commission into a good roads commission? Reduce the local tax rates for road purposes in order to increase the revenue therefrom and if a railroad gets in the way of an automobile, elevate it. This plan need not legislate anyone out of a job. If road-building prove an uncongenial task for the chairman of the commission the legislature might pay him for regulating interstate rates and create a vice-chairman to take charge of the constructive end of the work.

However, if cheap transportation is really desired, the *Railway Age Gazette* has compiled some statistics of its own, which we may not be able to prove, but which we can confidently assert will demonstrate that it is cheaper to walk than to travel either by automobile or by rail, even within the confines of a

sovereign state. If this discovery is worth \$100,000,000 to the shoe trust, let the Register and Leader make the most of it.

IMPROVING RELATIONS BETWEEN RAILWAYS AND THEIR PATRONS

THE problem of railway regulation is losing none of its complexity or magnitude, but the recent annual report of the Interstate Commerce Commission contains indications of an improvement in many respects in the relations between the railways and their patrons. Since it was the unsatisfactory state of these relations which was responsible for the creation of the problem of regulation this improvement represents progress in fundamentals. The need for railway regulation arose principally from the controversies between the buyers and the sellers of transportation over the rates to be paid by the buyer for the service rendered by the seller, and most of the work of both the federal and the state commissions has had to do with one phase or another of this question.

The improvement to which we refer is manifested in the reduction in the number of such controversies. In the year ending October 31, 1915, covered by the commission's report, the commission received 964 formal complaints, a decrease as compared with the previous year of 190, and as compared with 1913 of 59. It also received 6,500 informal complaints, as compared with 7,880 the year before and 7,600 in 1913.

The commission says that the decrease in the number of complaints filed during the year has been more than offset by the complex nature of the cases that have been presented, and that the rate structures between various communities are now more often the subject of complaint than was the case in earlier years. This means that the cases involve not so much dissatisfaction with the amount of the rates as market rivalry between competing cities. The number of proceedings involving rates suspended by the commission was 199, a decrease of 4, and the number of cases in which the commission refused to suspend new rate schedules was 368, an increase of 157.

Moreover, the proportion of indictments for violations of the law returned against carriers to those returned against shippers, passengers and others was less than ever before. The report of the division of inquiry of the commission, which has to do with the investigation of seeming violations of the interstate commerce laws, shows that about 90 per cent of the matters investigated were disposed of without resort to the courts, and that the larger part of the field investigations made by the division did not disclose violations of law.

Of the 72 indictments returned during the year at the instigation of the commission, only 22 were against carriers or carriers' agents and 50 were against passengers, shippers or other interested parties. The indictments against railroads were principally for failure to strictly observe their tariffs and for granting to individuals favors or free passenger service, and while these cases receive wide publicity, the fact that the commission has caused more prosecutions of the patrons of the railways than of the railways themselves for violations of the laws is usually overlooked. Whether or not it is more blessed to give than to receive, it is true that not only during the past year but in every year but two since the commission's division of prosecution was organized in 1907 there have been more indictments of shippers and passengers for soliciting and receiving rebates, or other preferential treatment, false billing of shipments, filing false claims and for violations of the anti-pass act, than of the railways for giving favors.

The indictments for each year, as shown by the Interstate Commerce Commission reports, have been as follows:

	1915	1914	1913	1912	1911	1910	1909	1908	Totals
Against carriers or carriers' agents	22	20	28	34	29	25	16	18	192
Against shippers, passengers and others	50	38	33	54	26	19	19	28	267
Joint indictments				5	7				12

As far as rebates are concerned there are always two parties to the transaction, the giver and the receiver, but much of the

increase in the proportion of indictments against shippers is accounted for by the practice of false billing of freight in order to secure a lower rate and the filing of excessive or fictitious claims for loss and damage, practices which in many cases the railway's cannot prevent.

The commission also notes an improvement in the practices of the carriers in adjusting claims, showing that of 4,563,438 presented during the calendar year 1914, 96 per cent were adjusted, 50 per cent within 15 days after receipt, more than 65 per cent within 30 days, and all but 6 per cent within 120 days.

NEW SOUTH WALES GOVERNMENT RAILWAYS

THE annual report of the New South Wales Government Railways is always interesting because they constitute the most important railway system of Australia. The report of the chief commissioner for the year ended June 30, 1915, is especially interesting because of its indication that transportation conditions in the antipodes are subject to many of the same influences that exist elsewhere; that government ownership is no antidote for reductions in volume of traffic, or increases in wages and other expenses such as have been experienced in this country; and that it does not serve to prevent increases in capitalization and rates.

Following an increase in gross earnings in 1914 over 1913 of \$4,827,224, and an estimate that the 1915 earnings would show a still further increase of \$1,750,000, the volume of traffic was so reduced after the outbreak of the war in August that the earnings for the year actually amounted to \$37,016,000 as compared with \$37,627,000 in 1914, a loss of \$611,047, or 1.62 per cent. Operating expenses were \$25,812,247 as compared with \$26,291,725 the previous year, a reduction of \$479,477. The balance, after payment of operating expenses, was \$11,203,996, as compared with \$11,335,566 in 1914; but an increase in the interest on capital invested from \$10,318,042 in 1914 to \$11,317,384 in 1915 resulted in a deficit for the year of \$113,388, as compared with a surplus of \$1,017,523 in 1914. From the increased rates and fares put into effect on March 1, 1914, the earnings for the year benefited to the extent of \$1,083,780, as compared with \$361,263 in the previous year, when the higher rates were in operation for only four months. But for these higher rates the year's operations would have resulted in a larger deficit than that recorded.

The chief commissioner says in the report that the principal decrease in the earnings was caused by the comparative failure of the wheat crop and that there were also large decreases in the earnings from general merchandise, attributable to war and drought conditions, and from coal, coke and miscellaneous traffic. He also says that "when it became evident early in the year that the anticipated increase in earnings would not be realized, steps were taken to curtail the working expenditure in every possible way without impairing safety or efficiency. Unprofitable train mileage was reduced as much as possible and only absolutely necessary maintenance works were proceeded with." In November he made application to the court of industrial arbitration for the suspension of periodical advances in wages to salaried officers, engineers and firemen that had been awarded the year before, but the court dismissed the application. The additional expenditure during the year attributed to these advances was \$568,114. It is also stated that the cost of materials used during the year due to advances in prices increased approximately \$175,000. The train mileage for the year was 20,420,023, a reduction of 129,672 miles, the mileage of passenger trains being 9,647,652, of mixed trains 1,353,920, and of goods trains 9,418,451.

An appendix to the report shows, however, that the average number of men employed, 37,403, was 4,076 greater than for the preceding year, and although most of the increase was in the number employed on work charged to capital account the operating force was 414 larger than in 1914.

The interest requirements, which were \$999,342 larger than

for the previous year, include interest on money expended on work under construction during the year, which the commissioner says should be treated as part of the cost of the work and charged to capital, rather than to operation. But for the inclusion of this amount, he observes, the result for the year would have been a surplus of \$149,036, instead of a deficit.

The balance after working expenses, available for the payment of interest, was equal to 3.6 per cent on the capital invested, as compared with 3.9 per cent in the previous year. This is referred to in the report as a "profit." The expenditure charged to capital account during the year amounted to \$20,987,448, which increased the total cost of lines open for traffic on June 30, 1915, to \$318,734,711 for 4,134.5 miles, or \$77,094 per mile. In 1914, the capital investment was \$75,048 per mile, in 1907, \$62,917 and in 1888, \$63,734.

Of the total earnings the passenger business contributed \$14,145,924, a slight increase over 1914, and the freight business \$20,442,297, over half of the freight earnings being derived from the merchandise traffic, and approximately one-fourth from the livestock traffic. The ton miles of freight carried amounted to 916,923,022, the average haul was 78.64 miles and the average earnings per ton-mile were 1.9 cents. The average haul on general merchandise was 89.68 and the average rate per ton-mile 2.78 cents. The average rate on coal and shale was 1.08 cents, on grain and flour .74 cents, hay, straw and chaff .72 cents, wool 3.92 cents and livestock 2.12 cents. The number of passengers carried was 88,774,442, of which 79,914,452 were suburban passengers carried at an average rate of .9 cents per mile and 8,859,990 "country passengers," carried at an average rate of 1.32 cents. Extensions amounting to 163 miles were opened for traffic during the year, and 1,078 miles of extensions are under construction.

NEW BOOKS

Claims Between Shippers and Carriers. By Ralph Merriam of the Chicago Bar. Size, 6 in. by 9½ in., 1815 pages, bound in buckram. Published by La Salle Extension University, 2550 South Michigan avenue, Chicago. Price, \$10.

This book is a digest of the decisions of the American courts, both national and state, relating to claims between shippers and carriers by rail and water from the earliest times (1658) to the present day, and is said to cover every point made in each decision. The various points are concisely and clearly summarized and the arrangement is such that the rulings of the courts on the exact point at issue can be instantly located, making the book unusually valuable for ready reference.

In seeking the decisions upon any question, the reader may by a glance at the table of contents determine, first, the main division within which the point falls; and, second, the particular section covering the set of facts or circumstances involved. Turning to this section of the body of the book he will find the cases upon the point assembled, with the decisions of the United States courts coming first, followed by those of the state courts in alphabetical order. The decisions are then arranged, first, according to the rank of the court; and second, chronologically. A slight variation of this arrangement is made in the cases under "Shipments by Water," due to the fact that recent decisions of the United States courts are arranged alphabetically according to districts. At the end of each decision appear the name of the case and a reference to the official report or reports in which the full opinion is printed. As an additional aid to the reader in locating any point he wishes, there is a 50-page alphabetical index at the end of the book.

The author is known to traffic men as co-author of Lust and Merriam's "Digest of Decisions Under the Interstate Commerce Act," and his new work should be valuable to all traffic men both of railroads and of industrial companies as well as to operating men and others who have anything to do with the handling of claims or the prevention of loss and damage to freight.

Letters to the Editor

ORIGINAL COST TO DATE, COST OF REPRODUCTION NEW, AND COST OF REPRODUCTION LESS DEPRECIATION

NEW ORLEANS, La.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

It is becoming increasingly evident from the trend of discussion that "cost of reproduction new" is taken to mean the problematical expense of providing a hypothetical substitute transportation plant rather than the retracing at present-day prices of the growth of the existing plant. Else why this talk of "rational programs of construction"? Perhaps a hybrid having more or less the characteristics of both parents will be the final outcome. What is the real meaning of the valuation act of March 1, 1913, in this respect? Is it intended to ascertain what it would now cost to build railroads of similar intent and purport but not necessarily identical with the present ones? Or may we lay down the principle that everything that has entered into the productive cost of the present transportation plant to date, minus the deletions, should figure in its reproductive cost in like manner and that nothing that has not should? Cannot the intimate connection between cost of production, cost of reproduction new, and existing depreciation be argued from the very juxtaposition of the phrases, "original cost to date, cost of reproduction new and cost of reproduction less depreciation"? How else will "cost of reproduction less depreciation" fit in with the depreciation in the existing plant?

The most damning feature of such "cost of reproduction new" is its necessarily theoretical and academic basis. It is not intended to be put to the acid test of accomplishment. Railroads do not spring like Minerva full-panoplied from the brain of Jove. Railroads, moreover, like castles, may be built in the air. Are we justified in making use of the experience of the past, dearly bought at the sacrifice of investors, only to the extent of avoiding proven errors, thus cheapening the estimated cost of construction? Can we assume in our program of reproduction the collective engineering wisdom of the country such as was not at the disposal of original constructors? Then, again, there are the liable false assumptions of ideal financial arrangements, unlimited and ever-ready capital; indeterminate time; ideal conditions alike as to weather, labor troubles and a market for supplies without fluctuations; the perfect co-ordination of all parts of the directing and working organization without friction or lost motion; construction without waste; continuous and contiguous construction as opposed to piecemeal growth, spotted in time and place; all of which is contrary to general railroad experience. Even where, under the proposed scheme, provision is to be made for the cost of experience and similar contingencies, it is on some percentage basis, which is highly unsatisfactory and likely to be at great odds with reality.

The valuation is entirely without meaning unless intended to be used. Of possible uses, not the least important is as a basis of criticism of existing passenger and freight rates. In any resulting revision, two parties are vitally interested, the public investing in railroad securities, on the one hand, and the traveling and shipping public, on the other. We should carefully guard against adopting valuation methods which may either confiscate private property or mulct the public according as they depress or inflate actual railroad values.

On the other hand, what more natural than, having ascertained according to law the actual original cost to date, to take these same units of talent, land, labor and material and restate them in money equivalents of the present time. "Cost of reproduction new" would thus measure the increment or decrement in the investment as wrought by the passing years. We should then have but one basic statement (by valuation sections and

recapped) of "original cost to date, cost of reproduction new and cost of reproduction less depreciation," with deletions in italics, as deductions, when they occur, and arranged in columns as follows:

1. Description of units of property broken up into elements of cost.
2. Date as of which investment was made.
3. Actual original quantities to date as proven from the records of the carriers, supplemented and checked by the physical inventories, or estimated as closely as possible when otherwise unobtainable.
4. Actual or estimated original cost to date.
5. A restatement of the above in money equivalents of the present day.
6. Ascertained existing depreciation in the present plant.
7. Cost of reproduction new less depreciation.

J. S. TASSIN.

THE TRAIN DESPATCHER'S LIFE, PAST AND PRESENT

CHICAGO, Ill.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

That article on "The Train Despatcher," by "One of Them" in your issue of August 20 is a fine portrayal of the strenuous life of a train despatcher on a busy single track railroad. I agree with all he has to say, except that, on the whole, I do not think the despatcher's lot is more strenuous today than it was 20 or 25 years ago. However, I have been out of harness as a despatcher for 15 years (though still in the service) and my perspective may have changed. It is true they now have the sixteen-hour law and other laws and requirements that add to their work, but I think these additional burdens are at least offset by conveniences now enjoyed in the way of better lighted and better ventilated offices, better circuits and often shorter districts, larger engines and consequently fewer trains to handle and double tracks; and, above all these advantages, more considerate railway officers, from the president down to the trainmaster.

The despatcher still is one of the most important spokes in the steering wheel. In times past despatchers were subjected to "umbrella rules"—rules that often bound them regardless of conditions—but we have got away from that; and on all of the more important roads the despatcher has, in a sense, been elevated to an officer and is actually recognized as such.

The writer was a despatcher in the latter eighties and early nineties, when the superintendent was as much of a Czar toward the despatchers, as some of the despatchers were toward the "OS" operators. I served for several years under one superintendent whom I shall never forget. This man had roughed it for many years, was familiar with adversity, rather coarse and of the driving kind, but withal a shrewd man. He came to the road as a trainmaster and succeeded to the superintendency only a few months later; this being his first position as superintendent. He was about 50 years of age, and his attitude toward most of his subordinates was that of a greatly exaggerated superiority. Everybody got out of the way and gave him a clear track when they saw him coming. The underground reports via the switch shanty were to the effect that he was a "terror" and had been run off of some road in the Southwest on account of his hard treatment of men; and his attitude from the start was anything but reassuring. He brought with him his family, including four boys, the eldest about 17 years old. I should like to tell you about how he put this boy ahead, but to make a long story short I will only say that to maintain one's rights it was necessary that we (the operators and despatchers) had to stand up with great firmness, and sometimes appeal over the superintendent's head. The boy was soon made despatcher and after one collision and a number of "close shaves" became a quite decent one.

The trouble with this old-school superintendent was that he didn't know how to treat men; and, moreover, didn't care to know. He was not interested particularly in either the men or the company; and, as was most natural, many of his subordi-

nates were of the same stripe. This man finally went the route of the selfish and arrogant. With a change in management he was dropped out and so far as I know has not had an official position since.

That kind of treatment of men was not at all uncommon 25 to 30 years ago. But that and other adverse conditions the present managements have overcome, so that railroad life is now more pleasant; not only for the train despatcher, but for all others.

Today the train despatcher, with other railway officers, and the employees as well, have on most roads of any consequence the assurance, not only of retention in the service, but of promotion on merit and ability; and beyond that a reward of merit in the shape of a pension. If perchance an unworthy man slips in as superintendent, the despatcher can and does have easy access to the general officers, and even to the president, if he chooses. And the higher officer, almost without exception, has graduated from the ranks, so that he naturally frowns on nepotism, favoritism and all discrimination.

The very fact that the office of train despatcher, or chief despatcher, on a busy road, is a strenuous one, is what attracts strong men. The work after all is in the nature of a race and usually (as was not always the case years ago) the best man wins. It is true the despatcher is an "inside" man; and, unfortunately, sometimes a superintendent who graduated by way of the "M. of W." route will not seem to acknowledge his persevering efforts, but will promote an outside man for performing some one piece of work to his fancy; but this, though not always right, works both ways.

After all, it is usually the wideawake, persevering man who gets there, and I think by reason of the very strenuous nature of the work, of which the officers must have some knowledge, the train despatcher's route—all things considered—is a very favorable one.

A train despatcher with the right kind of stuff in him will make his work strenuous. He maps out the moves, posts each conductor and engineer on what is wanted, breaks a passive rule here and crowds the devil there; but withal takes no chances, so far as real safety is concerned. As the writer of the article referred to observes, the despatcher is often frozen to his chair for an hour or more after his relief, so absorbingly interested in his work that he can't let go. He may often do much good in obviating trouble due to errors on the part of others. In fact, the hundred point train despatcher feels responsible for the safety of every train on his territory, and during his hours there are very few accidents due to lapses on the part of any one. He gives the crew of a train about to leave a terminal a "hunch" about a late overdue superior train that does not appear on their orders. In completing an order to another crew on the road, which puts them into a blind siding for an opposing train, he gives them a tip that number so and so is on time, etc. He keeps an eye on a new conductor or engineer, and really feels that it is up to him to get such a man over the road safely, feeling a personal pride in the work.

It is the old, old story; that feeling of self approval that we would all attain must come through sincere effort. "The divine law is very simple and automatic; we receive only as we give away."

My advice to the train despatcher would be this: If you want a position where there are only certain specific things to do, and where you can quit on the hour, look up another calling. If, on the other hand, you are ambitious, thank your stars that you have the opportunities that a position as train despatcher offers. See to it that you put your whole soul into the work to the extent that it meets with your own unqualified approval, whether promotion does or does not come as often as you think it should. A good despatcher, like good men in other lines, has initiative, and makes use of it. A man of that kind compels recognition. "The law of compensation never rests." Although, as before stated, I am now out of the train-wire harness, I beg to subscribe, like your former correspondent,

ONE OF THEM.

MAINTENANCE EXPENDITURES ON THE PERE MARQUETTE

DETROIT, Mich.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to the article published in your issue of November 19, concerning the operation of the Pere Marquette for the fiscal year ending June 30, 1915; you are justified in commenting that "it is by no means conclusively demonstrated that the 1915 rate of expenditure for maintenance can be continued without detriment to the property. Under present conditions of operation, with the necessity for heavy rails, ballast, etc., and probable cost of track labor, \$864 appears to be considerably less than will be required as an average over a series of years for maintenance of way and structures."

The maintenance of way work was carried on under a carefully prepared program, which called for an expenditure of approximately \$2,000,000, which we considered ample to maintain the property in normal condition; and I may state that the property is at this time, in reality, in as good physical condition as the business warrants, and in our judgment should be maintained for not to exceed \$900 per mile or \$2,082,600 per annum.

With a slight variation in the mileage, maintenance of way expenditures for the past 10 years have been as follows:

1906	.....	\$1,627,307
1907	.....	1,639,447
1908	.....	1,658,834
1909	.....	1,669,220
1910	.....	1,932,437
1911	.....	2,123,296
1912	.....	2,064,891
1913	.....	2,944,517
1914	.....	2,996,118
1915	.....	2,000,282
Total	.....	\$20,656,349

This is an average of \$2,065,635 a year.

Approximately one-third of the expenditures made in the years 1913 and 1914 were on account of deferred maintenance. I am satisfied we did not receive as much value for each dollar expended in this rehabilitation work as we would have had the maintenance been kept up to normal during the previous years. In dealing with the Pere Marquette we must not lose sight of the fact that of the total mileage there are but 1,339.67 miles classified as main line, the balance being branch lines and business-producing branches.

It is the judgment of all of those who have been connected with the property since the consolidation (which occurred in 1900) that it is in better physical condition to-day than ever before.

Referring to the maintenance of equipment: The expenditure of \$3,492,973 may also be said to be a normal annual expenditure.

Below you will find the expenditures for a 10-year period:

1906	.....	\$1,897,036
1907	.....	1,975,221
1908	.....	1,966,751
1909	.....	2,018,494
1910	.....	2,117,700
1911	.....	2,550,859
1912	.....	2,804,938
1913	.....	2,987,156
1914	.....	6,487,963
1915	.....	3,492,973
Total	.....	\$28,299,091

This is an average of \$2,829,909 a year.

Since May, 1914, the maintenance of equipment account includes a depreciation charge of approximately \$54,000 per month. Prior to this time the amount charged off to depreciation was small.

I have not gone into the detail to show the relative density of traffic handled covering the period under maintenance of way, nor the engine and ton miles under maintenance of equipment, but have treated the matter generally without going into detail, and I feel satisfied that both the equipment and roadway are being maintained fully up to a normal condition.

FRANK H. ALFRED
General Manager for Receivers.

Heavy Pacific Type Locomotive for the Lackawanna

**Anthracite Coal Burning Engines with a Tractive Effort
of 47,500 lb. and a Weight on Drivers of 197,300 lb.**

About three years ago seven Pacific type locomotives* were built for the Delaware, Lackawanna & Western, by the American Locomotive Company, to replace a class of heavy 10-wheel locomotives then handling the through passenger service. The division between Scranton and Hoboken crosses the Pocono mountains and has a constant ruling grade between Stroudsburg and Pocono Summit of 78 ft. per mile for a distance of 16 miles, with curves of five and six degrees. The Pacific type locomotives were designed to handle a 460-ton train over this grade at a sustained speed of 30 miles an hour and have handled trains of eight cars weighing 530 tons at that speed.

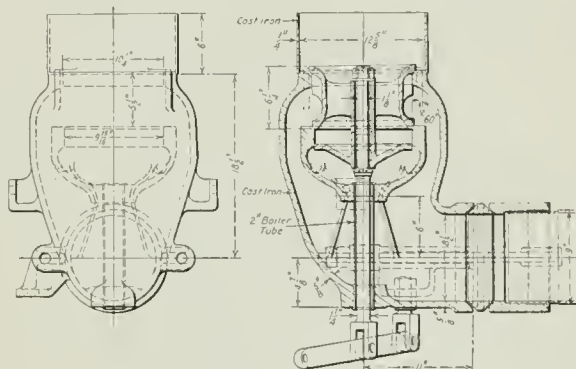
The general introduction of steel cars in passenger service has necessitated the purchase of still heavier and more powerful engines, and five Pacific type locomotives, the most powerful of this type on record at this time, have recently been delivered by the American Locomotive Company. These engines are hauling trains of nine steel cars, weighing 600 tons, over the grade referred to above, at a speed of 30 miles an hour. On other trains they are handling from one to two extra cars on schedule time on the grades, and have made it possible to dispense with all helpers on the mountain district on trains of 10 cars or less.

The new locomotives have a total weight, engine and tender, of 471,300 lb. and a tractive effort of 47,500 lb. Pacifics of the 1106 class have a total weight, engine and tender, of 449,800 lb. and a tractive effort of 40,800 lb. With an increase in weight of 4.8 per cent, an increase in tractive effort of 16.4 per cent has been obtained.

A tractive effort of 47,500 lb. from a Pacific type locomotive requires a boiler of high capacity. At the first course, the barrel

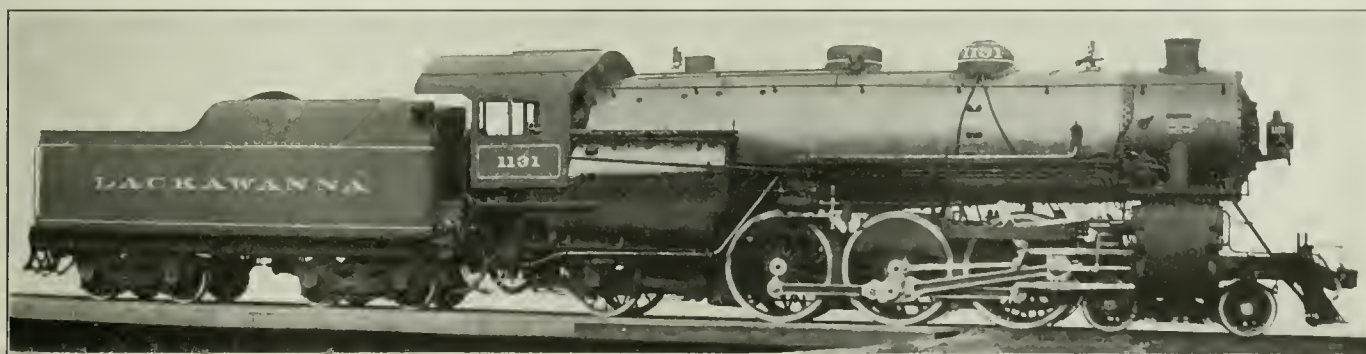
a net increase in heating surface of 255 sq. ft. Each firebox includes a combustion chamber 44 in. long.

The engines are equipped with the Woodard throttle which has been developed and patented by the builders. In this arrangement the throttle rod is placed on the outside of the boiler shell and operates the throttle valve by means of a horizontal



The Woodard Throttle

shaft passing through a stuffing box on the side of the steam dome. The valve stem projects downward through a passage open at both ends, but closed from communication with the throttle box. At the lower end of the throttle stem is a horizontal lever, one end of which connects through a vertical rod with the inner arm of the operating shaft on the side of the dome.



Lackawanna Heavy Pacific Type Locomotive

is 79½ in. in outside diameter, while the diameter of the largest course is 88½ in. Baffle plates are installed along both sides of the dome opening to prevent water from washing into the dome when rounding curves. All longitudinal seams are quintuple riveted. Four of the engines have a total evaporating heating surface of 3,680 sq. ft., while the other, which is provided with a Riegel boiler, has a total of 3,935 sq. ft. of evaporating heating surface.

The firebox is of the Wootten type, for burning anthracite coal and has a grate area of 91.3 sq. ft. The general design is the same on all five engines, the Riegel firebox differing only in the application of a set of 2½-in. water tubes connecting each side water-leg with the crown. There are 38 of these tubes on each side, with a total heating surface of 260 sq. ft., which, after deducting for the holes in the crown and side sheets, gives

The stuffing box on the side of the dome is of ordinary construction suitable for a rotating shaft.

The throttle rod passes over the outside of the boiler jacket and in through the front of the cab. The throttle lever to which it is connected is arranged to provide a differential leverage. The leverage is greatest and the movement of the end of the lever is largest for a given motion of the throttle rod, when the throttle is closed. After the throttle valve is unseated the leverage increases, with a corresponding decrease in the travel of the lever handle for a given lift of the valve. In this way the travel of the lever handle in the cab may be kept within workable limits and a starting pull obtained sufficient to easily lift the valve.

All driving axes and main crank pins are of Cambria Coffin process steel with 3-in. holes bored the entire length after the completion of the Coffin process. The frames are of vanadium steel.

*For a complete description see the *Railway Age Gazette* for July 19, 1912, page 88.

The special equipment includes Manchester-Riegel by-pass drifting valves, Walschaert direct-drive gear having the combination link attached to the wrist pin, Schmidt superheater, Security brick arch, Ragonet power reverse gear, Foulder solid back end main rod, Woodard inverted link, constant resistance engine truck, Cole long main driving-box, self-centering valve stem guides and radial buffer.

The principal data and dimensions are given in the following table:

General Data

Gage	4 ft. 8½ in.
Service	Passenger
Fuel	Anthracite coal
Tractive effort	47,500 lb.
Weight in working order	305,500 lb.
Weight on drivers	197,300 lb.
Weight on leading truck	52,200 lb.
Weight on trailing truck	56,000 lb.
Weight of engine and tender in working order	471,300 lb.
Wheel base, driving	13 ft.
Wheel base, total	34 ft. 5 in.
Wheel base, engine and tender	67 ft. 1 in.

Ratios

Weight on drivers ÷ tractive effort	4.15
Total weight ÷ tractive effort	6.43
Tractive effort × diam. drivers ÷ equivalent heating surface*	719.4
Equivalent heating surface* ÷ grate area	52.8
Firebox heating surface ÷ equivalent heating surface*, per cent.	7.7
Weight of drivers ÷ equivalent heating surface*	40.9
Total weight ÷ equivalent heating surface*	63.4
Volume both cylinders	18.6 cu. ft.
Equivalent heating surface* ÷ vol. cylinders	259.8
Grate area ÷ vol. cylinders	4.0

Cylinders

Kind	Simple
Diameter and stroke	27 in. by 28 in.

Valves

Kind	Piston
Diameter	14 in.
Greatest travel	6½ in.
Steam lap	1½ in.
Exhaust clearance	3/16 in.
Lead in full gear	9/16 in.

Wheels

Driving, diameter over tires	73 in.
Driving journals, main, diameter and length	11½ in. by 21 in.
Driving journals, others, diameter and length	10½ in. by 16 in.
Engine truck wheels, diameter	33 in.
Engine truck, journals	6½ in. by 12 in.
Trailing truck wheels, diameter	50 in.
Trailing truck, journals	9 in. by 15 in.

Boiler

Style	Extended wagon top
Working pressure	200 lb. per sq. in.
Outside diameter, of first ring	79½ in.
Firebox, length and width	126¼ in. by 104¼ in.
Firebox plates, thickness; crown and sides, ½ in.; tube, 9/16 in.; back, ¾ in.	
Firebox, water space	front and sides, 5 in.; back, 4 in.
Tubes, number and outside diameter	272 = 2 in.
Flues, number and outside diameter	38, 5¼ in.
Tubes and flues, length	17 ft.
Heating surface, tubes and flues	3,311 sq. ft.
Heating surface, firebox, including arch tubes	369 sq. ft.
Heating surface, total	3,680 sq. ft.
Superheater heating surface	760 sq. ft.
Equivalent heating surface*	4,820 sq. ft.
Grate area	91.3 sq. ft.

Tender

Tank	Water bottom
Frame	Channel
Weight	165,800 lb.
Wheels, diameter	36 in.
Journals, diameter and length	6 in. by 11 in.
Water capacity	9,000 gal.
Coal capacity	10 tons

* Equivalent heating surface = total evaporative heating surface ÷ 1.5 times the superheating surface.

some of the rails were rolled so that what was the top side of the ingot as it first entered the blooming rolls, formed the head of the rail and other rails were rolled so that the top side of the ingot formed the web of the rail.

The work was done at Ensley, Ala., at the works of the Tennessee Coal, Iron & Railroad Co., who kindly furnished all the material and facilities for the investigation. The rails were made by the open-hearth process and were tested by means of drop tests, tension tests, transverse tests of the base and polishing of cross-sections.

Sixteen ingots were selected for special blooming. Eight were rolled "top in top"; that is, with the top side of the ingot as it first entered the blooming rolls, rolled into the head of the rail, and the other eight were rolled "top in web"; that is, with the top side of the ingot rolled into the web of the rail. The amounts of reduction between turning were varied in the early part of the blooming and were, respectively, 1 in., 2 in., 3 in., 4 in., 6 in., 8 in., 10 in., and regular practice, two ingots being rolled for each of the eight rolling conditions. From the standpoint of the construction of the mill, it was not considered advisable to reduce the ingot more than 2 in. in one pass, and the reductions between turning of 3 in. or more were therefore produced in two or more passes.

In the drop test, the rails rolled "top in top" gave about the same results as those rolled "top in web." With the head in tension the ductility in the drop test was about the same for the different rates of reduction. With the base in tension there was a general decrease in ductility as the rate of initial reduction in blooming increased, but there was considerable irregularity in the results, and it would take a much more extensive set of tests to be able to state this as a law.

Transverse tests of the base were made by placing the rail on two supports, 6 in. long, placed opposite each other near the edges of the flanges, and applying the load to the head of the rail at the middle. The general average results showing breaking load and transverse ductility of the rails rolled "top in top" were about the same as those of the rails rolled "top in web." The transverse results were also about the same for the various rates of reduction in blooming. The longitudinal ductility of the base in the drop test averaged 15.6 per cent, and the transverse ductility of the base in the transverse test averaged 2.7 per cent.

The thought is expressed that part of the problem of improvement of rails consists of increasing the transverse ductility of the base and particularly of eliminating the cases of very low transverse ductility. In the tensile tests the rails rolled "top in top" gave about the same results as those rolled "top in web." The tensile results were also about the same for the various rates of reduction.

Incidental to the main investigation, a comparison was made of the tensile results from three locations in the rail section, namely, the upper corner of the head, the interior of the head and the flange. For a given tensile strength, the ductility was greatest in the flange, next in the corner of the head and least in the interior of the head.

Cross-sections were cut from the head of the rails, polished with emery, etched with copper-ammonium chloride solution and finally polished with tripoli. No internal cracks were found in any of the samples examined.

In conclusion, the general results may be summarized as follows: The rails rolled "top in top" gave about the same results as those rolled "top in web," in the drop tests, transverse tests of the base and tensile tests. The results were also about the same for the various rates of reduction in making the bloom, except that in the drop tests with the base in tension there was a general decrease in ductility as the rate of initial reduction increased, but there was considerable irregularity in the results, and it would take a much more extensive set of tests to be able to state this as a law. This work had reference particularly to the transverse ductility of the base, and not specially to the production of seams, due to the tearing open of the sides of the bloom in rolling.

INFLUENCE ON RAILS OF THE METHOD OF BLOOMING*

An investigation was made concerning the influence on the rails, of the manner in which the bloom is rolled, particularly with reference to the transverse ductility of the bottom of the base of the rail. Blooms were rolled from ingots with varying amounts of reduction between turns. Some ingots were given light reductions or squeezes and turned so as to bring the other two sides in contact with the rolls, and other ingots were given successively greater reductions between turns. Also

* Abstracted from Bulletin 179 of the American Railway Engineering Association.

THE RAILROAD CLERK

By V. R. COOKE

So many articles have been written recently about the army of "competent and incompetent men in blind alley jobs," more commonly known as railroad clerks, and so much has been said deploring the conditions that exist, that it is a bit surprising that none have ventured to state *why* these conditions exist.

A clerk being in a position, drawing pay, has a right to be judged competent until he has been given an unprejudiced trial and has been found wanting. This trial the clerks have not been given. This is evidenced by the attitude of the officers towards their clerks, never giving them an opportunity to prove their worth in any official capacity, and by the failure on the part of the clerks themselves to prove by their actions in their present positions that they are competent to fill positions of greater trust.

The first reason may be explained by pointing to the time worn custom of making officers by promoting from the ranks of what have been termed "practical" railroad men. Not so very long ago, before these days of cost sheets and tonnage bureaus, officers were chosen more on account of their aggressiveness than progressiveness; more on account of their ability to handle men and keep things moving than for their ability to keep down the cost of operating expenses and show the why and wherefore in case of increase or decrease. Such men did not have time nor inclination to secure much of an education and, in fact, often prided themselves upon being considered "self made." They looked upon their clerks as a useless expense and only fit to wait upon them, to write letters, and keep nice records for the benefit of the public and the inquisitive railroad commissions. The clerks, on the other hand, were drawn from the ranks of those who had had better opportunities of securing an education and who on account of physical weaknesses or timidity did not care to follow the hardships and more dangerous occupations of the road. In a great many instances they looked down upon what they called the "outside man." Thus, when the outside man was promoted over them, there was an antagonistic spirit existing, even though it did not appear on the surface.

As an illustration we will say that Jones starts out as fireman, serves his apprenticeship and in due time becomes an engineer. As an engineer he is careful, observing and aggressive, being possessed of a sound body as a result of his years of hard work and clean living. He has a clear head and quick brain, even though he has not much book learning. He grasps an opportunity to clear the main track quickly sometime when there is a derailment, makes a hit with the division officers, and in time is made trainmaster. He assumes the duties of trainmaster; and dictates his first letter to Clerk Brown. Jones not being accustomed to dictating, makes a few grammatical errors and Brown instead of changing the letter himself thinks he will be smart and have some fun at the expense of the new T. M.; and calls Jones' attention to his errors before the boss. There immediately arises in Jones' mind a deep prejudice against clerks in general; and when he later becomes superintendent or general superintendent, that prejudice in a measure still remains. Considering the hardships he himself had to put up with to achieve his success, he would never recommend one who has had an "easy time" in an office to succeed himself or to take any such position.

So much for the official end of it. The second reason why clerks continue to be "just clerks" is due largely to their own short sightedness. Instead of specializing in whatever particular branch of the service they may have taken up or wish to advance in, they continue in the routine that has been laid out for them.

Specialize! If you are going to be a rate clerk find out all that there is to be known about rates and traffic. If you are a stenographer or secretary, be a good one. Strive to make your speed and accuracy better than that of the other fellows, not simply just as good. Learn all you can about the depart-

ment you are working in, and soon you won't be referred to as "just a stenographer."

If you are a timekeeper or an accountant strive not to be just a machine; make a statistician out of yourself. Post yourself on the per cents of increases and decreases and costs per mile so that when the boss asks you about this month's figures and how they compare with last month's, you can give him a prompt answer, containing the facts in a few words. Don't merely seek to memorize a lot of figures (a parrot can do that); know, yourself, the meaning of them. And if you have a suggestion that may save a few dollars, don't be afraid to make it. If it's a good one the boss may use it in suggesting to those higher up; and if he fails to mention your name in his report of the matter, don't get sore. The boss hasn't forgotten you. Remember, that Thomas A. Edison makes fortunes every day from the minds of men who are never heard of as individual inventors; but they, working under him, are getting rich also.

The question has been asked, "Where can we obtain that knowledge to enable us to better our condition?" Pick up almost any magazine and you will find the answer: the correspondence school, or the night school, or the business college. What stenographer would not be benefited if he took a post-graduate course in touch writing? What station accountant or timekeeper would not be improved by a course in accounting? What rate clerk would not advance himself further along the road to a position as soliciting or commercial agent were he to take a course in traffic?

We clerks must look for betterment of our condition through individual efforts. The salvation of the railroad clerk does not lie, as many seem to think, in "organization." Any clerk who will conscientiously analyze this matter can easily see why. The word "clerk" is too general; there are as many different kinds of clerks as there are departments to a railroad, and to get all the various departments upon a uniform working basis with hours that would apply to all and a schedule of salaries (emphasis upon the word salaries) that would cover each branch of clerical service would be impracticable. You might as well talk of making one schedule of wages for the operators, brakemen, conductors, engineers, firemen and shopmen and expect them to all agree to it.

Again, organization of all branches of clerks would not be fair to the companies that employ us. We, through the very nature of our positions, handle some of the most confidential affairs of the company, and as we are but human who among us could keep from using this information to our own advantage if we owed allegiance to an outside organization? Loyalty to the company is nothing more than is due. He who is not loyal is as incompetent as he who shirks his work and as untrustworthy as he who steals from the cash drawer.

Cannot both the railroad and the clerk offer a little more than they have done in the past? One of the largest eastern railroads has already made a great stride in this respect. This road now has at its head a broad-minded man who is a gentleman in every sense of the word, whose diplomacy, based on an education along *all* lines, has already won for his road many friends in a territory disposed to be unfriendly. The effects of such a broad-minded policy, so far as the clerks are concerned, are already noticeable. This road has at present on one of its districts two trainmasters, two yardmasters, and one chief dispatcher who were promoted from the clerical ranks. It behooves us all to give the best that is in us, endeavoring at all times to improve ourselves so that if by any chance opportunity should knock at our door we should be prepared. If we do our part well, it is not a very far off day before the railroad companies will do theirs.

EGYPTIAN RAILWAY TAKEN OVER.—The Egyptian State Railway administration formally took over, on December 1, the Helouan line, belonging to the Egyptian Delta Light Railway Company, Ltd.

Progress on the Erection of the New Quebec Bridge

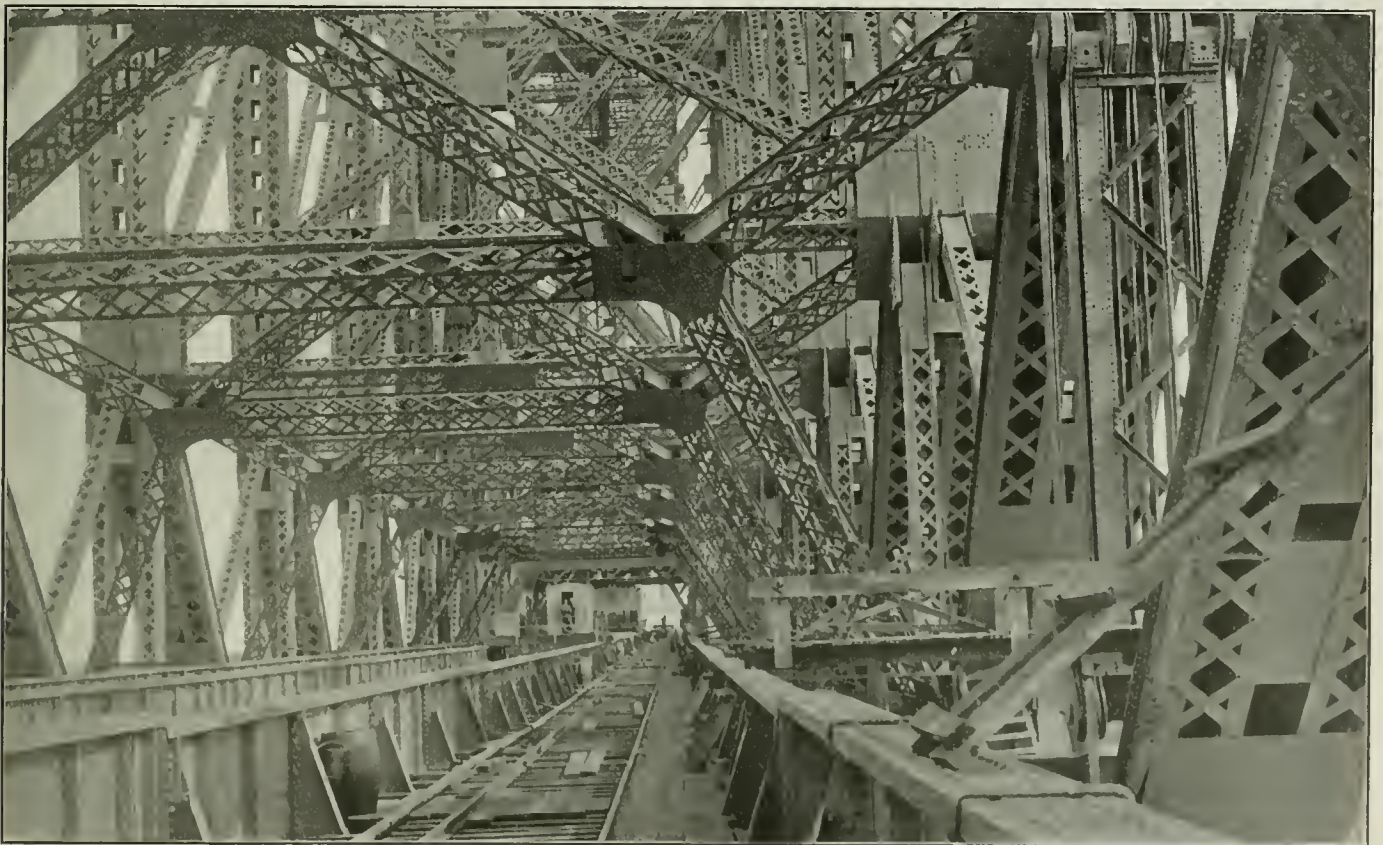
Work on This Notable Structure Is Proceeding Rapidly
and It Is Expected to Be Completed Late in 1916

By H. P. BORDEN

Assistant to Chief Engineer, Board of Engineers, Quebec Bridge,
Montreal, Que.

Satisfactory progress is being made this season in the erection of the new Quebec bridge. At the end of last year the anchor arm was entirely erected with the exception of the upper half of two panels next the main pier. During the winter the north portal was erected and a certain amount of riveting done at various points. Work was started this spring, about the middle of April, since which time the program of the contractors has been followed very closely. It was expected that the erection of the main posts would require more time than was actually the case. These posts are each shipped in 27 separate main sections, and had to be assembled with splice plates attached, necessitating very careful and accurate handling by the cranes. Both posts

capable of taking one full panel, supported at the shore end by means of pins connected to the chords, and at the river end by links attached to the upper web members. This "flying bridge" is planked over and affords ample room for jacking and riveting operations, providing a perfectly safe platform for the men to work. As each panel is completed, the bridge is taken up by the overhead cranes and moved ahead to its new position. At the present writing the fourth panel of the cantilever arm from the main pier is about half completed. The first three panels took approximately 25 days each to erect, including Sundays and lost time. As the panels progress towards the end, the members are lighter and the splices smaller, and the speed of the work will be



General View Looking Through the Bridge from the Portal

were assembled simultaneously, the entire erection being completed in thirty days. These posts weigh approximately 1,000 tons. Although there were six horizontal field splices, the length center to center of pins was as nearly accurate as it is possible to measure. From four to six gangs have been constantly engaged in riveting up splices in these members since their erection started, this work being now practically completed.

In the erection of the cantilever arm, which is progressing rapidly, each panel is completed as the work progresses, the complete bracing being put in place by the rear booms of the traveler as it advances panel by panel. On account of the fact that there is a vertical field splice in the bottom chord between the main panel points, these chords are erected in place on what is known as a "flying bridge." This bridge is a steel platform

materially increased. Owing to the great accuracy of the shop work, the members go together without any difficulty in the field, and no time is lost in correcting errors.

It is expected that the entire north shore cantilever arm will be completed by the middle of November if too much time is not lost by bad weather. The traveler on this side will then be taken down, transferred to and reassembled at the site where the suspended span will be erected.

As the erection of the cantilever arm progresses, very careful measurements and observations are made to determine whether the alignment is perfectly correct. At the present time the center points of the floorbeams of the erected portion are absolutely in line with the center point of the pier on the south side of the river. The erection of the main shoe on the south shore began on

July 8 of this year. Because of the experience gained in the erection of the falsework and anchor arm on the north shore, the erection of the south anchor arm has been greatly facilitated and

weeks ahead of last year's program. It is expected that before the work closes down the anchor arm will be completely erected, including the main post. Next year there will be no difficulty in



View Showing the Progress of Erection on the South Shore

much better time has been made. Although the work was started this year at approximately the same time as work on the north anchor arm last season, the work at the present time is nearly six

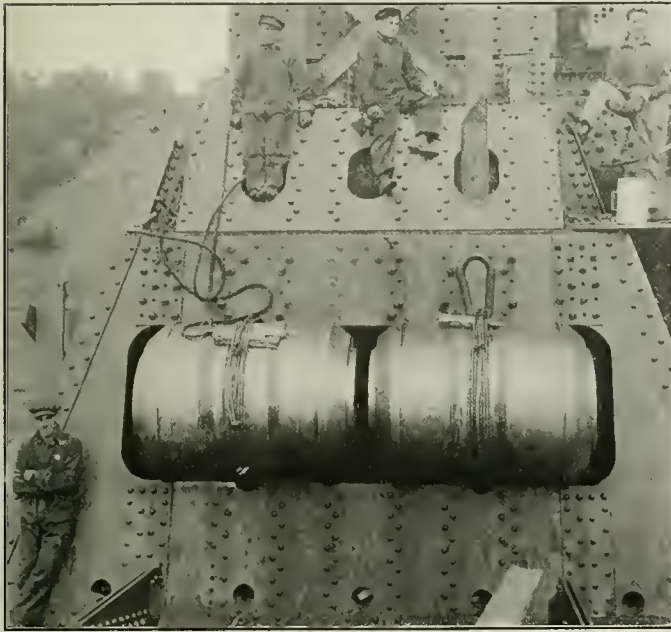
fully completing the south cantilever arm in plenty of time to connect up the suspended span.

The suspended span will be erected at Victoria Cove, a point



View of the South Shore Span Showing the Floor Supported on the Inside Falsework and the Bottom Chord on the Special Outside Falsework

about three miles below the site of the bridge. This span will be erected on falsework supported by concrete piers. It will be



View of the Main Shoe with the 30-in. Pins and the 45-in. Sleeve in Place, Preparatory to Placing the First Section of the Bottom Chord of the North Cantilever Arm



View of the North Cantilever Arm, Showing the Process of Moving the "Flying Bridge" Forward One Panel

entirely erected at this site, with the exception of a portion of the floor system, and will be floated to the bridge on specially designed pontoons. Hangers connected to the four corners of the cantilever span will be attached to the suspended span of special devices, the entire span being lifted into place by means of 2,000-ton jacks placed at each corner. The suspended span is 640 ft. long, 88 ft. wide, and 110 ft. high at the center, and weighs approximately 6,000 tons. It is expected that late in October, 1916, the work will be sufficiently advanced to float this span into place. If this program is carried out, it will be possible to run trains across this bridge at the close of next season.

REORGANIZATIONS AND RAILROAD BONDS

By JOHN E. BLUNT, JR.*

The weakness of a bond, as compared with a mortgage, lies in the inability of the individual holder to act for himself in realizing on his security, and in these days, when corporate mortgages overlap to such an extent that it is seldom a single issue can act independent of others, the complications arising are extremely difficult of solution.

A reorganization is usually the outcome of a situation of which the first step is a receivership. Close upon the heels of the latter follow the "protective committees" with their bondholders' agreements. You read in the evening paper that a certain property has gone into the receiver's hands; in the morning paper you find certain parties, at the request of a large number of bondholders, have consented to act as a committee. What is a bondholders' agreement? Briefly, it is a more or less elaborate power of attorney giving to the committee authority to do what in its judgment may seem best for the bondholders' interests. There are limitations, restrictions and privileges of withdrawal, but in actual practice it amounts to a complete delegation of power.

If you desired, in the ordinary course of business, to give a power of attorney to an individual you would naturally want a man in whom you had complete confidence as to his integrity, his judgment and his ability. There is no reason why the same standard should not apply to a member of a bondholders' committee. He should really represent the bondholders and should be selected for his qualifications for the position. He should realize its responsibility and trusteeship nature and be able to give sufficient time to make his services of some value.

The practice of officers of the trustee acting on a committee is subject to criticism. There should be co-operation between the committee and the trustee, and the advice of the latter is frequently of great value, but they should not attempt to serve in what might prove a dual capacity, but rather hold themselves in readiness to act as a check on the committee when necessary. In other words, they should act with, but not on the committee. I do not know why this association should not at a future meeting outline some plans for the selection or election of bondholders' committees.

A word may be said here on the question of expenses. They often seem out of all proportion to the results accomplished. Men who devote their time to constructive work should be well paid for their services, but a corporation that is unfortunate enough to get into the hands of a receiver should not be considered legitimate prey for the avaricious.

The amount of railroad mileage in receivers' hands today is greater even than in the years following the panic of 1893, and there has been no time in recent history when reorganizations were as numerous as at present. A study and comparison of some of the plans that are now being put forth would prove interesting and profitable, but this is not possible in a paper of this length.

I will say, however, that most of those I have had occasion to examine seem to offer temporary rather than permanent relief. Fixed charges are reduced, assessments are levied and various kinds of pressing obligations are paid off, but the new securities

*From an address before the Fourth Annual Convention of the Investment Bankers' Association at Denver, Colo.

are issued in the same manner as the old, and there is nothing to prevent a repetition of the trouble in the more or less distant future.

My own opinion is that before the majority of our railroads can hope to take care of what we may call their permanent future needs they will have to undergo reorganizations more drastic than most of those now proposed. They must issue their securities along new lines that will afford every possible protection to the legitimate investor, particularly the bondholder. What is there in the average railroad bond offered today that should attract anyone who gives it careful consideration? It usually runs fifty or more years without any provision for payment of the principal. And who is there during that fifty years who is looking after the bondholders' interests? Does the management? Not always, for it represents the stockholders. Does the trustee? Not to any greater extent than provided in the trust deed. Does the bond house? Sometimes, but there is hardly profit enough to warrant any great expenditure on its part. As a rule, the bondholder is helpless until the bonds are in default, and when trouble comes receivers' certificates, equipment trusts and even notes are taken care of first, and here let me say that I think equipment trusts, as issued at present, are the greatest possible menace to railroad mortgage bonds. A New York house making a specialty of equipments is authority for the statement that while in 1900 there were only \$60,000,000 equipment bonds outstanding, the amount at the present time approaches \$600,000,000, and all of them coming due at the rate of one-tenth each year for no better reason than that this kind has been found easiest to sell. Our railroad committee is doing some excellent work in outlining improvements in railroad trust deeds, and I trust will permit me to say here that I believe that any general mortgage drawn hereafter should provide for the issue of equipment bonds thereunder so that the road and equipment can be kept together, but making the bonds issued for equipment (while not differing as to lien from the longer time bonds) mature serially in one to twenty years, which is about the average life of the equipment, having them paid out of earnings as a regular depreciation charge.

I have had occasion to look into a certain railroad, and I find that at the rate it was charging off depreciation in equipment it would have had to have lasted 582 years, and that all the dividends that were paid in ten years just about equaled the amount that should have been charged off for maintenance and depreciation.

I think that the present troubles of the railroads can be largely attributed to two causes: bad financing on the one hand; failure to receive authority to increase rates sufficiently to meet increased cost of service on the other, and the tendency is for those responsible for each of these conditions to shift the blame on the other. The greatest obstacle to railroads securing what they really need today is the questionable financial transactions indulged in by the prominent financiers and bankers.

What are some of the remedies? I am aware that it is easy to criticize, but hard to construct. There are practical questions to be faced in all these situations that make it extremely difficult to work out our ideals and theories. I have no sympathy with those who are indulging in wholesale denunciation of railroad management and I believe that this country cannot have permanent prosperity until the railroads can share it. However, we must make an effort to get this railroad financing on a more satisfactory and solid foundation.

Let us provide sinking funds for the payment of mortgages in full. It requires only $\frac{1}{2}$ of 1 per cent a year to pay off a 5 per cent mortgage in 50 years. In other words, while it requires \$50,000 a year to pay the interest on a million dollar loan, an additional \$5,000 will take care of the principal as well.

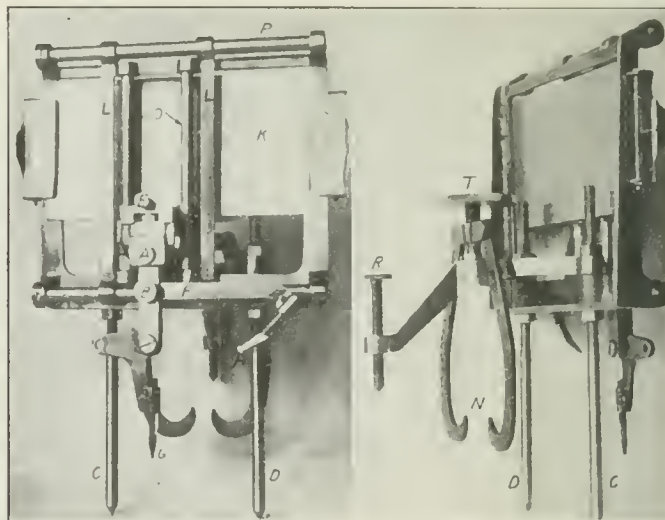
Let us have some means of taking care of the bondholders' interests during the life of the bond, either by enlarging the powers of the trustees, or possibly by giving the bonds voting power and a voice in the management of the road. I do not know why this should not be done, especially in cases where there is little equity in the stock.

We investment bankers distribute by far the greater part of the bonds issued in this country, and while most of us do not have the opportunity of originating the larger financial deals, we can nevertheless make our influences felt if we have the courage of our convictions. We ought to be in the position of an impartial judge or jury, able to put a stop to corrupt or incorrect financial practices, and at the same time as representatives of investors secure for our corporations such fair treatment at the hands of legislators as shall protect the investors' rights.

But, before we will be in a position to do this, it will be necessary to improve our own standards. I am afraid that we cannot entirely escape the responsibility for some of the conditions existing today. Has not the desire to make quick profits or the desire to participate in some large piece of financing caused many a hasty decision which should have been deferred until a careful investigation could be made? However, we cannot help the mistakes that have been made in the past, but we can turn our faces in the right direction, and while the desired results will not be obtained in a day or a year, we can make a start along the line of progress.

A RAIL PROFILE MACHINE

The accompanying photographs illustrate a rail profile machine, which embodies several advantages, of which the most important is the combination of accuracy with adaptability for rapid placing and removal of the apparatus from the rail. As shown in the photographs, it is attached to the rail by placing the points of the rods D and C on the tops of the flanges of the rail base, the point of the screw R on top of the head, and the points of the hooks N on the under side of the head, the



Two Views of the Rail Profile Machine

whole being made fast by turning the disc T. To release the machine this disc is given a quick turn in the opposite direction.

The profile is drawn on the prepared paper K by means of the brass pencil E. This is mounted in the crosshead A, sliding vertically in the rods O, which are mounted in a second crosshead L, sliding horizontally on the rod P. The arm F holding the pencil points G and H are rigidly attached to the crosshead A, secure against any rotation in the plane of the paper. As a result, any movement of the points G or H is reproduced simultaneously by all other points in the arm F and the crosshead A, and is recorded by the point E. By removing the pin D the frame F may be rotated 90 deg., permitting the point G to take the place of the point H, or vice versa, the latter being used for the underside and sides of the head, while the former is used for the top.

This machine has been in use on six or seven American railroads for the past three years with satisfaction. It was designed by C. D. Carey with Robert W. Hunt & Co., Pittsburgh, Pa.

Production of Smoke by the Railways of Chicago

Effect and Amount of the Smoke Produced by Locomotives in Chicago, and Results of Special Tests

An abstract of the complete report on Smoke Abatement and Electrification of Railway Terminals at Chicago, made to the Chicago Association of Commerce, was printed in the *Railway Age Gazette* of December 3, page 1047. In the issue of December 10, page 1089, the technical phases of the electrification were considered, and in the issue of December 17, page 1125, the cost set forth in more or less detail. The following gives in similar detail the findings of the committee regarding the amount of smoke made by locomotives in Chicago, together with the results of various scientific investigations made by the committee regarding locomotive service.

The committee pointed out that the factors affecting the formation of smoke are the combustible, the supporter of combustion (air), and the temperature at which combustion proceeds. Stated briefly, the combustible elements in coal may be grouped into two divisions, namely, volatile matter and fixed carbon, the proportion of these varying greatly in the various kinds of coal. As a supporter of combustion the air may be regarded as being composed of oxygen and nitrogen. Theoretically there must be 2.67 lb. of oxygen, or 11.55 lb. of air, for every pound of carbon. In ordinary furnace operation, however, it is necessary to provide for more than the theoretical amount of air. Regarding the third factor in combustion, namely, the temperature, it may be stated that every combustible has its critical temperature, below which it will not unite with oxygen.

The combustion of bituminous coal proceeds by stages. There is at first a period occurring at comparatively low temperature, about 500 deg. F., of so-called "destructive distillation," in which a disruption in the substance of the fuel takes place, the volatile portion being thrown out and separated from the non-volatile. The second stage of combustion involves the decomposition of the hydro-carbon, the volatile portion, and the burning of its gaseous constituents at a temperature of about 800 deg. F. This stage is a critical one, as regards smoke formation. If too little air is admitted to the furnace, or if the amount admitted is not properly distributed a portion of the carbon in the fuel is carried away unburned and visible smoke results. The third stage of combustion proceeds at a temperature which is nominally about 1,600 deg. F. It is during this stage that the non-volatile portion of the fuel, consisting chiefly of carbon, is burned. The third stage of combustion may easily be made smokeless, but if the supply of air be deficient incomplete combustion and visible smoke may result.

An important aspect of combustion relates to the economical use of fuel, which is a matter that cannot be completely separated from that of smoke prevention. As a result of elaborate tests made in recent years, it has been determined that under certain conditions resulting in apparent smokelessness there may be an escape of unburned combustible gases with a consequent loss of heat units while conditions which may utilize fuel value to a fuller extent result in a slight degree of smokiness. Careful laboratory tests have demonstrated that the amount of heat lost in black smoke is comparatively insignificant, one investigator reporting that under the worst possible conditions of combustion, if the smoke were collected there would be a saving of only 14.7 lb. from a ton of coal, provided all the smoke were burned again.

As a means of eliminating smoke at engine terminals, round-houses, etc., the committee referred to various smoke washing devices, calling particular attention to the smoke washing plant of the New York Central at its Englewood roundhouse in Chicago. This plant was described in the *Railway Age Gazette* of September 24, page 558. Referring generally to the smoke washing process, the committee said: "The possibilities of the proc-

ess have long been understood. Its application has been retarded by difficulties encountered in maintaining the plant in the presence of the corrosive acids developed by the process, and by operating costs arising from the consumption of water and power." Smoke washing as a process of general application is still in an experimental stage. Enough has been accomplished to prove that by means of it practically all the objectionable elements in smoke can be suppressed.

The precipitation of suspended matter and gases may also be accelerated by electrical means. If the products of combustion are made to traverse an electrostatic field the solid particles may be intercepted. This principle has been employed in the removal of solids from the gases of metallurgical and other industrial furnaces. A few applications have been made in connection with the furnaces of boiler plants; the approaching soot or dust particles, responding to electrical influences, attach themselves to the grating as do metallic particles to a magnet. The grating is cleaned by interrupting the current. The New York Edison Company has experimented with this process as a means for the suppression of fuel, dust and ash from the stack of one of its stations.

COAL AND COKE CONSUMED BY STEAM LOCOMOTIVES

From a careful investigation with the co-operation of all the roads operating in the area of investigation it was determined that during the year 1912, 2,555,233 tons of coal were consumed by steam locomotives in service within this area. Of this, 1,363,503 tons, or 53.37 per cent, was consumed by yard locomotives; 258,787, or 10.13 per cent, by road freight locomotives; 479,738, or 18.77 per cent, by freight locomotives in transfer service; 21,545 tons, or 0.84 per cent, by engines in passenger transfer service; 240,288 tons, or 9.40 per cent, by engines in through passenger service, and 191,372 tons, or 7.49 per cent, by locomotives in suburban passenger service. In contradistinction to the coal and coke consumed by locomotives in service a separate investigation was made to determine the amount of fuel consumed by steam locomotives at locomotive terminals during the same year, 1912. This was found to be 260,167 tons.

In the committee's investigation in determining the relative density or visibility of the smoke the Ringelmann method was employed. In computing the smoke density for a number of stacks or for those of an entire service or district the observed results are reduced to unit values, the value of one stack for a period of one minute being termed a "stack minute," and the omission of No. 1 smoke for one minute, or its equivalent, being termed a "smoke unit." By employing these unit values the percentage of density as measured by the Ringelmann scale may be computed by means of the following formula:

$$\text{Percentage density} = \frac{\text{Smoke unit} \times 20}{\text{Stack minutes.}}$$

In the development of the committee's investigation with reference to the visible properties of smoke a corps of from 10 to 20 trained smoke inspectors under the supervision of a chief inspector, were engaged in making observations of smoke density from April 22, 1912, to March 14, 1913. Observations of smoke from locomotive smoke stacks were made at each railroad yard, at each locomotive terminal, and at various points along each line of railroad within the area of investigation. The records show that 10,653 observations were made of smoke emissions from steam locomotives in railroad yards and at points on the line, and that 1,323 observations were made of smoke emissions from locomotives at terminals, a total of 11,976 observations. It was found that more smoke was produced, or, rather, the

average density of the smoke was greater, in the outer zone, Zone B, than in the inner zone, the latter including the most congested part of the area of investigation. The average density for Zone A was 15.30 and for Zone B, 23.17, making an average of 16.79. The road freight locomotives gave the greatest trouble, the average density in Zone A for this class of locomotive service being 25.32, and in Zone B 26.91. The steam locomotives rank third in the list of the various services which produce smoke in Chicago, the complete list being given below, according to the relative amount of average density provided:

	Relative Standing Per Cent
High pressure steam, stationary power and heating plants.....	44.79
Furnaces for metallurgical manufacturing and other processes.....	29.80
Steam locomotives	21.83
Low pressure steam and other stationary heating plants.....	2.87
Steam vessels	0.61
Gas and coke plants	0.10

SOLID CONSTITUENTS OF STEAM LOCOMOTIVE SMOKE

Information concerning the solid constituents of locomotive smoke has been derived from two series of investigations made by the committee in which the solids discharged from the smoke stack were measured. These embrace service tests con-

recorded for each test included the amount of fuel consumed, the cinders and fuel dust emitted, the ash and clinkers discharged, the water evaporated, the tractive effort exerted, the power developed, the draft at different rates of combustion, and such other facts as were needed to define completely the performance of the locomotive. A total of 76 tests were made. The maximum rate of combustion for each sample of fuel tested was more than 80 lb. per square foot of grate surface per hour, and in all except two cases was more than 100 lb. per square foot of grate surface per hour. The minimum rate of combustion for the several coals varied from 23 to 27 lb. per square foot of grate surface per hour. The accompanying diagram shows the percentage of the fuel burned which appears as solids in the smoke as averaged from all the tests made. It is shown by this diagram that the amount of solids emitted in smoke is a function of the rate of combustion. To establish these rates of combustion attending the normal operation of locomotives in through and suburban services in Chicago a series of 298 tests was made on locomotives operating within the area of investigation. The rate of fuel consumption was found by counting the scoops of coal fired, the value of the average scoopful having been carefully determined. The grate area of each loco-

TABLE I—EMISSION OF CINDERS IN YARD AND FREIGHT TRANSFER SERVICE

Service	Number of tests	Kind of fuel	Solids per ton fired (lb.)				Solids in per cent of fuel fired			
			Coarse	Fine	Dust	Total	Coarse	Fine	Dust	Total
Yard	5	Pocahontas	1.30	9.72	24.54	35.56	0.065	0.486	1.227	1.778
Yard	26	Bituminous	0.76	3.42	5.24	9.42	0.038	0.171	0.262	0.471
Freight transfer.....	3	Pocahontas	1.84	7.92	19.64	29.40	0.092	0.396	0.982	1.470
Freight transfer.....	7	Bituminous	0.62	2.16	4.46	7.24	0.031	0.108	0.223	0.362

ducted in connection with locomotives operating in yard and transfer service within the area of investigation, and laboratory tests conducted in connection with a locomotive mounted on a testing plant and supplemented by tests on locomotives operating in through passenger, through freight and suburban services in the area of investigation, to determine rates of combustion. By means of special apparatus all or a known portion of the solid emissions from the smoke stack were caught and deposited in an arrester from which they could be collected for analysis. The samples were classified as follows:

Coarse cinders—Solid particles which remain upon a coarse sieve of 20 meshes to the inch (400 apertures per square inch).

Fine cinders—Solid particles which pass through the coarse sieve and remain upon a fine sieve of 200 meshes to the inch (40,000 apertures to the square inch).

Fuel dust—Solid particles which pass through the fine sieve.

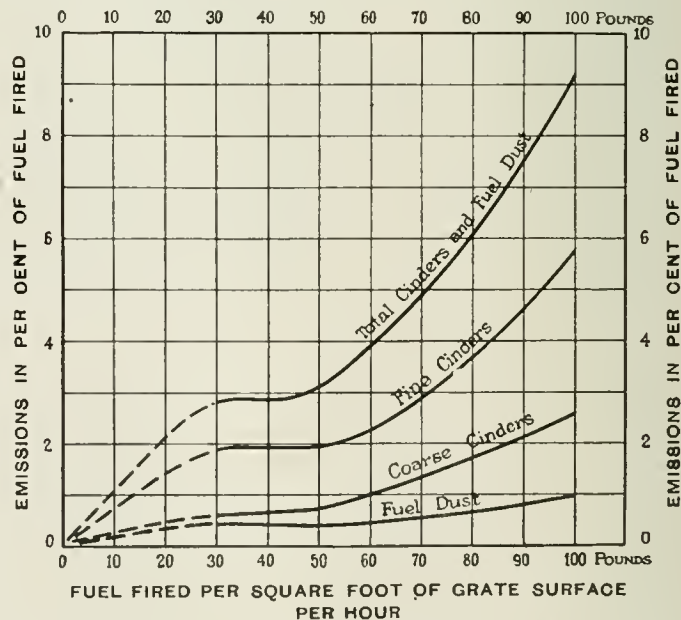
The road tests were conducted with suitable apparatus for obtaining a known proportion of the cinders emitted from the stack. A record of the number of scoops of coal fired was taken, the average weight of a scoopful of coal being ascertained by experiment, and with this information the relation between the solid constituents of locomotive smoke and the fuel consumed was established. Forty-one tests were conducted on steam locomotives operating in yard and transfer services of Chicago terminals. Bituminous coal was used for some of these tests and Pocahontas coal for others. Table I gives the results of these tests.

Since any method which could be satisfactorily applied in service was found impracticable for determining the amount of solid matter contained in smoke arising from locomotives while operating at high speed, data relating to the amount of solids emitted in smoke at various rates of combustion was secured by means of a series of tests conducted at the locomotive testing laboratory of the Pennsylvania Railroad at Altoona. The locomotive used in all laboratory tests was a Consolidation freight locomotive of the Pennsylvania type 11-B-B, weighing 238,300 lb. The coal for the test was typical of that used by the railroads entering Chicago. The locomotive firebox was equipped with a brick arch and all tests were conducted with the throttle fully open, the speed being controlled by the load. The facts

obtained from the railroad and all the rates of combustion determined. These were found to be for the several services involved, as follows:

Service	Lb. per sq. ft. grate surface per hour	Per cent of fuel fired while running
Road freight	40.6	92.7
Through passenger	52.2	98.2
Suburban passenger	62.7	96.4

By combining these rates of combustion with the values for the emission of cinders as set forth in the diagram, and by multiply-



Amount of Solid Constituents of Smoke Emitted by a Locomotive on a Testing Plant

ing the values ascertained by the percentage of fuel fired while running, the emission factors for solids emitted by locomotives operating within the area of investigation were established. The emission factors for solid constituents of locomotive smoke thus determined, and also those for yard and passenger service, as

determined by use of the cinder arrester in service tests, are presented in Table II.

RELATIVE IMPORTANCE OF THE STEAM LOCOMOTIVE AS A SOURCE OF SMOKE

Table III gives the relative information concerning the importance of the various classes of steam locomotives as a source of smoke, the individual classes being compared to each other and to all other classes of smoke producers. The questions of fuel consumption, visible smoke, solids in the smoke and gases in the smoke are considered. It was also shown that the steam locomotives consume 11.94 per cent of the total fuel consumed within the city limits of Chicago, ranking fourth as a fuel-consuming service. They are responsible for 22.06 per cent of the total visible smoke discharged within the city, and rank third among all services on the basis of total quantity of visible smoke produced. They are responsible for 7.47 per cent of the total

of 13,247 B.t.u., while the other nine varied between 11,227 and 11,919, with an average of 11,598 B.t.u. per lb. In Table IV are given the general averages obtained from these tests. They

TABLE IV—AVERAGE RESULTS OF THE ALTOONA TESTS

Group*	BA—10	NA—4	BA—4
Equivalent evaporation per pound dry coal (lb.)...	9.3	8.6	9.2
Boiler efficiency (per cent).....	67.7	63.4	67.2
Dry coal per dynamometer horsepower hour (lb.)...	4.3	4.6	4.3
Smoke densities (per cent).....	23.6	36.5	24.1
Cinders and fuel dust (per cent of fuel fired).....	4.56	5.56	4.18
Carbon contained in the cinders and fuel dust (per cent of fuel fired).....	3.11	3.79	2.88

* BA—10 = Average of 10 different coals with the brick arch.
NA—4 = Average of 4 different coals without the brick arch.
BA—4 = Average of 4 different coals with the brick arch.

are divided into three classes. The first class is an average of the ten coals, fired with a brick arch; the second gives the results of the coal from Macoupin, Ill.; Williamson, Ill.; Sullivan, Ind., and Vermillion, Ind., without the brick arch; while the

TABLE II—EMISSION FACTORS FOR SOLID CONSTITUENTS OF STEAM LOCOMOTIVE SMOKE

Service	Kind of fuel	Solids in lb. per ton of fuel burned				Solids in per cent of fuel burned			
		Coarse	Fine	Dust	Total	Coarse	Fine	Dust	Total
Yard	Pocahontas	1.30	9.72	24.54	35.56	0.065	0.486	1.227	1.778
Yard	Bituminous	0.76	3.42	5.24	9.42	0.038	0.171	0.262	0.471
Road freight	Bituminous	11.30	34.68	6.86	52.84	0.565	1.734	0.343	2.642
Freight transfer	Pocahontas	1.84	7.92	19.64	29.40	0.082	0.396	0.982	1.470
Freight transfer	Bituminous	0.62	2.16	4.46	7.24	0.031	0.108	0.223	0.362
Passenger transfer	Bituminous	1.30	9.72	24.54	35.56	0.065	0.486	1.227	1.778
Passenger transfer	Bituminous	0.76	3.42	5.24	9.42	0.038	0.171	0.262	0.471
Through passenger	Pocahontas and bituminous	15.08	39.40	7.84	62.32	0.754	1.970	0.392	3.116
Suburban passenger	Bituminous	20.54	47.42	9.26	77.32	1.032	2.371	0.463	3.866

solid constituents discharged into the atmosphere in the smoke of all services within the city limits of Chicago, ranking fourth among all services on this basis, and lastly, they are responsible

TABLE III—CONTRIBUTIONS MADE BY STEAM LOCOMOTIVES TO THE POLLUTION OF THE ATMOSPHERE OF CHICAGO

Service	Fuel consumption, per cent	Visible smoke, per cent	Solids in smoke, per cent	Gases in smoke, per cent
Yard	5.97	10.25	1.73	5.17
Road freight	0.77	2.01	1.18	0.66
Freight transfer	2.02	4.59	0.43	1.74
Passenger transfer	0.12	0.19	0.04	0.10
Through passenger	1.01	2.07	1.80	0.89
Suburban passenger	0.88	1.54	1.97	0.74
Locomotive terminals	1.17	1.41	0.32	1.01
All other classes of smoke producers.....	88.06	77.94	92.53	89.69

for 10.31 per cent of the total gases of combustion discharged into the atmosphere, ranking fourth in this respect.

PERFORMANCE OF ILLINOIS AND INDIA COAL

The following is a more detailed description of the test made by the committee on the Consolidation locomotive at the testing plant of the Pennsylvania Railroad at Altoona. The tests were planned for the prime purpose of establishing facts with reference to the smoke discharges of steam locomotives, and to show also the value of the brick arch in the locomotive firebox as a factor promoting economy in the use of fuel, a reduction of cinders and fuel dust in smoke, a reduction of the density of visible smoke, reduction of loss of heat units in smoke and ash discharges, and boiler efficiency. The value of experience in locomotive firing as a factor in promoting economy of fuel consumption, a reduction of cinders and fuel dust in smoke, a reduction in the density of visible smoke and in boiler efficiency was also considered.

A total of 75 tests were made, in 56 of which the locomotive firebox was equipped with a brick arch and in 19 the arch was removed. Sixty-four tests were made with experienced firemen and 11 were made with inexperienced firemen. The coals selected for this series of tests were representative of the coals burned in locomotives operating in the Chicago terminals. Coals were obtained from the following 10 counties: Macoupin, Ill.; Marion, Ill.; Saline, Ill.; Sangamon, Ill.; Vermillion, Ill.; Williamson, Ill.; Greene, Ind.; Sullivan, Ind.; Vermillion Ind., and Vigo, Ind. The coal from Saline, Ill., has an average heat value

third gives the results of these same coals with the brick arch.

From the results of these tests the following summary of the advantages of the brick arch in the firebox were determined:

Increases in number of pounds of water evaporated per pound of coal from 8.6 to 9.2.

Increases of boiler efficiency from 63.4 per cent to 67.8 per cent.

Decrease in the amount of coal consumed per dynamometer h.p.-hour from 4.6 lb. to 4.3 lb.

Decrease in average density of visible smoke emissions from 36.5 per cent to 24.1 per cent.

Decrease in the total average quality of cinders and fuel dust emitted in smoke from 5.56 per cent to 4.18 per cent of the fuel fired.

Decrease in the number of heat units per pound of cinders in fuel dust emitted in smoke from 9,610 B.t.u. to 9,064 B.t.u.

Decrease in the amount of carbon contained in cinders and fuel dust per ton of coal consumed, from 75.8 lb. to 57.6 lb.

Decrease in the number of heat units contained in the ash and clinker discharges per pound of fuel fired, from 6.28 to 4.98.

Decrease in volume of air intermingled with the gases of combustion, discharged through the stack, from 26.5 per cent to 22.5 per cent.

Increases of the portion of the carbon in the fuel which combines with oxygen to form carbon dioxide, from 51.1 per cent to 53.2 per cent.

Table V gives the results obtained with experienced and with inexperienced firemen operating the locomotive at 80 revolutions

TABLE V—RESULTS OF TESTS WITH EXPERIENCED AND INEXPERIENCED FIREMEN

Test Group*	BA—9—E	BA—9—1	NA—2—E	NA—2—1
Dry fuel fired per sq. ft. grate surface per hr., lb.....	46.1	57.5	51.5	55.6
Equivalent evaporation per sq. ft. H. S., per hour.....	7.1	7.2	7.0	7.1
Equivalent evaporation per lb. dry coal	9.7	8.0	8.6	8.2
Boiler horsepower†	700.4	707.7	684.7	711.0
Efficiency of boiler based on fuel per cent	73.2	59.7	65.2	62.7
Dry fuel per dynamometer h.p. lb., lb.	3.9	5.2	4.3	4.6
Thermal efficiency of locomotive based on fuel, per cent.....	5.0	3.9	4.7	4.5
Average smoke density, per cent Cinders and fuel dust in per cent of fuel fired	18.	36.	27.	31.
	3.44	4.00	2.37	2.98

* BA—9—E = Average of 9 different coals with the brick arch and experienced firemen.

BA—9—1 = Average of 9 different coals with the brick arch and inexperienced firemen.

NA—2—7 = Average of 2 different coals without the brick arch and with experienced firemen.

NA—2—1 = Average of 2 different coals without the brick arch and with inexperienced firemen.

† One boiler horsepower = 34.5 lb. equivalent evaporation per hr.

per minute and at 25.0 per cent cut-off, burning coal with and without the brick arch in the firebox. The first column is an average of the coals obtained from Marion, Saline, Sangamon,

Vermilion and Williamson counties, Ill.; and Greene, Sullivan, Vermilion and Vigo counties, Ind. The last two columns in the table consider the coal from Macoupin and Williamson counties, Ill.

When burning the same kinds of coal in a locomotive fire-box equipped with a brick arch, firing by inexperienced firemen, as compared with that by experienced firemen, results in the following:

An increase in fuel consumption from 46.1 lb. to 57.5 lb. of fuel fired per sq. ft. of grate surface per hour.

An increase in boiler horsepower from 700.4 to 707.7.

A decrease in boiler efficiency from 73.2 per cent to 59.7 per cent.

An increase in fuel consumed per dynamometer horsepower from 3.9 lb. to 5.2 lb.

An increase in smoke density from 18 per cent to 36 per cent.

An increase in cinders and fuel dust discharged in smoke from 3.44 per cent to 4.00 of the fuel fired.

A decrease in thermal efficiency from 5.0 to 3.9 per cent.

A similar comparison of the values obtained when firing the same kinds of coal in a locomotive firebox not equipped with a brick arch shows that firing by inexperienced firemen results in the following:

An increase in fuel consumption from 51.5 lb. to 55.6 lb. of fuel fired per sq. ft. of grate surface per hour.

An increase in boiler horsepower from 684.7 to 711.0.

A decrease in boiler efficiency from 65.2 per cent to 62.7 per cent.

An increase in fuel consumed per dynamometer horsepower from 4.3 lb. to 4.6 lb.

An increase in smoke density from 27 per cent to 31 per cent.

An increase in cinders and fuel dust discharged in smoke from 2.37 per cent to 2.98 per cent of the fuel fired.

A decrease in thermal efficiency from 4.7 per cent to 4.5 per cent.

LEGISLATIVE PROPOSALS OF THE BROTHERHOODS

By W. L. STODDARD

WASHINGTON, December 22.

President Wilson will not oppose such safety legislation as may be pressed upon Congress by the representatives of the railroad brotherhoods. When, in his annual message to Congress, the President declared that before further railroad legislation is attempted the whole field of railroad law and practice should be surveyed by a special commission, he did not intend to shut the door to measures proposed in the interests of safety. At least, this is what Mr. Wilson is reported to have told H. E. Wills, P. J. McNamara, Wm. H. Clark and Val Fitzpatrick, railroad brotherhood agents, who waited on him last week.

The brotherhoods have as yet proposed no bill to the present Congress, but they evidently intend again to ask for a law prescribing clearance limits for cars and engines. It was this proposition, in the La Follette bill, as may be remembered, that President Taft referred to in a message to Congress, declaring that its enactment would impose a burden of more than \$400,000,000 on the railroads, and recommending that the same result should be sought by other, presumably non-legislative, means.

Representatives of the brotherhoods here now propose to have the suggested clearance figures apply only to new cars and engines with the view of dealing with existing equipment later. In drafting such legislation it would be the aim to try to disarm the opposition of the railroads, and the less radical the proposals the better chance of being passed by Congress.

It is believed that this plan was outlined to the President at last week's conference.

In this connection it is worth recording that the brotherhoods are announcing that they will work for the passage of an amendment to the sixteen-hour law fixing a minimum penalty of \$100 for violations as recommended by the Interstate Commerce Commission in its annual report a week ago.

The brotherhoods apparently do not intend at this session to press the proposed amendment to the Federal employers' liability law nor the bill to limit the length of trains; while the question of semi-monthly or weekly payment of wages, regula-

tion of loan sharks, and a law allowing men who are away from home to vote by mail have been put aside from the national field as properly belonging to the province of the states.

The joint resolution for a joint committee of the House and Senate to look into railroad matters was ordered printed in the Record the other day. It bears the authorship of Senator Newlands, of Nevada, and has a long preamble to the effect that numerous bills on this subject are now pending, that numerous recommendations of the Interstate Commerce Commission call for attention, that the experience of the past 28 years ought to be reviewed, that the commission is overworked, and that well-managed transportation facilities are a prime necessity of business prosperity and a common interest of all the people. The resolution calls for a joint sub-committee to consist of five senators and five representatives from the respective interstate commerce committees of the two houses; the sub-committee to have power to do whatever is necessary for a full and comprehensive study, and to report in December, 1916.

A few bills relating to transportation have already been introduced in the new Congress. In both houses there is a proposition to amend the Cummins' amendment so that shippers of baggage and express need not in all cases declare the value of goods offered for transportation. Senator Pomerene, of Ohio, has introduced a bill to define straight and order bills of lading and to codify the conditions on bills of lading. Senator Clapp, of Minnesota, has introduced a bill on the same subject.

In the house there is a bill to increase the period of time within which claims for damage to freight may be presented to carriers and another forbidding the granting of credit on freight bills for longer than ninety days. Representative Adamson, of Georgia, has introduced in the house a bill to increase the number of interstate commerce commissioners from seven to nine and to increase the salary of the secretary of the commission from \$5,000 to \$7,500. Mr. Rayburn, of Texas, has introduced a bill to give the interstate commerce commission control over the issuance of securities by carriers.

The American Federation of Labor announces a long program of legislation which it will ask for, among which are a proposal to limit the working hours of railroad telegraphers to eight per day; a compensation act for railroad employees engaged in interstate commerce; and a law to prohibit the interstate transportation of goods in the manufacture of which the labor of children under a certain age have been employed.

SEGREGATION AND SPONGINESS IN LADLE TEST INGOTS*

By ROBERT W. HUNT & Co.

A recent order for the inspection of open-hearth steel rails was of such a character as to demand a check of the manufacturer's chemical analysis of each heat represented, and the results of our analysis differed so widely from those reported by the mill that it was finally deemed advisable to make some investigation of matters pertaining to ladle test ingots, and principally to the possibilities of their segregation and soundness. What has been known to exist for a long time became apparent at the outset of our investigation, that ladle test ingots were subject to unsoundness and segregation exactly as are all large ingots, the only difference being one of degree. Obviously as long as this condition exists, it is manifestly impossible to expect analyses of the same test ingot by different chemists to agree within the limits of possible chemical error unless drillings for the samples are taken with special care and mixed and divided so as to insure both chemists working on identical lots. But of much greater importance is the fact that when the ladle test ingot is segregated and unsound, the drillings taken from it may not be representative of the steel or heat as a whole, and the reported results are therefore misleading and inaccurate. Thus a heat of steel can be reported as 0.60 per cent for carbon, while as a matter of fact, it was

* Abstracted from Bulletin 179 of the American Railway Engineering Association.

actually 0.75 per cent, and vice versa. These figures are not exaggerations but are the differences reported by two chemists on drillings from the same test ingot.

At the mill at which we were engaged the ladle test ingot mold was about 2½ in. sq. at the top, 2 in. sq. at the bottom and 5 in. high. Depending on the amount of steel poured into it and the extent of its boiling, or raising up of the top, the resulting ingots varied in height from 3 to 6 in., and when they were drilled, in order to obtain the sample for analysis, many cavities were encountered. In some instances it became necessary to take drillings from two different locations on the same ingot and in such cases the chemical results varied by as much as 0.15 per cent carbon (by combustion).

Samples of ladle test ingots were taken from the same heat of open-hearth rail steel and split open to show the interior structure. The metal near the outside of the ingots differed from that near the inside and the location of the drillings with respect to the height particularly, also gave different results. The degree of porosity is apparently somewhat greater in the ingot from the first part of the heat than that from the last part of the heat, and further, that the addition of the deoxidizing agent, ferro-silicon, experimentally in one case, made that ingot absolutely sound for most of its height.

Soundness, viz.: freedom from blow holes, etc., is a very important feature for ladle test ingots to possess. In the first place, the more unsound one is the more it is inclined to be segregated, and secondly, in drilling steel that is full of blow holes, minute particles break off from the sides of the holes and render the chemical determination for carbon by combustion methods more difficult of accuracy than when thin flake-like drillings are furnished. It is quite evident that the soundness of the test ingot is not predicated by its shape. At the same time it is logical to regard a thin slab-like shape as preferable, because of its tendency to chill quickly and thus solidify with a minimum degree of segregation. The disadvantage of this shape of test ingot lies principally in the difficulty of obtaining sufficient drillings to provide for the requisite number of analyses.

The addition of a deoxidizing agent to insure a sound setting steel and a ladle test ingot free from blow holes is more or less common practice at some mills, and commercially pure aluminum in the form of pellets is admirably adapted for this purpose.

Based on the experience of the past, we feel constrained to recommend such additions to rail specifications as will provide:

First—A standard shape and size for ladle test ingots with directions as to the size of drill and location of the borings on which the analysis is made.

Second—The addition of aluminum, preferably in the dipper, when necessary to insure a sound setting steel in the ladle test ingot with freedom from blow holes.

In conclusion, we submit that the location of the test ingot in the heat with respect to the regular ingots cast, is also deserving of consideration, as is also the precise method of making the analysis for the various chemical elements.

TURKISH RAILWAY CONCESSIONS. In November, 1914, within a week of Turkey's declaration of war, the Ottoman government not only took over the working of the railways, which it had a perfect right to do under the terms of their concessions, but also interfered with their administration and finances. The French manager of one railway was thus bluntly asked to resign in favor of the manager of the Hedjaz Railway, a German, and the government also determined to seize \$200,000, which the French manager had on his departure deposited with the Ottoman Bank at Beirut. In order to overcome the legal difficulties in the way, a special law was passed empowering the seizure of funds deposited with banks by companies carrying on their business under concessions, and this \$200,000 was then used by the Ottoman government for the construction of military lines.

LOCATION OF PASSING SIDINGS ON SINGLE TRACK*

By F. L. DODGSON

Consulting Engineer, General Railway Signal Company, Rochester, N. Y.

In considering the effect of passing-siding locations on the capacity of a single-track railroad, it would seem to be the most logical thing to first determine, if possible, what rule or rules, if any, must be followed in order to so locate the sidings that the maximum capacity of the road will be obtained.

With this view, let us first assume a piece of level railroad 40 miles long over which we are to operate one class of trains only, these trains traveling at a uniform speed of 20 miles an hour. Fig. 1 is a train diagram of such a road with the distance the vertical lines and the time the horizontal lines. If there were no sidings on this road, two trains could be run (one in each direction) each four hours during the day. These two trains are shown on the diagram by the two heavy lines aW and aE. If, now, we assume that there is one passing siding on the road, it is quite evident that the maximum capacity would be reached with this siding located exactly in the center of the road. With this arrangement two additional trains could be run each four hours and they are shown on the diagram by the lines bE and bW. If we represent the time required for the westbound train to run from E to C (C being the siding location) by W1 and the time required for the same train to run from C to A by W2; likewise the time required by the eastbound train to run from A to C by E2, and the time required to run from C to E by E1; and represent by S the spacing in time between trains running in the same direction; we shall find by inspecting the diagram that:

$$(1) S = W2 + E2$$

and

$$(2) S = W1 + E1.$$

Therefore:

$$(3) W2 + E2 = W1 + E1.$$

Or, if we state this last equation in words, it means that the sums of the running times of an eastbound and a westbound train between sidings are equal.

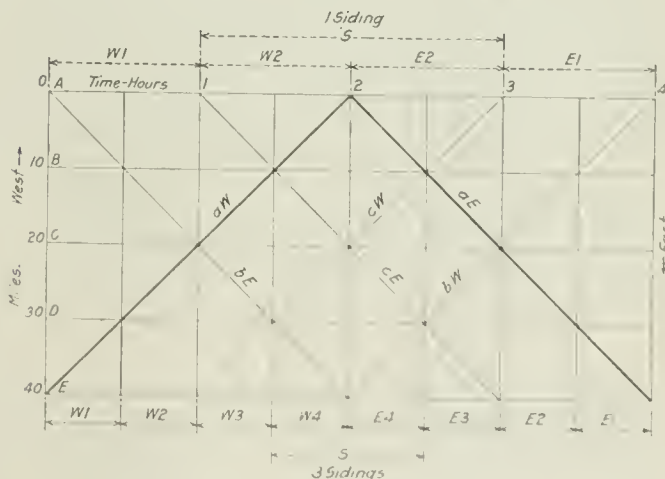


Fig. 1

Now let us continue and add two more passing sidings to our railroad. Again it is quite obvious that the maximum capacity will be obtained if these two additional sidings are located exactly midway between A and C, and C and E. If, as before, we represent the running time of the westbound train from E to D by W1, D to C by W2, C to B by W3, and B to A by W4 (B and D being the locations of the two new sidings); and also the running time of the eastbound train from A to B by E1, B to C by E2, C to D by E3, and D to E by E4; and

* A paper presented to the Railway Signal Association at its annual meeting, Salt Lake City, September 14.—Abridged.

as before make S the time spacing between trains in the same direction; we shall find from the diagram that:

$$(4) \quad S = W1 + E1$$

and

$$(5) \quad S = W2 + E2$$

and

$$(6) \quad S = W3 + E3$$

and

$$(7) \quad S = W4 + E4.$$

Therefore:

$$W1 + E1 = W2 + E2 = W3 + E3 = W4 + E4.$$

Again this last equation stated in words means that the sums of the running times of trains in opposite directions between passing sidings are all equal.

From this simple diagram, Fig. 1, it will appear, therefore, that the maximum capacity of the railroad, with a given number of passing sidings, would be reached when the sums of the running times of the east and westbound trains between passing sidings were all equal.

We can determine the value of S quite readily as follows: by adding equations 1 and 2 we have:

$$(8) \quad 2S = W1 + W2 + E1 + E2$$

or, representing $W1 + W2$ by W , the total running time of the westbound train, and, similarly, $E1 + E2$ by E ,

$$(9) \quad S = \frac{W + E}{2}$$

which is the value of S when there is only one passing siding.

Again, if we add equations 4, 5, 6 and 7, we have:

$$(10) \quad 4S = W1 + W2 + W3 + W4 + E1 + E2 + E3 + E4$$

or

$$(11) \quad S = \frac{W + E}{4}$$

If we let N equal the number of passing sidings, then, in equation 9, $2 = N + 1$, and, in equation 11, $4 = N + 1$. Therefore, by substituting in equations 9 and 11, N for the number of sidings, we obtain the formula:

$$S = \frac{W + E}{N + 1}$$

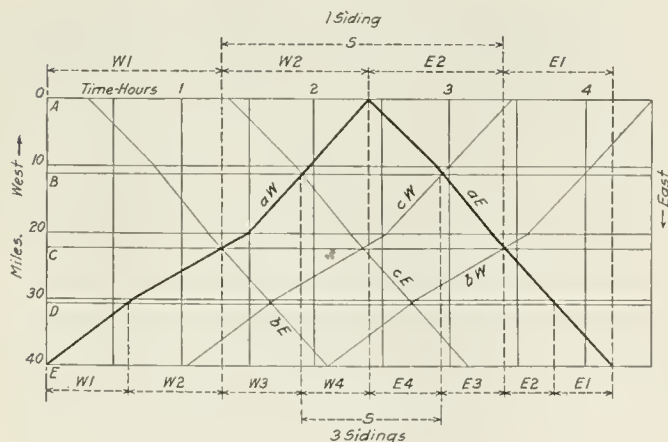


Fig. 2

To construct a diagram for varying and unequal speeds, the lines representing trains in the same direction may be plotted at intervals determined by the formula, $S = \frac{W + E}{N + 1}$, for a given number of passing sidings, as in Fig. 2. The intersections of the lines representing opposing trains will then fix the locations of those sidings for maximum capacity.

It will be apparent here, as before, that the sum of the running times between A and B is equal to the sum of the running times between B and C, etc. The rule, therefore, which we first laid down seems to hold true when the running times are unequal and speeds not uniform.

It is quite obvious that the number of trains per day, which we will represent by T , will be $T = \frac{1,440 \times 2}{S}$ (1,440 being minutes in a day and S being expressed in minutes).

In Fig. 3 allowance is made for the time lost at the siding,

represented by a ($\frac{1}{2} a$ entering and $\frac{1}{2} a$ leaving), and by a stop for water at mile-post 15. Then

$$S = W1 + E1 + \frac{a}{2} + \frac{a}{2};$$

also

$$S = W2 + E2 + \frac{a}{2} + \frac{a}{2};$$

or

$$2S = W1 + W2 + E1 + E2 + a + a$$

or

$$S = \frac{W + E + 2a}{2}$$

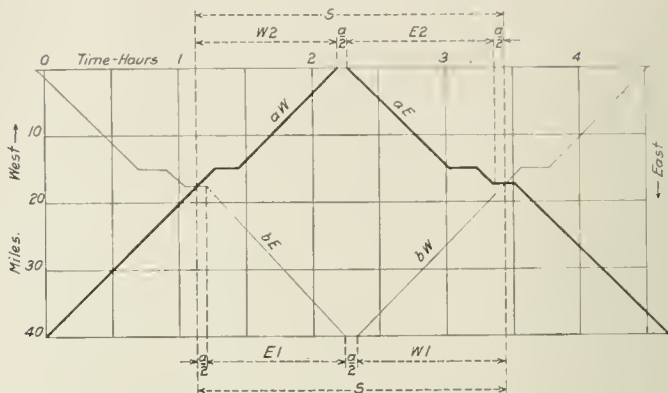


Fig. 3

If N equals the number of passing sidings, then substituting in the last equation $N + 1$ for 2 we have:

$$S = \frac{W + E + (N + 1)a}{N + 1}$$

Substituting this value of S in

$$T = \frac{1440 \times 2}{S}$$

we have

$$T = \frac{2880 (N + 1)}{W + E + (N + 1)a}$$

In other words the maximum number of trains of one class that can be run in 24 hours over a piece of railroad equals 2,880 times the number of passing sidings plus 1, divided by the sum of the running times of an east and a west bound train over the road, plus the number of sidings plus 1 multiplied by the delay caused by a train taking the passing siding.

If trains were run in one direction in two sections and in one section in the opposite direction, the train diagram would look like the following:

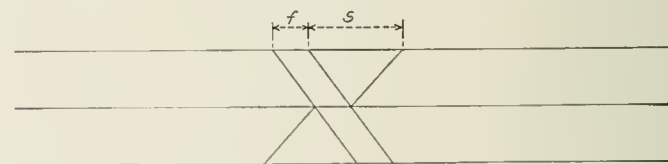


Fig. 3a

If we let f represent the time spacing between following trains, then the number of trains in 24 hours would be:

$$T = \frac{1440 \times 3}{S + f}$$

Substituting in this equation the value of S for maximum capacity we have

$$T = \frac{4320 (N + 1)}{W + E + (N + 1)a + (N + 1)f}$$

If passing tracks were of sufficient capacity, both the east and west bound trains could be run in two sections, in which event we should have:

$$T = \frac{1440 \times 4}{2 + 2f}$$

or, substituting the value of S ,

$$T = \frac{5760 (N + 1)}{W + E + (N + 1)a + (N + 1)2f}$$

Let us now consider for a moment the effect the number of passing sidings has on the capacity. Going back to Fig. 1, it will be seen that with one passing siding there are four trains

in a certain time, that time being the sum of the total running times of the two trains. Further, with three passing sidings, there are eight trains in the same time, and if we continue adding passing sidings we shall find that, with seven passing sidings, there will be 16 trains and with 15 passing sidings, 32 trains, and so on. In other words, if we neglect for the moment the delay caused by one train meeting another, we can say that, in a time that is equal to the sum of the running times of the two trains over a certain territory, there will always be two more trains than twice the number of passing sidings. But while the capacity increases rapidly as the number of passing sidings is increased, the time required to cover the territory is rapidly increased. To arrive at this increase in running time, if we let R represent the average running time of the two trains, we can readily construct the following formula:

$$R = \frac{W + E + (N + 1) a}{2}$$

in which (N + 1) a is the total time required for the meeting of trains when there are N passing sidings.

This formula is also based on a schedule in which a train in one direction meets a train in the other direction at every passing siding. If trains are run in two sections in one direction, our formula then becomes:

$$R = \frac{W + E + (N + 1) a + Nf}{2}$$

and likewise, if trains are run in two sections in both directions, then our formula becomes:

$$R = \frac{W + E + (N + 1) a + N2f}{2}$$

In order to show a practical example of the application of the formulas which we have set forth in the foregoing, we have chosen an actual piece of railroad about 34 miles long on which there are six passing sidings at B, C, D, E, F and G, A and H being the two terminals. The running time for full-tonnage trains without stops is shown in the second and third columns of Table I, these being given between passing sidings. On this road the westbound trains take the siding and there is one water stop, this water stop being located at siding C. Siding C is a lap siding and the water crane is at the lap, so that an eastbound and a westbound train can both be taking water at the same time.

Sta.	Running time without stops			Original Siding Location Full schedule running time				Siding G Moved Full schedule running time			
	2	3	4	5	6	7	8	9	10	11	12
A	16	12	28	25	12	37		25	12	37	
B	10	11	21	19	W23	42	11	19	W23	42	00
C	13	11	24	W25	11	36	17	W25	11	36	6
D	15	14	29	24	14	38	15	24	14	38	4
E	10	12	22	19	12	31	22	19	12	31	11
F	16	28	44	25	28	53	00	21	21	42	00
G	8	9	17	17	9	26		24	16	40	
H	88	97				65					21

¹ Column 8—Differences between the sums of the running times and the maximum, 53.

² Column 12—Differences between the sums of the running times and the maximum, 42.

W—Time including water stop.

Columns 5 and 6 of the table show, westbound and eastbound, what we have called a full schedule running time, full schedule meaning that in this case we are operating trains of only this one class and that every train is meeting a train in the opposite direction at every passing siding; and we have, further, made the assumption that the time lost by a train taking the siding to meet another train would be nine minutes and the time required for a train to take water, 12 minutes. Under these assumptions, therefore, the westbound running time between A and B would be 16 + 9 or 25 minutes; between B and C would be 10 + 9 or 19 minutes. Now between C and D, as a westbound train can be taking water while on the siding and as 12 minutes only is required for the water stop, the

additional time required for this train would be 13 + 12 or 25 minutes. The running time of the westbound train between D and E, E and F, F and G, and G and H, would in each case be nine minutes greater than the running time without stops as shown in the second column of Table I.

The running time of the eastbound train would be from H to C the same as shown in the third column, because this train does not take passing sidings. At the east end of siding C the eastbound train takes water. Therefore, its time between C and B would be increased by 12 minutes, the time required for the water stop. The seventh column of the table shows the sums of the running times of the two trains between the sidings plus the siding stops. It will be noticed that the maximum of these times is between F and G, and it is 53 minutes. The capacity of the road, therefore, for trains of this one class would be two trains in each 53 minutes or 54 trains per day.

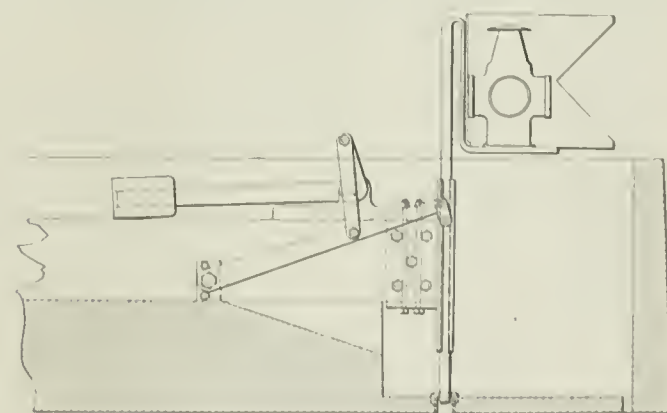
There would be a delay to each westbound train at each passing siding equal to the difference between 53 minutes and the sum of the two running times. For example, between B and C the sum of the two running times is 42 minutes and 53 minutes is allowed for these running times, so that there would be a delay to the westbound train of 11 minutes at siding C, and likewise a delay of 17 minutes at siding D. If the schedule were properly arranged, there would be no delay at siding B, because, while the sum of the running times is only 37 minutes, the westbound train would not leave A until just in time to meet an eastbound train at B. Likewise, there would be no delay at H because the westbound train would have reached its terminal. The total delay to the westbound train is, therefore, 65 minutes.

It is quite evident that, if the spacing between sidings F and G were decreased, the capacity of the road would be increased; and if siding G is the only one to be moved, it is quite obvious that it would do no good to move this siding east a greater distance than will be required to make the sum of the running times between F and G equal to 42 minutes, because the sum of the running times between B and C is 42 minutes.

When this is done the result is as shown in the last four columns of the table, and we have a maximum spacing of 42 minutes, which means two trains every 42 minutes or 68 trains per day, an increase of 14 trains from what the capacity was with siding G in its original location, or approximately an increase of capacity of 26 per cent. The delay to the westbound trains under this new arrangement totals 21 minutes, a saving in the running time of the westbound trains under full schedule of 44 minutes per train.

WILLIAMS' DISAPPEARING SWITCH LIGHT

This is a switch light fixed to the end of the tie at a switch and arranged to drop into a small pit when the track is set for



Disappearing Switch Light

the main line, so that it will be visible only when the switch is set for the side track. When set to show, the light appears just above the level of the tie as indicated in the illustration. It

is moved up and down by levers, the arrangement being similar to that of the ordinary ground switch lever. The target, of sheet metal, is cut out and the lamp is set into it. The pit is arranged with a steel cover, to be locked when the switch is set straight. This keeps out rain and prevents the lamp from being tampered with.

This lamp has been in use at the Bakersfield (Cal.) terminal of the Southern Pacific for something over a year, and is well spoken of by those who have had experience with it.

The proprietor is E. F. Hartzell, East Bakersfield, Cal. He says that he has two more under construction. Making them on a small scale, he finds the cost of the whole outfit about \$25 each.

A HISTORY OF THE LITTLE KANAWHA SYNDICATE

The Interstate Commerce Commission has made its report in the investigation of the ownership, management and control of the Little Kanawha Railroad in accordance with the resolution of the United States Senate calling upon the commission to make such an investigation. The commission's findings bring out the fact that the Little Kanawha was to have been used by the Goulds and Joseph P. Ramsey to form a part of the connection between the Wabash-Pittsburg Terminal and the Western Maryland. Very much condensed and in substance the findings of the commission are as follows:

The Little Kanawha Railroad is now being operated between Parkersburg, W. Va., and Owensport by the Baltimore & Ohio as agent for the stockholders. Of the 5,095 shares of stock of the Little Kanawha, 4,781 are jointly owned by a combination of the Pittsburgh & Lake Erie, the Pennsylvania Company and the Baltimore & Ohio. The Pittsburgh & Lake Erie owns half of this joint stock and the Pennsylvania Company and the Baltimore & Ohio one-quarter each. The purchase of the Little Kanawha Railroad Company's stock was made in order to obtain coal properties in Gilmer, Braxton and Lewis counties, W. Va., and the railroad has been operated at a loss since 1906 and is not being held to tie up and prevent the development of the Little Kanawha Valley. The road is now for sale. In 1901 George J. Gould, Joseph Ramsey, Jr., and William E. Guy organized the Little Kanawha syndicate after having bought the Little Kanawha Railroad. The former stockholders of the railroad received about \$8.09 per share for their stock. A total of \$6,310,104 was subscribed by the syndicate for the extension of the Little Kanawha, purchase of other railroads and purchase of coal lands. Construction work on the extension of the Little Kanawha was actually begun and contracts had been entered into with McArthur Brothers for the work. When the Gould scheme for a transcontinental system extending from Baltimore to San Francisco fell through, construction on the extension of the Little Kanawha was stopped and McArthur Brothers were given similar work on the Zanesville, Marietta & Parkersburg. About \$429,000 had been spent on the extension.

In 1905 relations between Joseph Ramsey, Jr., who had been president of the Wabash, and George J. Gould were severed and Mr. Ramsey was left with control of the Little Kanawha. He entered into negotiations with W. H. Newman, then president of the New York Central Lines, and J. M. Schoonmaker, vice-president of the Pittsburgh & Lake Erie (a New York Central Line), and the Pittsburgh & Lake Erie finally bought the properties which Mr. Ramsey offered it in order to obtain the Kincheloe, Fulton and Arnold coal properties, aggregating about 30,810 acres. To do this they had to buy also the majority stock of the Little Kanawha and also other railroad franchises. It is estimated that the price paid was about what the coal properties would have cost and that the majority stock of the Little Kanawha was acquired practically without cost. In February, 1906, the Pittsburgh & Lake Erie sold one-quarter of this majority stock of the Little Kanawha to the Pennsylvania Company and one-quarter to the Baltimore & Ohio. The transfer of one-half of the interest in these properties was made by the

Pittsburgh & Lake Erie on the basis of actual cost primarily for the purpose of sharing the burden of its investment in such properties and franchises with the Baltimore & Ohio and the Pennsylvania. The sale was in harmony with the spirit and general terms of a so-called gentlemen's agreement entered into between John Newell, when he was president of the Pittsburgh & Lake Erie, and George B. Roberts, when he was president of the Pennsylvania Railroad in the decade ended 1889.

Immediately after the purchase Mr. Schoonmaker made an inspection of the Little Kanawha and found it in a very poor condition, and found that to place it in proper condition and extend it would involve the expenditure of a large amount of money. No effort was therefore made to extend the road and efforts have been and are being made by the owners to sell their stock in the company and their coal properties.

RAILROADING FROM A GENERAL STORE-KEEPER'S POINT OF VIEW*

By J. G. STUART

General Storekeeper, Chicago, Burlington & Quincy

It was a common mistake some years ago to think because a man or a department used the material they would be the best fitted to care for it. This idea has died out to a great extent. It is certain that no superintendent or master mechanic fully alive to the interest of his own department has the necessary time to look after material he is using, and if his department is in charge of material it is certain he will not look after it individually, but will assign these duties to some one of his force. The best plan would seem to be to make the store department responsible for all material and let all departments look to it for supplies.

Like all other departments the store department is expected to pay dividends, or, in other words, to make a showing. A good showing for the store department consists among other things in the following: Service; reduced investment and economics in handling. While a small investment is very desirable, nevertheless, if the investment is reduced so that the service is curtailed, it is in many cases more expensive than to maintain a greater investment. By service I mean the ability to supply the generally used or standard items of material within a reasonable time after the order for them is received. To maintain a supply of standard material is a difficult matter, as the use of standard material is not and cannot be regular.

In practically all storehouses a stock book is kept, which, though different on the various roads, is yet similar in its general principle. Although the stock book is not by any means perfect, it is a great advance over the old "hit and miss" way of ordering which was in effect some years ago. In the minds of many the figures showing past consumption in the stock book are supposed to dictate what material is to be ordered for the future. This is an entirely wrong impression, as the figures are only used as a basis on which to order for the future. Good storekeeping begins with these figures, and the knowledge a storekeeper has of future conditions as compared with past conditions enables him to place his order for what in his judgment will be needed and not to follow arbitrarily any figures showing past usage.

Reduced Investment.—Reduced investment is placed second to service. Some time ago one of our large railroads figured it cost about 12 per cent per annum to carry material, that is, for every dollar's worth of material carried for one year it cost the railroad practically 12 cents to cover the interest on the investment, insurance, taxes, loss and damage through breakage, leakage or becoming defective or obsolete and by extra handling. These figures may not be absolutely correct, but they are not very far out of the way. To prevent this loss it is important that material be kept moving and not allowed to remain in

* Abstract of paper presented at the October meeting of the Western Railway Club.

stock longer than is absolutely necessary. Assuming 12 per cent to be correct, then a railroad reducing its investment in material by one million dollars would be able to make saving of \$120,000 a year or enough to take care of the entire monthly pay roll for some of the largest shops on the line. These figures, of course, are large, and large figures are generally too far away to be of much help.

Suppose a superintendent started over his division the first of the month and saw a section man sitting reading a paper and when he returned at night the same man was still sitting there doing nothing. There is no question but what something would happen. Yet the same superintendent will, perhaps, without giving the matter more than a passing thought, permit crossing plank, switch ties, frogs or switches amounting to \$300 to lie around for an entire year. The investment charges on this would amount to \$36 for the year or enough to pay the section man for an entire month. It should be fully understood that material lying idle is just as expensive to the railroad as laborers sitting idle and that it is immaterial to the railroad company whether the money is paid out as investment charges or wages.

The investment in material can also be reduced by the prompt return of all unapplied material, whether new or second-hand, to the store. It is perhaps a great temptation when a superintendent gets some special tools, such as ditching spades, for a job in his territory to hold them after the particular job is finished, because he may need them again and then he may not be able to get them. Consequently they are tied up as idle capital for an indefinite time while the superintendent on the next division may need some of these same spades and for whom it would be necessary to purchase them in order to supply his needs.

Every store department acts in the nature of a clearing house and material not needed at one point is shifted to another point where it is needed.

It should be borne in mind the store department is organized in order to furnish material and it will always furnish material that is needed when the order is properly approved. The habit of holding on to material of all sorts instead of returning it to the storehouse promptly is one that is costing every railroad a considerable amount of money. In using material men are prone to overlook its value and special efforts should be made to have men approving requisitions for material fully informed as to its cost.

The concentrating of material in the storehouses enables the store department to handle a large volume of business in one place and permits the use of labor-saving handling devices which cannot be profitably used if each department handles its own material and consequently does a smaller volume of business. Establishment of lumber yards permits the use of locomotive cranes, concentration of scrap yards permits the use of overhead or gantry cranes as well as locomotive cranes.

A successful store department cannot be entirely selfish in its aims, as it is impossible for a store department to make a good showing without helping the other departments at the same time. The master mechanic or superintendent should look on the store as his store, not because he is responsible for it, but because it is the store that is supplying him with his material, in this way making it possible for him to make his own work a success or else retarding him in his work. More earnest co-operation of these departments with the store would be beneficial all around.

A more lively interest in the store on the part of master mechanics or superintendents and an occasional visit to the store would undoubtedly be a great help to the storekeeper in making a showing for the store department, which after all is merely the giving of good and efficient service to his two best customers, the master mechanic and superintendent. It would result also in a reduction in the investment, which means a reduction in the operating cost to the railroad, the thing for which all railroad officers are striving.

TRAIN ACCIDENTS IN NOVEMBER¹

The following is a list of the most notable train accidents that occurred on railways of the United States in the month of November, 1915:

COLLISIONS						
Date	Road	Place	Kind of Accident	Kind of Train	Killed	Injured
2.	Balt. & Ohio.....	Keswick	rc	F. & F.	3	0
†22.	Cent. Georgia.....	Columbus	bc	P. & F.	5	45
†23.	Southern	Salisbury	rc	P. & P.	2	20
23.	Bessemer & L. E....	Grove City	rc	F. & F.	1	0
DERAILMENTS						
Date	Road	Place	Cause of Derailment	Kind of Train	Killed	Injured
8.	Baltimore & O.....	Cairo, W. Va.	b. truck	F.	1	2
11.	Atlantic C. L.....	Thomasville	malice	F.	1	1
13.	Denver & R. G.....	Salida	b rail	P.	0	20
14.	Trinity & B. V.....	Kirven	unx	P.	0	15
17.	Chicago, B. & O.....	Quincy	neg	P.	2	0
29.	St. Louis, I. M. & S.	Garber	slide	F.	4	6

The trains in collision at Keswick, Va., on the night of the 2nd, about ten o'clock, were an eastbound freight, which at the time was standing at the station, and a following train, consisting of two locomotives moving backward. The two locomotives were running at excessive speed and crashed into the standing train with sufficient force to seriously damage three cars of cattle. Three trainmen were killed. The second train—the two locomotives—had been admitted to the block section on a caution card.

The trains in collision near Columbus, Ga., on the 22nd, were an eastbound passenger train and a westbound extra train of 28 cars carrying a "carnival" company. Both engines and nine flat cars of the carnival train were wrecked. The cars of the passenger train, of steel, did not leave the rails and the baggage car only was slightly damaged. The wreck took fire from combustible matter loaded on one of the flat cars and nine cars, containing carnival equipment, were burned. Five members of the carnival company were killed, and about forty others, passengers on passenger train and members of the carnival company, were more or less injured, none seriously. Five trainmen, one mail clerk and one express messenger were injured, none seriously. The cause of the collision was overlooking and misunderstanding of orders by the men in charge of the passenger train.

The trains in collision at Salisbury, N. C., on the evening of the 24th were northbound passenger No. 32, second section, and No. 38. No. 32 was an excursion, standing at the station. No. 38 disregarded a rule on the time table which required that from signal No. 370, south of Salisbury, to the station, speed should be reduced so as to be under control. The flagman of the standing train, however, is held primarily responsible. A coroner's jury blamed the flagman and the engineman and also held the fireman negligent for failure to observe the signal on the hind end of the standing train. Two passengers were killed and twenty were injured, all in the rear car of the standing train.

The trains in collision at Grove City, Pa., on the 23rd were southbound freights. The caboose of the leading train was wrecked. The flagman was fatally injured.

The train derailed at Cairo, W. Va., on the eighth was eastbound freight No. 40, and 11 cars were badly damaged. The car which first ran off the track crashed into the station of the Cairo & Kanawha Railway. The agent of that road was killed and two other persons were injured. The derailment was caused by a broken truck.

The train derailed at Thomasville, Ga., on the evening of the eleventh was a pay car train moving slowly over a Wye track. The locomotive was overturned and the engineman and fireman

¹ Abbreviations and marks used in Accident List: rc, Rear collision—bc, Butting collision—xc, Other collisions—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, Unexplained—derail, Open derailing switch—ms, Misplaced switch—acc, Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of locomotive on road—fire, Cars burned while running—P, or Pass., Passenger train—F, or Ft., Freight train (including empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

injured, the engineman fatally. The derailment was due to a spike which had been placed on the rail by a negro boy, seven years old.

The train derailed near Salida, Colo., on the 13th, was east-bound passenger No. 4, and 14 passengers and six employees of the dining car were slightly injured. The derailment was caused by the breaking of a rail.

The train derailed near Kirven, Tex., on the 14th was north-bound passenger No. 2. The tender was the first vehicle to leave the track, and after running about 100 ft. it came upon a trestle bridge where the bridge floor was broken up and the baggage car fell through to the creek below, about 30 ft. The second-class passenger car was overturned. Thirteen passengers and two employees were injured, none seriously. The cause of the derailment was not determined.

The train derailed near Quincy, Ill., on the evening of the 17th was a westbound passenger. The train was run past distant and home signals at the drawbridge over the Mississippi river and the engine plunged into the stream, the draw being open. The coupling at the rear of the engine was broken and the tender was left hanging over the end of the track on the fixed span. The engineman and fireman were killed.

The train derailed near Garber, Mo., on the 29th was a north-bound freight, and the engine and two cars fell down a bank. Three trainmen and one trespasser were killed and six trespassers were injured. The cause of the derailment was a landslide which occurred on a sharp curve. A rock fell from the bluff just as the train was passing, overturning the engine.

RAILROAD BONDS

The following is an abstract of the report of the committee on railroad bonds and equipment trusts, L. B. Franklin, chairman, at the fourth annual convention of the Investment Bankers Association of America.

During the period of the great prosperity of our railroad systems, their securities commanded a ready market both in this country and abroad, and throughout this time the competition on the part of investment bankers for new issues of railroad bonds was keen. This condition offered an opportunity to the issuing companies to decide upon the terms of their mortgages without much regard for the wishes of the banker and the protection of the investor, and this opportunity was in too many cases availed of. The investment banker, in order to participate in the business, was forced to accept the mortgages as drawn by the counsel for the railroad company, and in every way the advantage was with the seller and against the buyer. In justice to the banker, it must be conceded that since that period conditions unfavorable to the railroad companies have arisen which could not have been reasonably foreseen.

Conditions are now reversed. The advantage is with the buyer and a wonderful opportunity is offered for constructive banking. The buyer now can demand and obtain carefully drawn trust indentures protecting the investor at every point and avoiding those dangers which have in the past few years been pointed out in the most emphatic way.

Railroad property is no more immune from depreciation and obsolescence than is other property. Considerable mileage of road is dependent upon special sources of traffic which are not in their nature permanent and bonds secured on railroad property of this kind most certainly need and should have the benefit of a sinking fund. But this is not all. Trackage, which today is of the utmost importance and worth more than the bonds upon it, may in the near future, by reason of a change in conditions, become almost worthless. Replacement value or cost is not an infallible measure of real value. Property, to have value, must have earning capacity and earning capacity is subject to change. A sinking fund is the strongest protection which can be provided against a change in value due to a change in earning capacity. It is amazing what a small amount appropriated annually will provide in fifty years an ample fund. For exam-

ple, a cumulative sinking fund of $\frac{1}{4}$ of 1 per cent upon a 5 per cent fifty-year bond, callable at par, will retire more than 52 per cent of the issue by maturity, while a cumulative sinking fund of $\frac{1}{2}$ of 1 per cent on a similar bond will retire the entire issue prior to maturity.

The objection of the railroads to sinking funds is that their revenues are already restricted while the Interstate Commerce Commission, which controls railroad rates, does not appreciate the need for any repayment of debt out of earnings. Here is a fertile field for work.

The committee recommends that this association place itself on record as being in favor of the repayment of railroad debt in full or in part out of earnings and make an urgent plea before the Interstate Commerce Commission for the recognition of the principle.

The committee has discussed with railroad operators the question of providing in indentures for a specified sum to be spent on the maintenance of property covered by the mortgage and is of the opinion that such a provision is not practical.

Most of the states prohibit the sale of stock by a corporation at less than its par value and therefore comparatively few of our railroad corporations are today in a position to finance any part of their requirements for betterments, improvements or extensions other than by increase of their debt. This means a continual weakening of the margin of safety over the junior securities and unless offset in some way is sure to lead to trouble in the future as it has in the past.

What is a share of stock but an evidence of part ownership in the enterprise, and why should it have a nominal value which may in no way be related to its real or even its market value?

The railroad commission of the state of California has recognized the necessity on the part of public service corporations of maintaining the equity in their property over and above their bonded debt by allowing the sale of stock, both common and preferred, at prices below par, but approved by the commission. Such practice works no hardship on the buyer of the stock or the old stockholder, but maintains for the bondholder his pro rata lien on the property. It is admitted that such sale of stock without par value must not be permitted except under proper supervision, either state or national.

Contrast the credit position today of those roads which have been able to finance to a large extent by sale of stock with those which have had to sell bonds to meet all expenditures and then consider how much better would be the position of those weaker roads, had they been allowed to sell their stocks at fair prices. This is a subject where more education is needed.

Long-term bonds should not be issued to cover the purchase of equipment or to retire maturing equipment trust installments unless such bonds are protected by a strong sinking fund or strict provisions requiring the maintenance of the equipment pledged at a value equal to the bonds issued therefor. Provisions should be made for annual examination of the equipment records by the trustee at the expense of the railroad and adequate methods provided for enforcement by the trustee of the terms of the indenture.

It is recommended that general mortgage or refunding issues be drawn without fixed limits as to maturity, amount or rate of interest, thereby providing a flexible security which can be issued from time to time under provisions in accord with conditions then existing.

THE MERSEY RAILWAY.—The Mersey tunnel, under the river Mersey, connecting Liverpool with Birkenhead, was first proposed in 1860. The necessary authority was secured from Parliament in 1866, and additional powers in 1871, but it was not opened for traffic until February, 1886, when it was put in operation as a one and one-quarter mile two-tracked steam railway. Because of the difficulties of operation on the one hand and the lack of revenue resulting from the poor ventilation on the other, the Mersey Railway was not a paying venture. It was electrified in 1903, however, and since that time has actually had a new lease of life.

AN ENGLISH VIEW OF AMERICAN REGULATION

By W. M. ACWORTH

[The following discussion of some characteristics of American regulation of railways is an extract from Mr. Acworth's review, in the *Economical Journal*, of Prof. William Z. Ripley's book, "Railroads, Finance and Organization." The *Economical Journal* is the publication of the Royal Economic Society of Great Britain.]

Professor Ripley desires to maximize public interference. One would think that a supporter of interference by public authority would necessarily postulate two things: that the authority should be intelligent, and that the authority should be honest. Professor Ripley does not assert—as indeed in view of the history he could not—that either of these prerequisites exists in the United States. As for intelligence, let us take a crucial instance. If intelligent regulation is to be found anywhere, it is surely in that highly expert and respected body, the Interstate Commerce Commission. Yet in July, 1914, after an inquiry extending over more than 12 months, the majority of that commission solemnly reaffirmed their refusal of three years earlier to permit the trunk lines to raise their rates. Under the compulsion of gross and palpable fact they reversed that decision some 6 months later. But it is safe to say that for every dollar Jim Fisk stole from the Erie—and he stole a good many—the inhabitants of the United States lost a million in the months succeeding July, owing to financial depression and trade dislocation consequent primarily on the unintelligent appreciation of the situation by the Interstate Commerce Commission.

What about honesty? In the midst of a scathing indictment of the quite recent mismanagement of the New Haven Railroad Professor Ripley enumerates among its crimes "wholesale bribery, veiled in various ways, of members of the legislature." And this is not in the far west two generations ago, but in Massachusetts yesterday. Not a word is said in reprobation of those who were bribed. Does Professor Ripley take it as a matter of course that members of the legislature will be accessible to wholesale bribery? As for honesty in other than money matters, take this instance. The Interstate Commerce Commission is at this moment engaged in hearing at Chicago the application of the railroads in the territory west of that city to be permitted to raise their rates, with which, of course, the intrastate rates are inextricably entangled. Mr. Clifford Thorne is chairman of the Iowa State Railroad Commission, and he is appearing before the Interstate Commerce Commission as counsel for (a) a number of western state railway commissions, including his own, and (b) for a private trading association which dislikes the prospect of having to pay increased rates. The American public appear to see no objection. The Interstate Commerce Commission is evidently powerless, and the simple English expedient of disbarring Mr. Clifford Thorne is presumably not available. An Englishman, considering the propriety of further private regulation of railways, takes for granted the probity of parliament and the board of trade and the railway commission. But what would he think if legislators were accused of wholesale bribery, and if commissioners were as impartial as Mr. Clifford Thorne?

Take another instance, not from a western state, but from the federal government itself. For years the railroads have claimed that the payment to them for carrying the mails, which is practically in the uncontrolled discretion of the postmaster general, is inadequate. Some three years ago they succeeded in obtaining the appointment of a joint committee of the two houses of Congress to investigate. That committee severely censured the post office department and substantially supported the railroad contention that the method of payment was bad, that the arbitrary powers of the department were unjust, and that the amount of payment was insufficient. While the committee was sitting, the postmaster general introduced and carried a bill establishing a parcel post. The original limit of weight was reasonable. It has subsequently been extended to 50 lb. No provision was made in the bill for payment to the railroads for the extra work

thrown on them beyond the authorization of the postmaster general to pay to certain railroads a temporary increase not exceeding five per cent of the amount they were then receiving. How the extended parcel post is working as a business undertaking may be judged from scores of reports in the American press: of, for instance, a warehouse at Welis, Nevada, "where 80 tons of grain are held for shipment, sack by sack, through the parcel post;" of "a fast mail train delayed by the loading of two tons of wheat as parcel post;" or of "a car load of potatoes from Deeth to Halleck." From the moral point of view it is sufficiently criticised in the published words of ex-President Taft: "When we establish a parcel post—a good measure in itself—and make the railroads carry all the business we can get without adequate compensation, we are stealing from the railroads. That is what we are doing."

But this is not all the story. When the report of the joint committee above mentioned, based on two years' study of the question, was complete, and its tenor became known, but before it had been officially presented, the chairman of the House of representatives' committee on post offices, at the instance of the postmaster general, suddenly introduced a bill, the effect of which was further to reduce the payment which the joint committee had found to be inadequate, and to make the postmaster general absolute judge, without appeal, of his own cause. The bill was forced through the House of representatives, the railroads being refused even a hearing, and sent up to the Senate. The Senate refused to pass it, whereupon a second attempt was made to jam it through in the rush of business before the adjournment by "tacking" it on to an appropriation bill. Thereupon the Senate threw out the appropriation bill of the postmaster general, who, he it observed, is a cabinet minister, has since publicly accused the railroads of attempting to "loot the post office revenues." I have told these stories (which are not derived from Professor Ripley's pages) at some length because it would seem that English readers, in forming an opinion as to the desirability of more or less regulation, should have regard to the public record, not only of the regulatees, but of the regulators.

Another point may be noted in this connection. The railroads in the United States are regulated by 48 separate states and the federal government—"50 stripes save one," as a railroad president puts it—and in each of the 49 the authority to regulate is shared between the legislative, executive and judicial branches of the government—branches whose respective functions are strictly delimited by written constitutions. Professor Ripley recognizes the existence of a hopeless welter of confusion. He speaks of "the well-nigh intolerable conflict of authority of the many public services, commissions and state courts now at work. . . . No fewer than six different state commissions are said to be taking a hand in the reorganization of the Wabash. The approval of each is necessary for validation of the plans. And it is impossible to obey so many masters. It is daily becoming more clear that the conflict of state and federal authority can only be averted . . . by the assumption of unified control by the United States. Rates, service, and finance are so completely interlocked that satisfactory regulation in each field cannot be exercised except by the assumption of full authority over all three domains alike." That exclusive federal authority will be established in the near future is most unlikely. For, as has been shrewdly pointed out, any member of Congress who voted to deprive his state of control of its railways would sign his own political death warrant. And such documents politicians do not sign with alacrity. But Professor Ripley is so whole-hearted an advocate of public regulation that even the "well-nigh intolerable conflict of authority" does not deter him from desiring to increase both in scope and minuteness the present mass of public regulation.

Perhaps the most useful contribution to the railway question in the United States at the present moment would be an equally well-informed, intelligent, and honest history and criticism of the faults, both of dishonesty and stupidity, of the public authorities of the United States in dealing with their railways. Let us hope that Professor Ripley will find time to write it.

General News Department

The eastbound through passenger train of the National Transcontinental was derailed, on December 16, near Armstrong, the first important derailment on the new line. The damage to cars is said to have been considerable, but there were no serious injuries to persons.

W. F. M. Goss, chief engineer of the Chicago Association of Commerce Committee on Smoke Abatement and the Electrification of the Railway Terminals of Chicago, spoke before the Western Society of Engineers, Chicago, on Monday evening, December 20, on the work of the commission and its report.

The Texas & Pacific has reached an agreement with the Order of Railway Telegraphers, providing for an increase in wages which will cost the road about \$14,000 a year. The compromise agreement provides for a minimum wage of \$70 a month and some changes in working conditions. The operators had asked for a 20 per cent increase in all parts of the system.

The Minnesota Railroad and Warehouse Commission has filed with the Interstate Commerce Commission a brief in reply to the brief presented by the Presidents' Conference Committee on September 1, 1915, and discussed orally before the commission on September 30. This brief presents the views of the Minnesota commission on the points discussed by the railroads.

The Baltimore & Ohio is now engaged in the elevation of its tracks and the elimination of the grade crossing at Liberty avenue, Pittsburgh. The tracks are being elevated for a distance of about a mile, being carried on a fill between concrete retaining walls for about two-thirds of the distance and on a steel viaduct for 200 ft. The improvement is estimated to cost \$750,000 and will be completed late in 1916.

At a meeting of the board of managers of the Chicago Great Western Station Agents' Association held on December 11, the following officers were elected for the ensuing year: President, G. H. Hunt, freight claim agent; vice-president, J. F. Coykendall, secretary and treasurer; secretary, W. J. Cunningham, auditor of freight receipts. It was decided to hold the annual meeting of the association at Des Moines, Iowa, on January 25, 1916.

As announced in a recent issue a sub-committee of the Committee on Relations Between Railroads of the American Railway Association conferred with the Interstate Commerce Commission on December 9 regarding a plan for changes in the demurrage rules. The next step is to discuss the plan with representatives of the National Industrial Traffic League, as is customary in connection with matters pertaining to the general demurrage rules. The commission offered no encouragement to a plan for filing tariffs on short notice.

The Chesapeake & Ohio Employees' Magazine for some time has made a practice of publishing each month a special merit roll, calling attention to examples of especially meritorious service on the part of employees in preventing accidents. Since the establishment of this department about a year ago 376 employees have received favorable mention in this way, ranging from 14 in one division to 91 in another division. One of the division superintendents of the company writes to the magazine that the system of commending employees in this way has been very successful, as far as his division is concerned, and that "it makes all the employees more observing and careful to see that nothing that is liable to cause an accident gets by their observation."

The arbitrators who rendered a decision early in the year on the demands of the western enginemen and firemen, have been called together for a meeting in Chicago on January 4, to pass on 70 questions which have been submitted by the railroads and by the labor organizations regarding differences of opinion as to the interpretations of certain provisions of the award. The board has already been reconvened once (August 30), and at its meeting at that time issued rulings on 194 questions of disagreement that had been submitted. Four members of the board, including the two railroad representatives and the two brotherhood representatives, held a meeting two or three weeks ago in the

effort to reach an agreement on the 70 additional questions. As they were only able to agree on a portion of them, it was found necessary to call a meeting of the entire board.

More Relief for the Railroads

"Clifford Thorne, leader in the fight against increases in rates, yesterday declined to make any statement whatever in regard to the commission's finding."—*From the Des Moines Register and Leader.*

The Complaint Box—Turned Around

The Southern Railway prints on the bills of fare in its dining car the following:

"The management expects its employees to distinguish their service to the public by courtesy, and requests the traveling public to report examples of successful service so that the employees may be encouraged by appreciation of their efforts."

Railway Business Association Dinner

It is announced that the annual meeting of the Railway Business Association will be held at the Waldorf-Astoria Hotel, New York, on January 27, 1916. The sessions will be as follows: A business meeting at 11 a. m.; election of officers, 1:30 p. m., and dinner at 7 p. m. promptly. The speaking program will be announced later.

Research Fellowships in Engineering at the University of Illinois

The University of Illinois has maintained 10 research fellowships of \$500 each for graduate work in the Engineering Experiment Station since 1907. Last spring four additional research fellowships were created, making 14 in all. There will be five vacancies in these fellowships at the close of the current academic year and nominations for the places will be made from applications received by the director before February 1. Appointments are open to graduates of approved American and foreign universities and technical schools. If accepted, the student must remain two consecutive college years.

American Electric Railway Association

The seventh annual mid-year meeting of the American Electric Railway Association will be held at the Congress Hotel and Annex, in Chicago, on February 4, 1916. The joint dinner with the American Electric Railway Manufacturers' Association will be held on the evening of the same day. Although the program for the two events has not as yet been definitely decided upon, it is probable that the meeting will be given over to the discussion of two subjects—Valuation and Rate of Return. The committee on subjects is making arrangements for the presentation of papers by three men of national prominence. An unusually large attendance at both meeting and dinner is anticipated.

Association of American Portland Cement Manufacturers

At the annual meeting of the Association of American Portland Cement Manufacturers held in New York on December 15, the following officers were elected for the coming year: President, B. F. Affleck, president, Universal Portland Cement Company; first vice-president, F. W. Kelley, president of the Halderberg Cement Company; assistant secretary, L. R. Ferguson, connected with the association for some time as assistant secretary; treasurer, G. S. Brown, president of the Alpha Portland Cement Company, and assistant treasurer, John J. Matthes, treasurer of the Alpha Portland Cement Company. J. P. Beck was elected general manager of the association.

Plans for Eight-Hour Day Campaign

The executive committees representing the Brotherhood of Locomotive Engineers, the Brotherhood of Locomotive Firemen

and Enginemen, the Brotherhood of Railway Trainmen and the Order of Railway Conductors at a meeting in Chicago on December 15, 16, 17, 18, 19 and 20, formulated demands to be presented to all the railroads in the country, providing for an eight-hour day or 12½ miles an hour speed basis in freight and yard service and time and one-half for overtime, with no change in the present schedules as to passenger service. The form of the proposed changes in the present agreements with the railroads expiring about April 30, 1916, are to be submitted to a referendum vote of the membership of the organizations.

The New Haven Trial

The government attorneys in the trial of the former New Haven directors in the Federal District Court in New York rested their case Friday last after having spent 43 days and calling 27 witnesses. The documents identified numbered 1,981, and most of these were introduced as evidence. The testimony fills 6,500 pages, this meaning possibly one and one-half million words. Beginning Monday the attorneys for the defense presented their side of the case.

Pan-American Scientific Congress

The program of the transportation, commerce, finance and taxation section of the second Pan-American Scientific Congress, to be held at Washington, D. C., from December 27 to January 8, as announced, includes the following papers on railroad subjects: "The Relation of Central to Local Control in the Regulation of Public Utilities," by C. A. Prouty, director, division of valuation, Interstate Commerce Commission; "Problems of Government Regulation of Railway Rates," by Prof. Emory R. Johnson, University of Pennsylvania, Philadelphia, Pa.; "The Safety First Movement on American Railways," by R. C. Richards, general claim agent, Chicago & North Western, and "Lines of Future Railway Development," by Fred Lavis, consulting engineer, New York City.

James S. Harlan, of the Interstate Commerce Commission, is chairman of the sub-committee on transportation for the congress, and the other members are B. H. Meyer, of the Interstate Commerce Commission, and Prof. E. R. Johnson, of the University of Pennsylvania.

Chicago Strike Settled

A strike of the enginemen, trainmen and switchmen employed on the Belt Railway of Chicago, which was mentioned in last week's issue, was called on the morning of December 14, and was settled late in the evening on December 16, by a compromise agreement effected by G. W. W. Hanger, assistant United States commissioner of mediation and conciliation. Under this agreement the railway will run special service trains in the morning and evening to carry the employees to their work at the Clearing yard until January 1, 1917, by which time the men are expected to make arrangements to move their homes to the vicinity of the new Clearing yard.

A large number of the employees of the Belt live in the vicinity of the yards at Eighty-third street. When the new Clearing yard was opened last May, rather than move to the new location about six miles west, the employees demanded that the company run hourly trains to transport them to and from their work. The company objected to running passenger trains over the Belt Railway, which is used only for freight service, but agreed to run a train for the accommodation of the employees up to June 1, 1916, to give them time to adjust themselves to the new circumstances. The employees' organizations insisted on the train service up to October 1, 1916, and longer if there should still be a lack of "proper housing conditions" near the new yard. When the company refused to agree to this the strike was called by officers of the Brotherhood of Locomotive Engineers, Brotherhood of Locomotive Firemen and Enginemen, and the Brotherhood of Railway Trainmen. At the company's request Mr. Hanger went to Chicago and spent two days in conference with the officers of the brotherhoods and of the railroads in the effort to bring about a settlement. Meanwhile the company made no effort to operate its freight trains, which interfered rather seriously with the interchange of traffic between the railroads and resulted in a large accumulation of loaded cars at the Clearing yard.

The terms of settlement provide that four service trains

shall be run each way between Seventy-fifth and Halsted streets and the Clearing yard between 5 and 9 a. m., and between 5 and 8 p. m.

Forestalling Anxiety About Delays

(Circular of the Long Island Railroad Company, J. B. Austin, Jr., Superintendent)

In event of any delay to trains or interruption of traffic which may be important enough to affect the comfort and convenience of passengers, conductors will make every possible effort to find out the cause of the delay and its probable extent and will furthermore see that a suitable announcement is made to the passengers and others interested.

Conductors and trainmen are instructed to freely and courteously answer all questions addressed to them upon this subject and give any and all information which may be necessary for passengers to make suitable arrangements. It may not always be possible for conductors and trainmen to find out exactly the cause of the trouble or the extent of the delay. In such instances they will only be expected to do the best they can.

The chief train despatcher at Jamaica will get in touch with the situation and will aid the efforts of conductors by giving them proper information, which in turn should be given to passengers. Station agents will endeavor to find out why trains are late and see that the passengers waiting at the stations are properly advised. The train despatchers will keep in touch with the agents and assist them in ascertaining cause and extent of trouble.

This company feels that its patrons should be informed of any interruption of traffic or extraordinary delays to trains upon which they may be traveling or about to travel. In many instances information of this character is of great value to our patrons and frequently will enable them to change their arrangements and lessen the inconvenience to which they would otherwise be subjected. Nothing will produce so good an effect and contribute as much to the popularity of the Long Island Railroad as the announcement of information of this character.

Swedish State Railroads Advance Rates

Advances not only in passenger and freight rates, but in sleeping car and baggage charges as well, have been made by the government railways of Sweden to offset higher operating costs due to the war, according to the Bureau of Railway News and Statistics. Sweden follows the example of the state railways of Italy, Switzerland, Norway and Russia. Government railways elsewhere in the world also have made heavy increases in fares and rates since the war. In some instances these advances follow increases already made within the last few years to offset the abnormal rise in wages and cost of material which has been felt generally throughout the world. The Bureau says in its bulletin:

"For third class sleeping car accommodations the Swedish charge has been raised from 67 to 80.4 cents per night, or 20 per cent. First class sleeping car rates remain at \$2.87 per night (which it will be noted is about 43 per cent higher than the standard rates prevailing in the United States), while second class remains at \$1.43 per night (likewise 43 per cent above the \$1 rate of our tourist sleepers).

"All privileges of carrying baggage free, whatever the weight, have been withdrawn. Heretofore Swedish railways, like others in Europe, have allowed a free weight of 25 kilograms, or 55 pounds, about one-third the free allowance on American railways. A charge of 5.36 cents, regardless of weight, will be made hereafter, which, it is stated, will fall hardest upon the poorer third-class travellers and therefore has been opposed strongly by the Swedish press.

"Passenger fares have been advanced by fixed amounts instead of sums increasing with the distance, so that the ratio of increase falls heaviest upon the cheaper short journeys. Expressed in American cents, the advances are:

	1st Class.	2nd Class.	3rd Class.
1 to 30 miles.....	5.36	2.68	1.34
Over 30 miles.....	13.40	8.04	5.36

"Monthly tickets are increased 40 cents second class and 13.4 cents third, while party tickets for 20 rides are raised 21.4 cents second class and 8 cents third.

"On fast freight the rates are advanced 1.07 cents for every 22 pounds l. c. l. and 8.04 cents for every 220 pounds carload. Ordinary freight l. c. l. is advanced by from 5.36 cents to 3.22

cents for every 220 pounds. On carloads the advance measures from 3.22 to 1.07 cents for every 220 pounds."

Traveling Third Class in Russia

An entertaining description of how the average Russian travels is contained in a new book which has recently been published. The author (Julius West, in "Soldiers of the Tsar and Other Sketches") preferred to mix with the man in the street rather than confine himself to interviewing notabilities. It appears that on long-distance journeys the third-class cars are apt to be crowded, even if they do not contain their full complement of passengers, since, "besides the normal impedimenta, the Russian takes food enough with him to tide him over the most interminable delays, and, if the journey is to be a long one, he will always have a pillow and blankets tied up in a manner which suggests a suffocated baby." Lovers of fresh air will hardly like such long journeys in winter, since air is excluded from the coaches by double glass windows, screwed down to prevent their being opened, and by threefold doors. The third-class sleeping accommodation is of the most primitive nature, being furnished by wooden shelves placed one above the other. As the various compartments communicate with each other, the atmosphere after a journey of some two days and nights, which is by no means a long one in Russia, can more easily be imagined than described. Compensation of a kind exists, however, in the shape of the buffet, where tea may be had, "in a compartment decorated at the expense of the Government with a sixpenny ikon (sacred picture) and a bunch of artificial flowers." Moreover, third-class travel is cheap. The journey from Moscow to Warsaw, a distance of 807 miles, only costs about \$4.75.

Signal Companies Investigated

A committee of the New York legislature investigating the conduct of Robert C. Wood, a member of the Public Service Commission of the state for the First district (New York City), had before it last week Sidney G. Johnson, Col. Henry G. Prout, A. H. Renshaw, W. C. Banks and some of the directors of the Union Switch & Signal Company, and in the course of its examination of these and other witnesses brought out a few facts of general interest.

It was charged that Commissioner Wood, in 1914, had asked Johnson for money in consideration of his vote in the commission in favor of granting to the Union Switch & Signal Company, of which Johnson was vice-president, the contract for installing block and interlocking signals in the Center street subway (which contract finally was awarded to the Federal Signal Company, and Johnson, corroborating this, named the sum as \$5,000. Johnson reported to Prout, president of the company, and he laid the matter before the directors. W. D. Uptegraff, now president of the company, then holding a lower position, testified that Prout's proposition was in substance a request for \$5,000 to be used as a bribe, and that a majority of the directors at once voted to ask both Prout and Johnson to resign. They did resign at once. Johnson soon became vice-president of the General Railway Signal Company and Prout subsequently became president of the Hall Switch & Signal Company. Colonel Prout told the investigators that the demand for his resignation was based, in fact, not on his alleged desire to bribe a public officer, but to dissatisfaction because he pursued too conservative a course in the management of the company.

Commissioner Wood, some weeks before he took office as commissioner, had received \$1,500 from the Union Switch & Signal Company for arranging a \$70,000 contract with the Kansas City, Clay County & St. Joseph Railroad. Johnson testified that Wood, after receiving this money, at once paid back to him (Johnson) \$500 of it and that it was by him turned into the treasury of the Union company.

A. H. Renshaw, president of the Federal Signal Company, testified that John T. Cade, vice-president of that company, had received from W. C. Banks, of the North Western Equipment Company, New York City, an offer, for a consideration, to influence Wood's vote in favor of giving a certain contract to the Federal company, Banks being well acquainted with Wood. Renshaw at once told this to E. E. McCall, chairman of the Public Service Commission, who advised Renshaw to lay the facts before the governor of the state.

The investigation is still going on, and most or all of those

who have given useful testimony have been called before the grand jury.

Valuation Circulars

Thomas W. Hulme, general secretary of the Presidents' Conference Committee for the Federal Valuation of Railways, has issued a circular to the chairmen of valuation committees on the individual railroads calling attention to the manner of determining depreciation. The valuation act directs that depreciation be considered. A difference of opinion exists between the carriers and the government as to what constitutes this depreciation. In certain instances the government has used the "straight line" method and life tables in determining what it terms the "condition per cent" of the property. On the other hand, Director Prouty stated recently that it was his view that the useful service life of composite property like locomotives, cars, etc., was not ascertainable and that no attempt would be made to fix the same, but that the remaining service life of the elements of such properties would be ascertained and that an effort would be made to agree with the carriers upon this. The position of the carriers on this subject was set forth in the brief filed with the Interstate Commerce Commission on September 1, in which they maintained that there was no depreciation in the composite property when the deterioration in its physical parts is taken care of by proper replacements as due. The use of the "straight line" method and of life tables was condemned.

The government and the carriers agree that any depreciation existing must be deducted, but they disagree as to what constitutes depreciation. At a recent meeting of the engineering and equipment committees of the roads the following instructions to pilots relating to "condition per cent" were agreed upon:

(a) Instruct pilots to endeavor to agree when requested in regard to facts such as "age," probable date of renewal of parts of each individual unit as result of inspection of each unit or its parts and the estimated cost of same; "general description of the physical conditions of the whole or parts."

(b) Instruct pilots not to agree to life tables, to the life of the whole unit of property, nor to condition per cent.

(c) Instruct pilots to furnish all information possible in regard to facts, from the records or other reliable information, in regard to operating conditions and the standards of maintenance and to co-operate as far as possible with representatives of the Division of Valuation.

(d) Pilot should make a daily report accompanied by his notes.

These instructions apply to equipment, buildings, tie and rail systems in tracks, bridges and all other railway structures.

It is the duty of the carriers to co-operate with the government in the ascertainment of facts in so far as they are invited or permitted to do so. The railway pilots, however, should not, either by the acceptance of copies of the notes or by their signature thereon, enter into any agreement as to the use of the results of life tables or other methods whereby a condition per cent of the composite property may be fixed.

The President's Conference Committee has also issued a circular calling the attention of the carriers to the importance of including in their inventories all property owned or used by them in accordance with the valuation act. The committee suggests that the carriers prepare special lists showing property which is not owned but which is used "for its purposes as a common carrier," including industrial side tracks, warehouses, docks, elevators and other property forming part of the terminal facilities, equipment of private car lines, etc. Also, all property owned and used jointly with other carriers or owned by non-carriers but used by the common carriers should be included in the inventory with a full statement of the condition. The committee suggests that if the federal field forces do not include this information, appropriate exception be taken by the carriers' representatives.

NO BOOKING OF RAILWAY SEATS IN ENGLAND.—The executive committee now in charge of the English railways has decided not to book seats on any of the railway systems, with the exception of whole compartments and sleeping berths. The booking of seats necessitates a large amount of telephonic and postal correspondence, and by dispensing with the bookings the staff which deals with this department will be released for more important war service.

REVENUES AND EXPENSES OF RAILWAYS

FOR THE MONTH OF SEPTEMBER, 1915

Name of Road.	Average mileage operated during period.	Operating revenues			Maintenance of			Operating expenses				Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total.	Way and structures.	Equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Delaware & Hudson Co.—R. R. Dept.	886	\$1,624,948	\$331,163	\$2,072,983	\$154,143	\$296,096	\$24,938	\$622,664	\$27,765	\$66,135	\$1,189,687	\$883,295	\$56,500	\$826,795	\$45,978
Denver & Salt Lake.	255	147,048	32,221	187,299	18,830	28,296	2,322	56,191	.....	4,231	109,870	77,428	8,000	69,428	12,729
MONTH OF OCTOBER, 1915															
Alabama & Vicksburg.	143	\$100,225	\$36,188	\$147,949	\$18,214	\$29,988	\$3,944	\$48,115	\$2,224	\$6,041	\$108,525	\$39,424	\$10,350	\$29,074	\$16,991
Ann Arbor.	301	174,302	42,522	231,226	25,928	31,959	4,662	73,890	467	10,326	146,942	84,284	12,800	71,442	14,076
Atlantic City.	170	79,727	59,581	150,027	59,638	16,261	1,999	82,252	96	1,037	161,573	—11,546	10,000	—21,543	25,699
Baltimore & Ohio Chicago Terminal.	79	162,293	3,022	166,445	19,812	20,423	789	65,041	1,472	4,428	109,401	55,044	17,654	37,388	6,117
Birmingham & Garfield.	27	162,293	3,022	166,445	14,098	17,734	919	32,081	69	2,052	58,581	107,563	5,275	102,288	62,029
Buffalo & Susquehanna R. R. Corporation	253	132,208	5,862	140,007	22,557	38,171	1,030	73,127	897	5,794	104,680	35,327	2,600	32,727	9,072
Chicago & North Western.	8,108	5,857,056	1,770,914	8,457,318	1,014,921	3,166,903	109,272	2,793,106	50,555	157,209	5,402,201	3,085,117	385,000	2,669,841	567,561
Chicago & Great Western.	1,427	928,071	272,479	1,312,240	189,479	216,836	44,263	453,255	3,390	31,884	943,082	369,158	45,442	323,602	38,673
Chicago & Rock Island & Pacific.	7,663	4,333,065	1,528,481	6,330,758	1,017,540	4,103,939	142,863	2,278,168	54,270	5,618	126,105	91,048	29,427	49,427	14,421
Colorado Midland.	338	120,915	14,781	146,637	23,937	34,578	6,758	37,127	897	143,397	473,699	1,594,259	296,686	1,297,235	—130,623
Delaware & Hudson Co.—R. R. Dept.	886	1,892,714	252,732	2,572,557	188,399	321,164	26,358	675,823	18,900	67,329	1,296,750	978,807	10,000	920,117	220,440
Denver & Salt Lake.	255	166,377	22,829	195,526	20,416	35,460	1,519	66,109	.....	3,804	127,308	68,219	8,024	60,041	18,142
Detroit & Mackinac.	393	68,177	25,864	101,100	10,964	17,959	1,796	31,737	.....	2,745	62,817	38,283	6,555	31,728	8,272
Illiana Harbor Belt.	110	.....	336,934	40,091	40,091	27,862	2,718	129,545	.....	7,521	207,738	148,297	7,600	139,729	27,325
Kansas City, Mexico & Orient.	737	191,545	38,293	241,922	54,544	45,398	8,470	39,393	.....	10,678	208,483	33,439	14,274	19,149	41,514
Louisville, Henderson & St. Louis.	200	92,284	35,125	134,899	25,740	17,959	4,835	40,855	.....	3,304	92,692	42,207	3,800	38,394	9,028
Madison Valley.	380	119,085	35,413	162,694	25,276	20,236	2,429	48,449	.....	6,053	102,433	60,261	5,359	54,894	13,623
New Orleans & North Eastern.	196	211,123	53,680	370,851	40,831	57,406	10,531	108,428	5,543	11,139	233,878	136,973	15,100	121,873	72,568
New Orleans Great Northern.	285	102,745	28,272	144,044	18,829	24,954	2,912	41,379	189	6,251	94,513	49,531	4,089	45,395	1,534
New Orleans, Texas & Mexico.	286	115,384	25,459	147,692	24,851	22,817	4,007	46,997	.....	10,069	108,741	38,951	1,501	37,331	28,837
Norfolk Southern.	908	273,390	89,183	392,294	50,672	53,928	7,002	128,343	78	19,510	259,533	132,760	12,253	120,455	41,196
Oak Railway & Land Co.	114	52,498	21,302	79,526	8,174	8,434	683	28,341	.....	3,958	42,590	36,936	7,250	29,686	6,191
Pal & Reading.	21	145,883	172,047	9,052	172,047	13,679	38	48,310	.....	133	71,233	109,814	10,000	90,814	43,911
Philadelphia & Reading.	1,120	4,352,362	591,010	5,169,046	382,919	737,217	54,093	1,569,121	12,794	86,333	2,840,062	2,328,985	100,477	2,227,928	836,878
Southern Pacific Co.	6,928	6,765,855	2,954,959	10,652,827	1,022,473	1,433,679	190,194	3,066,292	190,581	220,037	6,107,834	4,544,993	407,731	4,135,100	636,807
THREE MONTHS OF FISCAL YEAR ENDING JUNE 30, 1916															
Delaware & Hudson Co.—R. R. Dept.	886	\$4,910,967	\$969,368	\$6,248,435	\$480,838	\$911,461	\$85,936	\$1,913,849	\$67,845	\$192,997	\$3,649,259	\$2,599,176	\$169,500	\$2,429,676	\$121,614
Denver & Salt Lake.	255	376,979	132,491	535,318	60,932	78,673	7,910	156,791	157	15,605	319,802	215,516	24,042	191,474	24,134
Uster & Delaware.	129	134,172	165,822	352,547	41,520	33,613	5,670	130,048	.....	8,359	219,367	133,180	10,500	122,666	20,485
Union R. R. of Baltimore.	0	317,637	66,654	389,241	48,755	33,613	5,670	130,048	.....	6,604	68,757	320,484	17,417	303,068	44,352
Union R. R. of Pennsylvania.	31	134,883	172,047	1,549,996	113,100	274,632	314	473,413	.....	9,062	870,821	679,174	22,001	657,174	356,646
Vicksburg, Shreveport & Pacific.	171	224,750	109,576	371,834	65,512	76,754	10,070	122,376	6,462	13,974	295,148	76,686	24,000	52,386	12,364
Virginia & North Western.	240	416,640	44,831	475,284	73,147	106,085	4,354	125,964	3,632	12,217	323,767	151,517	19,735	131,782	16,081
Washington Southern.	36	126,730	127,287	331,896	41,830	38,520	4,111	104,666	5,910	9,270	207,018	124,878	10,620	114,250	43,760
Western Ry. of Alabama.	133	165,287	104,696	302,357	52,021	69,785	16,438	85,977	.....	13,439	243,568	58,789	16,395	41,296	10,535
FOUR MONTHS OF FISCAL YEAR ENDING JUNE 30, 1916															
Alabama & Vicksburg.	143	\$341,306	\$141,639	\$528,095	\$69,192	\$119,471	\$14,759	\$181,085	\$8,652	\$22,348	\$415,508	\$112,588	\$33,886	\$78,701	\$32,761
Ann Arbor.	296	553,080	211,226	821,451	99,090	129,423	13,703	286,717	2,378	34,801	741,970	249,481	51,200	198,100	—26,254
Atlantic City.	170	314,052	793,032	1,152,592	145,068	85,753	1,703	490,444	2,378	8,361	744,724	407,868	40,000	367,789	32,525
Baltimore & Ohio Chicago Terminal.	79	162,293	3,022	166,445	19,812	20,423	789	65,041	1,472	4,428	109,401	55,044	17,654	37,388	6,117
Birmingham & Garfield.	27	658,373	12,171	672,952	67,398	57,089	3,089	38,979	461	7,792	321,227	176,895	70,614	434,549	205,925
Buffalo & Susquehanna R. R. Corporation	253	484,419	27,719	519,950	137,165	42,498	136,521	.....	.....	22,503	391,885	123,065	10,400	117,665	45,896
Chicago & North Western.	8,108	19,965,478	7,944,274	41,775,215	4,925,215	14,990,790	454,384	10,234,745	33,699	608,754	20,934,154	1,540,000	8,693,841	283,199	88,388
Chicago & Great Western.	1,427	3,300,634	1,191,858	4,926,235	755,606	855,599	182,234	1,650,448	138,690	131,401	3,603,941	1,322,294	184,184	1,136,458	—84,388
Chicago & Rock Island & Pacific.	7,659	15,520,170	6,859,416	24,230,932	4,031,091	14,410,287	581,210	8,794,001	210,090	584,301	18,602,724	5,628,208	1,130,984	89,740	—9,330
Colorado Midland.	338	432,346	97,728	571,471	108,732	128,876	29,597	335,502	.....	531,677	39,794	40,000	4,495,534	—1,637,737	.....
Delaware & Hudson Co.—R. R. Dept.	886	6,803,681	1,222,100	8,523,992	669,232	2,389,671	112,294	2,389,671	86,745	260,300	4,946,009	3,577,983	226,000	3,349,793	342,019
Denver & Salt Lake.	255	327,338	152,962	508,200	130,876	60,846	20,531	150,433	.....	12,251	383,936	124,263	15,200	108,959	19,054
Detroit & Mackinac.	393	412,807	129,787	573,411	103,019	70,035	9,136	172,429	.....	23,306	377,925	195,486	21,437	173,373	95,468
Illiana Harbor Belt.	196	902,765	192,826	1,229,344	136,555	225,190	40,652	373,982	22,524	43,288	844,191	385,153	60,251	324,902	106,485
New Orleans & North Eastern.	204	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Orleans Great Northern.	285	418,610	107,283	576,775	71,972	96,137	11,352	165,484	714	24,281	369,940	206,835	15,796	190,950	—4,820
New Orleans, Texas & Mexico.	286	405,336	95,198	532,234	79,532	86,428	11,352	173,414	.....	38,835	393,652	138,382	6,006	132,406	43,794
Norfolk Southern.	908	931,464	389,029	1,421,030	188,742	201,559	30,656	485,881	527	70,752	978,117	442,913	49,105	393,755	106,205
Oak Railway & Land Co.	114	418,358	53,518	38,630	38,630	53,518	2,707	101,412	.....	1,517	193,748	341,775	29,000	312,775	33,648
Pal & Reading.	21	457,160	562,469	42,068											

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.**—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, January, 1916, Atlanta, Ga.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.**—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.**—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.
- CANADIAN RAILWAY CLUB.**—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.**—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.**—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.**—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.**—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.**—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- NEW ENGLAND RAILROAD CLUB.**—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.**—Harry D. Vought, 95 Liberty St., New York. Regular meeting, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.**—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.**—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.**—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.**—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.**—Frank W. Noxon, 30 Church St., New York. Annual meeting, January 27, 1916, Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.**—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RICHMOND RAILROAD CLUB.**—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.**—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.**—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.**—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.**—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRAFFIC CLUB OF NEWARK.**—Roy S. Bushy, Firemen's Bldg., Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.**—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- TRAFFIC CLUB OF PITTSBURGH.**—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.**—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings, October to May.
- TRANSPORTATION CLUB OF DETROIT.**—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- UTAH SOCIETY OF ENGINEERS.**—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.**—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.**—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.**—E. N. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The Western Maryland has finished its new grain elevator at Baltimore and the structure is now in use. Its capacity is 1,000,000 bushels.

Shipments of anthracite coal during the month of November amounted to 6,297,215 tons as compared with 5,928,286 in November of the preceding year.

The railroads running east of Chicago have issued embargoes against export freight except perishable freight destined to the Atlantic seaboard ports, on account of the embargoes issued by the eastern roads because of the congestion at the ports.

The Twentieth Century Limited train of the New York Central Lines during the 12 months ending October 31, 1915, covered the total distance of 700,800 miles in both directions between New York and Chicago in 876,549 minutes. As the schedule called for 873,600 minutes, this is a record of 99.66 per cent on time.

The Panama Canal was cleared of obstructions sufficiently on Monday of this week to allow the passage of some small vessels, drawing not more than 20 ft. of water, which had been waiting for several months; but it was immediately thereafter ordered closed and it was announced that it would not be permanently reopened until there was no longer any danger of interruption by landslides.

Traffic officers of the Missouri railroads at a meeting in St. Louis last week decided tentatively to ask a rehearing of the case before the Missouri Public Service Commission in which the commission allowed increases in single ticket passenger fares on condition that the railroads issue 500-mile books good for bearer. A meeting was to be held this week to decide what action to take with reference to the increases in freight rates.

The Anti-Saloon League of New York has sent to the presidents of the railroads of that state a letter suggesting that the sale of liquor be abolished on all trains; the fact being pointed out that since the last election the number of towns in New York which have voted to prohibit the sale of alcoholic liquor in every form is 485. A considerable number of towns, in addition to this, have voted to permit its sale only by druggists.

The majority of the railway companies in Argentina on October 1 put into effect a 10 per cent increase in their freight and passenger rates after conferences with the officers of the national government, to offset increases in the prices of coal and railway materials, as well as increases in taxes. The increase does not apply to suburban first and second class tickets, second class long distance tickets, stone and maize, or to demurrage or telegraph charges. The companies had the power to raise rates without intervention by the government, because they are still earning less than the percentage of profit which under the law would enable the government to intervene in the regulation of their rates.

The Baltimore & Ohio has appointed two traveling chaperons, Mrs. C. H. White and Mrs. Samuel Watkins, who will have charge of special parties of students and other young women traveling. On account of the frequent trips made by students at girls' schools during the holidays, at vacation time and on other occasions, requiring the services of experienced travelers, it is believed that the chaperones will be of valuable assistance in imparting information as to points of interest, arranging for tickets, hotel accommodations, baggage transfers and other details. Everything will be done through the co-operation and approval of school authorities or others interested in such tours. The chaperones are the wives of agents of the road and have had wide experience in such matters. Mrs. White is the wife of the agent at Rockville, Md., and Mrs. Watkins the wife of the agent at Sykesville, Md. They will accompany a party of students of National Park Seminary, a girls' school at Forest Glen, Md., on a special train from Washington to Chicago.

The Chamber of Commerce of Boston has presented an elaborate protest to the Interstate Commerce Commission against the advanced freight rates which have been filed by the railways

to take effect January 1, on shipments from New England, New York and other Eastern territory to the Southeastern states. The special complaint of Massachusetts is that by the new tariff the rates from Boston are to be higher than from New York, whereas hitherto the two cities, on all important commodities, have had exactly the same rates. By the new tariff the first-class freight rate from Boston is five cents higher than from New York; second and third classes are four cents higher, fourth and fifth classes three cents, and sixth is two cents. Arguments were presented at the hearings in Washington by protestants from Nashville, Atlanta, St. Louis and a dozen other Southern cities. On the higher classes the increase in many cases is about 10 per cent; and on numerous commodities it is larger than this. The hearings, begun last week, extended to Wednesday of this week.

The Traffic Club of New York

The regular monthly meeting of the Traffic Club of New York, to be held at the Waldorf-Astoria, on December 28, will be addressed by P. H. W. Ross, president of the Marine League of the United States. His subject will be: "What If Ninety Per Cent of Our Land Transportation Were Also Under the Control of Foreigners?"

Decrease in Immigration to the United States

Immigration to the United States during the fiscal year 1915 was less than it has been for 17 years, according to the report of the Bureau of Immigration of the United States Department of Labor, amounting to only 326,700 in 1915, as compared with 1,218,480 in 1914; 1,197,892 in 1913, and 838,172 in 1912. The last year for which the immigration was less than in 1915 was in 1899, when the total number of immigrant arrivals in the United States was 311,715. For the fiscal year 1914, 204,074 aliens departed from this country, as compared with 303,338 the year before.

For 10 months of 1915, including October, the total number of alien and citizen steerage arrivals at the port of New York was 83,606, as compared with 427,346 in 10 months of 1914, a decrease of 343,740, or 80.44 per cent. Of the total for 1915, 76,527 were aliens and 7,079 were citizens.

Freight Traffic to and from Mexico

Since the resumption of freight traffic to and from Mexico through Eagle Pass and Laredo large numbers of loaded freight cars have passed over the river every day. Corn, wheat, clothing and machinery have been shipped in large quantities from Northern and Western states. American commercial travelers are now numerous in Mexico, but it is said that, in a good many cases, especially shipments of grain for remote interior points, payment for the goods is demanded at the border.

This week it is reported that shipments through the Laredo gateway are again badly hampered by the action of the International & Great Northern in cancelling its agreement with the National Railways of Mexico to permit its own cars and those of connecting American lines to enter the southern republic. It is said that the International & Great Northern was willing to let the agreement stand, but that other lines objected to allowing their cars to enter Mexico unless the Mexican roads would give a bond of \$1,000 for each car, insuring its safe return to this side of the border. This bonding feature is now in effect to a limited degree. Most shippers do not care to undergo the trouble and expense of guaranteeing the safety of a car and the old slow method of transferring freight from one car to another at the boundary is in effect. This embargo diverts much traffic destined to Mexico to the Eagle Pass gateway, where the Southern Pacific has a through-car working agreement with the National Railways of Mexico. The freight movement between the two countries is increasing rapidly. Considerable zinc ore is passing through Laredo and Eagle Pass on its way from Mexican mines to smelters in Oklahoma and Kansas.

RAILWAY IMPROVEMENTS IN INDIA. About 20 miles outside the Bombay terminus of the Great Indian Peninsula Railway, the main line to Kalyan, is being re-aligned between Thana and Paksi stations. Included in the engineering work is a double track, broad gage tunnel 4,762 ft. long which has just been completed.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Commissioner Hall and Examiner Thurtell, of the Interstate Commerce Commission, began a supplemental hearing in the Shreveport rate case at Houston, Tex., on December 17.

Coal from Illinois Points

Opinion by Commissioner Daniels:

Following the decision in the 1915 Western Rate Advance case (35 I. C. C., 497, 603-611) proposed increased rates on bituminous coal from Illinois mines to west bank Mississippi river crossings and other points are found justified (36 I. C. C., 549.)

Reparation Awarded

C. L. Gray Lumber Company v. Alabama, Tennessee & Northern et al. Opinion by Commissioner Clark:

The commission finds that a rate of 20½ cents a 100 lb. on lumber in carloads from Ward, Ala., to Memphis, Tenn., is unreasonable to the extent that it exceeds 14½ cents. (36 I. C. C., 376.)

Imported Nitrate of Soda

King Powder Company, et al. v. Pennsylvania Railroad et al. Opinion by the commission:

The commission refuses to permit increased import rates on nitrate of soda in carloads from Baltimore, Md., and Philadelphia, Pa., to Carrel street station, Cincinnati, and Kings Mills and Morrow, Ohio. (36 I. C. C., 653.)

Des Moines Commodity Rates

Greater Des Moines Committee v. Minneapolis & St. Louis et al. Opinion by Commissioner Harlan:

Proposed commodity rates to Des Moines, Iowa, from Chicago, based on the rates from Chicago to the Mississippi river, plus a mileage prorate of the rates from the Mississippi river to the Missouri river, found to be reasonable for the future. (36 I. C. C., 538.)

Classification of Empty Acetylene Gas Cylinders

Prest-O-Lite Company, Inc., v. Boston & Albany, et al. Opinion by Commissioner Harlan:

The official classification rate of third class on empty coppered or nickeled acetylene gas cylinders in less-than-carload quantities is found to be unreasonable and discriminatory, and a rating of fourth class is prescribed for the future. (36 I. C. C., 545.)

Rates on Glucose from Chicago

Opinion by Commissioner Daniels:

The commission finds that the carriers have justified proposed increases in the rates on glucose from Chicago to points in Pennsylvania and trunk line territory and for export through Atlantic ports. The present domestic rate to New York, for example, is 21 cents, the proposed rate is 25 cents. The export rate to New York is raised from 18.9 to 20 cents. (36 I. C. C., 379.)

Lettuce from Texas Points

Opinion by Commissioner Meyer

The commission finds that the carriers have not justified items in a tariff of F. A. Leland, agent, which have the effect of increasing the arbitraries on lettuce in straight carloads, or in mixed carloads with other vegetables, from East St. Louis to various destinations in Central Freight Association territory, on traffic originating in Texas. As illustrative of the increased arbitraries, the arbitrary from East St. Louis to Cleveland would be increased from 24.7 cents to 28.2 cents; from East St. Louis to Cincinnati from 18.4 cents to 21.4 cents, and from East St. Louis to Pittsburgh from 27.8 cents to 31.5 cents. Most of this lettuce is des-

tined to more important markets in Central Freight Association territory, such as those named. (36 I. C. C., 511.)

Rates on Lumber from Points on the Oregon-Washington

Eastern Oregon Lumber Producers' Association v. Oregon-Washington Railroad & Navigation Company et al. Opinion by Commissioner Holl:

Combination rates on lumber and forest products taking the same rate from Oregon producing points on the line of Oregon-Washington Railroad & Navigation Company to points on the Chicago, Burlington & Quincy south and east of Hemingford, Neb., Guernsey and Cheyenne, Wyo., and Brush, Colo., to and including Missouri river points, are found unreasonable and discriminatory. Reasonable and non-discriminatory joint rates are prescribed for the future. (36 I. C. C., 526.)

Pig Iron from Virginia Furnaces

Opinion by Commissioner Daniels:

The tariffs in issue propose increased rates on pig iron in carloads from points on the Chesapeake & Ohio and the Norfolk & Western to certain points in Maryland, West Virginia, Pennsylvania, New York and by rail and water to Boston. The case is similar to *Low Moor Iron Co. v. C. & O.* (30 I. C. C., 615 and 36 I. C. C., 222), in which the commission prescribed maximum all rail rates on pig iron from Virginia furnaces to Baltimore, Philadelphia, New York and Boston. The commission finds that the carriers have not justified the increased rates to points in Pennsylvania, New York and Maryland and the increased rail and water rate to Boston. Increased rates to Pittsburgh rate points and to West Virginia points are found justified. (36 I. C. C., 552.)

Cottonseed Oil Refining in Transit

Swift & Co. v. Southern Railway. Opinion by Commissioner Clark:

It is held that the tariffs naming joint through rates on cottonseed oil did not, at times the shipments involved in this case moved, provide that shipments originating at points on the Central of Georgia and destined to points in northern states might be refined in transit at points on other lines, or in this case at Charlotte, N. C., and that, therefore, the aggregates of intermediate rates were legally applicable to shipments so treated. The commission finds, however, that the aggregates of the intermediate rates, as applied to through shipments, were unreasonable to the extent that they exceeded the joint through rates contemporaneously in effect and subsequently made applicable in connection with refining in transit at Charlotte, N. C. (36 I. C. C., 386.)

Complaints Dismissed

Elmore-Benjamin Coal Company et al. v. Chesapeake & Ohio et al. Opinion by Commissioner Harlan:

Through rates on coal in carloads from the Kanawha and New River, W. Va., fields on the lines of the Chesapeake & Ohio to Milwaukee, Wis., are not found unreasonable, and a request for joint rates is denied. (36 I. C. C., 528.)

Alexandria Paper Company v. Atchison, Topeka & Santa Fe, et al. Opinion by Commissioner Harlan:

Complaints against the carload rates on news print paper from Alexandria, Ind., to various points west of the Mississippi river are dismissed. (36 I. C. C., 532.)

Fall River Bleachery v. Atlantic Coast Line, et al. Opinion by the commission:

Rail-and-water rates on cotton piece goods from Carolina territory to Fall River, Mass., are not found unreasonable or discriminatory. (36 I. C. C., 535.)

Lehigh Valley Lake Lines

The commission in an opinion by Commissioner McChord has denied the petition of the Lehigh Valley for a rehearing relative to the commission's decision refusing to allow the railway to continue an interest in the Lehigh Valley Transportation Company. The original decision was made in *Lake Line Applications under the Panama Canal Act* (33 I. C. C., 700). The

petition did not request a rehearing on the evidence, but merely a reconsideration of the question whether a competitive relationship exists between the railway and the steamship company. The commission holds that no reason appears tending to show that the previous finding that the Lehigh Valley does or may compete with the Lehigh Valley Transportation Company within the meaning of section 5 as amended was in error (37 I. C. C., 77).

New York-Jersey City Ferry Rates

The commission in an opinion by Commissioner Clark holds that the Erie has not justified proposed increased rates for the ferriage of vehicles and animals between the railroad's terminus in Jersey City, N. J., and its ferry stations in New York City on the opposite side of the North River at Twenty-third and Chambers streets (37 I. C. C., 103).

STATE COMMISSIONS

The Texas Railroad Commission has authorized the railroads of the state to make increases in their rates on sash, doors, blinds and similar articles, effective on January 31.

The Quincy, Omaha & Kansas City has filed a petition with the Missouri Public Service Commission asking that it be eliminated entirely from the general rate advance case. This was one of the roads exempted by the United States Supreme Court in the decision sustaining the state maximum rate laws, and the road believes itself entitled to a different consideration from that accorded to all the roads in the state in the recent decision of the Missouri commission.

PERSONNEL OF COMMISSIONS

Charles D. McKelvey, engineer of the Public Utilities Commission of New Jersey, died December 17, at his home in Paterson, N. J., at the age of 67. Mr. McKelvey was born in Orange county, N. Y., and began railroad service in 1865 as a telegrapher on the Erie. He served as operator, trainman and despatcher on a number of roads, and in May, 1884, was appointed superintendent of the New York, Susquehanna & Western. In 1889 he left that road and for a short time was manager of the Grand Central Terminal, New York City; but he soon returned to the Susquehanna and remained with that company until 1899, when he retired as general superintendent. He was appointed an inspector of the New Jersey Commission in 1910. For several years he was a member of the Board of Public Works of the City of Paterson.

COURT NEWS

The United States District Court at Portland, Oregon, has returned a decree in execution of the United States Supreme Court decision in the Oregon & California land grant case. The court holds that an equity of \$2.50 an acre in the 2,300,000 acres of land constituting the Oregon & California land grant is the sole right and interest of the Southern Pacific Company therein. Under the decree the Southern Pacific is temporarily enjoined from selling any of the land at any price, and permanently enjoined from selling at a greater price than \$2.50 an acre, or to persons other than bona fide settlers. It is also enjoined from removing or disposing of timber or mineral now on or in the land until Congress shall have had a reasonable opportunity to enact legislation for disposal of the land. The costs of the suit are assessed against the Southern Pacific.

Alternating Current Signal Apparatus Free of Royalty

In the United States District Court at Portland, Me., December 17, Judge Hale, a decision was rendered for the defendants in the suit of the Union Switch & Signal Company against the Hall Switch & Signal Company for infringement of the Struble patent, owned by the Union company, on alternating current apparatus used in automatic block signaling. The Hall company had used alternating current track circuit apparatus on the new subway in Brooklyn at Myrtle avenue. The Federal Signal Company jointly defended the suit with the Hall company. The court finds that if Struble's claims as to selective signaling by the use of alternating current are to be broadly construed they were anticipated by the patent of H. W. Spang, issued more than 40 years ago.

Liability for Conductor's Error

A passenger delivered his ticket to the conductor on a sleeping car and the conductor failed to return it, but gave it to some other passenger, resulting in the owner's ejection. The Alabama Court of Appeals held the railroad responsible for the act of the conductor, and therefore liable in at least nominal damages.—*L. & N. v. Laney* (Ala.), 69 So. 993.

Furnishing Cars—Local Agents' Authority

The Illinois Appellate Court holds that the promise of the local agent of a railroad company and its train despatcher to supply cars to a shipper on the tracks of another railroad is not binding on the former company; and the fact that it had previously ratified similar conduct does not make it liable for failure to supply such cars.—*Bullard-Johnson S. & L. Co. v. O. S. L.*, 192 Ill. App. 387.

Fires—Contributory Negligence of Owner

The owner of a barn adjacent to a right of way left a window therein (which faced the railroad) open. The interior was littered with loose straw and a spark from an engine fired the straw and destroyed the barn. The Texas Supreme Court held that the owner's contributory negligence in leaving the window open debarred any recovery by him against the road.—*St. Louis Southwestern v. Arey* (Tex.), 179 S. W. 860.

Fires—Other Engines Emitting Sparks

In an action for the burning of a factory it was claimed that the fire was caused by sparks from engine No. 123. The North Carolina Supreme Court held that it was not competent to prove that an engine, not identified as No. 123, threw live sparks which fell where the burned building had stood, in the absence of proof of similar conditions of the engines, if it was another, as well as similarity of conditions and manner of operation.—*Kerner v. Southern Ry.* (N. C.), 86 S. E. 998.

Interstate Carriers Not Insurers of Goods

By the Carmack amendment carriers of interstate shipments are not liable as insurers and the liability imposed is limited to loss caused by the carrier where some default is plainly implied. So the Oklahoma Supreme Court holds, in an action for injury to an interstate shipment, that a charge to the jury that the railroad was liable as an insurer was reversible error. It had the right to have the question of its negligence submitted to the jury.—*Missouri, O. & G. v. French* (Okla.), 152 Pac. 591.

Excursion Tickets—Time Limit

The purchaser of an excursion ticket limited on its face to a certain day and hour who uses it on a train scheduled to reach that place after the expiration of that time must pay additional fare from the point reached by the train at the expiration of the time limit. The representation of the agent at the starting point that the ticket could be used on that particular train would not waive the stipulation, it not appearing that the agent had authority to alter the original contract.—*Shoenig v. A. C. L.* (Ga.), 86 S. E. 940.

Government Tables of Shrinkage of Stock as Evidence

In an action for damages for negligent transportation of animals, the Texas Court of Civil Appeals held it proper to exclude tables of the Department of Agriculture and of the Texas Cattle Raisers' Association as to tests of shrinkage of stock in transportation where there was nothing to show that they were accurate or authentic. The court held that a document purporting to have been issued by the government has no more weight as evidence than documents issued by any other authority.—*Missouri, K. & T. v. Dale Bros. Co.* (Tex.), 179 S. W. 935.

Lien for Construction Material

In an action by a lumber company for the purchase price of ties used in the construction of a railroad the principal question was whether the plaintiff had a lien against the road for

the value of the ties. Statutes giving liens for labor and material furnished in the construction of railroads are quite common. Kansas formerly had one passed in 1865, but the revision of 1868 resulted in its repeal. The Kansas Supreme Court holds that without such statute no lien arises from the mere fact that material sold for that purpose is used in the construction of the road.—*Chatten Lumber Co. v. Scott City Northern* (Kan.), 152 Pac. 665.

Household Furniture

In an action for damages to an interstate shipment of household goods, total weight 2,200 pounds, it appeared that the plaintiff signed a bill of lading containing the provision, "Owner's risk, value \$10.00 a hundredweight." A piano included in the shipment was damaged, and the Kansas Supreme Court held that it was error to follow the theory of market, instead of actual value. The piano could be repaired and used by the plaintiff, although after the injury it had practically no market value. A rug worth \$21 weighed less than 100 lb. Two rates were in force, of which the shipper is presumed to be aware, and he was bound by that named in the bill of lading, and could recover only for the weight of the rug at \$10 a hundred pounds.—*Collins v. Union Pacific* (Kan.), 152 Pac. 649.

Explosion in Stored Car—Injuries to Fireman

A railroad company stored a car containing combustible material in its yard. Some of this exploded, causing a fire, resulting in other explosions. The fire department was called and a fireman was injured by an explosion. In an action against the railroad the Texas Supreme Court held that, inasmuch as the company's negligence was the proximate cause of the explosion setting the fire, as well as the subsequent one by which the plaintiff was injured, the company's negligence was a continuing cause and the plaintiff's situation, as well as the duty of the company, was the same as if he had reached the premises before the first explosion occurred and it had caused his injuries.—*Houston Belt & Terminal v. Johansen* (Tex.), 179 S. U. 853.

Attorney's Fee; Compromise by Client

The Arkansas Supreme Court holds that an attorney, after the compromise or settlement in good faith by his client of a claim upon which suit has been brought, is bound by the terms of his contract as to the amount of his fee, and is only entitled to that per cent of the amount realized from the settlement or judgment which was fixed by his contract. By contract with their client, a law firm was to receive 50 per cent of any amount derived from recovery or compromise of an action against a railroad. The client settled the claim for \$25, as he had a right to do, either without their consent or over their objection. It was held the railroad was only bound to them for \$12.50, the half of the sum paid in settlement of the claim.—*St. Louis, I. M. & S.* (Ark.), 179 S. W. 648.

Fires Caused by Acts Outside Scope of Employment

In Kansas the rule that an employer is not liable for the consequences of negligent acts of his employee committed outside the scope of his employment has been applied by the Supreme Court in an action for damages resulting from a fire maintained by laborers for their own domestic purposes on the right of way. The court cited the leading case of *Morier v. St. Paul, M. & M.*, 31 Minn. 351. There sectionmen in charge of a foreman engaged in repairing track built a fire on the right of way to warm their coffee for dinner. After dinner they resumed work without extinguishing the fire, which spread to adjoining premises and burned the plaintiff's hay. It was held that the railroad was not liable.—*Ireton v. Atchison, T. & S. F.* (Kan.), 152 Pac. 625.

Damages to Fireman for Permanent Injuries

A fireman, 32 years of age, who earned \$100 a month and was in the best of health, capable of undergoing the most strenuous exertion, was badly injured in a collision. His right leg from the knee down was caught between the tank on the tender and the boiler head in the cab and so roasted by the boiler that it had to be amputated, and the wound was not healed a

year after the accident; and he was unable to do any work. The Virginia Supreme Court of Appeals, finding the collision due to the company's negligence in giving wrong signals, held that an award of \$25,000 against the railroad was not so plainly excessive as to justify the court's disturbing it, although if it could have usurped the functions of the jury, it might have said that it should have been less.—*Chesapeake & O. v. Carnahan* (Va.), 86 S. E. 863.

Reasonable Notice of Demand for Cars

The West Virginia Supreme Court of Appeals holds that an application to a station agent for cars for a shipper's use on a particular day, made in the ordinary way, by one who has not been accustomed to make special contracts to furnish cars for particular dates, and without notice of intention or purpose to bind the company absolutely to furnish the cars on the day named, and the promise of the agent, in response to such application, that he would get the cars, do not prove a contract on the part of the railroad, binding it absolutely to furnish them on the day named. It was held that three days' notice of a demand for cars for live stock, in a period of great activity in such shipments, was not reasonable or sufficient. The court found that every effort was made to get the cars and the time required was just one week.—*McNeer & Co. v. C. & O.* (W. Va.), 86 S. E. 887.

Employers' Liability Act

A lineman of an electric railroad, engaged in interstate as well as intrastate commerce, killed while putting additional cross-arms on its poles for transfer thereto of the single wire used in its "hand" signal system and the stringing of additional wires to change the system to an "automatic" one, was held by the Iowa Supreme Court to be employed in interstate commerce, so that the cause of action for his death was under the federal employers' liability act, this work being "repair" or "maintenance" and not "construction."—*Rose v. Sheldon* (Iowa), 154 N. W. 499.

The South Carolina Supreme Court holds that an injury received by a car repairer, while raising a fallen drawhead to standard height during the temporary stoppage of the car for that purpose, while in interstate transit, falls within the federal employers' liability act.—*Lorick v. S. A. L.* (S. Car.), 86 S. E. 675.

Prescriptive Title to Railroad Land

A hotel was built partly on land belonging to a railroad, and the successive owners of the hotel knew it stood on the railroad land, and claimed no right therein, keeping possession under the mistaken belief that merely by going upon land they knew was owned by another and being suffered to remain in possession for 10 years they would acquire title by prescription under the Wyoming statute. In an action by the railroad to recover possession of the land, the Wyoming Supreme Court held that the defendants' possession for 10 years did not ripen into title by prescription. To have that effect the possession must not only be open, notorious, exclusive and continuous for the full 10-year period of the statute, but must also be taken and held either under color of title or claim of right. To acquire title by occupation and possession a man, in a case like this, must have a belief in his own mind that he possesses a right as owner.—*Bolin v. Colorado & S.* (Wyo.), 152 Pac. 486.

"Lookout Ahead" and Speed on a Curve

In an action for the death of a person struck by a train while he was standing on a sharp curve, it was the railroad's theory, sustained by proof, that a southbound train was so interposed between the deceased and the engine that struck him that he and his companion could not be seen from the engine. The Tennessee Supreme Court holds that, under Shannon's Code, section 1574, providing that every railroad company shall keep the engineer, fireman or some other person upon the locomotive always on the "Lookout ahead," engineers are not required, when on a curve, to look across the intervening space to the further end of the curve, thereby withdrawing the lookout from the track immediately ahead of the engine.

It also holds that, as a precaution against injury to persons walking on the track, but not seen, there is no duty to slacken the speed of a train approaching a curve in the open country,

although the curve be in whole or in part in a cut or the track be hidden from view by a train going in the opposite direction on the concave side of the curve.—*Cincinnati, N. O. & T. P. v. Wright* (Tenn.), 179 S. W. 641.

Excessive Rates on Milk

In an action to recover excessive freight charges neither party attempted to show the reasonableness or unreasonableness of the rate of itself. The South Dakota Supreme Court held that in such a case under the state law which places the burden of proof on the carrier to show the reasonableness of the rates when they are attacked in a proceeding before the railroad commissioners, and making evidence of the lowest prevailing rate for similar service elsewhere prima facie evidence of a reasonable rate, the parties may adduce comparative evidence of other rates on the question of reasonableness. Evidence that express rates on milk between certain points were higher than the railroad's rates between the same points was held not to establish the reasonableness of the railroad's rates, where it did not appear that the service rendered was the same. The express company maintained a free "pick-up" service and a free delivery service, which the railroad did not do, and the tariff recited that while on the platform the milk cans were at the owner's risk. A through rate for the carriage of milk between certain points which exceeded the total of local rates over the same line and distance was held to be an unreasonable rate.—*Turner Creamery Co. v. Chicago, M. & St. P.* (S. Dak.), 154 N. W. 819.

Overexertion in Lifting Heavy Articles

A section gang was engaged in cutting weeds on a track. They used a hand car, which was moved off the track on the approach of a train; the section foreman keeping a watch for trains. A workman suffered an inguinal hernia while assisting in removing the car, and sued for damages, recovering a verdict. On appeal, the Minnesota Supreme Court directed judgment for the railroad notwithstanding the verdict. It is the general rule that a master is not liable for an injury to his servant caused by overexertion in lifting heavy articles, as the servant is the best judge of his own lifting capacity, and the burden is on him not to overtax it. *Stenvog v. Minnesota Transfer*, 108 Minn. 190. The plaintiff recognized this rule, but contended that the foreman did not discover the approaching train until it was so near that great haste was necessary to avoid a collision; that in the exercise of proper care the foreman ought to have discovered the train in time to permit the removal of the hand car without such haste; and that the negligence of the foreman in this respect brought about the situation which caused the plaintiff to overexert himself. A careful examination of the evidence was held to show no such negligence.—*Creamus v. Great Northern* (Minn.) 154 N. W. 616.

Libel in Letter Charging Station Agent with Intoxication

In our issue of November 12 last appeared an abstract of a decision in which a letter from a passenger to a railroad general agent charging a conductor with intoxication and rudeness was held to be a libel, being malicious. A very similar case has recently been handed down by the Pennsylvania District Court, the parties being the general superintendent of a large shipper of the line and a station agent, between whom had existed for a long time a deep-seated ill-feeling. The alleged libel was contained in a letter to the president of the railroad, which stated that the station agent had, the day before, been "so drunk he hardly knew his name." It was held that such a letter is not a privileged communication if written and mailed maliciously. The jury were instructed, however, and it was held, properly, that if they found as a fact that the plaintiff was intoxicated on the day mentioned in the letter, their verdict must be for the defendant; and if they found that he was not intoxicated on that day, even then their verdict should be for the defendant if the charges were lodged in good faith, for the purpose of bettering the situation at the station, and without malice. The jury found that the letter was sent maliciously, and returned a verdict of \$1,000 damages. As no special damages had been alleged or proved, this was reduced to \$700 on appeal.—*Peterman v. Dewey*, 24 Pa. Dist. 920.

Receivers—Allowance of Claims for Supplies

The Circuit Court of Appeals, Eighth circuit, in a suit against the Kansas City, Mexico & Orient and others, holds that the claim of a creditor for payment out of the corpus of railroad property for necessary supplies (in this case tanks and culverts) furnished to a railroad company and used in the operation of the road, is inferior in equity to the claims of bondholders under a prior mortgage, and is not entitled to preference in payment over them, there being no diversion to the payment of unpreferred claims of current income from the payment of current expenses for wages, materials, supplies, and such necessities of operation. The expectation of the seller of supplies that its claim would be paid out of the current earnings of the company is not sufficient to take it from the class of general claims and place it in the class of preferential claims. If it were sufficient for the purpose, liens of prior mortgages on railroads would be idle, for nearly all general creditors undoubtedly expect payment out of the current incomes of the companies. Even loans of money to pay current expenses, or to keep a railroad company a going concern, in reliance on and in expectation of payment out of the current earnings of the company, are ineffectual to transfer claims for their payment, otherwise without equitable preference, to the class of preferential claims. —*Martin Metal Mfg. Co. v. U. S. & M. Trust Co., C. C. A., 225 Fed. 961.*

Undercharge Recovery—Plainness of Tariff

In an action to recover an undercharge it appeared that the defendant shipped 27 car loads of cattle from Groom, Tex., to Meade, Kan., over the lines of the plaintiff and connecting carriers. The rate charged was \$35 per car load. The lawful rate was \$47.50. The defendant claimed as a set-off damages on another shipment of cattle. But the other shipment was made under a contract prescribing that no recovery should be had unless an action was brought within 6 months; and this condition precedent was disregarded. The Kansas Supreme Court therefore held that no set-off could be allowed.

It was claimed that the tariff did not conform to section 2 of the Interstate Commerce Act requiring plainness of statement and printing. Some 25 railroads participated in the tariff, which was approved by the commission. The contention was not sustained. The court said: "The statutory provision requiring simplicity in railroad tariffs is satisfied when it is made as plain as a subject inherently complex will permit. Tariffs and their arrangement with reference to simplicity follow the outlines prescribed by the Interstate Commerce Commission, and must meet the approval of that tribunal. Ordinarily the courts make no mistake in deferring to its expert judgment touching the best methods of complying with the statutory mandate as to plainness and lucidity."—*Chicago, R. I. & P. v. Theis (Kan.), 152 Pac. 619.*

Keeping Trespasser Off Train—Duty of Conductor

A trespasser on a train had been repeatedly put off, the train being stopped for the purpose. On the final occasion he ran after the train, overtook it and attempted to board it at the rear steps in spite of the resistance of the conductor. It was claimed in an action for his death that he was pushed off by the conductor, and fell on the track. The train, which was passing around a curve, was not stopped. Next day the mangled body of the deceased was found on the track near the spot. It was held by the Iowa Supreme Court that a verdict and judgment for the plaintiff were not supported by the evidence. Clearly it was the duty of the conductor to prevent the deceased from boarding his train. To that end he was required to exercise all the reasonable means within his power, and this implied the use of a reasonable degree of force. The attempt of the deceased to board the train at the very point where the conductor was standing guard to prevent him was wanton and reckless in the extreme. His act was not only a violation of the statute forbidding the boarding of trains in motion, but it amounted to an assault upon the conductor, and created a position of manifest peril to the conductor. That his attempt should fail was a natural and probable result. Whether the conductor ought afterwards to have stopped his train would depend upon the question of whether he knew or ought to have known that the deceased was rendered too helpless to remove himself from the track. It was possible that this did happen, and that he was thereby

run over by a later train, but it was by no means proved.—*Hawthorne v. Delano (Iowa) 154 N. W. 590.*

Taxation of Express Companies in South Dakota

The suits by Wells, Fargo & Company and the American Express Company to enjoin the state of South Dakota from assessing certain taxes levied against the companies for the year 1910 have been decided in favor of the companies by the United States Supreme Court. Under the state law, Wells, Fargo & Company made a statement showing gross earnings within the state for the year ending April 30, 1910, of \$131,096, and value of office furniture, fixtures and real estate, \$18,474. The State Board of Assessment and Equalization assessed the value of the company's property at \$289,877, and imposed a tax of twenty-eight mills on the dollar, making a total tax of \$8,116. Similarly, the board assessed the value of the American Express Company at \$193,260, and levied a tax of \$5,411. The companies' bill averred a tender of taxes upon the returns, and charged that the assessments were a violation of the state constitution, and, if enforced, would have the effect of taking the property of the companies without due process of law, in violation of the federal constitution.

The state constitution, as in force at the time of the assessments (in this respect it is still practically the same), provided that the levy of taxes on corporate property should be made as nearly as possible in the same way as on individual property, and that all taxes should be levied in proportion to the value of the property. It appeared that the express companies doing business in the state in 1909 and 1910 were under contracts with the railroads to pay to the latter from 45 per cent to 55 per cent of their gross earnings from the transportation of express business over their lines, and that this payment, if not the only basis of the assessments made by the board, was the principal factor in fixing the value of the express companies within the state. The South Dakota statutes, other than those relating to railroads, telephone, telegraph, express and sleeping car companies, do not authorize a valuation which considers gross income, and individuals and other corporations are taxed according to the value of their property, without reference to the income derived therefrom. In other words, property owned by other corporations and individuals is assessed for what it is fairly worth, and a valuation for taxation is not fixed by a method which gives controlling effect to the amount of the gross income derived therefrom. The Supreme Court concurred with the opinion of the Circuit Court of Appeals that such procedure is in violation of the provision of the South Dakota constitution, above referred to, and affirmed that court's judgment in favor of the express companies.—(Decided November 29, 1915.)

Demurrage in Bad Weather—Commission Cannot Order Refund

The New York State Supreme Court, appellate division, holds that the Public Service Commission is without power to direct a common carrier to refund freight payments found by the commission to be excessive, provided the sum which has been collected is correct according to the published tariff. The court, with Justice Laughlin dissenting, held that the commission may determine the just and reasonable regulations to be observed by the carrier, but that its power is confined solely to violations of such determinations in the future, and that the commission has not the power, after a determination, to direct the repayment of charges already collected. The prevailing opinion was written by Justice Scott.

In his dissenting opinion, Justice Laughlin holds that not only has the Public Service Commission the right to determine as to the reasonableness of charges, but it has power to "order the defendant to make reparation by refunding the amount exacted in excess of the amount found to be just and reasonable."

The decision was handed down in a suit brought by Edward D. Murphy and William P. Murphy, in the hay and grain shipping business, against the New York Central. The railroad charged and collected from them between November 1, 1907, and May 20, 1910, \$178 for "track storage" on consignments of freight at Melrose Junction. The Murphys contended these charges were excessive and took their complaints to the Public Service Commission of the Second District, which ruled that the track storage charges, so far as they related to days which, owing to bad weather, made it impossible to unload the freight, were unreasonable.

Railway Officers

Executive, Financial, Legal and Accounting

Edgar J. Rich, general solicitor of the Boston & Maine at Boston, Mass., has resigned.

Edgar M. Williams, second vice-president of the Southern Express Company, at Chattanooga, Tenn., has been elected vice-president, succeeding Charles L. Loop, deceased.

Arthur E. Sweet, general manager of the Second district of the Chicago, Rock Island & Pacific, with office at Topeka, Kan., has been elected vice-president of the Denver & Rio Grande, succeeding E. L. Brown.

Operating

L. M. Dooley has been appointed inspector of transportation for the Texas & Pacific, at Dallas, Tex., instead of superintendent of transportation, as announced in these columns recently.

The office of G. W. Clark, general superintendent of the Central New England, has been transferred from Hartford, Conn., to Poughkeepsie, N. Y. At the same time 34 members of the office forces move from Hartford to Poughkeepsie.

Charles H. Smith, trainmaster of the Green Bay & Western, with office at Green Bay, Wis., has been appointed superintendent of the Green Bay & Western, the Kewaunee, Green Bay & Western and the Ahnapee & Western, effective January 1.

L. L. McIntyre, whose appointment as superintendent of the Carolina, Clinchfield & Ohio, at Erwin, Tenn., has already been announced in these columns, was born on October 4, 1874, at McColl, S. C., and was educated in the common schools. He began railway work on June 1, 1892, with the Cape Fear & Yadkin Valley, now a part of the Atlantic Coast Line, as a clerk and relief agent. In July, 1893, he went to the Norfolk & Western as clerk and operator at Welch, W. Va., remaining in that position until the following September. He was then engaged in yard and coal and coke weighing and billing service at various points on the Pocahontas division of the same road until January, 1898, when he was appointed train dispatcher at Bluefield, W. Va. On May 1, 1902, he was appointed night chief dispatcher; then from November, 1904, to July, 1906, was chief dispatcher. From July, 1906, to March, 1909, he was car distributor of the same road. On March 15, 1909, he went to the Carolina, Clinchfield & Ohio as car service agent at Erwin, Tenn. In April, 1911, he was appointed trainmaster at the same place, which position he held at the time of his recent appointment as superintendent of the same road as above noted.

Traffic

John Dunphy has been appointed assistant general passenger agent of the Pere Marquette, with headquarters at Detroit, Mich.

H. B. Hatch, contracting freight agent of the Illinois Central at San Francisco, Cal., has been appointed freight and passenger agent, with office at Fresno, Cal.

S. F. Hilton, agent of the freight department of the Union Pacific at Fresno, Cal., has been appointed district freight agent at the same place, effective January 1.

William P. Behen, contracting freight agent of the Cincinnati, Hamilton & Dayton, has been appointed commercial agent of the Cincinnati, Indianapolis & Western, with headquarters at Chicago.

Robert C. Haase, northwestern passenger agent of the Baltimore & Ohio, with headquarters at St. Paul, Minn., and Minneapolis, has been appointed district passenger agent at Philadelphia, Pa., succeeding Bernard N. Ashby, resigned. H. C. Strohn, traveling passenger agent at Omaha, Neb., has been promoted to northwestern passenger agent.

O. S. Lewis, whose appointment as assistant general freight agent of the Baltimore & Ohio, Southwestern and the Cincinnati, Hamilton & Dayton has been announced, began his railroad career as an employee in the accounting department of the Baltimore & Ohio. Later he was stationed at Lawrenceburg, Ind., as agent,

and subsequently was promoted to chief clerk in the office of the division freight agent at Vincennes, Ind. He served in the general office of the road for seven years and in 1912 was sent to Dayton, Ohio, as division freight agent.

Engineering and Rolling Stock

Joseph Gilkison has been appointed roadmaster of the Chicago, Terre Haute & Southeastern, vice William Padden, deceased.

K. B. Duncan has been appointed valuation engineer of the Atchison, Topeka & Santa Fe, eastern lines, in connection with the Kansas rate case.

Frederick A. Bonz, assistant engineer of the Buffalo, Rochester & Pittsburgh, has been promoted to division engineer, Divisions 1, 2 and Erie division, with office at Rochester, N. Y.

George J. Adamson, formerly special engineer of construction for the Union Pacific, with office at Omaha, Neb., has been appointed division engineer of the Wyoming division, with headquarters at Cheyenne, Wyo. George F. Maitland has been appointed division engineer of the Kansas division, with office at Kansas City, Mo.

Purchasing

Harvey DeCamp has been appointed purchasing agent of the Gulf & Ship Island, with office at Gulfport, Miss.

Special Officers

F. A. Greene, chief inspector of the insurance department of the Pennsylvania Railroad, has been appointed assistant superintendent of the insurance department of the Pennsylvania system, effective January 1.

OBITUARY

R. H. Montgomery, superintendent of the New York Central shops at Collinwood, Ohio, died at his home in Cleveland, on December 14.

Joseph B. Redfield, for 60 years in the service of the Chicago & North Western, and most of that time as auditor and assistant secretary, died at his home in Chicago, Ill., on December 20. About five years ago Mr. Redfield retired from his duties as auditor and engaged in the compilation of historical matter connected with the railway. He was a graduate of Union College, Schenectady, N. Y., and was born on September 25, 1825.

John Kirby, formerly from October, 1870, to October, 1892, general master car builder of the Lake Shore & Michigan Southern, died on December 8, at Adrian, Mich. Mr. Kirby was born in October, 1823, in Oxfordshire, England, and was educated in the common schools. He began railway work in May, 1848, and until 1854 was engaged in repairing cars on the Syracuse & Utica, which is now a part of the New York Central. He was then to September, 1856, engaged in repairing and building cars on the Michigan Southern at Adrian, Mich. From September, 1856, to September, 1858, he was foreman of shops on the same road at Adrian; then to October, 1870, was master car builder of the Michigan Southern & Northern Indiana, which subsequently became a part of the Lake Shore & Michigan Southern, which is now a part of the New York Central. In October, 1870, he was appointed general master car builder of the Lake Shore & Michigan Southern, remaining in that position until October, 1892. Mr. Kirby was president in 1891 and 1892 of the Master Car Builders' Association, and from 1900 to 1909 was treasurer of the same association.



J. Kirby

Equipment and Supplies

LOCOMOTIVES

THE INTERCOLONIAL will install superheaters on 100 locomotives.

THE LEHIGH VALLEY has issued inquiries for 15 switching locomotives.

THE EDMONTON, DUNVEGAN & BRITISH COLUMBIA is inquiring for two superheater locomotives.

THE GRAND TRUNK PACIFIC will install superheaters on 47 Consolidation and Mikado locomotives.

THE UNION RAILROAD has ordered five Consolidation locomotives from the Baldwin Locomotive Works.

THE TAVARES & GULF has ordered one Prairie type locomotive from the Baldwin Locomotive Works.

THE NORFOLK SOUTHERN has ordered four Consolidation locomotives from the Baldwin Locomotive Works.

THE PRESCOTT & NORTHWESTERN has ordered one Mikado locomotive from the Baldwin Locomotive Works.

THE NORFOLK & PORTSMOUTH BELT LINE has ordered one six-wheel switching locomotive from the Baldwin Locomotive Works.

THE OZAN GRAYSONIA LUMBER COMPANY, Prescott, Ariz., has ordered two Mikado locomotives from the Baldwin Locomotive Works.

THE DELAWARE, LACKAWANNA & WESTERN, reported in last week's issue as contemplating the purchase of locomotives, will buy 10 Mikado and seven Pacific type locomotives.

THE CHICAGO GREAT WESTERN, which was reported in last week's issue as having ordered five Mikado locomotives from the Baldwin Locomotive Works, has increased this order to 10 locomotives.

THE NEW YORK CENTRAL has ordered one Mountain type locomotive from the American Locomotive Company. It is also further reported to be contemplating the purchase of other locomotives.

FREIGHT CARS

THE CENTRAL VERMONT is in the market for 1,000 box cars.

THE UNION PACIFIC is in the market for a number of box and stock cars.

THE EAST BROAD TOP RAILROAD is in the market for five narrow gauge hopper cars.

THE NEW YORK, PHILADELPHIA & NORFOLK is in the market for from five to 10 cabin cars.

THE CHANUTE REFINING COMPANY is inquiring for prices on 50 8,000-gal. capacity tank cars.

THE DULUTH & IRON RANGE has ordered 100 flat cars from the American Car & Foundry Company.

THE SOUTHERN EXTRACT COMPANY has ordered 10 tank cars from the American Car & Foundry Company.

THE BETHELEHEM CHILE IRON MINES COMPANY has issued inquiries for 25 100,000-lb. capacity steel ore cars.

THE STANDARD OIL COMPANY, Whiting, Ind., has ordered three steel coke cars from the American Car & Foundry Company.

THE LONG ISLAND, reported in the issue of November 19 as being in the market for 100 gondola cars, has ordered 100 long gondola cars from the Pressed Steel Car Company.

THE NEW YORK, PHILADELPHIA & NORFOLK, reported in last week's issue as being in the market for 45 to 60 steel under-frame box cars, has ordered these cars from the American Car & Foundry Company.

THE MICHIGAN CENTRAL, reported in the *Railway Age Gazette*

of November 5 as having ordered 150 40-ton box cars from the Canadian Car & Foundry Company, ordered only underframes for 150 50-ton flat cars from that company.

THE IMPERIAL OIL COMPANY, LTD., Sarnia, Ont., has ordered 100 40-ton tank car bodies and trucks from the Canadian Car & Foundry Company for part of the 235 cars mentioned in an item in the *Railway Age Gazette* of December 10.

THE NEW YORK, NEW HAVEN & HARTFORD, reported in last week's issue as contemplating the purchase of 500 coal cars, has ordered these cars from the Standard Steel Car Company. It will also buy 20 milk and 50 refrigerator cars, not 500 refrigerator cars as reported in last week's issue.

PASSENGER CARS

THE WABASH is inquiring for prices on 6 postal cars.

THE LONG ISLAND, reported in the *Railway Age Gazette* of November 26 as being in the market for six parlor cars, 10 baggage cars and 25 trailer coaches, has ordered the 25 trailer cars from the Standard Steel Car Company.

THE NEW YORK MUNICIPAL, reported in the *Railway Age Gazette* of December 10 as inquiring for prices on 100 subway cars, has ordered these cars from the American Car & Foundry Company. These cars are for the Sea Beach Line, and constitute the fourth 100 ordered for this service from the same company.

THE NEW YORK, NEW HAVEN & HARTFORD.—The item in the issue of December 3, giving the division of the order for 100 passenger cars, placed with the Osgood-Bradley Car Company, was incorrect. The Osgood-Bradley Car Company has been authorized to proceed with the construction of 100 all-steel passenger train cars, as noted, but these will include 65 coaches and 35 baggage cars.

THE NEW YORK CENTRAL, reported in the *Railway Age Gazette* of December 10 as having issued inquiries for 30 to 60 70-ft. coaches, has placed orders for 105 cars as follows: Barney & Smith Car Company, 15 coaches for the Cleveland, Cincinnati, Chicago & St. Louis; Osgood-Bradley Car Company, 25 for the Boston & Albany; American Car & Foundry Company, 45 for the New York Central itself, and the Standard Steel Car Company, 20.

TRACK SPECIALTIES

THE GREAT NORTHERN has ordered 175,000 tie plates, 7,000 kegs of track spikes, 8,000 kegs of bolts and 90,000 angle bars from the Lackawanna Steel Company.

IRON AND STEEL

THE BALTIMORE & OHIO has ordered 300 tons of bridge steel from the Mount Vernon Bridge Company.

THE FRENCH GOVERNMENT has given the Maryland Steel Company an order for 90,000 tons of rails and fittings.

THE SOUTHERN RAILWAY has ordered 1,300 tons of bridge steel from the Virginia Bridge & Iron Company.

THE PENNSYLVANIA has ordered 435 tons of steel from the Pennsylvania Steel Company for an ore handling bridge on the Pennsylvania dock at Erie, Pa.

THE TOLEDO, ST. LOUIS & WESTERN has divided an order for 10,000 tons of 85-lb. rails between the Illinois Steel Company and the Carnegie Steel Company.

THE GREAT NORTHERN has divided an order for 8,000 tons of rails among the Illinois Steel Company, the Cambria Steel Company, the Lackawanna Steel Company and the Colorado Fuel & Iron Company.

SIGNALING

THE PHILADELPHIA & READING has given to the Federal Signal Company the contract for installing automatic signals on its line, double track, between Newberry Junction, Pa., and Lewisburg, 36 miles.

A mechanical interlocking plant is to be installed at Dun Loup, W. Va., at the crossing of the Chesapeake & Ohio and the Kanawha, Glen Jean & Eastern. The Federal Signal Company has the contract.

THE GREAT NORTHERN plans to install during the coming year automatic block signals on 200 miles of its line. The plans for the year include also the installation of a 22-lever interlocking plant at Aberdeen, S. D., where the line crosses the Chicago, Milwaukee & St. Paul; and a nine-lever interlocking at Calumet, Minn., where the line crosses the Duluth, Missaba & Northern.

THE ALABAMA GREAT SOUTHERN plans during the coming year to install automatic block signals on five miles of line. This number of miles is exactly the difference between the mileage reported as now operated under automatic block signals and the total mileage of road on which the passenger trains are run, indicating that at the end of the year the whole of the line will be signaled.

THE ILLINOIS CENTRAL plans to install automatic block signals during the coming year on 180 miles of its lines as follows: Gilman, Ill., to Mattoon, 90 miles double track; Dugan, Ky., to Cecilia, 8 miles; East View to Leitchfield, Ky., 14 miles; Horse Branch, Ky., to Beaver Dam, 12 miles; Rockport, Ky., to Mercer, 12 miles, and Eddyville, Ky., to Paducah, 35 miles, all single track; Woodstock, Tenn., towards Memphis, 8 miles single track, and Branch Junction, Ill., to Centralia, 2 miles, double track.

THE ERIE will install automatic block signals in 1916, in place of the manual block system, on 84 miles of road, namely: Solon, Ohio, to Cleveland, 16 miles double track; Kent, Ohio, to Leavittsburg, 27 miles double track; Buchanan Junction, Pa., to Pymatuning, 26 miles single track and 6 miles double track; Columbus, Pa., to Niobe Junction, 9 miles. Also on the controlled line, the New York, Susquehanna & Western, automatic block signals will be installed on 14 miles, double track, to take the place of the manual block system.

THE INDO-CEYLON RAILWAY.—It has been proposed to make the Indo-Ceylon Railway into a railway throughout by constructing a line along Adam's Bridge. At the meeting of the South Indian Railway on November 17, it was stated that the existing railway and ferry steamer service—which was only opened less than two years ago—was causing a great deal of trouble and was being operated at a very considerable loss. It was instituted at the special instance of the merchants, planters, people and government of Ceylon, and unless some satisfactory understanding could be come to with the Ceylon Government Railway it might become necessary either to close the route altogether or to run the service periodically, and then only for passengers.

RAILWAY DEVELOPMENT IN EASTERN MANCHURIA.—Some interesting details regarding Japanese railway development in Eastern Manchuria have recently been published in the Far East. Although the entire line from Antung to Mukden, 170 miles in length and costing \$10,000,000 to reconstruct, is devoid of any cities of importance, except Penchilin, which, about 40 miles southeast of Mukden, is in the center of a coal-mining district, the Japanese are busily engaged in opening up the mineral wealth of the country and constructing branch and light lines. Near Penchilin two modern smelting plants have been installed and iron ore is obtained at the Miao-Kou Iron Mine, some five miles from Nan Fan Station and connected with it by a light railway. Near the station of Nui-hsin-tai is situate another colliery, known as the Ho Lien Kuo, and from this a light line is to be built by the Japanese to Chien Chang, 53 miles to the north, for the purpose of carting timber from the forests. A new line is also to be built between Kaiyuan and Hailungsen, as there is plenty of coal from the Sha Ting Kang mines to work them. On the other hand, a group of Chinese merchants have formed a syndicate to build a light railway from Fushun, at the end of the Mukden extension, to Shing Ching, where there is a good supply of timber, which is greatly needed for the Fushun collieries. It is a sign of the times that it is reported that the Fengtien Branch of the Bank of China has agreed to finance the scheme, which needs \$500,000. The Japanese have recently laid a Decauville railway through the city of Liaoyang itself.—*Railway Gazette, London.*

Supply Trade News

Wilfred R. Dean, vice-president of the Dean Brothers Pump Works, Indianapolis, Ind., died recently, after a prolonged illness.

S. K. Smith, treasurer of the Harlan & Hollingsworth Corporation, has also been elected vice-president, succeeding Persifor Frazer. Henderson Weir, secretary, has been elected a director.

A. L. Murphey, purchasing agent, and J. P. Coonahan, assistant purchasing agent of the Midvale Steel Company, have been appointed to similar positions with the Midvale Steel & Ordnance Company.

Frank Howard Bailie, assistant manager of sales of the H. K. Porter Company, Pittsburgh, Pa., died after a brief illness from pneumonia on Tuesday, December 14. Mr. Bailie had been associated with the company for 27 years.

Richard Henry Lee, superintendent of the Lebanon blast furnaces of the Pennsylvania Steel Company and consulting engineer of the American Manganese Manufacturing Company, died suddenly, December 8, of heart failure.

Charles E. Duncan, formerly with the Carnegie Steel Company, and at one time superintendent of the plant of the Algoma Steel Corporation, Ltd., Sault Ste. Marie, Canada, has been appointed general manager of the newly incorporated Donner Steel Company, Ltd., Buffalo, N. Y.

The Garland ventilator, which is in general use on railroad sleeping and parlor cars, has now been successfully applied to automobile trucks and pleasure cars, removing the heated air from the motor compartment and reducing losses in power, oil, burned out bearings, scored cylinders and damage to the radiator.

Henry C. Kloos, of the electrical staff of the Pullman Company, has accepted a position with the Franklin Railway Supply Company, New York. This company is now engaging in the manufacture and sale of car lighting equipment, and is placing upon the American market the "Stone" system of car lighting, hitherto manufactured in England and extensively employed abroad.

Announcement is made that the receivership of the Barney & Smith Car Company, Dayton, Ohio, came to an end December 15, following the negotiation of a loan of \$600,000. There will be no change in the status of the stock and bondholders of the company. The officers of the company are as follows: President, H. M. Estabrook; vice-president and general manager, A. J. Stevens, and treasurer, A. F. Kiehofer. The board of directors will include these and Lawrence Maxwell, E. J. Barney, J. L. Oneil, E. N. Patten and C. L. Harrison.

The Boston Elevated Railway will build a creosoting plant of its own in Boston for the purpose of treating ties and other material. G. B. Shipley, consulting engineer, Pittsburgh, Pa., has been engaged to design the plant and superintend its construction. It will be a modern pressure creosoting plant, designed for any standard process, and will be fully equipped to meet all of the Boston Elevated requirements. This decision to use creosoting material comes after long experiments with various methods of wood preservation. The plant will be the first modern creosoting plant to be built in New England.

The American Steel Railway Cross Tie Company, Pittsburgh, Pa., has purchased the Maxey patents formerly owned by the United States Steel Railway Tie Company. The present management of the American Steel Railway Cross Tie Company is as follows: President, J. A. Langfitt, a Pennsylvania state senator for two terms; vice-president, W. S. Maxey, attorney-at-law and a prominent business man of Pittsburgh (this Mr. Maxey is not related to the Mr. Maxey who sold the patents to the company); treasurer, Oscar A. Adrian, of the Peoples Homewood Bank and treasurer of the Charles C. Wesley Real Estate Company, and secretary, Charles C. Wesley, president of the Charles C. Wesley Real Estate Company.

A new company with a capital of \$150,000 is about to be organized under the leadership of Joseph C. Reed, until re-

cently in charge of the railway and government business of the Shapleigh Hardware Company, St. Louis, to take over the Southern Railway Supply Company of that city. W. D. Achuff, vice-president, and Ephron Catlin, Jr., secretary and treasurer of the Southern Company, will hold similar positions with the new company, the name of which has not yet been definitely decided. The new company, in addition to carrying in stock a full line of miscellaneous supplies for railroads, mines, mills and industrial corporations, will specialize and represent exclusively in the southwestern territory the Buda Company, the E. F. Houghton Company, the Verona Tool Works and other companies. It will also have the exclusive sales agency in the United States for the Saunders corrugated car-stopper.

The following is quoted from the New York Times, of December 23: A syndicate headed by Potter, Choate & Prentice and F. B. Keech & Co. has bought the Haskell & Barker Car Company at Michigan City, Ind., and will take steps to extend the business after new capital has been raised. An offering of 220,000 shares of stock without stated par value is expected in a few days. It is understood that the shares are being placed with the syndicate at \$50 a share. Among the directors of the reorganized company are F. A. Vanderlip, president of the National City Bank; Ambrose Monnell, president of the International Nickel Company; William E. Corey, head of the Midvale Steel & Ordnance Company, and Arthur O. Choate, of the firm of Potter, Choate & Prentice. A large interest in the Haskell & Barker Car Company was held by Miss Catherine Barker, who was recently married to Howard Spaulding, Jr., secretary and general manager of the company. Control of the property has been in the hands of James B. Forgan, president of the First National Bank of Chicago; E. K. Boisot and T. J. McBride (president of the company) as trustees since the death of John Barker in 1910.

TRADE PUBLICATIONS

SAND BLASTS.—Bulletin No. 531, recently issued by the Pangborn Corporation, Hagerstown, Md., is a leaflet illustrating and describing the company's type "L. A." rotary table sand blast.

A RAILWAY CRANE.—The Bucyrus Company, South Milwaukee, Wis., has issued an eight-page pamphlet describing its Class 150-17 crane for wrecking and other railway purposes. This pamphlet gives the details of its construction and operation and is illustrated with numerous photographs.

PLANING MACHINES.—The Newton Machine Tool Works, Inc., Philadelphia, Pa., has recently issued Catalog No. 50, illustrating and describing the company's line of rotary planing machines. The catalog contains illustrations showing the various machines made by the company and gives specifications and general dimensions.

ACETYLENE.—The Searchlight Company, Chicago, has issued a pamphlet entitled "The Searchlight Treatise on Acetylene." It contains 12 pages, briefly describing the development of the use of the oxy-acetylene process for welding and cutting and discusses at some length the commercializing of the gases, in which the method of preparing, purifying and handling acetylene in cylinders is considered. There is also a brief discussion regarding the use of acetylene generated by small generators at the plant vs. the cylinder acetylene.

BOILERS.—The Harrison Safety Boiler Works, Philadelphia, Pa., has recently issued a 68-page catalog entitled "Finding and Stopping of Waste in Modern Boiler Rooms." The book treats of the value of feed water and condensate meters as aids in the management of power plants and it is shown how with a feed water meter one can ascertain the results of various factors, such as grade of fuel, grates, methods of firing, air leaks, control of draft, condition of gas passages, scale and soot on boiler tubes, radiation, etc. The point is made that the use of records which may be obtained with the meters arouses the ambition and spirit of emulation of the men, and makes it possible to reward special skill or attention to duty, as by bonuses or promotions. A section of the book also treats of the Cochrane metering heater (combined open feed water heater and hot water heater) with its several modifications. The Cochrane flow record for use in connection with V-notch weirs and a new type of meter working on the volumetric principle are also described. The book is well illustrated and attractively gotten up.

Railway Construction

ALASKA VALLEY.—Incorporated in North Carolina with \$150,000 capital to build from Bryson City, N. C., on the Southern Railway to the falls of Alaska creek, 12 miles. The headquarters of the company are at Bryson City. Arthur Brooks is said to be interested.

CALIFORNIA SOUTHERN.—Construction work is now under way on the section from Red Hill Station, Cal., to Blythe, 27 miles. The Blythe Construction Company, of Blythe Junction and Los Angeles, Cal., also G. W. Grayson, of Blythe Junction, are the contractors. (May 7, p. 993.)

CHICAGO, WEATHERFORD & GULF.—A charter has been filed in Texas to build a railroad from Gainesville, Tex., south via Weatherford and Granbury, to Waco, about 200 miles. The company has a capital of \$250,000, and the principal office is at Weatherford. W. D. Stratton, president; D. L. Decker, vice-president and general manager, both of Middleton, N. Y.; H. L. Moseley, vice-president; G. A. Holland, treasurer; T. R. Erwin, secretary, Weatherford.

CURTIS BAY RAILROAD.—Application to build and operate a railroad at Curtis Bay in Anne Arundel county, Md., has been made to the Public Service Commission of Maryland. The company was incorporated in March of this year with \$10,000 capital, and plans to build a railway from the plant of the Davison Chemical Company to Hawkins Point. The company also asks permission to construct wharves, piers, etc. In the application filed it is pointed out that the road will not conflict with any existing road, and that the conditions in that section demand the construction of a line of this kind, not only for commercial reasons, but to meet the passenger traffic needs of hundreds of workmen employed in the vicinity. C. Wilbur Miller, president of the Davison Chemical Company; J. Luntz, P. J. Peters, J. F. Gillespie and E. Miller are incorporators.

ELKIN & ALLEGHENY.—Construction work is now under way between Doughton, N. C., and Sparta. The company is carrying out the work with its own forces. Four miles have been graded, but track laying has not yet been started. The company now operates a 15-mile line from Elkin, N. C., northwest via Doughton to Veneer.

GRAND TRUNK PACIFIC.—Grading work on the Grand Trunk Pacific Branch Lines Company's Prince Albert branch has been completed into Prince Albert, Sask., but track has only been laid to St. Louis, on the north shore of the Saskatchewan river, which is 25 miles from Prince Albert. Grading work has also been finished on the Harte-Brandon branch, 26 miles, but track laying has not yet been started.

GULF, SABINE & RED RIVER.—The construction of a 35-mile extension has been decided upon, it is said, by Litcher & Moore, lumber manufacturers of Orange, Texas, the owners of this line. The proposed route is from Starks, La., north to Merryville. The extension will traverse a rich territory of the Sabine River valley, and will open up timberland. The company now operates a line from Niblett's Bluff, a few miles north of Orange, Tex., to Starks, La., where connection is made with the Kansas City Southern.

JACKSON & EASTERN.—Construction work is now under way from Union, Miss., west to Sebastopol, 14 miles. The work is being carried out by company forces. H. W. Harris, Meridian, Miss., may be addressed.

KANSAS SOUTHERN TRACTION.—Incorporated in Kansas with \$100,000 capital and headquarters at Oswego. The plans call for building an electric line from Parsons, Kan., southwest to Coffeyville, also a line from Parsons southeast to Columbus, in all about 70 miles. The incorporators include: P. Stack, Parsons, Kan.; T. Ritzo and D. Conti, Kansas City, Mo.; J. W. Everett and J. M. Page, Topeka, Kan.

MONTREAL & SOUTHERN COUNTIES (ELECTRIC).—This company has finished work on the extension from St. Césaire, Que., to Granby, 15 miles. One mile of the extension was built in 1914, and 14 miles in 1915. (July 2, p. 38.)

NEW YORK, PHILADELPHIA & NORFOLK.—This company now has under construction 7.54 miles of second track from Hallwood, Va., to Parksley.

PACIFIC & IDAHO NORTHERN.—This company, which now operates a line from New Meadows, Idaho, to Weiser, 89.7 miles, some years ago made surveys and reconnaissances from New Meadows north towards Grangeville or Lewiston, following generally the route of the Little Salmon and Big Salmon rivers. Governor Moses Alexander has been agitating the question of completing the gap between New Meadows and one of the points named above to provide rail connection between the northern and southern sections of Idaho. A commission was appointed by the governor, which has already made a favorable preliminary report. It is understood that capital can be secured to build the line; the construction work will be expensive. The Pacific & Idaho Northern has not yet done any work north of New Meadows except to make surveys. The company has filed its right of way through government land as far north as Riggins, at the junction of the Little and Big Salmon rivers, 35 miles north of New Meadows, at which point the P. & I. N. surveys intersect the Gilmore & Pittsburgh surveys from the present western terminus of that road at Salmon City, down the Big Salmon river and Snake river to Lewiston.

PALATINE, LAKE ZURICH & WAUCONDA.—This company, which operates a line from Palatine, Ill., northwest to Wauconda, 15 miles, has surveys made for an extension from Wauconda to Fox Lake, 10.5 miles. During 1915 work was finished on one-half mile of side tracks.

PHILADELPHIA ROADS.—The lowest bid for the steel superstructure of the Frankford elevated line extension from Unity street to Dyre street, Philadelphia, Pa., was submitted by the American Bridge Company. This company offered to carry out the work for \$249,000. (December 10, p. 1113.)

RICHMOND, RAPPAHANNOCK & NORTHERN.—Conditional contracts have been let by this company for the construction of the new line from West Point, Va., northeast to Urbanna, 17 miles. The contract, it is understood, was let to Winston & Co., Richmond, Va. The promoters must make a first payment of \$100,000 to the contractors before actual construction work will be started. The cost of construction and equipment of the line is estimated at \$300,000. The project has the endorsement of the Richmond Chamber of Commerce and Retail Merchants' Association, who are co-operating in raising the necessary funds. (August 20, 1915, p. 369.)

ROANOKE RIVER.—This company, which now operates a 12-mile line from Townsville, N. C., east to Manson, contemplates building an extension from Townsville west to a connection with the Southern Railway, about 9 miles.

SOUTHERN TRACTION.—An officer is quoted as saying that definite action for building from Waco, Tex., south to Austin, thence to San Antonio, about 180 miles, will be taken within the next few months. The company owns and operates interurban lines between Dallas and Waco and between Dallas and Corsicana.

SOUTH DAKOTA SHORT LINE.—This company, which was recently incorporated in South Dakota with \$2,000,000 capital, plans to build a line either from Sioux Falls, S. D., northwest to Pierre, 200 miles, or from Mitchell to Pierre, 120 miles. G. W. Adams, president, Council Bluffs, Iowa. (October 1, p. 622.)

VALLEY & SILETZ.—Work is now under way building an extension between Spalding Dam, Ore., and Siletz Basin, eight miles. The work is being carried out by company forces. (March 26, p. 721.)

VIRGINIA-BLUE RIDGE.—This company is building an extension from Lowesville, Va., to Massies Mill, 9 miles. The Wuch Construction Company, Roanoke, Va., has the contract. Surveys are now being made for an extension from Massies Mill to Tyro, 3 miles. (August 13, p. 301.)

RAILWAY STRUCTURES

TWO HARBORS, MINN.—The Duluth & Iron Range will build a one-story car repair shop at Two Harbors. The building will have a steel frame and brick walls; it will be 275 ft. by 310 ft. and will cost \$175,000. The date for opening bids for the work has not been set.

Railway Financial News

BUFFALO & SUSQUEHANNA.—See Wellsville & Buffalo.

CHICAGO, BURLINGTON & QUINCY.—See Paducah & Illinois.

CHICAGO, MILWAUKEE & ST. PAUL.—Kuhn, Loeb & Co. and the National City Bank, both of New York, have bought from the Chicago, Milwaukee & St. Paul \$2,856,000 general mortgage 4½ per cent bonds, the proceeds to be used to refund a like amount of Dakota & Great Southern first mortgage 5 per cent bonds maturing January 1, 1916.

The Wisconsin Railroad Commission has authorized the company to issue \$48,176,650 4 per cent bonds to retire a like amount of 4 per cent 15-year European loan bonds of 1910. These European loan bonds were printed in French and largely held in France. They have been surrendered by the owners to the French government and sent to this country to raise money for the government.

CHICAGO, ROCK ISLAND & PACIFIC.—The receiver is to ask the court for authority to pay the interest coupons maturing January 1 on underlying bonds and to renew short term loans and receiver's certificates.

ELKIN & ALLEGHENY.—C. B. Penney, general manager, and M. W. Thompson have been appointed receivers.

GULF, MOBILE & NORTHERN.—The state of Mississippi has issued a charter for this company, which is the new company taking over the New Orleans, Mobile & Chicago.

LEHIGH VALLEY.—Samuel T. Bodine has been elected a member of the board of directors, succeeding Abram Nesbitt, resigned.

MISSOURI PACIFIC.—Federal Judge Elmer B. Adams has, at his own request, been relieved of the receivership affairs of the Missouri Pacific and Judge Sanborne, of the United States Circuit Court of Appeals, has assigned Judge William C. Hooke, of Leavenworth, Kan., to take over the Missouri Pacific receivership.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—See Paducah & Illinois.

NEW ORLEANS, MOBILE & CHICAGO.—See Gulf, Mobile & Northern.

PADUCAH & ILLINOIS.—Kean, Taylor & Co., the Union Trust Company, the Merchants Loan & Trust Company, all of Chicago; the Second Ward Savings Bank, the First National Bank, both of Milwaukee; the Northwestern Trust Company, the St. Paul Commerce Trust Company, both of Kansas City; the Mercantile Trust Company, St. Louis, Mo., and James C. Wilson & Co., Louisville, Ky., have bought from the Paducah & Illinois \$3,500,000 first mortgage 4½ per cent 40-year bonds. These bonds are guaranteed principal, interest and sinking fund by the Chicago, Burlington & Quincy and the Nashville, Chattanooga & St. Louis. The Paducah & Illinois is a subsidiary of these two companies and is building a double-track steel bridge over the Ohio river near Metropolis, Ill. The bridge is about 5,700 ft. long and will form the only direct connection between the Nashville, Chattanooga & St. Louis and the Chicago, Burlington & Quincy.

PERE MARQUETTE.—Judge Tuttle, of the United States district court, has fixed April 5, 1916, as the date of sale with an upset price of \$14,000,000 subject to underlying bonds.

RICHMOND, FREDERICKSBURG & POTOMAC.—The directors, in accordance with the expressed desires of stockholders, have voted to issue a scrip dividend of 50 per cent. The state of Virginia owns about 18 per cent of the stock, which has been paying regular dividends of 9 per cent.

WELLSVILLE & BUFFALO.—This is the name of the new company which has applied to the New York Public Service Commission for a certificate of public convenience and necessity to operate the Buffalo & Susquehanna Railway, which it has taken over after reorganization.

WHEELING & LAKE ERIE.—For the third time the Wheeling & Lake Erie has been offered for sale. No bid was made.

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The salient fact in the annual statistical review of the block-signal situation on American railways, published in this issue, is the continued testimony to the superiority of the automatic to the manual block system, as shown in the large investments being made to substitute the one for the other.

And the items of proposed new work for 1916 indicate that this tendency grows stronger, year by year. The direct financial results of these changes are, usually, not immediately apparent, but everybody agrees that there is increased safety, and the increase in capacity of road by the shortening of block sections (which always accompanies the introduction of automatics) is surely valuable as soon as that increased capacity is used. The increase in manual block signal mileage is

also significant. Well-informed railroad officers have long known that the space interval system is the only adequate preventive of collisions; more and more this belief is shown by actual adoption of the practice. Including Canada, North America now has over 100,000 miles of railway on which the space interval is in use; and the thirty-odd thousand miles of this which covers automatic signals includes a good deal of four-track railway, so that the total miles of track automatically signalled is over fifty thousand.

A second very careful estimate has been made by L. F. Loree, president of the Delaware & Hudson, of the volume of railroad securities held abroad. The first estimate which Mr. Loree made was as of March 31, 1915; the second estimate as of July 31, 1915. Between these two dates the par value of railroad securities held abroad decreased by \$480,892,135. The total par value as of July 31 was \$2,223,510,229. There was apparently returned to this country between the first of February and the last of July securities with a par value almost as great as the amount which France and England borrowed under the terms of the joint loan which was negotiated in this country and floated by the syndicate of bankers with J. P. Morgan & Co. at its head. There is this difference, however, that whereas all of the proceeds of the \$500,000,000 loan was to be spent in this country, the proceeds of the sale of railroad securities may or may not have been spent in this country. The total market value of the \$2,223,510,229 railroad securities held abroad as of July 31 was \$1,751,437,913. It is rather interesting to note the taste of European investors for various classes of railroad securities. Whereas there was \$438,415,606 par value of railroad common stock held abroad, its market value was \$263,996,929; there was \$25,253,201 equipment trust bonds, with a market value, however, of \$24,480,411; there was a total of \$1,150,339,130 par value of mortgage bonds, with a market value of \$962,081,613. In addition to the common stock mentioned above there was \$236,151,600 par value preferred stock and \$5,608,850 of second preferred stock. The total of all classes of stock held abroad is about 30 per cent of the total par value of railroad securities. The total par value of all stock issued by American railroads reporting to the Interstate Commerce Commission is about 43.50 per cent of the total par value of all securities held by these railroads.

The large increase in the number of freight cars ordered in 1915 as compared with 1914 is clearly shown by the car construction statistics on another page. Although the total number is still considerably behind that for 1913, the full significance of the increase as an indication of present business conditions may be realized from the fact that orders for about one-half of all the freight cars ordered during the year were placed after October 1. A year ago attention was drawn to the increase in the number of all-steel box cars ordered. While steel box cars have again shown a large increase, both in the number ordered and in their proportion of the total number of box cars ordered, they cannot yet be said to be coming into general use, since about 95 per cent of the cars of this type were ordered by two systems—the Pennsylvania Lines and the New York Central Lines. The type of construction which has received the widest application during the year is the steel underframe car with steel body framing members. There has been a material increase this year in the average box car capacity. This is accounted for by the increased number of 100,000-lb. capacity cars ordered and the decrease in the orders for 60,000-lb. capacity cars. The number of cars of 80,000-lb. capacity has remained practically unchanged, for the two years, and the orders are widely distributed, making it evident that this is the accepted capacity for general service box

Car Construction in 1915

cars. There is no apparent change in the draft gear situation, friction gears having been specified on about five-eighths of all the freight cars ordered. However, attention should be directed to the fact that while the spring gear has been applied to a large number of cars with capacities as high as 100,000 lb. and 110,000 lb., these cars were practically all ordered by the New York Central Lines, and the tendency toward the adoption of the friction gear is much more general than the figures indicate. Practically the entire number of passenger carrying cars ordered are of all-steel construction. Of a total of about 3,000 cars for all classes of passenger train service approximately 90 per cent are all-steel. The others are of steel or composite underframe construction and are nearly all for express refrigerator or milk service. As compared with over 200 cars of wood construction reported a year ago it is interesting to note that, out of a considerably larger total, practically no orders for passenger cars of wood construction have been reported this year.

A NEW LOW RECORD IN RAILWAY EXPANSION AND ITS MEANING

THE statistics regarding developments in the railway field in the year 1915 which have been compiled by the *Railway Age Gazette*, and are published in this issue, disclose a most remarkable and significant fact. This is, that the new mileage of railways built in this country this year is less than in any other year for over 50 years, or since 1864. Furthermore, there have been only three years since 1848 when the increase in mileage was so small.

Neither the statistics which have been compiled by the *Railway Age Gazette* since 1893, nor those which have been compiled by the Interstate Commerce Commission since 1887 extend far enough back to afford a precedent for the conditions which have prevailed in 1915. The statistics of Poor's Manual of Railroads, which go back to 1833, cover for calendar years, not the new mileage built, but the increase in operated mileage. The two things are not the same; for a railway line built in one year may not be put into operation until the next. However, bearing this fact in mind, Poor's statistics may be used for comparison. They show that the only years since 1848 when the increase in operated mileage was less than 1,000 miles were 1861, 1862 and 1864; and the new mileage built in 1915 was less than this amount. In other words, the only period within the last 66 years which is comparable with 1915 in respect to new mileage built, is that during which the nation was devoting its energy and resources, not to its economic and industrial development, but to the prosecution of the greatest war in history until the present one in Europe.

The showing made by these figures is rendered more impressive if they be considered in connection with the fact that in October, 1915, there was the greatest mileage of railways in the hands of receivers in the United States ever recorded. This is not the case at the end of the year, only because since then the receivership of one large road, the Wabash, has been terminated. The number of cars and locomotives bought in 1915 was greater than in 1914; but it was smaller than in any other years except 1908 and 1914 since we began compiling statistics on this subject.

The question at once arises as to why the development of the railways sank to such a low ebb in 1915. Why did railway construction become less than in any year of the profound depression following the panic of 1873? Why was it more nearly halted than in any of the years of business prostration following the panic of 1893? Why did it require the ravages of civil war to create a condition comparable to that existing in 1915? The extreme situation which has existed is not attributable to general business depression, for the general depression has not been as profound as it was in the 70's or the 90's. It is not attributable to the war in Europe, for the decline in railway building began long before the war.

It is evident that the condition in the railway field in the

year now closing has been largely due to causes which did not operate in the past, or which have operated recently with unprecedented force. Furthermore, what those causes are must be clear to every person who has studied railway affairs and the railway situation with a real desire to understand them. The outgo of the roads has been increased enormously by advances in wages and taxes, and by regulation by the state and national governments; and their total earnings have been restricted by regulation of their rates by the state and national governments. Ground between these upper and nether millstones the income available for interest and dividends has tended downward for over nine years. It has not become relatively as small as in some earlier periods; but in those periods the roads were not subjected, as they are now, to regulation, one of the main avowed purposes of which is to restrict their net return. In consequence, in those earlier periods capitalists and railway managers were encouraged to continue to make investments in permanent improvements and in new lines by the hope and expectation that after the depressions had passed they would be able to make large profits which would more than offset the losses incurred in bad times. The present system of regulation has effectually discouraged such hopes and expectations. This, unquestionably, is the correct explanation of the condition in the railway field disclosed by our statistics for 1915.

There are many gentlemen of the railway-baiting type, such as Senator La Follette, Senator Cummins and Clifford Thorne, who in reply to such statements as the foregoing pile up long rows of figures to show that under regulation the railways have been, and are, eminently prosperous, and that therefore regulation is not responsible for the interruption of railway development, and consequently should not be made less drastic. It is usually easy to demolish their statistics and the conclusions they draw from them, but the situation which actually exists is the best answer to them. It demonstrates beyond question that capitalists are not disposed to invest in railways. They must, therefore, believe that such investment would be unprofitable. Those who have shown that they know how to make money by making it must be better judges of the relative profitableness of investment in the various fields than even the most eminent statesmen of the class mentioned. Anyway, their opinion, and not that of the railway-busting politicians, is controlling it, for they have the capital and will invest it where they please; and the facts show that at present they do not please to invest it in railways.

It may be said that the reason why the construction of new mileage has been so greatly reduced is that the country now has all the railways it needs. Possibly it does not need many more trunk lines, but it certainly is not true that it does not need a much larger mileage. There are vast areas susceptible of being rendered highly populous and productive scattered throughout the country, but mainly in the south, the southwest and the southeast, which can never be adequately developed without the construction of a large additional mileage of railways. In New Jersey, Massachusetts, Pennsylvania, Ohio, Illinois, Indiana and Connecticut, and in the District of Columbia, the mileage of railway line per 100 square miles exceeds 20 miles, and rises to 31 miles in New Jersey and to over 60 miles in the District of Columbia. But the average number of miles of railway per 100 square miles of territory in the entire United States is only 8½ miles. In Wyoming, Utah, New Mexico, Nevada and Arizona it is less than 3 miles; in Idaho, Montana and Oregon, only a little more than 3 miles; in Texas only 6 miles; and in California, Colorado and South Dakota less than 6. In Nebraska it is only 8 miles and in Washington and North Dakota it is less than 8. In Tennessee, Oklahoma, Kentucky and Florida it is less than 10 miles. In 20 states the mileage of railway per 100 square miles of area is less than 10 miles, and in 6 others it is less than 12 miles. Are the people of these states prepared to say that they do not want any more branch lines built? Do the people of Texas, with only 6 miles of railway per 100 square miles, want no more lines? In all the great territory west of the western boundary of Minnesota, Iowa,

Missouri, Arkansas and Louisiana, there are only four states whose mileage of railway per 100 square miles equals the average for the entire United States, $8\frac{1}{2}$ miles, and there are only two west of the Mississippi river which have more than 11 miles per 100 square miles. And yet it is in this relatively undeveloped section that regulation has waxed most furious.

The condition in the railway field is not good for capital, because capital is not getting a fair return. It is not good for labor, because, while labor is getting high wages, the interruption of railway expansion is preventing a normal increase in the number of men employed in transportation services. It is not good for the public, because it is interfering with the development of the country in every way.

Is the present condition as respects railway development going to continue? While the statistics for 1915 do not show it, the situation undoubtedly is changing for the better. We do not refer to the large increases in gross and net earnings which occurred during the last six months of the year. Large, important, and helpful as these were, they would have little significance if there were reason to believe that the same influences which have been affecting the railways were going to continue to affect them with the same force as in the past. Increases in expenses and taxes unaccompanied by advance in rates have converted large increases in gross earnings to decreases in net earnings in the past, and could and would do so in future. The true and sufficient reason for optimism is that the press, the public and influential public men, including members of the Interstate Commerce Commission and the President of the United States, are beginning to realize the condition existing in the railway field, and to adopt means for dealing with it. The press is discussing it with a fairness and intelligence never shown before. The Interstate Commerce Commission, while refusing many advances in rates which the railroads have sought, has granted many which, combined, will amount to a good many millions of dollars a year. It is also advocating its own reorganization along lines which it believes would increase its efficiency, and is apparently disposed to curb some of the pernicious activities of the state regulating authorities. The attitude of some of the state regulating bodies themselves is improving. Finally, and perhaps most important of all, President Wilson has recommended the creation of a commission to investigate the entire subject of the regulation of railways and to recommend such changes in the present system and policy as the welfare of the nation demands. That a commission composed of able economists, business men and statesmen would find reason for recommending great and important changes in the present system and policy there can be no serious question.

The country has been experimenting with effective regulation for almost 10 years. Experience has shown that effectiveness is not the only thing or the most important thing needed. The main things needed are consistency, expertness, fairness, public spirit, and wisdom both in drafting and in administering the regulatory laws. The whole system and policy of regulation ought to be overhauled and made more simple and constructive. The inconsistencies and conflicts between state and federal regulation should be abolished. The principle should be adopted of not only restricting the freedom of action of the management of railways in respects in which restriction will promote the welfare of the public, but of also helping them in those respects in which helping them will be of public benefit. If the labor brotherhoods, as well as the railway managements, need curbing, then both, and not merely one, should be curbed. If railway profits are to be regulated, they should be regulated, not merely to prevent them from becoming too large, but also to prevent them from becoming too small.

There are many indications that the press, the business interests and leading public men are being brought by the compulsion of the irrefutable logic of events to a recognition of the soundness of these principles, and that they will join and join soon in a movement to give them effect in our policy of railway regulation.

LOCOMOTIVE PROGRESS IN 1915

THERE were ordered during the calendar year 1915, 1,573 locomotives, an increase of 308 over the figures for 1914. Of these, practically 50 per cent were ordered since October 1 and the outlook for a continuation of this rate of ordering in 1916 is promising. Of those ordered the greater number were Mikados, there being 562 of this type, a considerable increase over 1914. The number of Mallets ordered has also increased, there being 59 in 1914 as against 120 ordered in 1915. The 75 locomotives of the Santa Fe type ordered constitute an increase of 12 over those for 1914, and it is worthy of note that this type has come into popularity during the past two years, none having been ordered in 1911, 1912 and 1913. There was a slight falling off in the number of Mountain type locomotives, but the number ordered in any year indicates that this type is still favored for special service only. There were 10 more electric locomotives ordered in 1915 than in 1914.

Of the total locomotives ordered, 1,174 are equipped with superheaters and 919 with brick arches. The percentage in both these cases show no falling off but rather a tendency toward an increase. There has been no tendency toward the revival of compounding, practically the only type in which it is employed being the Mallet.

Last year we called attention to the probability of large numbers of existing locomotives being equipped with economy and capacity increasing devices. It is interesting to note that during the past year there were practically two locomotives modernized in this way for every new locomotive built. Attention was also called at that time to the experimental use on one locomotive of pulverized fuel. The experimental work in this connection proved successful and the work of development along these lines has continued throughout the year, there now being three locomotives so equipped. The results from those now in service give indications of the more extended use of this fuel in the immediate future.

The continued increase in locomotive capacity is well shown by the marked increase in the number of stoker-fired locomotives. There are now about 1,300 locomotives in the United States on which the mechanical stoker is in daily use and the greater portion of these are of such a maximum capacity as to be beyond the limits of hand firing. The records of stoker-fired locomotives show marked increases in the tonnage rating as compared with the same or similar locomotives hand-fired. Of superheating it may be said that while there have been no radical changes during the past year there has been, and in all probability will continue to be, a tendency toward the use of a greater number of units, giving an increase in the amount of superheat obtained. The only radical move made in connection with the fire-brick arch is the extension of its use, supported on arch-tubes, to oil-burning locomotives. It now has a fair start in this field and promises excellent results.

A year ago the use of special steels and refined designing in order to obtain the lightest possible reciprocating and running parts was confined to but a few roads. There has been a great deal more attention given to this during the past year, resulting in a considerable number of locomotives having been built with what might be considered a minimum weight in the parts comprising the driving gear and a corresponding increase in the dimensions of the boiler to provide additional steaming capacity.

There has been, as previously noted, a considerable increase in the popularity of the ten-coupled locomotive and there are now in service several locomotives of this type having all the driving wheels flanged and working successfully on curves of 20 degrees because of the application of a floating front axle and ball joints in the side rods. Locomotives with this construction now in service on the New York, Ontario & Western have 28-in. by 32-in. cylinders, 57-in. driving wheels and a maximum tractive effort of 71,200 lb., the driving wheel base being 20 ft., while similar locomotives for the Erie Railroad have 31-in. by 32-in. cylinders, 63-in. driving wheels and develop 83,000 lb. tractive effort on a driving wheel base of 22 ft. 6 in. It has been pre-

dicted that the use of this principle on a twelve-coupled locomotive with floating driving axles front and back can readily provide a tractive effort of 100,000 lb. with the use of a single pair of cylinders, the limit of wheel loads now used on a number of locomotives not being exceeded.

The largest and most powerful locomotives of the Pacific type built during 1915 of which we have record are those of the Delaware, Lackawanna & Western, which develop a tractive effort of 47,500 lb., and have a total weight of 305,500 lb., cylinders 27 in. by 28 in., and driving wheels 73 in. in diameter. They were built by the American Locomotive Company. Locomotives of this type built by the Baldwin Locomotive Works for the Richmond, Fredericksburg & Potomac develop practically the same tractive effort, but have driving wheels 68 in. in diameter. The cylinders of these locomotives are 26 in. by 28 in. and the total weight 293,000 lb. The most powerful locomotive of the Mallet type ordered during the year of which we have record develops 91,400 lb. maximum tractive effort, but more powerful Mallets have been built in previous years. A Mikado type locomotive built for the Montour Railroad develops 64,500 lb. tractive effort. The most powerful locomotive of the 2-10-2 type is that the Erie Railroad, referred to above.

The Erie Railroad has under construction at the Baldwin Locomotive Works two Triplex locomotives similar to the one which was built in 1914. In general the construction is the same as that of the original locomotive, although, as might be expected, certain changes were made in details based on the performance of the experimental locomotive. Everything considered, while the building of large locomotives continues, there is not the tendency that there was a few years ago to build large engines without due consideration being given to economical features as well as maximum capacity. On the contrary the immediate future will probably see continued progress along these lines.

RECEIVERSHIPS AND FORECLOSURE SALES

AT one time during the past year there was approximately 42,000 miles of railroad being operated by receivers. Since that time the Wabash, operating 2,514 miles, has been sold and taken over by a new company. There have been various other adjustments and changes, so that the mileage being operated by receivers on December 31 was 38,661. The total face value of securities of the old companies of the roads in receivers' hands was \$2,354,900,301. The accompanying table shows also the amount of receivers' certificates and the aggregate of interest in default wherever this information could be obtained. On December 27 an application was made in Texas for the appointment of a receiver for the Texas & Pacific. The hearing on this application

FORECLOSURE SALES IN 1915

Name of Company.	Mileage.	Funded Debt Outstanding.	Stock Outstanding.
Arkansas, Louisiana & Gulf.....	62	\$1,230,000	\$1,231,000
Atlantic Northern	17	100,000	150,000
Buffalo & Susquehanna.....	91	6,162,000	10,000,000
Cincinnati, Indianapolis & Western.....	381	7,115,800	7,124,754
Fitzgerald, Ocilla & Broxton†.....	14	150,000	300,000
New Orleans, Mobile & Chicago.....	403	14,152,602	10,075,300
New Orleans, Texas & Mexico.....	286	30,179,409	2,000,000
Ocala Northern	53		
Opelousas, Gulf & Northeastern.....	57	1,143,000	1,422,250
Wahash	2,515	99,272,240	92,400,427
Williamsville, Greenville & St. Louis.....	35	525,000	525,000
Total	3,914	\$160,030,051	\$125,228,731

*The amount of outstanding securities of this road is not ascertainable.
†This road was sold under foreclosure and later the operation of it was discontinued.

was set for December 31. The road is, of course, not included in our table. As will be seen from the accompanying table, there were 12 roads for which receivers were appointed during the calendar year 1915. The total mileage for these 12 roads was 20,143, and the total face value of the securities \$1,070,808,628.

The most important roads that went into bankruptcy in 1915 were the Chicago, Rock Island & Pacific, the Missouri Pacific, the Missouri, Kansas & Texas and the Western Pacific. The Rock Island holding company device has been described at length

in these columns. The whole scheme hung on the ability of the railway company to pay dividends. This it could not do in 1914 and the holding companies were wiped out, but the railway company's credit had been so impaired that it could not make ar-

SUMMARY OF RECEIVERSHIPS FOR 40 YEARS

Year.	No. of roads.	Miles.	Bonds and stocks.
1876.....	42	6,662	\$467,000,000
1877.....	38	3,637	220,294,000
1878.....	27	2,320	92,385,000
1879.....	12	1,102	39,367,000
1880.....	13	885	140,265,000
1881.....	5	110	3,742,000
1882.....	12	912	39,074,000
1883.....	11	1,990	108,470,000
1884.....	37	11,038	714,755,000
1885.....	44	8,836	385,460,000
1886.....	13	1,799	70,346,000
1887.....	9	1,046	90,318,000
1888.....	22	3,270	186,814,000
1889.....	22	3,803	99,664,000
1890.....	26	2,963	105,007,000
1891.....	26	2,159	84,479,000
1892.....	36	10,508	357,692,000
1893.....	74	29,340	1,781,046,000
1894.....	38	7,025	395,791,000
1895.....	31	4,089	369,075,000
1896.....	34	5,441	275,597,000
1897.....	18	1,537	92,909,000
1898.....	18	2,069	138,701,000
1899.....	10	1,019	52,285,000
1900.....	16	1,165	78,234,000
1901.....	4	73	1,627,000
1902.....	5	278	5,835,000
1903.....	9	229	18,823,000
1904.....	8	744	36,069,000
1905.....	10	3,593	176,321,000
1906.....	6	204	55,042,000
1907.....	7	317	13,585,000
1908.....	24	8,009	596,359,000
1909.....	5	859	78,095,000
1910.....	7	735	51,427,500
1911.....	5	2,606	210,606,882
1912.....	13	3,784	182,112,497
1913.....	17	9,020	477,780,820
1914.....	22	4,222	199,571,446
1915.....	12	20,143	1,070,808,628

rangements for refunding maturing obligations and was also put into the hands of a receiver in 1915.

The Missouri Pacific was one of the Gould roads. It was much overcapitalized, its credit having been used for financing other Gould railway projects, and control of the company was

SUMMARY OF FORECLOSURE SALES IN 40 YEARS

Year.	No. of roads.	Miles.	Bonds and stocks.
1876.....	30	3,840	\$217,848,000
1877.....	54	3,875	198,984,000
1878.....	48	3,906	311,631,000
1879.....	65	4,909	243,288,000
1880.....	31	3,775	263,882,000
1881.....	29	2,617	137,923,000
1882.....	16	867	65,426,000
1883.....	18	1,354	47,100,000
1884.....	15	710	23,504,000
1885.....	22	3,156	278,394,000
1886.....	45	7,687	374,109,000
1887.....	31	5,478	328,181,000
1888.....	19	1,596	64,555,000
1889.....	25	2,930	137,815,000
1890.....	29	3,825	182,495,000
1891.....	21	3,223	169,069,000
1892.....	28	1,922	95,898,000
1893.....	25	1,613	79,924,000
1894.....	42	5,643	318,999,000
1895.....	52	12,831	761,791,000
1896.....	58	13,730	1,150,377,000
1897.....	42	6,675	517,680,000
1898.....	47	6,054	252,910,000
1899.....	32	4,294	267,534,000
1900.....	24	3,477	190,374,000
1901.....	17	1,139	85,808,000
1902.....	20	693	39,788,000
1903.....	13	555	15,885,000
1904.....	13	524	28,266,000
1905.....	6	679	20,307,000
1906.....	8	262	10,400,000
1907.....	6	114	13,777,000
1908.....	3	138	2,547,000
1909.....	12	2,629	250,033,000
1910.....	17	1,100	93,660,109
1911.....	13	1,386	40,741,453
1912.....	12	661	25,910,990
1913.....	6	1,159	86,163,850
1914.....	9	1,470	83,189,500
1915.....	11	3,914	285,258,782

secured by Kuhn, Loeb & Co., of New York. This strong banking house proposed a reorganization plan under which all classes of security holders would have accepted certain readjustments and the holders of junior bonds and the bonds on what were considered unimportant lines would have accepted a

nominal scaling down of the face value of their securities and accepted a preferred stock in place of a bond. Common stockholders were asked to subscribe sufficient money to rehabilitate the property. It was soon found, however, that it was quite impossible to reconcile the various conflicting interests of security

holders and that the only way to effect a reorganization would be through receivership. The road, therefore, was put into the hands of receivers.

The Missouri, Kansas & Texas was being particularly well operated. Crop failures and flood damage had been very costly

RECEIVERSHIPS AND FORECLOSURES

Name of Road	Mileage	Date of Receivership	Bonds of Old Co.	Stock of Old Co.	Total Old Co. Securities	Receivership Cfts.	Interest in Default
Alabama, Tennessee & Northern.....	194	Nov. 1915	\$5,297,000	\$25,000,000	\$30,297,000	.....	.....
Apalachicola Northern.....	102	May 28, 1914	2,000,000	3,000,000	5,000,000	\$10,000	None
Arkansas, Louisiana & Gulf Ry.....	.....	May 29, 1913	.....	.....	.....	.....	.....
Arkansas South Eastern.....	.....	.....	.....	.....	.....	.....	.....
Atlanta, Birmingham & Atlantic.....	638	Jan. 1, 1909	19,172,407	35,000,000	54,172,407	4,994,000	\$4,969,392
Beaumont, Sour Lake & Western.....	119	July 9, 1913	2,057,825	85,000	2,142,825	222,000	316,940
Birmingham, Columbus & St. Andrews.....	38	.....	25,000	\$4,500,000	\$4,525,000	3,635	.....
Boca & Loyalton.....	54	.....	418,000	1,200,000	1,618,000	.....	.....
Boyncy City, Gaylord & Alpena.....	70	Oct. 1914	310,000	501,200	811,200	20,000	.....
Brownwood, North & South.....	18	July 5, 1913	91,000	225,000	316,000	.....	.....
Buffalo & Susquehanna Ry.....	90	May 2, 1910	6,873,750	10,000,000	16,873,750	None	.....
Cape Girardeau Northern.....	106	April 14, 1914	1,500,000	110,000	1,610,000	93,700	148,055
Chicago & Eastern Illinois.....	1,282	May 27, 1913	63,155,000	25,817,800	88,972,800	6,000,000	2,262,096
Chicago, Anamosa & Northern.....	36	.....	.....	400,000	400,000	.....	.....
Chicago, Peoria & St. Louis.....	255	July 31, 1914	5,506,000	4,000,000	9,506,000	.....	.....
Chicago, Rock Island & Pacific.....	8,330	April 20, 1915	267,142,789	74,482,523	341,625,312	2,500,000	.....
Cincinnati, Bluffton & Chicago.....	52	March 13, 1908	1,500,000	1,125,000	2,625,000	179,052	790,000
Cincinnati, Hamilton & Dayton.....	1,003	July 2, 1914	49,607,000	8,248,175	57,855,175	None	4,308,850
Colorado Midland.....	338	Dec. 13, 1912	9,469,000	7,476,100	16,945,100	None	1,136,280
Columbus & Southern.....	23	Oct. 19, 1914	\$500,000	2,000,000	2,500,000	.....	.....
Crooked Creek Railroad & Coal Co.....	18	Jan. 1, 1915	116,500	112,500	229,000	None	5,825
Dansville & Mt. Morris.....	12	June, 1894	\$150,000	\$50,000	200,000	.....	.....
Denver, Laramie & Northwestern.....	57	June 12, 1912	1,071,546	25,660,900	26,732,446	74,698	220,322
Florida, Alabama & Gulf.....	26	Feb. 27, 1914	500,000	150,000	650,000	None	105,000
Florida Central.....	47	June 1, 1912	.....	.....	.....	.....	.....
Florida Railway.....	59	June 25, 1915	\$1,180,000	4,000,000	5,180,000	.....	.....
Ft. Smith & Western.....	250	Oct. 9, 1915	\$5,833,000	\$5,000,000	10,833,000	None	.....
Ft. Worth & Rio Grande.....	235	July 5, 1913	4,467,000	2,928,300	7,395,300	None	.....
Georgia & Florida.....	320	April, 1915	8,308,454	8,750,000	17,058,454	125,000	561,065
Gould Southwestern.....	18	April, 1914	.....	\$51,000	51,000	\$7,500	.....
Houston & Brazos Valley.....	28	Nov., 1915	420,000	24,000	444,000	.....	.....
Idaho Southern.....	24	Dec., 1915	\$1,141,000	\$3,000,000	4,141,000	.....	.....
International & Gt. Northern.....	1,160	Aug. 11, 1914	38,229,500	4,822,000	43,051,500	600,000	831,217
Iowa & Omaha Short Line.....	12	July 10, 1913	\$150,000	.....	150,000	.....	.....
Kansas City & Memphis.....	56	July, 1914	855,516	852,000	1,707,516	80,658	34,400
Liberty White.....	49	Nov., 1914	\$250,000	\$300,000	550,000	.....	.....
Louisiana & North West.....	121	Aug. 23, 1913	1,264,619	2,300,000	3,564,619	None	.....
Macon & Birmingham.....	97	Feb. 1, 1908	500,000	500,000	1,000,000	12,000	.....
Marietta, Columbus & Cleveland.....	46	July 10, 1914	250,000	250,000	500,000	.....	.....
Mississippi, Hill City & Western.....	18	.....	.....	.....	.....	.....	.....
Missouri & North Arkansas.....	365	April 1, 1912	8,340,000	8,340,000	16,680,000	2,062,750	166,800
Missouri, Kansas & Texas.....	3,536	Oct., 1915	146,455,450	76,283,257	222,738,707	None	None
Missouri, Oklahoma & Gulf.....	328	Dec. 11, 1913	\$8,774,000	.....	.....	.....	.....
Missouri Pacific.....	3,391	July, 1915	\$8,474,000	.....	27,903,200	.....	.....
St. Louis, Iron Mountain & Southern.....	3,363	July, 1915	161,118,500	82,841,085	243,959,585	None	1,849,625
Muscataine, North & South.....	55	Sept. 16, 1914	144,331,120	44,394,739	188,725,859	None	757,450
Nashville & Knoxville.....	.....	.....	800,000	425,000	1,225,000	None	30,000
New Berlin & Winfield.....	8	.....	\$33,800	.....	63,800	.....	.....
New Orleans, Mobile & Chicago.....	402	Dec. 19, 1913	13,686,920	9,333,250	23,020,170	None	2,031,231
New Orleans, Texas & Mexico.....	287	July 5, 1913	30,470,492	2,000,000	32,470,492	.....	.....
Ohio & Kentucky.....	40	.....	.....	.....	.....	.....	.....
Ohio River & Columbus.....	24	Oct. 8, 1914	500,000	501,000	1,001,000	3,750	54,408
Orange & Northwestern.....	62	July 9, 1913	1,066,947	35,000	1,101,947	None	165,377
Pacific & Idaho Northern.....	90	Sept. 4, 1915	2,646,911	2,929,800	5,576,711	None	250,263
Pere Marquette.....	1,795	April 5, 1912	66,672,000	26,268,410	92,940,410	.....	.....
Pittsburgh, Lisbon & Western.....	34	.....	1,210,995	5,000,000	6,210,995	.....	.....
Pittsburgh, Shawmut & Northern.....	184	Aug. 1, 1905	14,491,600	15,000,000	29,491,600	3,100,000	5,796,640
Rome & Northern.....	20	Feb. 28, 1911	\$300,000	.....	300,000	17,500	.....
St. Louis & San Francisco.....	4,749	May 27, 1913	287,310,928	49,985,762	337,296,690	3,000,000	10,701,919
St. Louis, Brownsville & Mexico.....	518	July 5, 1913	12,179,506	500,000	12,679,506	.....	.....
St. Louis, San Francisco & Texas.....	244	July, 1913	1,188,000	804,000	1,992,000	.....	.....
San Antonio, Fredericksburg & Northern.....	26	Oct. 28, 1914	.....	30,000	30,000	.....	.....
San Antonio, Uvalde & Gulf.....	316	Aug., 1914	4,413,000	280,000	4,693,000	.....	.....
Sharpville Railroad.....	21	Jan. 20, 1897	.....	350,000	350,000	None	76,110
Tennessee Central.....	294	Dec. 31, 1912	12,220,900	8,000,000	20,220,900	425,899	2,952,695
Tennessee Railway.....	59	July 1, 1913	1,135,000	.....	1,135,000	131,000	231,000
Toledo, St. Louis & Western.....	451	Oct. 23, 1914	28,027,000	19,947,600	47,974,600	.....	.....
Trinity & Brazos Valley.....	303	June 16, 1914	.....	.....	.....	.....	.....
Valdosta, Moultrie & Western.....	42	Aug. 23, 1913	300,000	100,000	400,000	.....	.....
Virginia & Kentucky.....	5	Jan. 1, 1914	.....	.....	.....	.....	.....
Wabash, Chester & Western.....	65	July 15, 1914	690,000	1,250,000	1,940,000	.....	470,536
Wabash-Pittsburgh Terminal.....	63	May 29, 1908	50,236,000	10,000,000	60,236,000	.....	.....
Western Pacific.....	945	.....	75,000,000	75,000,000	150,000,000	None	1,250,000
Wheeling & Lake Erie.....	512	June 8, 1908	24,329,325	36,980,400	61,309,725	.....	8,183,850
Wisconsin & Michigan.....	123	Jan. 15, 1912	.....	.....	.....	.....	.....
Total.....	38,661	.....	\$1,607,895,500	\$747,004,801	\$2,354,900,301	.....	.....

¹On September 15, 1915, this road was sold under foreclosure, but it was under lease to the Arkansas, Louisiana & Gulf Railroad to December 1, 1915. As soon after that date as is practicable the new purchaser is to take over the road. The mileage is not included in the totals, nor are the securities.

²This road, 31 miles long, has been in the hands of receivers for a number of years. Operations have now been discontinued and the mileage and securities are not, therefore, included in the totals.

³No recent figures for the securities of the old company are available. The figures used here are those given in Poor's Manual or other unofficial sources.

⁴This is one of the former subsidiaries of the St. Louis & San Francisco but is now being operated by a separate receiver. Its mileage and operations however, were formerly included in the annual reports of the old St. Louis & San Francisco company.

⁵This road was sold under foreclosure in October, 1915, but the receiver was instructed to continue the operation of the road until the delivery of the deed, the purchaser for the bondholders not having taken delivery up to the latest advices received pending negotiations for the disposition of the property to other parties.

⁶The amount of interest in default is not ascertainable because of the periods of grace for various bonds on which interest was not paid when due, but has not become as yet legally in default.

⁷No interest has ever been paid on the outstanding bonds.

⁸The portion of this road in Florida was sold to the Atlantic Coast Line and that portion in Georgia has now been abandoned and the rails taken up and sold as scrap. No mileage or securities, therefore, are included in the totals.

⁹The \$8,774,000 bonds and the stock and receivers' certificates do not include securities of the railroad company or the Texas company. The railroad company's bonds are shown separately.

¹⁰The securities of these two companies are furnished separately. There is, therefore, presumably a duplication in the amount shown as outstanding.

¹¹This is the amount given as the cost of road.

¹²The Tennessee Central figures include securities and mileage of the Nashville & Knoxville.

¹³Including West Side Belt.

¹⁴Information refused.

in the previous year, but had there been a normal condition in the railway security market the company ought easily to have pulled through its difficulties. It had \$11,000,000 notes falling due shortly before the sinking of the *Lusitania*. An agreement with the holders of these notes was reached by which all but a very small minority of the notes were extended. After the sinking of the *Lusitania*, however, bankers were more than ever disinclined to make any new ventures, and further flood damage necessitated considerable immediate expenditures of cash on the Missouri, Kansas & Texas. This situation was made worse by attempts on the part of the holders of the notes that were not extended to compel payment in cash, and it was decided that the best way to preserve the interests of everybody was to place the roads in the hands of a receiver.

The Western Pacific was the extension of the Gould system to the Pacific coast, which had previously ended at the western extremity of the Denver & Rio Grande at Salt Lake City, Utah. The road had no local traffic to speak of and was carried for a while by the Denver & Rio Grande, but receivership had been inevitable for some time.

BRIDGE CONSTRUCTION IN 1915

THE unprecedented stagnation in railroad development during the past year is reflected in the field of bridge building. The tonnage of structural steel bridges erected during the year has been unusually small and except for the sudden and unusual demand late in the year for structural steel as an indirect result of the war orders, the bridge shops would have fared badly. The general reduction in railroad construction and retrenchment in the replacement of existing structures has naturally resulted in a marked reduction in the construction of railroad bridges of moderate size. There has been an unusual number of large bridges under construction during the year, but this is readily explained by the fact that work had been commenced on most of these structures before the present depression became general. The year 1915 saw work in progress on bridges over the Ohio river at Metropolis, Ill., Sciotoville, Ohio, and Pittsburgh, Pa., and over the Mississippi river at St. Paul, Keokuk and Memphis, while the citizens of St. Louis are finally building the \$2,000,000 approach to their free bridge. A new project of importance started during 1915 is a bridge over the Missouri river at Kansas City for the Chicago, Burlington & Quincy.

The crowning achievement of the year was the closing of the Hell Gate arch, but the year was marked also by another important event in the completion of the Lackawanna's Tunkhannock viaduct, a triumph for concrete construction. Satisfactory progress is being made on the Quebec bridge, but the honor of witnessing its completion belongs to another year.

Still other structures deserve notice as marking progress in bridge engineering. The bridge which is being built jointly by the Burlington and the Nashville, Chattanooga & St. Louis at Metropolis, Ill., provides for a pin-connected, simple truss span of 725 ft., the longest of its kind in the world. The new bridge of the Pennsylvania Lines at Pittsburgh contains a riveted truss simple span of 525 ft., also the longest of its type in the world. At Sciotoville the piers for the Chesapeake & Ohio Northern bridge are now ready for the erection of the longest riveted trusses in America. In railroad plate girder construction, records have been set by the Nickel Plate on track elevation work in Chicago, where girders have been used for a 130-ft. 6½-in. simple span, and again by the Canadian Pacific at Montreal for a double track draw span involving deck girders 239 ft. long and 13½ ft. deep.

One trend of bridge construction is noted in the increased use of special steels, no less than five of the structures mentioned above involving the use of high strength steel in some parts. However, the tonnage of this material represents so small a proportion of the total tonnage of bridge shops that its fabrication is still considered of a highly special nature. Further developments have been noted in the design of movable bridges,

particularly of the vertical lift type. Similarly in erection there has been a continued display of ingenuity and skill on the part of those responsible. In this field of engineering no single incident deserves more notice than the work on the Hell Gate arch.

CONSTRUCTION ACTIVITIES IN 1915

NO statistics show in a more striking manner the depression through which the railways have been passing during the past year than those of the mileage of new lines completed. Following four years of steadily declining activity in this field and particularly last year, when the amount of new line placed in service was only half of that built in the previous year, a further reduction of 35 per cent this year is most unusual and significant. Records compiled in these columns for the past 23 years show no equal for this condition. It is necessary to go back to 1864 during the midst of the Civil War to find a year in which less miles of new railway were built than in 1915, or a year in which less than 1,000 miles of line was placed in service. Instead of a normal increase in the mileage of about 1½ per cent, the increase this year was only about 0.35 per cent, or less than that for any year since railway development really began in this country. It must also be remembered that some of the mileage placed in service this year and reported in the statistics for 1915 was placed under construction three or four years ago. This was the case of the Lackawanna cut-off north of Scranton, Pa., which was started in 1912. Even less mileage was placed under construction during 1915 than these figures indicate.

The distribution of this mileage through the country is also interesting. A total of 172 miles was built in the area east of the Mississippi and north of the Ohio rivers. Eliminating the 98 miles built in Pennsylvania and the 29 miles built in Wisconsin, only 45 miles was built in the remaining 14 states. The south shows continued although decreased activity, 253 miles being built in 11 states. Likewise, in the west, a total of 473 miles was built. While there is the greatest demand for increased railway facilities in the south and west, it is interesting to note that the state in which the largest mileage of new line was built during 1915 was Pennsylvania. While few if any long lines will be built in the more highly developed eastern states which are now well served with railway facilities, increased development will require the construction of additional mileage of short lines continuously for many years.

In studying statistics of railway construction and particularly such unusual data as are compiled this year, it is interesting to observe the extent to which construction activity was curtailed in those southwestern states which have been most active in anti-railroad legislation, including particularly Iowa, Missouri, Kansas, Arkansas, Oklahoma and Texas. In one of these states, Iowa, no mileage was built during 1915, while only 0.16 miles was built in Missouri. In Texas, the state which has led in attacks on the railways and which probably needs additional railway facilities more than any other state in the Union, only 4.40 miles was built in 1915, as compared with 50 miles in 1914 and 356 miles in 1913. Only 35 miles of line was built in Oklahoma, while 59 miles was built in Kansas, this latter mileage consisting principally of three short independent lines.

The mileage of second and other multiple main tracks built last year is also correspondingly small, reflecting not only the unsatisfactory conditions under which the railways have been operating, but particularly the decreased demands upon the railways for additional facilities. Following the congestion of business in 1906 and 1907, the railways spent large sums for enlarged terminals and multiple main tracks, with the result that in general, they are to-day in a position to handle economically and promptly considerably more business than was offered to them during 1915.

The situation in Canada is also interesting. As was to be expected, the beginning of the European war brought about an almost complete cessation of construction activities of every kind

in the Dominion. Consequently, although 718 miles of line was completed, nearly all of this was mileage on which work was far advanced and which it was advisable to push to completion. Among the more important projects of this nature was the Pacific Coast extension of the Canadian Northern, which was placed in service a few weeks ago. The Canadian Pacific Western Lines, which reported a total of 574 miles built in 1914, report only 23 miles opened this year. A further condition leading to this decreased mileage is the fact that the mileage of railways built in western Canada has expanded far more rapidly than the settlement of the country and as a result the railways can well afford to decrease their construction activities in this territory until the country develops more fully.

The causes for the unusual conditions in the United States are fully discussed in another column. It requires no argument to demonstrate that any conditions which have led to the almost complete cessation of railway construction activities in a country of the magnitude of the United States are wrong. Recent events indicate that this fact is being realized by the public and railway commissions alike and that the worst has been passed from this standpoint.

It is difficult to predict what 1916 will produce. A deeper realization of the needs of the railways on the part of the state and national commissions and of the public and a more favorable attitude on their part are reflected in recent rate decisions. The recent stimulus to railway traffic resulting from the movement of the heavy crops and war materials has created a more optimistic feeling among railway men and even at this early season plans are being prepared for a relatively large amount of railway improvement work involving large expenditures for next year. With the general revival of business the railways will find it necessary to make large expenditures for increased facilities, and, if conditions permit, many of the roads are planning to prepare for this condition as soon as possible. The year 1916 can be no worse and the indications are that it will be far better than the year just closed.

NEW BOOKS

Proceedings of the International Railway General Foremen's Association: Compiled and published by William Hall, Secretary of the Association, Winona, Minn. Size, 6 in. by 9 in., 265 pages. Bound in paper or leather.

At the eleventh annual convention of the International Railway General Foremen's Association, which was held at the Hotel Sherman, Chicago, Ill., July 13-16, 1915, a number of subjects were discussed which are of vital interest to those having to do with the maintenance of locomotives. An extensive report was made on piston valves, which covered not only the construction and operating features of the various types of valves, but also dealt with the maintenance of valves, valve packing, rings and bushings. A comprehensive report on valve gears was also presented. This contains considerable information relative to valve setting and maintenance of all types of all gears now in use on locomotives. Other subjects discussed are rods, tires, wheels, etc., shop efficiency, and oxy-acetylene welding. The report on the latter subject contains considerable information relative to generators and equipment installations, as well as the use of torches in locomotive repair work. The book is illustrated with a large number of line drawings and photographs.

Proceedings of the Twenty-third Annual Convention of the International Railway Master Blacksmiths' Association: Size, 6 in. by 8½ in., 226 pages. Bound in cloth. Published by the Association, A. L. Woodworth, Secretary, Lima, Ohio.

This volume contains a complete account of the proceedings of the last annual convention of the International Railway Master Blacksmiths' Association, which was held at the Hotel Walton, Philadelphia, Pa., August 17-19, 1915. Among the subjects discussed were flue welding, frog switch and crossing work, carbon and high-speed steel for tools, tools and formers, reclaiming scrap, and shop kinks. The volume contains a fund of information on these subjects which will be found of value to many blacksmith foremen.

Letters to the Editor

"SAFETY FIRST" IN EXCESS

REOSTACK, Ark.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

"Safety First," like every other great movement, loses its effectiveness in direct proportion to the extent that it is overdone.

I have in mind a railroad which I once served, where, when it rained, which was quite often, it was necessary for the train despatcher to issue an order to all trains on the division that a severe storm was in progress between certain points and that within storm limits they should run carefully, with extreme caution; take no chances, sacrifice speed to safety, not endeavor to make schedule time where conditions were unfavorable, approach all stations at reduced speed and keep a sharp lookout for soft track, washouts and slides where they were liable to occur.

In winter an order fully as long, but somewhat differently worded, was at once issued on the appearance of more than half a dozen snowflakes in the atmosphere. This form contained, along with other valuable information, the news that a snowstorm was imminent, and unusual care should be displayed in attending to switches, etc. Being near the seacoast, where fogs were frequent, we were also provided with a stereotyped "fog" order, which it was necessary to put out upon the slightest indication of a superabundance of vapor hovering over the landscape.

Weary of all this agony, the despatchers viewed approaching summer with relief, hoping that the weather bulletins would disappear with the inclement weather. But it was not to be. The first day that the sunshine was in evidence enough to bring out B. V. D.'s the assistant superintendent ordained that an order be issued to all enginemen to run carefully and look out for sun kinks!

Unless it is arbitrarily assumed that all trainmen and enginemen are deaf, dumb, blind and foolish and cannot recognize bad weather unless they have a meet order with the same, there should be no necessity for such methods. The mere fact that a man is considered worthy to command a train or drive a locomotive should guarantee his judgment in such matters. If certain men are naturally reckless and prone to flirt with danger they will do it regardless of a bushel of such orders; and yet we go on issuing them to the prudent and imprudent alike. The cases of careless men should be handled individually, and if they cannot be educated to a proper appreciation of their responsibilities they should not be retained in the service.

It should not be necessary for a train despatcher to sit with one eye and one ear trained on the weather, and at the first appearance of a disturbance among the elements put out a long-winded train order directing train and enginemen to do exactly what they are taught and expected to do in their routine duties without any special instructions in individual cases. It burdens the despatcher with unnecessary work and burdens the men on the line with useless train orders and diverts their minds from the proper interpretation and execution of more important orders. There are very few of them that do not regard these "rain," "fog" and other such orders as jokes.

The practice of issuing such orders seems to be becoming prevalent on many railroads, although the practice is a direct violation of the standard rule that train orders shall not contain information nor instructions not essential to the movement of trains.

Too much cooking spoils many a cake and in "Safety First" as well as in everything else a little judgment should be used. Zeal should be tempered with a little consideration of the exigencies of the case.

HOMER PIGEON.

The Railway Situation from Different Viewpoints

Julius Kruttschnitt; Frank Trumbull; Judson C. Clements; Robert R. Prentis; C. H. Markham; W. B. Scott; W. J. Eck; Frank Nay; George Gibbs.

PRESENT RELATIONS OF RAILWAYS AND THE PUBLIC

By J. KRUTTSCHNITT

Chairman, Southern Pacific Company

Anyone who studies the present relations of the public and the railroads must conclude, however regretfully, that the public still lacks confidence in the honest intentions of the carriers, and that a lack of confidence exists on the part of the carriers in the fairness of the public. This absence of complete harmony and co-operation has behind it many years of history, which it would hardly be profitable now to review.

Suffice it to say that at the beginning the conception of a railway as a public servant was little understood by railway stockholders, directors and other officers, and that the exaggeration of the private personal point of view at the expense of the public point of view led to many abuses. This attitude, while now almost entirely abandoned, still is occasionally evidenced, particularly in reckless financial operations that jeopardize operating efficiency and arouse hostile sentiments in the minds of all classes of the public.

Possibly because railroads are so vital to their existence, the people have too freely generalized from conspicuous cases of inefficient and dishonest management, and have manifested their condemnation in severely restrictive statutes that have, while restraining the guilty, at the same time hampered the innocent. The public has not been as fair in discriminating between good and bad railroads as between good and bad banks, for instance, which are also under federal and state control. In the case of banks, which are under close regulation, the public satisfies its sense of justice by jailing the dishonest officers, not by a sweeping statute restricting the natural and reasonable activity of banks in general.

The mass of ill-considered, conflicting and oppressive legislation which hampers in so many instances that activity on the part of railway management that is essential to good service—which interferes with minute details of railway management under the guise of regulation, and at the same time evades all responsibility for results—has aroused distrust and suspicion in the minds of railway owners.

In such an infected atmosphere, nothing of enduring value in the way of regulation can be achieved. Harmony and co-operation between regulators and regulated must be established. It should be plain to the thinking public that its interest in good service—which is the fundamental consideration—demands an attitude of compromise at least, but, better yet, of cordial co-operation in achieving the result desired.

It is a simple thing to restore harmony and confidence, if both parties display a willing spirit. The railways appreciate the paramount necessity of public backing. Their shareholders and their officers and employees, themselves constituting a large

part of the public, are eager and ready to meet their fellows more than half way. If, therefore, investors in railroad securities, shareholders, directors, officers and employees labor with the public, in season and out of season, in a spirit of trust and co-operation, they cannot fail to inspire a reciprocal spirit, and out of the new relations will be achieved that degree of progress in railway service that the public is rightfully demanding.



J. KRUTTSCHNITT
Chairman, Southern Pacific Company

RAILWAY SECURITIES REGULATION

By FRANK TRUMBULL

Chairman, Chesapeake & Ohio

I think there is no objection, and on many accounts it is desirable, that the issuance of railway securities in the future be supervised by the federal government, if the onerous and conflicting regulation as well as supervision by the various states of bond and stock issues can be done away with. This question is largely a banking function and is too delicate to admit of delays, either at Washington or at the state capitals. In saying this, I refer particularly to the question of prices investors may be willing to pay and which, as we all know, are subject to fluctuations, some of which are violent in character. Any company

might fall into bankruptcy by not acting promptly at a favorable moment, and even when that is obviated delays frequently add to the cost of financing, a burden which ought to be saved to the public. This has been demonstrated many times. On the other hand, it would be entirely proper for the federal government to determine in behalf of all the states the purposes for which new capital issues may be made, and to require a strict accounting of the disposition of the proceeds realized by carriers engaged in interstate commerce, which, as we all know, embrace all the roads of the country.

Concerning the President's recommendation about railways matters in his address* to Congress on the 7th of December: I feel quite sure that the railroads do not object, but will welcome, a comprehensive inquiry by Congress into the methods of railway administration and regulation. If it is accompanied by a broad and tolerant spirit and an honest desire to get all the facts, I believe it will prove very helpful to all interests.

I am confident that there is a very much improved public attitude toward the railroads, and that, of course, provides a very helpful foundation for a fine piece of constructive work for the railroads by the federal government, similar to that already

accomplished for the banks.



FRANK TRUMBULL
Chairman, Chesapeake & Ohio

* The president said in part:

"In the meantime may I make this suggestion? The transportation problem is an exceedingly serious one in this country. There has from time to time of late been reason to fear that our railroads would not much longer be able to cope with it successfully, as at present equipped and coordinated. I suggest that it would be wise to provide for a commission of inquiry to ascertain by a thorough canvass of the whole question whether our laws as at present framed and administered are as serviceable as they might be in the solution of this problem."

PUBLIC CONTROL OF RAILWAY CAPITALIZATION

By JUDSON C. CLEMENTS

Member Interstate Commerce Commission

Before stating reasons which in my view call for some degree of public control over the issuance of stocks and obligations by railway companies, I desire to be clearly understood as not in favor of unnecessary legislation of any kind; for that which is not well considered, directed to the protection of rights by the prevention, suppression, or reparation of wrongs or the furtherance of the general welfare, and effected by means consistent with justice to all, is sure to produce harmful results in some direction. This is especially true in respect of legislation for the regulation of business methods of persons, whether natural or corporate. It is, therefore, only because I am convinced of grave wrongs, effected through improper capitalization, that could in large measure be prevented by reasonable limitations or restraints upon such issues, particularly as to bonds and other fixed obligations which when due demand their "pound of flesh," that I believe the time has fully arrived for the exercise of suitable public authority in prevention of abuses of this kind.

But the question is asked: How is the issuance of stocks, bonds, or notes by a corporation a matter of lawful concern to any member of the general public other than the corporation and the investors in its securities? An all-sufficient answer, it seems to me, is plainly apparent in the rate contests before the commissions and the courts, where questions of confiscation are raised in connection with the reasonableness of existing or proposed increased rates. In approaching these questions it is the almost universal method of the carriers in recent years, in cases involving rates on traffic of large volume, to show the gross earnings, the operating cost, the extent to which earnings have been diminished by fixed charges, including taxes and interest on obligations, and finally the balance available for dividends or a margin of surplus. Then when there results from this process no such balance as will afford a fair return upon the property of the shareholders, the need of increased revenue through increased rates is urged.

It would, therefore, seem obvious that if there is to be no recognized relationship or connection between the capitalization of the companies and their rates, it must follow that their financial condition and the need of revenue with which to meet obligations imposed by such capitalization is immaterial and irrelevant to the question of the reasonableness of their rates, existing or proposed.

Whatever may be said of the relative insignificance of stock issues, especially in former times when the considerations pertinent to the determination of questions of reasonableness and confiscation in rate-making did not arise as they do now in the more advanced stages of public regulation and judicial interpretation, their importance cannot longer be questioned. This, I repeat, is especially true as to such specific obligations as bonds and notes.

While not conceding that the demonstrated need of increased revenue is of itself conclusive justification for increased rates, it is impressive to take note, from the viewpoint of the carriers, of the inseparable links in the short chain connecting capital obligations with the outgo of capital funds to meet them for whatever purpose, proper or improper, they have been issued, and the net financial results which are constantly pressed as pertinent and forceful in the determination of the reasonableness of the rates to be borne by the public.

Although for many obvious reasons the financial condition of a carrier or its need of additional revenue cannot be the exclusive or controlling test of the reasonableness of its rates,

there seems to be no doubt of the relevancy of these considerations, along with others proper and pertinent, in arriving at just conclusions upon this subject. Otherwise, in its search for the reasonable maximum rates to be prescribed, how is the commission to avoid fixing them on a scale that might be confiscatory? How can the question of confiscation in rate-making be dealt with if we are to leave wholly out of view the financial results of operation as related to investment, or value and capital obligations? If, therefore, included in the capitalization of a company there be obligations, calling for interest from time to time, or dividends, as well as final payment of the principal, the issuance of which was not justifiable or representative of actual investment for the legitimate purposes of the carrier, then the financial results which we are called upon to consider in rate-making rest upon a basis that is unsound because it has been affected by an outgo of corporate funds used to meet the demands of securities which, but for the rights of innocent purchasers, in justice have little if any better standing than spurious issues.

Many millions of dollars in securities of the railways go into the vaults of the insurance companies, savings banks, trust companies and other fiduciary institutions, and in a propaganda on behalf of the carriers for increased revenue through increased rates or fares in order to strengthen their credit, it is but to be expected in the natural assertion of self-interest that these institutions line up in favor of the increases.

A restatement here of the facts disclosed in the investigations of the Chicago & Alton; the purchase of the stock of the Louisville & Nashville by the Atlantic Coast Line, in connection with which securities of the latter company, in bonds and preferred stock, were issued to the extent of fifty millions of dollars; the New York, New Haven & Hartford; the St. Louis & San Francisco; and the Chicago, Rock Island & Pacific, which show beyond question that directly, as well as through holding companies and otherwise, unjustifiable action of the sort to which I have referred has been taken on large scale, would outlaw this paper by reason of its length.

Briefly, some of the important facts disclosed by the investigation of the Chicago & Alton a few years ago are as follows: The books of this company, on December 31, 1898, showed that the value of the property was \$39,935,887, and that the stock and funded debt and other liabilities amounted to \$33,951,407. About this time the Harriman syndicate purchased the Chicago & Alton at \$200 for the preferred stock and \$175 for the common, or at a total cost of \$39,042,200. Thence on until June 30, 1906, the capital indebtedness of the Chicago & Alton expanded from \$33,951,407 to \$114,610,937, an increase of about \$80,000,000. Of this only \$18,000,000 was actually expended in improvements, etc., leaving \$62,660,000 increase of stock and liabilities without one dollar of consideration. This was done by placing a \$40,000,000 three per cent mortgage on the property to take up \$8,500,000 of first mortgage bonds and to make improvements, additions and for "other corporate purposes." These bonds were sold to stockholders at about 60 cents on the dollar, the syndicate obtaining nearly all, owning at that time 218,138 shares of stock out of 222,306 outstanding. But only \$32,000,000 of the \$40,000,000 issue was sold, the syndicate disposing of what it had obtained at a profit of about \$8,000,000. Of the remaining \$8,000,000 issue \$7,000,000 was pledged as security for a \$5,000,000 loan and the remaining million was retained in the treasury. Out of about 60 cents on the dollar realized by the railroad the principal stockholders voted themselves a dividend of 30 per cent, amounting to \$6,669,180, which was never reported to the Interstate Commerce Commission. What the stockholders obtained for all of them was not shown, but it did appear that



JUDSON C. CLEMENTS
Member Interstate Commerce Commission

ten millions of them went into one of the great New York life insurance companies at about 96 cents on the dollar.

How many more such object lessons are necessary to demonstrate that the time has arrived to prevent for the future these indefensible practices, detrimental alike to the general public and hurtful to the good name and credit of American railways, both at home and abroad; to *bona fide* investors; and to the stockholders of the carriers other than those who invent, execute and profit by the schemes whereby these wrongs are consummated?

In answer to questions propounded to Mr. Cravath, attorney for Kuhn, Loeb & Co., the New York banking house that figured in the Chicago & Alton matter, he said:

I think any fair-minded man must recognize that under existing conditions there is a call for a closer regulation of the issue of securities by semi-public corporations than has heretofore been the case. And yet we must not forget conditions that existed when these securities were issued.

I quite agree that there is ample basis for the view that the time will come when attention should be paid to seeing that the par value of securities outstanding bears a definite relation to the value of the property against which they are issued. I think there is no doubt about that.

But I quite agree that where securities do not bear some definite relation to the intrinsic value of the property, it becomes difficult in many cases to ascertain what the fair earning capacity is, and I shall not differ with you at all in advocating, under existing conditions, some regulation by law as to the amount of securities which should hereafter be issued against property and against earning capacity.

Publicity and exposure "after the fact," as we have seen in the list of disclosures above referred to, occurring since the Chicago & Alton matter, is wholly insufficient to prevent the repetition of these things. There should, I believe, be required such previous notice of proposals to increase capitalization as would insure publicity beforehand; at least, to some public federal authority; and in addition to this there should be vested in some public tribunal authority to veto or prevent a proposed issue, if after investigation and upon the exercise of a sound discretion, directed and controlled by law, such proposed issue is found not justified. Such limited authority might prove sufficient. It is worth trying before resorting to an elaborate system which may prove to be so rigid as to seriously impair the consummation of necessary and limited financial transactions in respect to which there is no apparent or probable cause for suspecting impropriety, after due publicity has been given.

It must be apparent that state authority, for want of that uniformity of action which is most desirable and of territorial breadth of authority, will never be adequate, especially as to large systems of railways traversing many states wherein the regulating bodies are vested with varying degrees of authority.

It seems improbable that the outstanding capitalization of railways can ever be purged of that for which there was either no proper reason for its issuance or a misapplication of the funds thereby derived, because to do so would, even if lawful, work gross injustice to *bona fide* investors who were not parties to their flotation. It must also be clear that wrongs once effected by improper and over-capitalization cannot be righted as to all victims. Prevention is the only adequate means of protection from the evil.

THE RELATION BETWEEN NATIONAL AND STATE RAILWAY REGULATION

By ROBERT R. PRENTIS

President, National Association of Railway Commissioners, and Chairman, Virginia State Corporation Commission

This is my response to your request to me as president of the National Association of Railway Commissioners for a short article on the relation between national and state railway regulation. It must be distinctly understood, however, that I am not speaking in my official capacity, but only expressing some personal views, and that I am alone responsible for what is here said.

The question has been discussed for many years, and with renewed interest since the decision of the Supreme Court of the United States in the case of *Houston East & West Texas Railway Company, etc., v. United States, etc.*, 234 U. S. 342, commonly designated as the Shreveport case. This case decides that the prohibition against unjust discriminations as between persons, places, commodities, or particular descriptions of traffic, which are forbidden by section 3 of the act to regulate commerce, authorizes the Interstate Commerce Commission to require a common carrier to remove the resulting unjust discrimination against interstate commerce arising out of the relation between intrastate and interstate rates where the interstate rates are in themselves reasonable, and this notwithstanding the proviso in section 1 of the act that its provisions shall not apply to intrastate traffic.

In view of that proviso which reads:

That the provisions of this act shall not apply to the transportation of passengers or property, or to the receiving, delivering, storage, or handling of property, wholly within one state and not shipped to or from a foreign country, from or to any state or territory, as aforesaid.

the decision came as a distinct surprise to the state commissions.

There has been much intemperate discussion on both sides of the controversy, and much darkening of counsel "by words without knowledge."

The other recent case which should be considered in this connection is *Simpson v. Sheppard*, 230 U. S. 352, which is the great Minnesota rate case. Mr. Justice Hughes, in the Minnesota case, discusses most elaborately the well-established doctrine that the states have the right to control intrastate rates, and with unanswerable logic and emphasis reaffirms the doctrine, subject only to the admitted qualification that the action of the state must not impose a direct burden upon interstate commerce, and must not be in conflict with the lawful provisions of the act to regulate commerce. In that case the point afterwards decided in the Shreveport case is expressly reserved.

The opinions in these two cases doubtless contain the last authoritative word on the subject, and the law as expounded therein will be accepted by all unless and until the Congress shall enact further legislation. Under existing legislation the question may be regarded as closed, and the law as expounded by Mr. Justice Hughes will be applied to future controversies.

In order to consider the Shreveport case intelligently, however, the limitations plainly expressed must be remembered. For instance, Mr. Justice Hughes, referring to the lower Texas intrastate rates, says:

It is undisputed that the difference was substantial and injuriously affected the commerce of Shreveport.

And in another place:

Here the commission (Interstate Commerce Commission) expressly found that unjust discrimination existed under substantially similar conditions of transportation, and the inquiry is whether the commission had power to correct it.

The whole result of this decision is made to depend upon the undisputed fact, which had been formally ascertained by the Interstate Commerce Commission, that the discrimination created by the application of the Texas rates to commerce moving between points in Texas substantially and injuriously affected and unjustly discriminated against interstate commerce. Having ascertained this fact the court determined that the carrier could be required to remove this discrimination against the interstate rates from Shreveport, Louisiana, to Texas points, which interstate rates had been already determined to be reasonable.

The opinion makes it apparent that the court is merely determining the precise question which it reserved in the Minnesota case for future decision, and that it was not intended in any way to limit the authority of the Minnesota case. This

is indicated in many ways. At one point it is thus expressed:

This is not to say that Congress possesses the authority to regulate the internal commerce of a state, as such, but that it does possess the power to foster and protect interstate commerce, and to take all measures necessary or appropriate to that end, although intrastate transactions of interstate carriers may thereby be controlled.

So that the insistence that the decision in the Shreveport case practically eradicates state lines as to all railway rates is either the thoughtless expression of those who being interested in maintaining the authority of the states unimpaired take counsel only of their fears; or of those representing and advocating the railway interests in whom the "wish is father to the thought."

The decision then is carefully limited to the proposition that, if there is unjust discrimination in favor of the intrastate rates and against interstate rates which have been ascertained to be reasonable, then the Interstate Commerce Commission has the authority under the act to regulate commerce to require the railroads to remove such discrimination.

Whatever criticism may be made of the decision itself all well-balanced and just men desire to avoid unjust discrimination in rates, whether in favor of interstate or intrastate commerce. It is, however, believed that as wise men have either settled, or successfully temporized with, the great controversies arising out of our dual state and federal sovereignty in the same territory, so the true relations between national and state regulation will ultimately be well and wisely settled, and there is little danger that radical action will be attempted, either by state or federal authorities.

There are many things in connection with public regulation which the state authorities can do very much better than the federal authorities, such as the regulation of local rates, and the supervision of local officials, tracks, station buildings, and many of the instrumentalities used by the carriers in commerce. They can do many things far better than a central commission located in Washington, already greatly overworked, or the subordinates of such a commission, can possibly do. At the same time it is true that the federal commission can do many things that the state commissions cannot do, such as the regulation of interstate rates, and matters of a character which directly relate to and promote commerce between the states.

The National Association of Railway Commissioners, composed as it is of the members of the Interstate Commerce Commission and certain of its officials, of the various state commissions and the Canadian commission and certain of their officials as active members, together with representatives from the Association of American Railway Accounting Officers and the American Electric Railway Accounting Association and others, as honorary members, was organized 26 years ago, and is maintained for the express purpose of avoiding and correcting the evils which were anticipated and have been developed by reason of the conflicts which sometimes, but not frequently, arise between federal and state regulations.

In its efforts for the last quarter of a century to bring about such uniformity as is desirable the association has not labored in vain.

Much of the criticism of the federal and state commissions, to which many seem to be so ready to give support, is inspired by those interested in obstructing and defeating all effective public regulation, and those criticisms which are most severe and extreme are generally based upon gross ignorance of the facts. The questions with which all of the commissions have to deal are frequently complicated and difficult and it is still true that sometimes commissioners, railroad men, and even editors "rush in where angels fear to tread," and with a word dispose of the most difficult problems which wise men confess

themselves unable to solve. If those engaged in such thoughtless criticism would credit the public authorities with those things which have been accomplished, which all admit are for the general good, much better progress could be made. For instance, under public regulation rate wars have ceased; the evils of rebates and the abuses of the pass system are practically unknown; publicity in accounting has greatly enlarged the knowledge of railway men themselves as to the condition and progress of their business, and has promoted economy in transportation expenses and otherwise. Within the past three years the whole system of stating express rates has been simplified and improved. There is a disposition everywhere to make state legislation conform with federal legislation, although as to many reforms which are deemed wise by those who have given most attention to the subject the states have more frequently led than the Congress.

If those who are most interested in railway development will devote as much time to co-operating with the federal and state commissions as they do in their efforts to produce public distrust progress toward better things for them and for the public would be more rapid. However desirable it might be in the interest of simplicity and uniformity to have all the powers of regulation lodged in a federal commission, it cannot be demonstrated that such a radical change in our system would be either wise or produce any greater efficiency. It needs all the power of the federal government combined with all the power of all of the states to deal with these questions efficiently.

There are many strong men who are members of the National Association of Railway Commissioners. Many of them have rendered distinguished public service in other high official positions both federal and state. In ability and character they will compare favorably with any other body of picked men in the country, and it is believed that at no time in the history of the association has its membership been more earnest and patriotic or more determined to render valuable and efficient service to the country.

The dual system of regulation is here; it has come to stay, for the states will not surrender their authority. The state commissions desire, however, heartily to co-operate with the federal commission, with each other and with the public service corporations for the accomplishment of the best results. This co-operation between federal and state commissions has already to some extent been accomplished through the National Association of Railway Commissioners. When the railway authorities more cordially sustain and support such of their efforts as are wise many of the evils most complained of will disappear.

Co-operation then is the remedy for any conflicts, inconsistencies and discriminations which exist because of national and state railway regulation.

REQUIREMENTS OF OUR RAILWAYS IN A SYSTEM OF NATIONAL DEFENSE

By CHARLES H. MARKHAM
President, Illinois Central Railroad

The efficiency of a country's railways as a part of a system of national defense will depend, first, upon the completeness with which they connect centers of population and production with outlying points upon the coasts or frontiers; second, upon the centralization, unanimity and efficiency of the operating control for military purposes; third, upon the physical condition of all the facilities of transportation and their capability of withstanding a sudden overload.

Our railway system would require less of extension than of unification to fit it for military purposes. An amplification of



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the plan which appears to work successfully in Great Britain seems to promise satisfactory results here. So long ago as in 1871 the British government adopted the plan under which its railway system is now operating. There, as here, the railways are owned by numerous private companies. The resolution of 1871 provided that in case of war all the lines should at once come under the control of the government. The working out of the plan provides that actual operation of each road shall remain in the hands of its own officers and employees. On August 4, 1914, when war became imminent, an order in council put in effect the resolution. A railway executive committee was immediately organized, of which the president of the Board of Trade, a cabinet minister, became ex-officio chairman and the general manager of the London & South Western Railway acting chairman. Other members of the committee are the general managers of ten of the leading railways. Provision was made by act of Parliament for a net return to the railways during the period of government operation equal to the rate earned by them in the period immediately preceding.

Although the burden thrust upon the roads has been far in excess of what was anticipated and the expected duration of the arrangement has been greatly prolonged, its working appears to have been satisfactory to the government and to the managements. As a result of the scheme, Great Britain has in its hands a flexible means of transporting whole armies from one place to another with a celerity never before approached outside of a country whose railways have been constructed primarily for military purposes.

While the system adopted by England is adaptable to American conditions, the nature and magnitude of the problems presented in the two cases are quite different. The railway board of Great Britain directs operations in a territory comparable in extent to New England, New York and New Jersey. The area of this part of the United States is a little greater than that of the United Kingdom, and the railway line mileage involved is somewhat less. The density of population of England is, of course, very much greater than that of this country.

There is an obvious relation between the territorial extent of a country and the importance of the service its railway system may be able to perform as a part of a system of national defense. The United States has a very large area. This means long boundary lines and frontier points far distant from the centers of population and production. Its boundaries consist largely of coast lines far apart. The completeness and efficiency of its means of internal communication are therefore matters of vital importance in the consideration of measures of preparation for possible war. It is conceivable that in a densely-populated country of small extent secondary means of transportation may serve with some approach to adequacy, but where distances are represented in thousands of miles, there are no secondary means of military transportation. If the primary means, the railway system, fails, the cause is lost.

The first step toward constituting our railways a satisfactory part of a system of preparedness should be a conference between representatives of the government and of the railways to decide upon the form of central organization which should have active control in case of war and to inquire into the measures that should be adopted to unify and improve the physical facilities. Such other measures as might be found necessary to provide for the efficiency of the operation of the unified system would also naturally follow under the guidance of the central organization.

Military authorities fully recognize the importance of such co-operative consideration. General Leonard Wood, formerly chief of staff and now in command of the United States Army

in the Department of the East, in a recent discussion before the New York Railroad Club, said:

"The vast area of our country, our long coast lines, all make it most important that our use of the railroads should be upon carefully thought out plans. This includes many a little line which runs to some unimportant place commercially, but important nevertheless from a military standpoint. . . .

"Normally, our rail routes are potent agents in our national development and material betterment. This machinery of peace, which contributes so much to the tide of our prosperity, should be readily adaptable to defensive service if the occasion arise. But this would not be possible with us unless some scheme of general co-operation were agreed upon in advance, not only among the roads themselves, but as between the roads so united in purpose and the general government; in short, organization in the fullest sense of the word.

"The railroads and our military experts must be brought together and from their joint labors must spring a plan of reciprocal action, a scheme of interdependence that will evolve unity of working and instant readiness on the part of every railroad in the country."

Brigadier-General Tasker H. Bliss has recently contributed an article to the Journal of the Military Service Institution in which transportation facilities are considered at some length. He says, concluding a reference to the present inadequate condition of the railways from a military viewpoint:

"We often speak of the throwing—that's our favorite word for it—throwing great masses of men on this or that frontier threatened with sudden danger. We can stop the pulsation of the blood for only an instant without destroying the life of the organism; and the railroads are the veins and arteries of national life. They are none of them military; that is, none of them has been constructed with a secondary view to commerce and a primary one to military requirements. . . . The railway systems of the United States are an essential part of our military resources and must be first available in time of war. They become as much a part of the military organization as are the ammunition and supply trains of an army. There is no greater problem before us than the working out of a scheme for the orderly handling by railways of both military and civil business—a scheme for mobilizing the railroads, for making them able to move with the greatest effectiveness in war, without which schemes for the mobilization of armies will be of little avail."

Second in order, though perhaps not in importance, to the establishment of a controlling and operating organization, would be the adoption of measures toward putting the railway system in proper physical condition. These should take into account not only the main lines of communication, but all lines forming connection between the principal centers and isolated localities. Lines now seemingly insignificant might have an important service to perform as connecting links.

General Wood has answered the question, "What are some of the essentials toward putting the railroads of this country in position to meet the requirements of a system of national defense?" by in substance emphasizing the importance of bringing the railroads into a proper condition for efficiency in time of peace.

Under the general head of needed improvement in physical condition falls one item which requires special mention. The experience of European nations, and particularly Great Britain, in the present war, impresses the importance of extensive terminal facilities.

Handling rapidly a large volume of traffic, troops and supplies suddenly concentrated at a single point, is of the very essence



C. H. MARKHAM
President, Illinois Central

of successful military transportation. Present terminal facilities of American railways constitute one of their weaker points. Proof of this is afforded by the present condition at the ports. A heavy movement of freight of all kinds following closely upon a long-continued depression in traffic, has congested some of the principal ports to an alarming extent. It is commonly supposed that most of this congestion is due to the accumulation of munitions of war for export. This is not so. The growth of our export business is, of course, affected by war conditions in Europe. But the greater part of this freight is for the supplying of demands hitherto supplied by countries now at war. Statistics of the Department of Commerce show that for the month of October, 1915, the proportion of the whole export business of this country that could accurately and properly be classed as war material amounted to a little less than 11 per cent.

In time of war somewhat similar conditions might arise at any important terminal, whether on the coast or in the interior. There is also at the present time a heavy strain upon the facilities of railways far in the interior and which are only moderately affected by the increase in volume of export traffic.

These occasional congestions in times of peace are significant as indicating what would be likely to occur in exaggerated form under conditions calling for strenuous measures of defense. The present congestion shows how easily trouble may arise under abnormal conditions caused mainly by a sudden great increase of traffic. It also suggests that certain measures needed to prepare our railways to serve as a part of a system of defense are also required to put them in satisfactory working shape in time of peace.

Several causes have united to contribute toward keeping many of our railways in poor physical condition and unfit for handling increases in traffic due to a general return of industrial activity. They would be still more incapable of making the extraordinary exertions incident to service as an adjunct to a military organization. Heavy increases in wages and taxes have not been accompanied by corresponding increases in rates. In some instances they have been accompanied by decreases. Reduction in net earnings and inability to raise capital for needed improvements have been reflected on many roads in imperfect maintenance. Unpractical and inconsiderate demands on the part of local regulating authorities have added greatly to expenses and impaired facility of operation. An essential to putting the railways in position to serve properly as part of a system of national defense is a less localized and less selfish and short-sighted policy of public control.

A policy of regulation which constantly imposes new burdens and restrictions on them, and limits their profits as narrowly as the federal constitution will permit, is not adapted to preparing them to serve the public well and adequately, either in peace or war.

THE RAILWAY SITUATION IN THE SOUTHWEST

By W. B. SCOTT

President, Sunset-Central Lines

The railway situation in the Southwest, particularly in Texas and Louisiana, in which states our lines operate, while somewhat improved, is yet far from satisfactory. I see but small prospect of any permanent improvement until such time as there develops a better recognition of the difficulties surrounding railway operation and a better understanding and support on the part of the public, who should realize by this time that their best advertisement and their most effective solicitation in the matter of immigration is in the prosperity of their transportation lines. I say here "best advertisement and solicitation" because both Texas and Louisiana are agricultural states with great promise, and an equally great need of high-class, intelligent and enterprising farm owners. These the states could not hope to secure, for success feeds upon success, and if the railway systems of any section are operated by receivers and struggling for existence,

the condition would seem to suggest an equally hazardous and precarious situation as affecting all other lines of commercial endeavor.

Of the 12 more important railway lines or systems operating in Texas, 5 are being operated by representatives of the courts because of their inability to meet their operating expenses and other obligations from their current income. I am satisfied that those which are still operated by their owners have escaped the fate of their neighbors only through rigid economies and through more favorable local conditions, rather than through any special or particular privilege or emoluments. The same conditions which have oppressed the lines now in the hands of receivers have applied with a like force, differing only in degree, to the lines which still retain their own autonomy and direction.

In considering the handicaps which have for the past several years deterred the progress of the Texas transportation lines, I am hardly prepared to suggest that, or those, which represented the greatest obstacle to success. Suggestion may have been present, for with an example set prominently by our national government in the matter of restrictive and possibly unnecessary legislation, it is not particularly surprising to witness state legislatures going Congress one better, adding to the burdens of the railways and always failing to provide means or opportunity for recouping revenues in order to meet constant additions to their operating expenses.

I do not assert that legislative acts have been the main contributing factors, but rather than they have contributed their quota to a general situation. Neither do I suggest that commission regulation of railroads is altogether unnecessary. Possibly the cause as represented by some lines or group of lines may have made commissions a necessity, for no one with propriety may claim an exception to proper regulation, but "over-regulation" often follows when once the excuse is suggested. It is a sad commentary upon the equity of government, yet nevertheless true, that commissions sometimes fail to recognize that they set as judges of questions involving the rights of both the people and the corporations, and in some instances incline to the role of prosecutor for the people alone. The adjudication of differences demands that both sides of the shield be read. There is some fallacy in any reasoning which forbids an increase in rates when the expenses are greater than the revenues. This principle is exemplified and well illustrated by the action of tax boards, which by various direct and indirect methods replenish their depleted treasuries by an increased assessment of railway properties out of all proportion as compared with the increases assessed against other properties. In 10 years the taxes of Texas lines have increased 267 per cent, and of Louisiana lines, 156 per cent.

I am satisfied that the commissions are trying honestly to work out a basis whereon differences may be amicably adjusted, but the very nature of the business would seem to require the cool, dispassionate judgment of men thoroughly familiar with railroad details, including rates, to pass intelligently upon the mass of technical detail that environs the operation of a rail line. This cannot be absorbed in its entirety, and while not of any extreme difficulty, personal familiarity alone can make these details comprehensive in all of their many phases. Our commissioners, or most of them, are able and sincere, but if they cannot, as I suggested, give to the problems confronting them the benefit of a really expert personal knowledge, I fear they will have just as decided a difficulty in absorbing second hand information from individuals whose knowledge of the facts often is not thorough. Reasons for rates, direction and balance of traffic, physical complexities, grades, distribution of power, equipment and fuel, and a multitude of other important considerations must be apparent and understood before conclusions can be either fair or satisfactory.

There are other factors, however, which nature and topography in this section have made pertinent. Floods and storms of the past three years have created havoc, both in their immediate damage and as a cumulative result. Roadbeds have been

washed and rewashed, softened and kept soft, materially increasing the cost of current operation and requiring large sums for replacement and repairs. Bridges, structures and equipment have felt the burden; not once but many times, while expenses of train operation have coincidentally shown very pronounced advances, overtime and fuel not the least of these, with disordered schedules and an impatient and not always considerate public.

Texas is a state of considerable distances. Much of the transportation is through territory interminable in extent and unproductive as to local business, yet these sections of the line must be operated and maintained despite the lack of revenue from intermediate sources, the through haul being charged with the burden of upkeep. To this, and the situation practically applies to the north and south lines as well as the transcontinental railways, are added the unsatisfactory freight conditions represented by the long and expensive haul of empty equipment, due to the unequal movement of business, which is frequently 65 to 80 per cent one way, necessitating equalization of power, equipment and crews, which adds heavily to expenses with no attendant revenue.

Loss and damage claims in this territory make heavy inroads into the earnings of the carriers. This is partly due to the long hauls on perishable commodities and the opportunity for deterioration enroute. The return empty movement of special equipment, unsuited for other traffic moving in that direction, is also a considerable item of expense. Again, the carriers often suffer heavy loss through the shipment of live stock and market conditions, and also, perhaps, the natural disposition of some shippers and consignees to capitalize the disability or unavoidable delay on the part of the railway.

The viewpoint of the public as to moral obligations in relation to physical conditions must vary in the several states. This is evidenced by the attitude of certain Texas juries in determining personal injury verdicts and damage claims. Legitimate injury and damage claims are, as a rule, not difficult to adjust when negotiations are between the claimant and the railway, but claims of a doubtful character and those where no actual injury or damage exists, ordinarily termed "fake" claims, which are made the subject of a damage suit, are mainly responsible for the heavy tax upon our revenues, such payments having increased from \$165 per mile in 1906 to \$275 per mile in 1914. Perhaps a more striking comparison is in the payment to this account for the year 1900 the amount of \$1,018,637, while for the year 1914 the total payments had increased to \$2,905,327, an increase of 185 per cent, with an increase of only 60 per cent in train mileage. From this showing we would naturally conclude that railroading in Texas was more hazardous than elsewhere, but the contrary is the case, and it is safe to say that a very great portion of the amount mentioned was unwarranted by fact, but the drain continues to increase notwithstanding. Sentiment rather than responsibility is too frequently the governing factor, the law often being disregarded as well as the disposition or willingness of the railways to recognize even an implied liability in the settlement of such obligation as exists.

The situation today, and this is demonstrated by the receiverships recently inaugurated on a number of the smaller purely local lines, proves that no Texas railway can be profitably operated without a large quota of interstate traffic, and even then the results are questionable, as indicated by the receiverships on lines which do an interstate business.

Such of the transcontinental railways as have remained solvent have done so because of the volume of traffic which came to them from their interstate connections and which enabled them

to meet their expenses, when, if they had been dependent upon a purely local or intrastate business, they would more than likely have gone down in defeat.

One of the main sources of revenues of the Texas lines is in the carriage of cotton, yet few realize the great expense and risk attending this business, owing to loading and compress charges, insurance, light tonnage loading, handling into and out of compresses, all without extra charge and all trenching upon the efforts to make both ends meet and realize a margin of profit from their handling of freight—handicaps railways in other sections are not compelled to bear.

Generally speaking, conditions are not altogether normal and we may not be compelled again to take care of a loss of over a million dollars, speaking for our Sunset-Central Lines, caused by storm conditions, nor witness again the utter demoralization of business by war scares and impairment of the value of cotton and other southern commodities. The southern roads do not serve a manufacturing territory and few penetrate the great grain-producing belt; therefore they have participated but little in the prosperity that has come to other lines as one result of the European struggle. There will be an urgent necessity for positive economies with us for a long time to come yet. The \$13,000,000-dollar deficit of the Texas lines for the past three years cannot be made up by a few good months. The heralded wave of prosperity which the northern half of the country is experiencing has only touched us, but we have hopes that the real stringency is about over.

I am inclined to believe that popular and unreasoning prejudices against railroads are getting to be a thing of the past and that the rights of the carriers are being recognized more and more by the people and the government. At least I hope so.

SIGNALING PROGRESS IN 1915

By W. J. Eck

Signal and Electrical Engineer, Southern Railway*

Progress in railway signaling during the year 1915 was marked by a few notable developments rather than by the quantity of work installed. The signal depart-

ments have borne their proportion of the general retrenchment required and many economies in operation have been effected. The reduction of forces has resulted in considerable study being given to the subject of combined maintenance. The combining of track and signal forces is still used to some extent where originally installed, but has made practically no progress elsewhere. The consolidation of the signal, electrical and telegraph departments is more promising and has been effected on a number of roads. On account of the similarity of the duties of the three departments, all having to do with electrical affairs, the arrangement is a logical and economical one.

The most marked tendency of the year has been the very extensive use of alternating current for the operation of signals on steam railways. First employed on electrified lines from necessity, its advantages were so apparent that its use has rapidly extended to steam railroad lines, and the coming years will probably see it used with the majority of semaphore signals installed.

"Light" signals consisting of electric lights with various colored lenses have been used for a number of years on electric lines where cheap power was available and where speeds were moderate. Such signals are also in general use in snow sheds and tunnels on steam lines. An entirely new improvement of the light signal, known as the "position light," has been developed which is suitable for both day and night service in the open on high-speed railroads. An extensive installation of these signals was made during the year on the Pennsylvania Railroad

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and is now in successful operation. The possibilities for the future use of this signal are very great on account of its having no moving element and its peculiar adaptability to roads using alternating current for signal operation.

Single-track automatic signaling is receiving an increasing amount of attention and the mileage installed during the year greatly exceeds that on double track. It has been only a few years since railway officers believed that automatic signals on single track would hinder instead of facilitate movements. Particularly since the so-called "absolute permissive block" has been developed has this idea given way to a realization of the safety and aid that the system affords. In the A. P. B. system for single-track signaling the trains are given an absolute block from passing siding to passing siding for opposing trains and a permissive block for following trains. This system has been almost exclusively installed during the past year.

There has been a substantial decrease in the miles of track protected by manual block owing to the substitution of automatic block signals in its stead. This was also true in 1914 and can reasonably be expected for a number of years to come unless a law should be passed requiring the immediate installation of block signaling on all lines, in which case the manual system would be the only one that could be installed in a short time.

The use of electro-mechanical interlocking, that is, interlocking where the power for operating switches and derails is manual and for the signals, electric, shows continual growth due to the satisfactory operation of such plants. The use of switch and lock movements and the elimination of separate levers for facing point locks is a development of the year. Such plants reduce the size of machines necessary and with switch indication circuits, concrete foundations and heavier construction now used in signaling, no element of safety has been sacrificed.

On railways where white is used as a proceed signal there is always the possibility of a false proceed indication due to a broken lens or roundel in a stop signal. This possibility, though very rarely causing an accident, is always present and each year sees the gradual adoption of green as the color indication for proceed on some railroads. This year has been no exception, one prominent road in the south having completed the change from white to green in the past few weeks.

The Division of Safety of the Interstate Commerce Commission has secured the services of an experienced and well-known signal engineer during the year. His advice and counsel will, it is believed, do much to prevent hasty and unconsidered legislation affecting railway operation and, particularly, block signaling and automatic train control. The appointment of an experienced man to this position was of peculiar interest to the railways just at this time when Congress has before it a bill to expand the jurisdiction of the Interstate Commerce Commission to cover operating matters.

Valuation of the signal appliances on a number of railways has been started during the year in connection with the federal valuation. This work has required the services of many signalmen both by the government and the railroads. It is only because of the general depression in construction work that the railways have not been required to materially increase the signal engineers' forces to take care of this work on roads where it is now under way. This work is generally handled under the supervision of the signal engineer, his forces making the detailed inventory and obtaining the required records. The Presidents' Conference Committee on Valuation has appointed a subcommittee of signal engineers to prepare data and to handle such signal matters as are assigned to it. The committee has been quite active throughout the year.

An interesting development during 1915 has been the extensive introduction of American signal devices and American signalmen on Australian railways, a field which has heretofore been occupied exclusively by the products of Great Britain, and this, with the American signaling appliances that have been put in service on English railways, where signaling was born, says much for the state of the art in this country.

Except for a few small installations for experimental purposes there has been no installation of automatic stops or cab signals on steam roads. The Brooklyn Rapid Transit, an electric subway line, is installing an automatic stop and cab signal system with speed control features which is of interest on account of the control being continuous, the brakes being applied whenever the speed at any point exceeds a predetermined amount as obtained from a braking chart. A speed control of this character prevents much of the serious decrease in capacity which will result from a simple automatic stopping device.

The Railway Signal Association has continued its work of standardization during the year, so that a majority of the parts used in signaling and interlocking are now standard. The uniformity established by the association has resulted in material savings to the railways and it has had much influence for good in the advancement of the signaling art generally.

The coming year promises to be the most active in the volume of signaling installed ever experienced on American railways.

PROGRESS IN ELECTRIFICATION DURING 1915

By GEORGE GIBBS*

Consulting Engineer, New York



W. J. ECK
President, Railway Signal Association

During a year of great disturbance in all business conditions little has been done in the way of initiating new railway projects, but the period has witnessed the completion of two very important electric traction installations and the partial completion of a third on steam railways. All three represent departures in important details from previous installations and practical results will be watched with interest.

On the Norfolk & Western a freight haulage installation was undertaken to relieve the congestion by an increase in train speed and also to produce operating savings on the main line heavy grade division over the Alleghany mountains; it is conducted under unprecedented conditions as to density of traffic and train weight.

The suburban passenger train electrification of the Pennsylvania at Philadelphia is an application under complicated terminal conditions of an electric system which is designed to be adapted for future extension over long distance main lines and to then handle all classes of service.

The Chicago, Milwaukee & St. Paul electrification in Montana and Idaho applies electric traction to heavy train units, both freight and passenger, on a line having heavy traffic and over the longest distance yet attempted; it is being carried out by an electric system quite different in detail from that employed on the two railways first mentioned.

These installations, added to others already in operation, furnish examples representing practically all conditions and kinds of railway service. Their purposes are various. Electric traction has been employed to make underground terminals in large cities practicable; to facilitate safe operation in long tunnels; to increase the capacity of lines or of passenger terminals; and to increase the operating capacity on heavy grades. In certain of these cases increased economy of operation is an important and perhaps a controlling consideration. The reasons, therefore,

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have been either compelling ones from an operating standpoint, or those connected with expected economies.

The success of this form of traction may be viewed from different standpoints, accordingly as the inquirer sets the problem for himself. Technically, it has been amply demonstrated that electricity can propel trains of any weight at any speed, not limited by other considerations, and that the apparatus required will function reliably; in fact, notwithstanding the complicated mechanism involved and the circumstance that an electric system is tied together from the power house to the trains, thus requiring that all links must operate to secure service, operation has been found remarkably reliable, and, in this respect, an advance on steam operation which it superseded.

Increased capacity has been obtained from electric operation, both as the result of its ability to concentrate almost unlimited power at the train, and thus increase speed and hauling capacity under adverse conditions, and because in certain kinds of service, such as suburban passenger, multiple unit motor car operation is substituted for head end locomotive operation, thus reducing shifting and idle movements in congested terminals.

As regards the aspect of economy, this is not yet as clearly defined as might be expected, considering the number and variety of installations already made. Some of these installations are as yet too new to furnish comparison, but a factor of more importance is that in nearly every case new conditions have been introduced with the new form of traction, and thus the same things cannot be compared. Another fact is that the actual cost of an existing steam service is frequently as much in doubt as the probable cost of electric operation which is to replace it. This peculiar condition exists because railway accounts are not thoroughly segregated for the cost of each part of the equipment or for each operating division as a whole, much less for a particular service on part of a division, as is often required.

Generally speaking, the most attractive fields for electric operation from the standpoint of increased direct net money return on the investment are: (1) where traffic is dense over an entire division and where the train loads, or speeds, or both, may be increased by electric operation, thus utilizing motive power more effectively than with steam; (2) for traffic having a high load factor, i. e., a fair degree of uniformity throughout the day, so that trains may be operated with reduced power and labor costs. Long lines with thin traffic and terminal station operations do not generally furnish an attractive field for electric traction from the standpoint of operating savings, although in some cases such installations may prove profitable where the cost of energy can be largely reduced by obtaining it from cheaper sources.

The indirect benefits of electric operation are, however, often controlling in any installation, and among these may be mentioned smoke elimination in tunnels and underground terminals, increased comfort, speed and attractiveness in passenger service, and the increased line capacity referred to above.

It is, therefore, to be expected that electric traction will continue to develop as regards methods of application, and will be used in the many cases where it is well suited to or is required by surrounding conditions. Electric traction apparently cannot supersede steam traction for all, or for even a very large part of the railway mileage of the country, unless some radically new type of apparatus should be developed, a contingency which, unfortunately, does not seem at present to be pending.

A word may be said regarding the technical developments which have occurred or have become realized during the past year. Electric traction has for several years been tending towards extension to long distance or, rather, to entire divisional operation; this is in many cases almost essential for proper railway operation, as intradivisional transfer of power or train is costly and inconvenient. Long distance and heavy train-unit traction has made a change desirable from the expensive method of distribution of low tension direct current power to the trains by third rail conductors, which requires large capacity of feeders and sub-station machinery. The three installations completed this year all illustrate the present tendency to use an overhead

trolley wire of small size, but large power capacity, by reason of the high potential of the current carried. The Norfolk & Western and Pennsylvania installations use an alternating current system throughout and distribute current at very high potential; the St. Paul's installation uses direct current in the trolley wire at a potential which is high compared with that used in a third rail, but low compared with the practice in alternating current systems. Standardization, therefore, of electric systems as a whole cannot be said to be complete, but progress has been made towards the use of overhead conductors as a standard, and, in the case of the alternating current systems, towards uniform characteristics of the current used in the working conductors.

We may, therefore, as regards further developments, properly await experience with the two overhead systems now on trial. The relative first cost of these two systems does not appear, from present information, to differ greatly and the further development of both will doubtless proceed for some time. It may well be that both will find a place in heavy railway work unless one of them is shown to be greatly superior as regards simplicity, reliability and cost of operation. It is especially important, therefore, that each new installation undertaken should be based upon a competent examination, not only of the railway operating features, but of the complex technical developments now taking place, in order to clarify the problem for the future.

ENDING THE FISCAL YEAR ON DECEMBER 31 INSTEAD OF JUNE 30

BY FRANK NAY

Controller, Chicago, Rock Island & Pacific

The Interstate Commerce Commission was created by an act of Congress in 1887. The act required annual reports from railroads to the Interstate Commerce Commission for the years ending on June 30,—that being date for closing the governmental fiscal year. Prior to that time the railroads closed their fiscal years on various dates, according to their own convenience. Later on, when the various states required annual reports from railroads similar to those to the Interstate Commerce Commission, they also adopted June 30 as the close of the report year.

Under these conditions a large majority of the railroads closed their books two times each year and rendered two separate annual reports covering different periods, one covering their own fiscal year to their stockholders and directors, and the other for the year ended June 30 to the Interstate Commerce Commission and to the various state commissions. This caused a duplication of work, and, owing to the fluctuations of traffic and operating conditions in different seasons of the year, the annual reports to the stockholders frequently appeared to be out of harmony with the annual reports to the Interstate Commerce Commission and the various state commissions. Consequently, nearly all the railroads in the United States changed their own fiscal years to agree with those of the Interstate Commerce Commission.

As the years went on, serious objections developed to June 30 as the date for closing the fiscal year, among which were the following :

- 1.—On the majority of the railways of the United States the programs of maintenance and improvement work conform naturally to the calendar year, and in reporting the details of such work, a year ending December 31 has decided advantages over a year ending June 30. The maintenance and improvement forces are at the maximum and the heavy work is in progress on June 30, while December 31 is the natural close of the year for maintenance and improvements.

- 2.—Annual reports, the compilation of which is so much work added to the daily routine, can be more easily prepared during the winter than during the summer season, on account of vacations in general offices, and the slowing up, as a rule, of accounting work.

- 3.—December 31, coming at the close of the season for main-

tenance work, is a better time than June 30 for taking the annual inventory.

4.—Many carriers are required to make extensive reports to state commissions and taxing bodies, covering a calendar year period, for purposes of taxation, thus duplicating much of the work included in the report for the fiscal year ended June 30. The two reports may present more or less apparent variance which would be overcome by having both cover the same period.

5.—The present plan of closing the fiscal year for railroads on June 30 prevents satisfactory comparisons with other great lines of industry, as nearly all the latter close their fiscal years on December 31.

These objections were presented from time to time to Henry C. Adams, in charge of statistics and accounts for the Interstate Commerce Commission, by the accounting officers of various railroads in their conferences with him concerning the uniform system of accounts formulated and promulgated by the Interstate Commerce Commission. He presented the matter to the Interstate Commerce Commission and the National Association of Railway Commissioners, which latter association appointed a committee of which Mr. Adams was chosen chairman, to canvass the situation and report the result. Under date of July 28, 1909, Mr. Adams issued an inquiry to all of the carriers in the United States reporting to the Interstate Commerce Commission, calling on them for an expression of opinion on this subject, by propounding to each one of these carriers the following questions:

- 1.—Would you approve such a change in date?
- 2.—What reasons occur to you as pertinent why such a change should be made?
- 3.—In case you oppose making a change, what reasons occur to you as pertinent for retaining June 30 as the date for closing the fiscal year?

Coincident with the inquiry among railroads, he also solicited opinions from the various state railway commissioners. Mr. Adams reported that the result of these inquiries did not indicate any great desire either on the part of the carriers or the state railway commissioners for a change in the date for closing the fiscal year for railroads; in fact, many of the state railway commissioners opposed the change for the reason that to make the change would require statutory enactment on the part of 22 states. However, in 1910 the act was amended so that the Interstate Commerce Commission may change the fiscal year from June 30 to December 31.

It is believed that when the first inquiry was sent out by Mr. Adams, the subject was not given careful consideration, and from time to time the matter was discussed by railway accounting officers. In March, 1914, at a special meeting of the Association of American Railway Accounting Officers, a special committee was appointed to bring this matter again to the attention of the railroads and a circular was sent to all railroad accounting officers in the United States, propounding the following queries:

- 1.—Do you approve of the suggestion to change the period covered by the annual report to the Interstate Commerce Commission from the 12 months ended June 30 to the 12 months ended December 31?
- 2.—Please state as fully as possible your views in favor of or against the proposition.
- 3.—Lines for which answer is made; total operated mileage of the same.

In response to that circular, replies were received from railroads representing 271,867 miles operated, of which roads representing 212,542 miles or 78.2 per cent of the total miles operated recorded their votes in favor of the change, and roads representing 13,939 miles, or 5.1 per cent of the total mileage operated,

were indifferent, leaving roads representing only 45,376 miles or 16.7 per cent of the total as recording themselves in opposition to the change. Subsequently, some of the latter roads changed their votes, and recorded themselves as favorable to the proposed change. Those who opposed the change offered the following reasons:

- 1.—Comparisons would be disturbed.
- 2.—It would be necessary to have stockholders change the fiscal year for most of the railroads in the United States.
- 3.—It would be necessary to have the statutes of 22 states changed.

As to these objections, it may be stated, in passing, that they are not at all serious, because: comparisons would be disturbed for one period only and one supplemental report relieves that situation; it would not be a serious hardship for the stockholders to change their fiscal years from June 30 to December 31; and since the Congress of the United States has already amended its law so as to permit the Interstate Commerce Commission to change the date for closing the fiscal year from June 30 to December 31, whenever it sees fit to issue an appropriate order, it should not be difficult to induce the 22 states referred to to enact similar amendments to their laws.

The report of the special committee was presented to the Association of American Railway Accounting Officers at its annual meeting in Atlanta, Ga., April 28, 29 and 30, 1915. The matter was referred to the executive committee of the association with power to deal with federal and state commissions relative thereto. Subsequently, the executive committee sent communications to all of the members of the association, inquiring if the executive officers of the railroad concurred in the vote of the accounting officers as registered in the replies to the circular sent out by the special committee. The replies to this latest inquiry indicate that the executives of railroads are now very much interested in this subject, and substantially all executives whose accounting officers had given replies favorable to the changes support their accounting officers. Some executives whose accounting officers voted against the change take a different view and favor the change. At the present time it may be safely stated that the desire for a change is nearly unanimous on the part of railroad companies.

R. A. White, president of the Association of American Railway Accounting Officers, delivered an able address before the National Association of Railway Commissioners at their annual convention in San Francisco, Cal., held in October, 1915, in which he presented in a very convincing way, the need for this change in the fiscal year. While Mr. White gave several reasons, he particularly emphasized two which should appeal strongly to all, viz.:

(a) The programs of maintenance and improvements conform naturally to the calendar year, as such programs are commenced during the early part of the calendar year and are completed during the latter part of the calendar year. At June 30 they are in their busiest stage. Erroneous impressions may be conveyed in the annual reports because in one year the climatic and business conditions are such that a majority of the maintenance and improvements programs may be completed prior to June 30, while in the succeeding year a majority of work covered by such programs may be deferred until after June 30, but these programs are always substantially near completion at December 31.

(b) Nearly all of the officers and as many as possible of the clerical force like their annual vacation at a time of the year when it really counts for something. Few men can really have a good time in winter; most of them want to get away during the summer for rest and recreation. No one would maintain that



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a vacation should take preference over reports to the various commissions, but with the fiscal year closing on June 30, the heaviest work for the clerical forces of a railroad occurs, in July, August and September, during which time the weather conditions are most depressing and during the very time when these men would like to have vacations. During the period of the preparation of annual reports it is necessary for the clerks to work overtime more or less, and the officers who have to supervise the preparation of the reports must perform such supervision in addition to their regular duties during the heated season of the year. If the fiscal year closed at December 31 this pressure would come during January, February and March, —a time of the year when the weather conditions inspire vigor and activity.

The present year ending June 30 consists of six months of one year added to six months of another year, while the calendar year is the logical business year. Therefore, in the interest of producing more useful annual reports of railways covering a 12 months' period, closing at the end of the logical business year which will reflect more nearly than any other, on the whole, their true financial conditions, their true income accounts, and the true additions and betterments to their properties, it is most desirable to have the fiscal year end on December 31.

1915 FROM THE CONTRACTOR'S STANDPOINT

By W. A. ROGERS

President, Bates & Rogers Construction Company, Chicago, Ill.

The year just closing is unique from the standpoint of the railroad contractor. During the past year less miles of railroads have been built in the United States than in any year since 1864. In 1915 only 933 miles of main line was completed in the United States, and 718 miles in Canada.

In past years we have been in the habit of comparing periods of depression in railroad construction with the years immediately following 1893. We will now have to start with a new date. There was 495 miles less railroad completed in 1915 than in 1895, which was the year of least railroad construction in that period of depression. There have been only four years since 1848, and 1915 was one of these, when less than 1,000 miles of new line was completed. When we consider that the normal amount of railroad construction completed in a year runs from 3,500 to 4,000 miles, we can realize why 1915, with its 933 miles, has seemed such a quiet year. It is a significant fact that during this year not a railroad in the United States built 100 miles of line. In fact, the greatest mileage reported by any road is in Alabama, where one road reports 52 miles of main track constructed. Only one state in the Union has added to its mileage as much as 100 miles of railroad.

Many causes have contributed to the dearth of railroad construction. It would be a wise man, indeed, who would be able to give all of the reasons and to name them in the order of their importance. One of the principal reasons has been the attitude of our law makers and other public officials toward the railroads. The shortsighted policy which has resulted in the practical abandonment, during 1915, of expenditures for the construction and improvement of the railroads has had undoubtedly an immense reflex action on the prosperity of the country. The railroads have not had the money to spend, with the result that the thousands of men who would ordinarily have been employed in the various construction activities have been idle. There has also been a corresponding depression in the various lines of business involving materials of construction and other railroad supplies.

The result of this lack of railroad construction has been a very quiet year for railroad contractors. Only a very small number of contracts of any size have been let during the year, among the largest of which were those for the Norfolk & Western cut-off near Farmville, Va., and the Chesapeake & Ohio

extension in Ohio. The Lackawanna cut-off has been completed during the year, as well as the Canadian Northern's transcontinental line. There has been very little railroad work going on elsewhere in Canada, and practically no new work has been started there. Good progress is being made on the Rogers Pass tunnel of the Canadian Pacific, which was started in 1914, and there has been some terminal work in eastern Canada.

With this dearth of railroad work, the contractors who have followed this class of construction in the past have, in many instances, turned to other fields. They have taken up river and harbor work, reclamation service work, mine stripping, various forms of municipal and power development work, building construction and road making. By spreading out into different fields many of the railroad contractors have kept busy.

The labor conditions throughout most of the United States have been good during the greater part of the year, although during the latter part of the season the war order business in the East has caused some shortage. Prices for contract work during 1915 have been very low, and work has been figured on closer margins than in many years. Many contracts have been taken simply to keep the contractors' organization intact. As we draw to the close of 1915 I think that the railroads, the railway supply men and the railroad contractors are all glad to write "Finis" to a very quiet year and turn over the page.

Beginning about September, railroad earnings began to show an improvement, resulting, in considerable measure, from the handling of war order business, and later from the moving of the most bountiful crops in the history of this country. As the year is closing the railroad earnings are showing a remarkable improvement. I believe we can look forward with confidence to a good year in 1916. Over 1,200 miles of new line is now under construction, about 1,625 miles additional has been surveyed ready for construction, and projected lines amounting to over 2,060 miles are being seriously considered. In view of these facts and considering also the changed attitude of the public, the newspapers and the law makers toward the railroads, coincident with the increased earnings and the general increase of business throughout the country, a more optimistic feeling is apparent among those who are dependent upon the railroads for business.

Railroad construction work will cost more in 1916 than in 1915. Prices for materials have advanced and are advancing. If any large amount of construction work is undertaken the labor supply is almost certain to be very short. In addition, those contractors who have been willing to take work at cost, simply to keep an organization together, will undoubtedly be relieved of this necessity by the fact that there will be more construction work to bid on. One of the serious problems is going to be the labor supply. When we consider the number of men who have gone to Europe to join the armies of the various warring nations, with the sources of further supply practically closed, one can realize what we may have to contend with when construction work really starts. With this in view it would seem to be the part of wisdom of those who expect to undertake work the coming season to start as early as possible in order to get organized early in the season before the shortage develops.

As we look back over 1915 and forward to the coming year we cannot help feeling that we have now really come to the turning point, that a new era of prosperity for the railroads and allied interests is just starting, and that beginning with 1916 we will have a steadily increasing period of prosperity.

RAILWAY CONSTRUCTION IN SPAIN.—It is officially announced in Spain that projects will be received at the Dirección-General de Obras Públicas, Ministerio de Fomento, Madrid, up to May 21, 1916, for the construction of a secondary railway from Palencia to Aranda de Duero. The line will be of meter-gage. The average cost per kilometer must not exceed 100,000 pesetas (about \$20,000). The minimum weight per meter of the rails to be used will be 30 kg. (66 lb.)

The Trend of Railway Earnings in the Year 1915

Results as Shown by Net Earnings Compare Favorably with 1914, but Principally Through Savings in Expenses

By FRANK HAIGH DIXON

Professor of Economics, Dartmouth College, Chief Statistician, Bureau of Railway Economics.

At the close of the year 1914 the Commission had just granted to the Eastern carriers an increase in rates as a result of the rehearing in the five-per-cent case. Many had hoped that this would furnish the necessary stimulus to pull business in general, and the railway business in particular, out of its slough of despond. But in spite of a marked revival in industrial activity, almost wholly due, I regret to admit, to the demands occasioned by the war, the railways for another six months remained quiescent and closed the fiscal year, on June 30, 1915, with a discouraging looking income account.

Table I, based on the compilations of the Interstate Commerce Commission, shows the revenues and expenses in the aggregate and per mile for the fiscal years 1912 to 1915 of all railways having annual operating revenues of \$1,000,000 or over, and includes about 90 per cent of the mileage of the country. The inclusion of the remaining 10 per cent of mileage, which unfortunately is unavailable, would reduce somewhat the per-mile figure, but would not disturb to any important degree the impression gained from a comparison of the items year by year. Total operating revenues show a falling off from the previous year of \$165,000,000. While this decline on a per mile basis amounts only to 6.7 per cent as

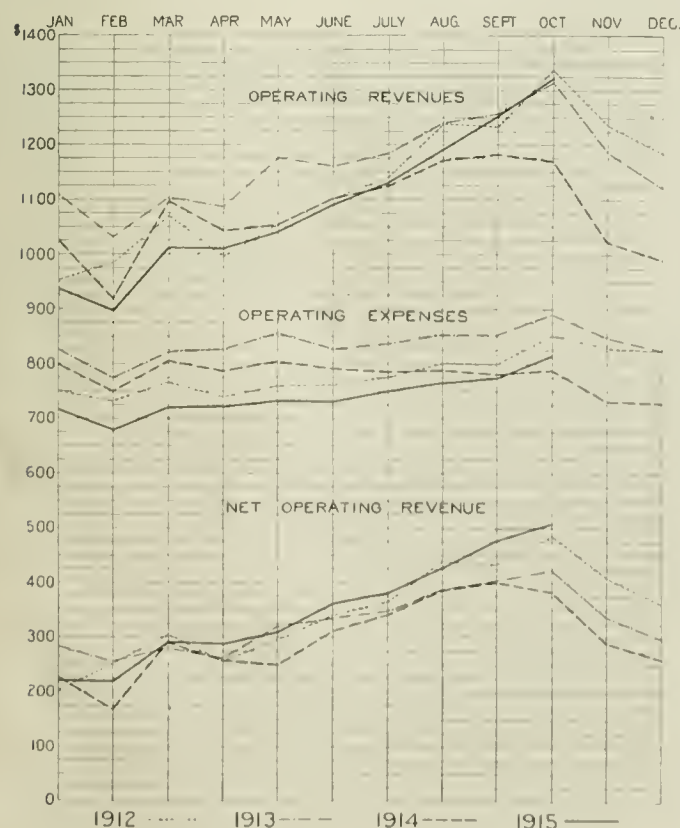
compared with 1914, it should be noted that this follows a decline of over \$80,000,000 in gross earnings between 1913 and 1914. If the classification of railways by the commission made it possible to carry the per-mile figure for the "million dollar" roads back as far as 1910, it would be found that the per-mile figure of operating revenues for 1915 is smaller than in any year since 1909.

Upon a superficial examination, net earnings look better, but closer inspection shows that the slight increase in net, amounting per mile to 1.3 per cent over 1914, had no encouraging features about it. It was secured only by drastic cuts in the costs of operation, which have been practiced from the very beginning of this fiscal year, and which mean in large measure deferred expenditures that must be made good as soon as earnings permit. Taxes, for some unaccountable reason, did not increase during the year, but actually fell off 3.3 per cent per mile. The result is an increase of 2.1 per cent per mile in operating income, which, however, is 13.9 per cent below the figure for 1913 and 6 per cent below that for 1912.

Table II presents the financial experience for these railways by months for the complete calendar years 1912, 1913 and 1914, and for the ten months of 1915 for which data are available. For any revival in the carrying industry we look at once to the figures of gross earnings. Here the first six months tell the same story as do the final figures for the fiscal year just discussed—a decline month by month as compared with the corresponding month of 1914; and this, it should be recalled, was on top of a shrinkage in gross earnings in the previous year. In not one single month of 1914 did the operating revenues equal those of 1913. However, during these six months of 1915, the monthly decreases were growing smaller until finally they disappeared altogether, and in July were replaced by an increase of one-half of one per cent. This was the turning point, as it proved, and increases in gross have been steady and rapid in the three months since, amounting to 13 per cent in the per-mile figure for October as compared with the same month of 1914. Drastic cuts in operating expenses, which had been a feature of every month of the year 1914, continued throughout the first nine months of 1915. The effect on net earnings has been remarkable. Whereas in every month but one in 1914 net earnings per mile showed decreases as compared with 1913, beginning with February, 1915, there are increases per mile in net earnings in every month, which run all the way from 10.6 per cent in August to 32.3 per cent in October. The policy of retrenchment was yielding its results at last. As has already been intimated, this policy of economy can be pursued only so long as gross earnings compel it. It was therefore to be expected that when earnings took a turn for the better expenses would increase. October shows the beginning of this policy with an increase in expenses per mile of 3.6 per cent. That the railways must enter upon a period of more generous maintenance is everywhere recognized—in fact, contracts on a large scale have already been signed. But for many months ahead, the severe economies practiced in the last eighteen months should show their effects in considerable increases in net revenue.



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Comparative Chart of Earnings and Expenses

The comparative chart of monthly revenues and expenses per mile reveals in a very striking fashion this movement which I have endeavored to describe. The 1914 operating revenues curve for the months of September to December drops far below those of 1912 and 1913. The curve representing 1915 starts

1914. The purpose of this table is to analyze the material already presented, and to bring out any characteristic features peculiar to some one section of the country that might escape attention in aggregates for the United States as a whole. This analysis reveals the fact that recovery in gross revenues began much

TABLE I—REVENUES AND EXPENSES IN THE AGGREGATE AND PER MILE OF LINE OF STEAM ROADS HAVING ANNUAL OPERATING REVENUES OF \$1,000,000 OR OVER; FISCAL YEARS ENDED JUNE 30, 1915, 1914, 1913 AND 1912

	1915		1914		1913		1912		1914		1913		1912	
	Amount		Amount		Amount		Amount		Amt.		Amt.		Amt.	
	Per mile of line	Per cent	Per mile of line	Per cent	Per mile of line	Per cent	Per mile of line	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Miles of line operated (average)	228,554		225,478		223,547		219,666							
Total operating revenues	\$2,889,029,475	\$12,641	\$3,053,747,597	\$13,543	\$3,135,016,158	\$14,024	\$2,830,219,885	\$12,884	d902	d6.7	d\$1,383	d9.9	d\$243	d1.9
Total operating expenses	2,032,689,894	8,894	2,219,432,612	9,843	2,191,139,100	9,802	1,975,741,558	8,994	d949	d9.6	d908	d9.3	d100	d1.1
Net operating revenue	856,339,581	3,747	834,314,985	3,700	943,877,058	4,222	854,478,327	3,890	47	1.3	d475	d11.3	d143	d3.7
Taxes	133,993,519	586	136,612,209	606	123,655,189	553	116,418,825	530	d20	d3.3	33	6.0	56	10.6
Uncollectible railway revenue	640,345	3												
Operating income	721,705,717	3,158	697,702,776	3,094	820,221,869	3,669	738,059,502	3,360	64	2.1	d511	d13.9	d202	d6.0

d Decrease.

below those of the previous three years, crosses 1912 in April, only to fall back again in May. In July it passes 1914, in September, 1912, in October, 1913, and fails to reach the highest point attained in the four years only because of an abnormal jump in earnings in October, 1912. The 1915 line of operating

earlier in the East than in either of the other sections, due unquestionably to the stimulus given to manufacturing by the war orders of the allies. There has been an increase in gross revenues per mile in the Eastern district in every month since April, this increase growing steadily larger until it reached 17.1

TABLE II—MONTHLY REVENUES AND EXPENSES PER MILE OF LINE: 1912, 1913, 1914 AND 1915

Month	Operating Revenues per Mile					Operating Expenses per Mile					Net Operating Revenue per Mile				
	1915					1915					1915				
	1912	1913	1914	Amount	Per cent Increase or decrease from 1914	1912	1913	1914	Amount	Per cent Increase or decrease from 1914	1912	1913	1914	Amount	Per cent Increase or decrease from 1914
January	\$953	\$1,109	\$1,026	\$936	d 8.8	\$751	\$826	\$799	\$716	d 10.4	\$202	\$283	\$227	\$220	d 3.1
February	984	1,031	918	897	d 2.3	732	774	750	678	d 9.6	252	257	169	219	29.6
March	1,071	1,103	1,097	1,012	d 7.7	767	822	805	720	d 10.6	304	281	292	292	...
April	995	1,087	1,043	1,010	d 3.2	739	826	786	722	d 8.1	256	261	257	288	12.1
May	1,054	1,175	1,053	1,040	d 1.2	759	855	803	732	d 8.8	295	320	250	308	23.2
June	1,101	1,160	1,102	1,090	d 1.1	762	826	791	730	d 7.7	339	334	311	360	15.8
July	1,139	1,183	1,124	1,130	0.5	775	836	785	750	d 4.5	364	347	340	380	11.8
August	1,239	1,241	1,171	1,191	1.7	801	853	786	765	d 2.7	438	387	385	426	10.6
September	1,233	1,257	1,182	1,251	5.8	799	853	781	774	d 0.9	434	403	401	477	19.0
October	1,338	1,314	1,171	1,323	13.0	851	891	787	815	3.6	487	423	384	508	32.3
November	1,237	1,186	1,023	.....	.....	829	848	732	.....	.....	408	338	292	.....	.....
December	1,184	1,122	990	.....	.....	823	824	728	.....	.....	361	298	262	.....	.....

d Decrease.

expenses remains below all the others until October, when it passes 1914. It has not yet reached the height attained by the curves of the other two years. The 1915 line of net revenue shows a steady gain over those of the three preceding years, being at a higher point than any of the others in April,

per cent in October. In the other two districts the increase did not begin until September. In the movement of operating expenses, experience was similar in all three districts, decreases occurring in every month except October. But the decreases in the South were much larger than in either of the other two

TABLE III—MONTHLY REVENUES AND EXPENSES PER MILE OF LINE, JANUARY TO OCTOBER, 1915, BY DISTRICTS

Month of 1915	Eastern District						Southern District						Western District					
	Operating Revenues		Operating Expenses		Net Oper. Revenues		Operating Expenses		Operating Revenues		Net Oper. Revenues		Operating Revenues		Operating Expenses		Net Oper. Revenues	
	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.	Per ct. inc. or dec.
	Amt. per mile	from 1914	Amt. per mile	from 1914	Amt. per mile	from 1914	Amt. per mile	from 1914	Amt. per mile	from 1914	Amt. per mile	from 1914	Amt. per mile	from 1914	Amt. per mile	from 1914	Amt. per mile	from 1914
January	\$1,592	d 6.3	\$1,285	d 9.8	\$307	11.8	\$793	d 15.0	\$589	d 15.2	\$204	d 14.3	\$681	d 7.1	\$495	d 7.4	\$186	d 6.5
February	1,508	a	1,203	d 10.2	305	81.8	761	d 10.4	568	d 11.6	193	d 6.7	660	a	472	d 6.4	188	21.0
March	1,741	d 5.9	1,289	d 11.0	452	12.7	864	d 11.9	608	d 12.3	256	d 10.9	726	d 6.5	496	d 7.8	230	d 3.8
April	1,812	1.0	1,286	d 6.1	526	23.9	846	d 6.1	600	d 11.5	246	10.3	695	d 5.2	503	d 7.5	192	1.5
May	1,868	2.7	1,308	d 7.8	560	40.1	830	d 6.6	593	d 12.5	237	12.1	727	d 2.0	513	d 7.2	214	13.2
June	1,967	3.3	1,298	d 7.4	669	33.4	814	d 5.9	590	d 9.4	224	5.0	777	d 1.4	537	d 6.3	262	5.3
July	2,008	3.8	1,316	d 3.9	692	22.5	846	d 4.5	612	d 9.2	242	9.7	819	d 1.4	547	d 2.1	319	3.8
August	2,117	7.6	1,346	d 2.1	771	15.5	879	d 1.2	612	d 7.1	267	15.9	866	a	533	d 0.2	376	7.7
September	2,182	3.9	1,364	d 0.7	818	26.1	930	7.8	621	d 3.5	309	41.0	929	2.8	553	d 2.1	376	7.7
October	2,292	17.1	1,453	5.2	839	45.4	986	14.3	653	2.7	333	46.7	989	8.9	575	2.3	414	19.7

a Less than one-tenth of one per cent. d Decrease.

June, July, September and October, and destined, it is hoped, to remain in its present relative position for many months to come.

Table III presents the per-mile figures of gross and net earnings and expenses for the three districts into which the country is divided for statistical purposes by the commission. The table covers the ten months of the calendar year 1915, and gives the percentage relation of the figures to the corresponding data for

sections. In net revenue the East has made a striking showing. Every month has a substantial increase in its per-mile figure over the corresponding figure of 1914, October having a gain of 45.4 per cent. The February percentage of 81.8 per cent may be disregarded as abnormal. The month of February, 1914, yielded only \$174 per mile of net revenue, which was a decline of 55.6 per cent from 1913. While this showing of net earnings in the East cannot be equalled either in the size or the uni-

formity of the increase by the other districts, yet the latter have shown steady improvement since March. October yielded an increase per mile in the South of 46.7 per cent and in the West of 19.7 per cent.

One may safely prophesy that the year 1916 will show results far more agreeable to railway stockholders than have been realized in the past few years. The turning point seems to have been reached. However much we may deplore the occasion for our sudden awakening from our industrial lethargy, we must admit that it has enormously stimulated business and that its influence is being felt in industries and in sections remote from any connection with the European conflict. The commission has recognized the principle that the railways must have sufficient income to attract investors and to secure the capital necessary to maintain a standard of service demanded by the public. Such increases as the commission has granted will now do their part in increasing the fund of gross earnings. So far as reduction in expenses consists of deferred maintenance, it will mean only a temporary saving to the railways. But so far as the starvation period now passing away has developed more economical methods of operation and has reduced transportation expenses, it will represent a clear saving to the roads and a swelling of their net earnings. Their prosperity during the coming year depends in no small degree upon the manner in which expenses have been curtailed during the past two years.

DIVIDEND CHANGES

The accompanying table shows the changes in rates or in amounts declared of dividends of the railroads in the United States which made a change in 1915 as compared with 1914. The uncertainty of the first half of the calendar year and the increased business and brighter prospects of the second half of the year made the dividend changes very irregular.

Only such roads are included in the table where the total amount declared in 1915 was different than that in 1914. Thus,

DIVIDEND CHANGES

	Declared in 1915	Declared in 1914	Present annual rate	Annual rate in 1914
Alabama & Vicksburg.....	5	7	5	7
Baltimore & Ohio, common.....	5	6	5	6
Bangor & Aroostook.....	3	3½	1	..
Chesapeake & Ohio.....	None	3	..	..
Chicago Great Western, first preferred..	1	None	4	..
Chicago, Milwaukee & St. Paul, common 4½	4½	5	4	5
Detroit & Mackinac, common.....	None	5	..	5
Hocking Valley.....	1	7	..	7
Kanawha & Michigan.....	1½	5	..	5
Louisville & Nashville.....	5	7	5	7
Michigan Central ²	4	6	4	6
Nashville, Chattanooga & St. Louis.....	5	7	5	7
Pennsylvania Company.....	6	4	3	3
Pittsburgh, Cincinnati, Chicago & St. Louis ⁴	4	..	..	..
Southern Railway, preferred.....	None	4½ ³	..	5
Toronto, Hamilton & Buffalo.....	None	4¾	..	6
Vicksburg, Shreveport & Pacific.....	None	5	..	5
Wrightsville & Tennille.....	3	6	..	6

¹ Deferred.

² The company declares its dividend after the English methods out of earnings for certain periods, but in the table above the periods within which the dividends were declared are indicated, and the Michigan Central is made uniform with the other companies.

³ The annual rate is not determinable.

⁴ In December the directors declared 4 per cent on the preferred and 2 per cent on the common stock. The last previous dividend was 2½ per cent, declared in December, 1914, on the preferred, and ¾ per cent declared in March, 1915.

⁵ Of the 4½ per cent dividends declared in 1914, 2 per cent was paid in 5-year 4 per cent interest bearing scrip.

if a road deferred or omitted to pay a semi-annual dividend in the first half of the year 1915, but later declared the regular semi-annual dividend in the second half year and a dividend to correspond with the deferred or omitted dividend of the first half year, this road would not be included in the table.

ENLISTMENTS FROM THE NORTH-EASTERN RAILWAY OF ENGLAND.—The total number of employees of the North-Eastern Railway who had joined the colors up to November 22 was 9,179, or 16.85 per cent of the company's regular staff.

THE LABOR SITUATION

By W. L. STODDARD.

Washington, December 29.

The meager news which emanates from various quarters, chiefly from Chicago, concerning the great eight-hour day movement of the concerted railroad employees is causing considerable speculation here. The average congressman is, very likely, a resume of the salient ideas and theories which this correspondent ignorant of the situation, but Washington opinion is not wholly made up of congressmen's views. The following paragraphs are sent, for one, has been able to gather from more than a single source. While it is forbidden to mention names, it may be said that the general theme of this letter follows closely the thought of a government officer who is peculiarly well placed to speculate wisely:—

The gravity of the situation cannot be overestimated, and as time goes on the movement which has been started after months of more or less circumstantial rumor, grows more and more formidable. Eventually it will mean either a strike, the worst railroad strike in the history of the United States, or mediation. In case a strike should be called, it is expected that the public would step in, and the case then go to arbitration. But the men will avoid arbitration as long as possible, preferring to place their demands in the hands of a committee for the purpose of conferring or mediating with a committee of railroad officers.

The railroad employees appear to be little inclined to use the strike as a bluff—as has been done in the past. Brotherhood officers who are averse to striking are finding it difficult to talk down the idea of a strike—to make the men see that the strike should be used as a threat rather than as an actual implement wherewith to secure their demands.

The fact that the rank and file of the railroad employees appear to be getting impatient of the usual long-drawn-out arbitration proceedings is an important factor. It means that there are only two ways in which they may press for their demands: mediation or strike. The men seem to be in the mood for bargaining with the roads, provided the bargain can be of the short, direct, non-technical kind instead of the elaborately documented court proceedings of the usual arbitration case. As the situation "sizes up" today, the last resort of the brotherhoods in their fight for an eight-hour day will be forced arbitration growing out of an actual strike of some days' duration.

The seriousness of this situation is still evidently unappreciated by the public and by many railroad men—both employees and employers. The organized and industrial unionized movement for an eight-hour day has been a long time coming, but apparently it is surely approaching a climax. The moral effect of this great movement, say my informants, is bound to be far-reaching irrespective of the immediate outcome. And, by the same token, the manner in which both the men and the roads handle themselves and the case will be of the utmost significance in future railroad wage controversies—for, boiled down to dollars and cents, the fundamental question is one of wages for overtime. It is partly a question of machinery, but to a large extent a question of attitude and temper. On the answer made to these questions depends the further question of whether there will be an actual strike or not.

ELECTRIFICATION IN BRITAIN.—At the end of 1913 there were 83 electric locomotives in use on British railways, of which 52 were on the City & South London, and 21 on the Metropolitan. There were at the same period 1,019 electric motor vehicles with a total seating capacity of 51,219, and 1,467 electric trailer cars with a seating capacity for 77,297. All the electric locomotives and the trailer cars, and also all the motor vehicles except 13 cars, seating 712 passengers, in Ireland, are in England. In addition to these there were 214 steam rail motors, seating 11,078 passengers. Four, seating 145, were in Scotland; six, seating 242, in Ireland, and the remainder in England and Wales.

Cars and Locomotives Ordered and Built in 1915

Year Signalized by Extension of All-steel Equipment,
Foreign Orders and Rush of Business in Last Quarter

The railways, the private car lines and other users of cars and locomotives in the United States, Canada and Mexico have during 1915 placed orders for or authorized the construction of 107,796 freight cars, 3,092 passenger cars and 1,573 locomotives.* The supply companies of this country and Canada have at the same time, however, received orders from foreign coun-

tabulations as complete as possible, but it will be found that the orders shown do not add up to as great amounts as the totals given in the several tables, there having been orders placed (as reported by the equipment builders) for 1,830 tank cars, 85 miscellaneous freight cars, and 88 small locomotives con-

TABLE I. CARS AND LOCOMOTIVES ORDERED DURING PAST 15 YEARS

Year.	Cars			Year.	Cars		
	Locomo- tives.	Passen- ger.	Freight.		Locomo- tives.	Passen- ger.	Freight.
1901....	4,340	2,879	193,439	1908....	1,182	1,319	62,669
1902....	4,665	3,459	195,248	1909....	3,350	4,514	189,360
1903....	3,283	2,310	108,936	1910....	3,787	3,881	141,204
1904....	2,538	2,213	136,561	1911....	2,850	2,623	133,117
1905....	6,265	3,289	341,315	1912....	4,515	3,642	324,758
1906....	5,642	3,402	310,315	1913....	3,467	3,179	146,732
1907....	3,482	1,791	151,711	1914....	1,265	2,002	80,264
				1915....	1,573	3,092	107,796

tries, notably Russia and France for at least 18,222 freight cars and 850 locomotives. The domestic orders this year show a substantial increase over those of 1914 when 80,264 freight cars, 2,002 passenger cars and 1,265 locomotives were ordered, but they are small compared with the figures for 1905 when 341,315 freight cars, 3,289 passenger cars and 6,265 locomotives were ordered.

During 1915 there have been built in the plants of the car and

TABLE II

CLASSIFICATION OF LOCOMOTIVES ORDERED DURING THE LAST FIVE YEARS					
	1915	1914	1913	1912	1911
Mikado	562	333	796	1,309	590
Switching	221	201	638	821	443
Consolidation	194	166	823	858	577
Mallet	120	59	72	168	112
Pacific	102	174	566	594	486
Santa Fe	75	63	...	....	...
Ten-wheel	39	48	255	364	238
Mogul	12	24	42	61	127
Mountain	9	12	24	....	2
Atlantic	1	34	46	5	9
American	1	19	8	8	27
Electric	69	59	94	75	133
Other	168	73	103	252	406
Total	1,573	1,265	3,467	4,515	2,850

locomotive builders 74,112 freight cars, 1,949 passenger cars and 2,085 locomotives. Although these totals include a fair proportion of foreign orders, they are much below the totals for 1914, the output for cars in fact being the smallest reported by this

TABLE III. FREIGHT AND PASSENGER CARS BUILT EACH YEAR SINCE 1899

Year.	Freight.	Passenger.	Total.
1899.....	119,886	1,305	121,191
1900.....	115,631	1,636	117,267
1901.....	136,950	2,055	139,005
1902.....	162,599	1,948	164,547
1903.....	153,195	2,007	155,202
1904.....	60,806	2,144	62,950
1905.....	165,155	2,551	168,006
1906*.....	240,503	3,167	243,670
1907*.....	284,188	5,457	289,645
1908*.....	76,555	1,716	78,271
1909*.....	93,570	2,849	96,419
1910*.....	180,945	4,412	185,357
1911*.....	72,161	4,246	76,407
1912†.....	152,429	3,060	155,489
1913†.....	207,684	3,296	210,980
1914†.....	104,541	3,691	108,232
1915†.....	74,112	1,949	76,061

* Includes Canadian output.

† Includes Canadian output and equipment built in railroad shops.

cerning which it was impossible to obtain detailed information. Although even with this there may be some omissions of domes-

TABLE IV. LOCOMOTIVES BUILT FOR EVERY YEAR SINCE 1893

Year.	No. Built.	Year.	No. Built.	Year.	No. Built.
1893.....	2,011	1901.....	3,384	1908*.....	2,342
1894.....	695	1902.....	4,070	1909*.....	2,887
1895.....	1,101	1903.....	5,152	1910*.....	4,755
1896.....	1,175	1904.....	3,441	1911*.....	3,530
1897.....	1,251	1905*.....	5,491	1912†.....	4,915
1898.....	1,875	1906*.....	6,952	1913†.....	5,332
1899.....	2,475	1907*.....	7,362	1914†.....	2,235
1900.....	3,153			1915†.....	2,085

* Includes Canadian output.

† Includes Canadian output and equipment built in railroad shops.

tic orders, the results are sufficiently accurate to meet the general purpose for which these statistics are prepared, namely, to show the character and extent of the purchases of motive power and rolling stock this year as compared with last.

Tables are also given, showing the foreign orders for cars and locomotives. While it is not likely that these tables are complete it is probable that they include at least nine-tenths of the foreign orders received and certainly all of the important ones.

TABLE A—CLASSIFICATION OF FREIGHT CARS ORDERED DURING 1915

	Steel Frame and steel underframe					Not specified	Total	Draft Gear		
	All Steel	Steel frame and steel underframe	Steel underframe	Composite underframe	Wood			Spring	Friction	Not specified
Box	11,005	14,945	11,377	1,225	601	1,850	41,303	14,852	24,225	2,226
Refrigerator	224	100	3,619	...	...	550	4,493	2,069	1,874	550
Hopper, including ore.....	27,548	8	...	...	10	906	28,472	1,016	26,537	919
Gondola	9,337	7,845	2,515	150	...	500	20,347	8,759	10,538	1,050
Coal (not otherwise specified).....	1,000	...	...	...	...	600	1,600	...	1,000	600
Stock .....	...	510	1,500	300	...	10	2,320	1,050	1,260	10
Flat	1,047	...	...	6	104	95	1,252	107	892	253
Tank	5,881	...	...	...	...	186	6,067	50	4,045	1,972
Caboose	120	20	145	27	...	50	362	27	260	75
Miscellaneous or not specified.....	551	340	244	...	10	435	1,580	121	991	468
Total	56,713	23,768	19,400	1,708	725	5,482	107,796	28,051	71,622	8,123

paper since 1904, and that of locomotives the smallest since 1898.

On the following pages are shown detailed lists of the freight cars, passenger cars and locomotives ordered by the railways, private car lines and industrial companies of the United States, Canada and Mexico. Every effort has been made to make these

* It will be understood that these totals include only those orders for cars and locomotives which came to our attention up to the time of going to press, Wednesday evening, December 29. If other orders, placed before the end of the year, are reported later, the items will appear in the Equipment and Supplies column in the General News Section in next week's issue and revised totals will be given in that column.

The information given herewith is compiled from official sources. The *Railway Age Gazette* in answer to its inquiries received communications this year from all but two of the railways in the United States and Canada owning over 500 cars. It also heard from the greater part of the remaining roads and from most of the private car lines owning over 100 cars. In the case of foreign orders, and where no replies were received, from the railways here, the details were taken from the weekly records or from the reports of the builders.

The remarkable feature in this year's records has been the revolutionary change in business activity since October 1. Our records show that the first half of the year, as far as the equipment market was concerned, was exceedingly dull, and that scarcely more than one-third of the orders for the year were placed before July 1. The last four months have been exceptionally prosperous, and it is worthy of note that approximately half the year's orders have been placed since October 1. The year will also be remembered for the enormous increase of business with railways of foreign countries.

Of the 107,796 freight cars ordered this year only 725 are specified as being of wood, and only 1,708 as having composite underframes. There has been a very decided increase in cars of all-steel and steel frame construction, but the cars with steel underframes only are but little more than half those of last year. This is shown in the case of the box cars particularly, the number of all-steel box cars having increased over four times.

Concerning passenger cars, it is noticeable that by far the

from builders in both the United States and Canada, and, as usual, the output of railway shops is also included. Of the total of 74,112 freight cars built, 59,984 were on domestic, and 14,128 on foreign orders. In like manner, 39,783 were specified as being of all-steel construction, 27,887 as having steel underframes, and only 4,432 as being of wood. The construction of the remaining 2,010 was not specified. These figures for freight cars built do not show the great amount of repair work done, or the large number of steel underframes constructed for installation on old wooden cars. The economies forced upon the carriers by the late depression made this a big business this year, and a number of builders did no other work.

The total of 1,949 passenger cars built includes 1,935 for domestic uses, and only 14 for export. Nearly all the cars were of all-steel construction, 1,898 being so specified, 40 as having steel underframes, and 11 as being of wood. The total of 2,085 locomotives built includes 1,250 for domestic uses, and 835 for export abroad.

It is the consensus of opinion that the prosperity which the

TABLE B—CLASSIFICATION OF PASSENGER CARS ORDERED DURING 1915

	All Steel a	Steel under-frame b	Composite under-frame d	Wood f	Not specified g	Total	Method of Lighting					Not specified h
							Electric x	Gas y	Electric and gas xy	Oil w	None v	
Coaches and smoking, including combination coach and smoking.....	1,771	7	..	..	..	1,778	1,763	13	..	..	..	2
Parlor and chair.....	83	..	..	..	..	83	80	..	2	..	..	1
Sleeping.....	473	..	..	..	..	473	466	..	7	..	..	..
Dining.....	35	..	..	..	..	35	31	..	..	..	..	4
Comb. passenger and baggage.....	90	1	..	1	..	92	86	5	..	..	..	1
Baggage.....	245	1	..	..	..	246	200	31	..	..	..	15
Comb. baggage and mail.....	116	..	..	..	..	116	103	13	..	..	..	..
Mail.....	40	..	..	..	..	40	21	16	..	..	..	3
Gas-electric and gasoline.....	10	..	..	..	..	10	7	..	..	..	..	3
Miscellaneous.....	11	85	23	..	100	219	10	3	..	1	105	100
Total.....	2,874	94	23	1	100	3,092	2,767	81	9	1	105	129

larger proportion of the equipment is of all-steel construction and provided with electric lighting.

Of the total of 1,573 locomotives ordered, 1,174 are specified as being equipped with superheaters, and 919 as being provided with brick arches.

The returns relating to equipment built in 1914 have come

railway supply field is now enjoying will extend well over into the coming year. A number of companies have sufficient orders on hand at present to keep them busy for a number of months. Some report orders on hand at the close of the year from three to ten times as great as were waiting to be filled at this time last year.

FREIGHT CARS ORDERED IN 1915

Purchaser	No.	Kind	Builder	Purchaser	No.	Kind	Builder
Alabama & Vicksburg....	cn 60	Gondola . 80,000	Am. C. & F.	Bangor & Aroostook....	an 125	Flat 80,000	Std. Steel
Alberta & Gt. Waterways	cn 11	Tank ... 80,000	Am. C. & F.	Barrett Mfg. Co.....	an 1	Tank ... 6,233g.	Ger. Am.
Am. Cotton Oil Co.....	fm 50	Box 60,000	Can. C. & F.		an 1	Tank ... 6,231g.	Ger. Am.
American Linseed Co....	an 148	Tank ... 8,050 g.	Ralston		an 1	Tank ... 5,810g.	Ger. Am.
Am. Refrig. Transit Co....	an 10	Box 60,000	Am. C. & F.	Berlin Mills	an 1	Gondola . 100,000	West. Steel
Am. Sheet & Tin Plate Co.....	bm 16	Refrig. .. 60,000	Am. C. & F.	Bethlehem Chile Iron Mines	an 3	Flat 100,000	Press. Steel
Am. Steel & Wire Co....	6	Tank	Ger. Am.	Boston Elevated	an 1	Flat 40,000	Laconia
American Zinc Co.....	an 50	Tank ... 100,000	Ger. Am.	Buckbannon Chemical Co.	am 3	Dump .. 40,000	Universal
Anaconda Copper Co....	a 25	Tank ... 100,000	Am. C. & F.	Butte, Anaconda & Pac...	f 6	Logging	Russell W. & F.
Anaconda Copper Min. Co.	an 22	Ore 120,000	Mt. Vernon	California Dispatch Line.	an 100	Ore 100,000	West. Steel
	an 100	Hopper .. 100,000	West. Steel	Calumet & Hecla Min. Co.	an 5	Tank ... 80,000	Ger. Am.
Anglo - Newfoundland Dev. Co.....	an 6	Concen- trate .. 120,000	Mt. Vernon	Campbell's Creek	bm 5	Hopper .. 100,000	West. Steel
Atchison, Top. & S. Fe...	an 14	Dump ... 100,000	Pullman	Canadian Govt. Rys....	bm 100	Gondola . 80,000	Am. C. & F.
	am 6	Concen- trate .. 100,000	Cambria	Canadian Pacific.....	am 250	Gondola . 100,000	Eastern Car
	am 2	Hopper .. 100,000	Cambria	Capitol Refining Co....	bm 500	Box 80,000	Can. C. & F.
	cm 12	Box 40,000	Eastern Car	Car. Clinchfield & Ohio..	bm 150	Box 80,000	Can. C. & F.
	bn 700	Box 80,000	Has. & Bar.	Carnegie Steel Co.....	800	Box	Co. shops
	bn 500	Refrig. ... 60,000	Am. C. & F.	Central of Georgia.....	250	Refrig.	Co. shops
	an 25	Flat 80,000	Am. C. & F.	Central of New Jersey...	a 25	Tank ... 80,000	Am. C. & F.
	an 25	Ore 100,000	West. Steel		1	Concrete mixing.	McKeen
	cn 500	Concen. . 100,000	Pullman		am 3	Tank ... 60,000	Press. Steel
	an 400	Tie 80,000	Has. & Bar.		bn 500	Box 80,000	Pullman
	an 100	Tank ... 80,000	Press. Steel		bn 500	Vent. box 80,000	Am. C. & F.
	an 25	Concen- trate .. 100,000	Pullman		an 1000	Hopper .. 110,000	Std. Steel
	an 50	Flat 60,000	Co. shops		an 1000	Hopper .. 110,000	Press. Steel
	an 10	Flat 80,000	Co. shops		cn 500	Box 80,000	Std. Steel
	an 200	Flat 80,000	Am. C. & F.		cn 500	Box 80,000	Am. C. & F.
	bn 750	Box 60,000	Mt. Vernon		bn 250	Ins. Box .. 80,000	Am. C. & F.
Atlas Car Co.....	am 15	Tank ... 8,000 g.	Chgo. Car		1	Dump ... 20 yds.	Clark Car
Baltimore & Ohio.....	an 15	Tank ... 8,000 g.	Ger. Am.		35	Logging ... 60,000	Magor
	bn 1006	Box 80,000	Mt. Vernon	Central Steel Co.....	an 1000	Coal 140,000	Std. Steel
	an 2000	Hopper .. 110,000	Cambria	Champion Lbr. Co.....	1000	Box 60,000	Central Loco.
	an 600	Hop. bod. 105,000	Am. C. & F.	Chesapeake & Ohio.....	50	Caboose	Am. C. & F.
	an 400	Hop. bod. 105,000	Ralston		an 10	Gon. bod. 115,000	Press. Steel
	an 910	Hop. bod. 105,000	Std. Steel	Chicago & Alton.....	dn 150	Gondola . 80,000	Has. & Bar.
	an 200	Hop. bod. 105,000	Greenville	Chicago & North Western	cn 2000	Box 80,000	West. Steel
	an 300	Hop. bod. 105,000	Press. Steel		an 500	Ore 100,000	Am. C. & F.
	bn 500	Box 80,000	Std. Steel		bn 50	Caboose	Am. C. & F.
					250	Ore	Am. C. & F.
				Chic. Burlington & Quin.	cm 1000	Box 80,000	Hettendorf
					cm 1000	Box 80,000	Am. C. & F.
				Chicago Great Western..	an 2	Air dump 20 yds.	Kil. & Jac.
				Chic., Milwaukee & St. P.	500	Ore 120,000	Co. shops

Purchaser	No.	Kind	Builder	Purchaser	No.	Kind	Builder
Chic. Rock Island & Pac.	cn 2500	Box	80,000 Pullman	Intercolonial	am 5	Snow plow.....	Can. C. & F.
	cn 1000	Box	80,000 Bettendorf		350	Box	80,000 Nat. Steel
Chic. St. Paul, Minn. & Omaha	cn 500	Box	80,000 Has. & Bar.	Intermountain	an 10	Logging	70,000 Magor
				International Agric. Corp.	a 20	Tank ...	100,000 Am. C. & F.
				International & Great Northern			
Chili Exploration Co....	bn 100	Refrig. ..	60,000 Has. & Bar.	International Smelting Co.	bn 200	Stock ...	60,000 Mt. Vernon
Cin., Hamilton & Dayton	cn 750	Box	80,000 Has. & Bar.		cn 500	Box	80,000 Mt. Vernon
Cin., Indianapolis & West.	cn 750	Box	80,000 Am. C. & F.		cn 300	Ballast ...	100,000 Mt. Vernon
	cn 300	Auto. ...	80,000 Am. C. & F.				
	an 40	Ore	120,000 Press. Steel		an 4	Hopper ..	120,000 Mt. Vernon
	am 2	Gondola ..	100,000 Cambria		a 10	Flat bod..	80,000 Mt. Vernon
	bn 450	Box	80,000 Has. & Bar.		cn 3	Hopper ..	100,000 Press. Steel
	bn 50	Stock ...	80,000 Has. & Bar.		a 20	Tank ...	60,000 Am. C. & F.
	an 40	Flat	80,000 Has. & Bar.		a 30	Tank ...	100,000 Am. C. & F.
	bn 50	Gondola ..	100,000 Has. & Bar.		20	Hopper ..	100,000 Clark Car
	an 50	Hopper ..	100,000 Has. & Bar.		an 1	Tank ...	80,000 Erie
	dn 20	Caboose ..	Has. & Bar.		a 36	Tank ...	80,000 Am. C. & F.
	bm 500	Auto. ...	80,000 Am. C. & F.		a 12	Tank ...	100,000 Am. C. & F.
	6	Ore	Cambria		a 12	Tank ...	60,000 Am. C. & F.
	100	Coal	Co. shops		an 155	Tank ...	10,000 g. Am. C. & F.
	a 20	Tank ...	80,000 Am. C. & F.		an 197	Tank ...	8,000 g. Am. C. & F.
	an 6	Tank ...	10,000 g. Kennicott		an 13	Tank ...	6,000 g. Am. C. & F.
	an 50	Ore	100,000 Press. Steel		an 23	Tank ...	8,000 g. Kennicott
	a 50	Tank ...	100,000 Am. C. & F.		an 5	Flat	200,000 Ralston
	a 30	Tank ...	80,000 Am. C. & F.		an 1	Sand	100,000 Summers
	a 20	Tank ...	60,000 Am. C. & F.		am 1	Sand	100,000 Summers
	f 10	Logging ..	20,000 Russel W. & F.		an 32	Hopper ..	100,000 Am. C. & F.
	an 5	Tank ...	60,000 Am. C. & F.		an 406	Hopper ..	100,000 Cambria
	an 35	Tank ...	100,000 Am. C. & F.		an 25	Ore	100,000 Am. C. & F.
	an 50	Tank ...	100,000 Ger. Am.		b 25	Caboose ..	Am. C. & F.
	a 50	Tank ...	80,000 Am. C. & F.		f 1	Box	Preston
	f 5	Logging ..	30,000 Russel W. & F.		bn 100	Box	100,000 Press. Steel
	f 10	Logging ..	30,000 Russel W. & F.		bn 100	Long gon	100,000 Press. Steel
	an 2	Cun	200,000 Press. Steel		an 1	Tank ...	10,000 g. Am. C. & F.
	fm 1	Snow plow.....	Russel S. P.		an 30	Tank ...	8,000 g. Ger. Am.
	fm 6	Flanger	Russel S. P.		an 50	Flat	60,000 Am. C. & F.
	dn 5	Caboose	Co. shops		bm 1000	Box	80,000 Co. shops
	an 500	Hopper ..	100,000 Am. C. & F.		bm 400	Gondola ..	100,000 Co. shops
	bn 1000	Box	80,000 Am. C. & F.		an 75	Logging ..	75,000 Bettendorf
	cn 300	Gondola ..	80,000 Bar. & Smith		bn 500	Stock	80,000 Has. & Bar.
	200	Gondola ..	Std. Steel		am 5	Flat	80,000 Press. Steel
	an 12	Hopper ..	150,000 Am. C. & F.		a 75	Tank ...	100,000 Am. C. & F.
					a 120	Tank ...	100,000 Am. C. & F.
	fm 6	Platform .	30,000 Can. C. & F.		an 50	Hopper ..	100,000 Press. Steel
	b 2	Dump	10 yds. Russel W. & F.		am 500	Auto. ...	100,000 Has. & Bar.
					am 500	Auto. ...	100,000 Has. & Bar.
	cn 100	Box	80,000 Am. C. & F.		cm 500	Gondola ..	110,000 Std. Steel
	cn 100	Auto. ...	80,000 Am. C. & F.		am 1500	Auto. ...	100,000 Has. & Bar.
	am 1	Tank ...	100,000 Press. Steel		am 1000	Auto. ...	100,000 Am. C. & F.
	fm 1	Flanger	Can. C. & F.		am 1000	Auto. ...	100,000 Pullman
	an 250	Ore	100,000 Am. C. & F.				
	an 500	Ore	100,000 Std. Steel		bm 3	Refrig. ..	60,000 Mil. Ref.
	an 100	Flat	60,000 Am. C. & F.		a 20	Logging ..	60,000 Mt. Vernon
	an 1000	Ore	100,000 West. Steel		an 55	Tank ...	100,000 Ger. Am.
	an 200	Hopper ..	100,000 Pullman		cn 500	Box	80,000 Bettendorf
	an 5	Box	60,000 Co. shops				
	an 25	Hopper ..	70,000 Co. shops		cn 400	Box	80,000 Am. C. & F.
					cn 100	Auto. ...	80,000 Am. C. & F.
	a 15	Tank ...	80,000 Am. C. & F.		an 200	Ore	100,000 Am. C. & F.
	a 19	Tank ...	100,000 Am. C. & F.				
	a 20	Tank ...	80,000 Am. C. & F.		bm 45	Box	80,000 J. G. Brill
					bn 80	Box	60,000 Co. shops
	f 10	Hopper ..	60,000 Co. shops		bn 200	Ballast ..	100,000 Am. C. & F.
	an 2	Gondola ..	100,000 Press. Steel		bm 100	Refrig. ..	60,000 Am. C. & F.
	10	Stock	Nat. Steel		bn 450	Refrig. ..	60,000 Has. & Bar.
	fm 50	Box	60,000 Can. C. & F.		an 20	Tank ...	80,000 Chgo. Steel
	an 50	Ore	100,000 Press. Steel		am 3	Flat	80,000 Can. C. & F.
	100	Gondola ..	Am. C. & F.				
	bn 500	D. E. Gon.	110,000 Std. Steel		cn 20	Caboose ..	Co. shops
	b 500	Gondola ..	110,000 Am. C. & F.		cm 200	Box	80,000 Co. shops
	an 1000	Gondola ..	100,000 Press. Steel		cn 800	Box	80,000 Co. shops
	a 104	Tank ...	100,000 Am. C. & F.		1	Dynamometer	Burr Co.
	am 1	Tank ...	80,000 Press. Steel		an 50	Dump ...	100,000 Pullman
	am 6	Tank ...	60,000 Press. Steel		cn 150	Box	60,000 Am. C. & F.
	60	Logging ..	80,000 Magor		cn 34	Gondola ..	80,000 Am. C. & F.
	am 2	Tank ...	60,000 Press. Steel				
					bm 500	Auto. ...	80,000 Am. C. & F.
	bn 500	Box	60,000 Has. & Bar.		bm 500	Auto. ...	80,000 Bar. & Smith
					cm 500	Gondola ..	110,000 Press. Steel
	dm 1200	Box	80,000 Has. & Bar.		cm 500	Gondola ..	110,000 Std. Steel
	dm 300	Stock	80,000 Has. & Bar.		cm 1000	Gondola ..	110,000 Std. Steel
	am 200	Gondola ..	100,000 Has. & Bar.		cm 2000	Gondola ..	110,000 Std. Steel
					am 500	Auto. ...	100,000 Has. & Bar.
	a 100	Tank ...	100,000 Am. C. & F.		am 1000	Auto. ...	100,000 Am. C. & F.
	bn 375	Vent. box	60,000 Lenoir		am 500	Auto. ...	100,000 Am. C. & F.
	an 130	Gondola ..	80,000 Lenoir				
	am 2	Tank ...	60,000 Press. Steel		an 6	Hopper ..	100,000 Ralston
	an 4	Hopper ..	100,000 Press. Steel		an 10	Gondola ..	100,000 Press. Steel
	an 200	Box	100,000 Has. & Bar.		10	Hopper ..	Std. Steel
					an 11	Hopper ..	100,000 Press. Steel
	b 30	Dump ...	10 yds. Russel W. & F.				
	fm 500	Box	80,000 Has. & Bar.		dm 2	Flat	100,000 Cambria
	bm 12	Dump ...	6 yds. Can. C. & F.		dn 4	Flat	100,000 Cambria
	cm 40	Dump ...	20 yds. Can. C. & F.		500	Coal	Std. Steel
	bn 100	Box	80,000 Has. & Bar.		am 20	Caboose ..	Co. shops
	a 50	Tank ...	80,000 Am. C. & F.		an 400	Hopper ..	100,000 Cambria
	a 100	Tank ...	80,000 Am. C. & F.		100	L. s. gon.	Am. C. & F.
	a 21	Tank ...	100,000 Am. C. & F.		bn 76	Box	100,000 Am. C. & F.
	am 6	Gen. serv.	100,000 Can. C. & F.		b 50	Box	Am. C. & F.
	f 15	Logging ..	50,000 Russel W. & F.				
	fm 2	Lidgerwood			bn 65	Cabin ...	Co. shops
		unloader	60,000 Can. C. & F.		am 50	Dump ...	16 yds. Kil. & Jacobs
	am 1	Flat	100,000 Can. C. & F.		an 1000	Gondola ..	180,000 Co. shops
	am 1	Flat	100,000 Can. C. & F.				
	bm 1000	Refrig. ..	60,000 Am. C. & F.		an 24	Ballast ..	100,000 Am. C. & F.
	bm 900	Refrig. ..	60,000 Am. C. & F.		a 1	Plow car..	Am. C. & F.
	am 100	Gondola ..	100,000 Am. C. & F.		an 150	Tank ...	100,000 Am. C. & F.
	40	Dump ...	West. Wh.		an 8	Tank ...	8,000 g. Kennicott
	a 10	Tank ...	Am. C. & F.		bm 750	Stock ...	80,000 Has. & Bar.
	b 50	Gondola ..	Has. & Bar.				
	an 235	Tank ...	Co. shops		a 100	Tank ...	100,000 Am. C. & F.
	an 5	Tank ...	80,000 Chgo. Steel		am 10	Logging ..	80,000 Seattle

Purchaser	No.	Kind	Builder
Pennsylvania R. R.....	an 1000	Box ....100,000	Altoona Shops
	an 622	Long gon.140,000	Altoona Shops
	an 100	Cabin ....140,000	Altoona Shops
	an 95	M.W.Flat 100,000	Altoona Shops
	an 94	M.W.Flat 100,000	Altoona Shops
	an 2	Flat ....150,000	Altoona Shops
	an 2	Spec. flat.150,000	Altoona Shops
	an 3000	Hop. gon.140,000	Cambria
	an 300	Box ....100,000	Cambria
	an 1719	Hop. gon.140,000	Am. C. & F.
	an 973	Long. gon.140,000	Am. C. & F.
	an 400	Box ....100,000	Am. C. & F.
	an 224	Refrig. ....90,000	Am. C. & F.
	an 453	Long. gon.140,000	Press. Steel
	an 20	Box ....100,000	Press. Steel
	an 200	Hop. gon.140,000	Std. Steel
Pennsylvania Lines West	cn 100	Refrig. ....90,000	Am. C. & F.
	an 1000	Gondola .140,000	Am. C. & F.
	an 1500	Gondola .140,000	Press. Steel
	an 1150	Gondola .140,000	Has. & Bar.
	an 1000	Box ....100,000	Has. & Bar.
	an 1000	Auto. ....100,000	Has. & Bar.
	an 1000	Hopper .140,000	Ralston
	an 800	Hopper .140,000	Std. Steel
	an 800	Hopper .140,000	Press. Steel
	an 50	Ore .....100,000	West. Steel
Phelps, Dodge & Co....	bgn 1000	Box ....85,000	Am. C. & F.
Philadelphia & Reading..	an 1000	Hopper .110,000	Press. Steel
	bn 500	H. S. Gon.100,000	Std. Steel
	an 500	Hopper .110,000	Std. Steel
	an 200	Hop. bod.100,000	Am. C. & F.
	an 200	Hop. bod.100,000	Am. C. & F.
	an 200	Hop. bod.100,000	Am. C. & F.
	bn 100	Box ....80,000	Am. C. & F.
Pbila., Balt. & Wash...	an 322	Long gon.140,000	Altoona Shops
	an 10	M. W. flat.100,000	Altoona Shops
	an 250	Box ....100,000	Press. Steel
	an 47	Long gon.140,000	Press. Steel
	an 14	Long gon.140,000	Am. C. & F.
	an 18	Flat ....200,000	Press. Steel
Pittsburgh Cruc. Steel Co.	cm 1000	Gondola .110,000	Std. Steel
Pitts. & Lake Erie.....	cm 1000	Gondola .110,000	Press. Steel
	cm 1000	Gondola .110,000	Std. Steel
	am 1000	Hopper .110,000	Std. Steel
	10	Hopper .110,000	Std. Steel
Pittsburgh Steel Co.....	120	Tank .....100,000	Am. C. & F.
Ponca Refining Co.....	a 30	Logging . 80,000	Russel W. & F.
Poulson Logging Co....	an 1	Gondola .100,000	Press. Steel
Proctor & Gamble Co....	a 100	Tank ....80,000	Am. C. & F.
Producers Ref. Co.....	an 50	Tank ....60,000	Am. C. & F.
Prudential Oil Corp....	an 120	Tank ....80,000	Am. C. & F.
	an 30	Tank ....100,000	Am. C. & F.
	50	Tank ....100,000	Am. C. & F.
	b 25	Box ....80,000	Mt. Vernon
Quanab, Acme & Pacific	bn 15	Gondola .100,000	Std. Steel
Raritan River	an 20	Ore .....120,000	Press. Steel
Ray Cons. Copper Co....	f 35	Logging . 50,000	Russel W. & F.
Richardson & Avery....	bm 50	Refrig. ....60,000	Co. shops
St. Louis Refrig. Car Co	bm 300	Gondola .100,000	Am. C. & F.
St. Louis, Troy & Ea....	an 1500	Hopper .110,000	Cambria
Sandy Valley & Elkborn	an 1000	Hopper .110,000	Am. C. & F.
	an 500	Hopper .110,000	Press. Steel
San Pedro, Los Ang. &	bm 5	Caboose Pullman	
Salt Lake.....	a 17	Tank ....100,000	Am. C. & F.
Smethport Extract Co...	dm 25	Box ....60,000	Central Loco.
South Dakota Central..	dm 2	Caboose Central Loco.	
Southern	2	Dynamometer ... Lenoir-Burr	
Southern Extract Co....	10	Tank ....100,000	Am. C. & F.
Spang, Chalfant & Co...	an 10	Flat ....150,000	Cambria
	an 5	Gondola .100,000	Cambria
Standard Oil Co.....	a 3	Coke .....100,000	Am. C. & F.
Sun Co.....	a 60	Tank ....80,000	Am. C. & F.

Purchaser	No.	Kind	Builder
Swift & Co.....	300	Beef	Co. shops
	250	Freight	Has. & Bar.
Tenn. Coal, Iron & R.	am 20	Tank ... 80,000	Press. Steel
R. Co.....	a 35	Tank ...100,000	Am. C. & F.
Tennessee Copper Co...	cn 10	Stock ... 60,000	Nat. Steel
Toronto, Hamilton &	a 120	Tank ... 80,000	Am. C. & F.
Buffalo	bn 500	Refrig. ....80,000	Am. C. & F.
Thwing, F. H., & H. M.	an 1000	Tank ... 6,500 g.	Std. Steel
Evans	am 4	Flat ....60,000	Laconia
Union Ref. Tran. Co....	50	Dump ...30 yds.	Clark Car
Union Tank Line.....	an 100	Ore .....100,000	Press. Steel
U. S. Navy.....	100	Ore .....100,000	Std. Steel
Utah Copper Co.....	an 300	Box ....100,000	Has. & Bar.
Vandalia	cn 23	Box ....60,000	Am. C. & F.
Vicksburg, Shreveport &	f 13	Logging . 40,000	Russel W. & F.
Pac.	bm 120	Box ....60,000	Am. C. & F.
Vilas Lbr. Co.....	a 30	Tank ... 60,000	Am. C. & F.
Virginia-Carolina	a 10	Tank ...100,000	Am. C. & F.
Warner, Quinlan Asph.	an 3000	Hopper .100,000	Pullman
Co.	cm 1000	Box ....80,000	Pullman
Western Maryland	an 56	Long gon.140,000	Altoona Shops
Western Pacific	an 1	M. W. flat.100,000	Altoona Shops
West Jersey & Seabore	an 30	Box ....100,000	Press. Steel
	an 13	Long gon.140,000	Am. C. & F.
Wheeling & Lake Erie..	cn 200	Auto. ....80,000	West. Steel
	an 200	Gondola .140,000	Press. Steel
	an 400	Gondola .140,000	Std. Steel
Wil. Brunswick & So...	5	Gondola Ga. Car	
Winston - Salem South-	an 20	Flat ....80,000	Am. C. & F.
bound	an 15	Flat ....140,000	Press. Steel
Woodward Iron Co.....	an 25	Tank ... 8,200 g.	Ger. Am.
Wood Products Co....	f 4	Platform.. 20,000	Russel W. & F.
Yale & Towne Mfg. Co..			

ORDERS FROM FOREIGN RAILWAYS

British War Dept.....	c 1200	Box ....60,000	Can. C. & F.
Cuban Central	100	Box ....30,000	Std. Steel
	200	Flat ....30,000	Std. Steel
	25	N. g. flat. 30,000	Std. Steel
	50	N. g. box. 30,000	Std. Steel
	20	Flat bod. 30,000	Std. Steel
French Government.....	am 1000	Gondola . 44,000	Eastern
	1000	Box	Keith Car
Guantanamo & Western.	10	.....	Magor
Nigerian Ry.	bm 100	L. s. gon.....	Can. C. & F.
	f 100	Coal ....20,000	Can. C. & F.
Russian Government....	a 5000	Gondola .110,000	Press. Steel
	c 2000	Box ....88,000	Press. Steel
	c 2000	Box ....88,000	Eastern
	c 4100	Box ....88,000	Am. C. & F.
	200	Freight	Magor
	250	Freight	Magor
	b 60	Flat ....110,000	Press. Steel
South Africa, High Com.	am 2	Flat ....100,000	Can. C. & F.
for	645	Flat ....40,000	Std. Steel
United Rys. of Havana.	50	Flat ....60,000	Std. Steel
	100	Box ....60,000	Std. Steel
	10	Caboose Std. Steel	

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

PASSENGER CARS ORDERED IN 1915

Purchaser	No.	Kind	Builder
Alberta & Gt. Waterways..	a 2	Gasolene mech. drive	McKeen
Atlantic Coast Line.....	ax 2	Coaches	Pullman
	ax 3	Mail & bagg.....	Pullman
	an 1	Pass. & bagg.....	Pullman
Baltimore & Ohio.....	ax 33	Coaches	Pullman
	ax 5	Pass. & bagg.....	Pullman
	ay 2	Bagg. & mail....	Pullman
	ay 4	Baggage	Pullman
	ax 6	Cafe coaches....	Pullman
Bevier & Southern.....	f 1	Pass. & bagg.....	Am. C. & F.
Boston & Albany.....	ax 25	Coaches	Osgood-Brad.
Boston & Maine.....	ay 4	Mail	Laconia
	ax 2	Mail	Laconia
	ax 6	Baggage	Laconia
	ax 6	Coaches	Pullman
	ax 2	Smoking	Pullman
Bureau of Fisheries.....	aw 1	Fish	Har. & Holl.
Butte, Anaconda & Pac....	ax 1	Mail & baggage..	Am. C. & F.
Canadian Pacific.....	ay 12	Postal	Co. shops
	ay 1	Bagg. & mail....	Co. shops
	ay 4	Baggage	Co. shops
	ax 1	Dining	Co. shops
Central of Georgia.....	ay 4	Express	Pullman
	ax 1	Bagg. & mail....	Pullman
Central of New Jersey....	ax 40	Coaches	Har. & Holl.
	ax 10	Pass. & baggage..	Har. & Holl.
	ax 5	Bagg. & mail....	Har. & Holl.
	ax 5	Bagg. & exp....	Har. & Holl.
Chic., Burlington & Quincy.	a 8	Dining	Am. C. & F.
	a 9	Pass. & bagg.....	Am. C. & F.
	a 15	Coaches	Am. C. & F.
	a 15	Chair	Am. C. & F.
	a 2	Coach & smoking.	Am. C. & F.
	a 5	Postal	Am. C. & F.
Chicago & North Western..	ay 10	Coaches	Am. C. & F.
	ay 3	Smoking	Am. C. & F.
	ay 10	60-ft. Baggage....	Am. C. & F.
	ay 3	70-ft. Baggage....	Pullman
	ay 5	Pass. & baggage..	Pullman
	ay 10	Baggage & mail..	Pullman
	ax 2	Chair	Pullman
	ax 4	Parlor	Pullman
	ax 3	Obs. buffet-lounge-ing	Pullman
Chicago Elevated Railways..	ax 122	Motor elevated...	Cincinnati
Chicago Great Western....	ax 2	Buffet chair....	Pullman
	ax 2	Cafe obscr.....	Pullman
	ax 2	Pass & bagg.....	Pullman
	a 1	Postal	Am. C. & F.
Chic., Milwaukee & St. Paul	axy 7	Obs. sleeping....	Pullman
Chic., St. Paul, Minn. &	axy 2	Obs. lounging....	Pullman
Omaha	ax 2	Dining	Pullman
	ax 2	Obs. lounging....	Pullman
Chic., Wau & Fox Lake	a 1	Gasolene mech. drive	McKeen
Tract.	ax 15	Coaches	Bar. & Smith
Cleve., Cin., Chic. & St. L.	dy 3	Pass. & mail....	Co. shops
Colorado Midland.....	ax 9	Coach & smoking.	Bar. & Smith
Delaware & Hudson.....	ax 9	Coach & smoking.	Am. C. & F.
	ax 6	Baggage	Am. C. & F.
Del., Lackawanna & Western	ax 3	Bagg. & mail....	Am. C. & F.
	ax 2	Mail & exp....	Am. C. & F.
	ax 2	Dining	Pullman
	ax 10	Express	Pullman
Eaton, Sir J. C.....	ax 1	Private	Preston
El Paso & Southwestern....	ax 2	Dining	Pullman
	ax 2	Observation	Pullman
Erie	ax 11	Coaches	Pressed Steel
	ax 2	Pass. & baggage..	Pressed Steel

Purchaser	No.	Kind	Builder
Florida East Coast.....	ax 1	Gas-electric	Gen. Elec.
Ft. Dodge, Des Moines & So.	ax 3	Pass. & baggage..	Am. C. & F.
Ga. Southern & Fla.....	ax 2	Pass. & baggage..	Pressed Steel
Grand Rapids & Indiana...	ax 6	Coaches	Pressed Steel
Grand Trunk Pacific.....	b 50	Exp. refrig.....	Can. C. & F.
Green Bay & Western.....	b 1	Coach	Am. C. & F.
Illinois Central	b 100	Pass. refrig.....	Am. C. & F.
Illinois, State of.....	a 1	Private	McGuire - Cum-mings
Interborough Rapid Tran...	ax 12	Subway	Pressed Steel
	ax 478	Subway	Pullman
	ax 311	Subway	Pullman
Intercolonial	ax 4	Sleeping	Preston
Kewaunee, Green Bay & W.	b 1	Coach	Am. C. & F.
Lehigh Valley.....	d 20	Milk	Std. Steel
	ax 2	Dining	Pullman
London & Port Stanley....	bx 3	Coaches	Preston
	bx 1	Baggage	Preston
Long Island.....	ax 20	Trailer coaches...	Std. Steel
	ax 25	Trailer coaches...	Std. Steel
	ax 1	Club	Am. C. & F.
	ax 10	Baggage	Am. C. & F.
	ax 6	Parlor	Am. C. & F.
	ax 2	Pass. & baggage..	Am. C. & F.
	ax 4	Smoking & comp. coaches	Am. C. & F.
	ax 4	Smoking & comp. coaches	Am. C. & F.
	ax 2	Baggage	Am. C. & F.
	ax 4	Bagg. & mail....	Am. C. & F.
	ax 15	Coaches	Am. C. & F.
Michigan Central	ax 12	Passenger	J. G. Brill
Minn., St. P., Roch. & Dubuque	ax 1	Bagg. & mail....	Co. shops
	ax 1	Baggage	Co. shops
	ax 2	Gas. Elec.	Gen. Elec.
Minn., St. Paul & S. S. Marie	ax 6	Postal	Am. C. & F.
Mo., Kansas & Texas.....	a 15	Baggage	Am. C. & F.
	a 4	Dining	Am. C. & F.
	a 2	Postal	Am. C. & F.
Muscatine & Iowa City....	ax 4	Gas electric....	Gen. Elec.
Nash., Chattanooga & St. L.	ax 2	Postal	Am. C. & F.
New York Central.....	ax 30	Coaches	Am. C. & F.
	ax 20	Coaches	Osg. Bradley
New York Municipal.....	ax 100	Motor subway...	Am. C. & F.
	ax 100	Subway	Am. C. & F.
N. Y., N. H. & H.....	ax 65	Coaches	Osgood-Brad.
	ax 20	70 ft. baggage...	Osgood-Brad.
	ax 15	60 ft. baggage...	Osgood-Brad.
	ax 2	Dining	Pullman
N. Y., Phila. & Norfolk....	bx 2	Coaches	Pressed Steel
N. Y., Westchester & Boston	ax 15	Passenger	Pressed Steel
Norfolk & Western.....	ax 10	Coaches	Har. & Holl.
	ax 12	Bagg. & exp....	Am. C. & F.
	ax 2	Mail	Am. C. & F.
Pennsylvania R. R.....	ax 36	Coaches	Altoona shops
	ax 8	Baggage	Altoona shops
	ax 19	Bagg. & mail....	Altoona shops
	ax 4	Pass. & bagg...	Altoona shops
	ax 5	Pass. bagg. & mail	Altoona shops

Pennsylvania R. R.—Continued.	ax 5	Bagg. & mail....	Altoona shops
	ax 10	Bagg. & mail....	Altoona shops
	ax 17	Coaches	Am. C. & F.
	ax 8	Pass. & bagg....	Pressed Steel
	ax 5	Horse-express	Pressed Steel
	ax 14	Baggage	J. G. Brill
	ax 28	Baggage	J. G. Brill
	ax 11	Baggage	Am. C. & F.
	ax 5	Horse-express	Am. C. & F.
	ax 6	Coaches	Pressed Steel
Pennsylvania Lines West...	ax 12	Bagg. & mail....	Pullman
	ax 6	Dining	Pressed Steel
	ax 10	Coaches	Pressed Steel
	ax 7	Baggage	Std. Steel
	ax 22	Coaches	Pressed Steel
	ax 3	Pass. & bagg....	Pressed Steel
	ax 8	Bagg. & mail....	Pullman
	ax 6	Dining	Pullman
	ax 20	Baggage	Std. Steel
Philadelphia & Reading.....	ax 10	Coaches	Pullman
	ax 5	Pass. & baggage..	Pullman
	ax 10	Coaches	Har. & Holl.
	ax 20	Coaches	Har. & Holl.
	ax 10	Pass. & baggage..	Har. & Holl.
	ax 2	Baggage & mail....	Co. shops
Phila., Balt. & Wash.....	ax 10	Coaches	Altoona shops
	ax 2	Baggage	Altoona shops
	ax 5	Pass., bagg. & mail	Altoona shops
	ax 14	Baggage & mail....	Altoona shops
	ax 15	Coaches	Std. Steel
	ax 7	Coaches	Pressed Steel
	ax 6	Pass. & bagg....	Std. Steel
	ax 2	Baggage	J. G. Brill
	ax 7	Baggage	Am. C. & F.
Pullman Company	ax 462	Sleeping	Pullman
	ax 40	Parlor	Pullman
Rich., Fred. & Potomac....	ax 6	Coaches	Am. C. & F.
	ax 2	Postal	Am. C. & F.
Temiskaming & Nor. Ont...	ax 2	Bagg. & exp....	Pullman
	ax 2	First class.....	Pullman
U. S. Army, Q. M. Dept...	bx 1	Pass. & bagg....	Am. C. & F.
Vandalia	ax 4	Coaches	Pressed Steel
	ax 4	Pass. & bagg....	Pressed Steel
	ax 3	Pass. & bagg....	Pressed Steel
	ax 4	Bagg. & mail....	Pullman
	ax 4	Baggage	Std. Steel
Wabash	ax 2	Mail	Am. C. & F.
Wells, Fargo & Co.....	b 35	Pass. refrig.....	Pullman
Western Pacific.....	ax 5	Baggage & mail....	Am. C. & F.
West Jersey & Seashore...	ax 4	Coaches	Altoona Shops
	ax 4	Bagg. & mail....	Altoona Shops
	ax 3	Coaches	Am. C. & F.
	ax 6	Pass. & bagg....	Std. Steel
	ax 5	Coaches	Std. Steel
	ax 47	Coaches	Har. & Holl.
	ax 3	Baggage	Am. C. & F.

a Indicates all-steel cars.

b Indicates steel underframe cars.

c Indicates steel frame cars.

d Indicates composite underframe cars.

f Indicates all-wood cars.

x Indicates electric lighting.

y Indicates gas lighting.

w Indicates oil lighting.

LOCOMOTIVES ORDERED IN 1915

Purchaser	No.	Cylinders	Total Weight	Type	Builder
Akron & Barberton Belt.	1	20x24	144,500	2-6-0	Baldwin
	1	20x24	144,500	2-6-0	Baldwin
Alabama & Tombigbee...	1		83,000	2-8-0	Lima
Alberta & Gt. Waterways	*2	24x32	133,000	4-6-0	Canadian
Algonia Lbr. Co.....	1	17x24	121,700	2-6-2	Baldwin
Allegheny Steel Co.....	†1	19x24	118,000	0-6-0	Baldwin
Am. R. R. of Porto Rico	†3	14&20x20	83,000	2-8-0	American
American Smelters Sec. Co.	1	8x12	64,000	Shay	Lima
Anderson, Edw. G.....	1		80,000	Geared	Heisler
Angelina County Lbr. Co.	1	10x12	84,000	Shay	Lima
Arkansas Construction Co.	1	6x10	26,000	Shay	Lima
Arthur Iron Min. Co...	*†8	20x24	130,000	0-6-0	Lima
Atchison, Top. & Santa Fe	*30	25x32	293,000	2-8-2	Baldwin
Atlantic Coast Line....	*†10	22x28	226,800	4-6-2	Baldwin
Baltimore & Ohio.....	*†15	26&41x32	485,000	2-8-8-0	Baldwin
	*†15	26&41x32	485,000	2-8-8-0	American
Bates & Rogers Const. Co.	2	7x12	17,200	0-4-0	Baldwin
Bethlehem Steel Co....	2	22x28	196,000	0-8-0	American
	1	21x26	153,000	0-6-0	American
Big Creek Logging Co.	1	11x12	100,000	Shay	Lima
Bingham & Garfield....	*6	21x24	152,000	0-6-0	Baldwin
Birmingham Southern...	*2	22x26	160,000	0-6-0	American
	*1	23x28	202,000	2-8-0	American
Blackwell Lbr. Co.....	1	12x12	120,000	Shay	Lima
Boston & Albany.....	*†4	21½&34x32	354,000	2-6-2	American
Brodie, James, & Sons.	1	13x18	60,000	0-6-0	Canadian
Bruce & Findlaym.....	1		52,000	Geared	Heisler
Butte, Anaconda & Pacific	1		160,000	Electric	Gen. Elec.
Caddo River Lbr. Co....	*1	20½x28	179,050	2-8-2	Baldwin
	1	19x26	140,000	2-6-0	American
	1	19x26	133,000	0-6-0	American
Calumet & Ariz. Min. Co.	2			0-6-0	Baldwin
Cambria Steel Co.....	1	21x26	159,000	0-6-0	Baldwin
Canadian Copper Co....	*15	24x32	232,000	2-8-0	Canadian
Canadian Govt. Railways	*8	19x24	138,700	4-6-0	Co. shops
Canal Lbr. Co.....	1		80,000	Geared	Heisler
Carnegie Steel Co.....	1	20x26	154,000	0-6-0	Baldwin
	2			0-6-0	Baldwin
Carney, W. M., Mill Co.	1	11x12	100,000	Shay	Lima
Carolina & Yadkin River	1			Elec. equip. only	Gen. Elec.
Central Coal & Coke Co.	1	12x15	140,000	Shay	Lima
Central New England...	*†4	26x32	328,000	2-8-2	American

Purchaser	No.	Cylinders	Total Weight	Type	Builder
Central of Georgia.....	*†8	27x30	284,400	2-8-2	Lima
	*†4	23x28	222,300	4-6-2	Lima
Champion Lbr. Co.....	1	14½x15	180,000	Shay	Lima
Chesapeake & Ohio.....	*†34	22&35x32	434,000	2-6-2	American
	*†1	22x26	200,000	4-4-2	American
	*†6	23½x28	204,000	2-8-0	American
Chess & Wymond.....	1		144,500	0-6-0	Baldwin
Chestnut Ridge.....	1	21x26	64,000	Geared	Heisler
Chic., Milwaukee & St. Paul	24			Elec. Freight	Gen. Elec.
	6			Elec. Frt. with steam htg. device for pass. service	Gen. Elec.
	2			Electric Switch	Gen. Elec.
Chicago & North Western	*†6	25x28	260,000	4-6-2	American
	*†6	22x26	229,000	4-6-2	American
	*†12	27x32	302,000	2-8-2	American
	*†10	21x28	165,000	0-6-0	American
	1	12x18	55,000	2-6-0	American
Chic. Bur. & Quincy....	*†15	27x28	266,400	4-6-2	Baldwin
	*†15	28x32	315,400	2-8-2	Baldwin
	*†10	30x32	367,850	2-10-2	Baldwin
Chicago Great Western...	*†5	21x26	148,200	0-6-0	Baldwin
	10			2-8-2	Baldwin
Chicago Junction	*†3	20x26	148,000	0-6-0	American
Chicago River & Indiana	*†1	20x26	149,500	0-6-0	American
Chic., St. Paul, Minn. & Omaha	*†4	25x28	260,000	4-6-2	American
	*†6	27x32	302,000	2-8-2	American
Chrome Steel Works....	1	14x22	64,000	0-4-0	Baldwin
Cincinnati, Ind. & West.	*†10	19x28	160,000	4-6-0	Baldwin
	*†10	22x28	180,000	2-8-0	Baldwin
	*†8	27x30	286,000	2-8-2	Lima
	*†5	22x28	163,000	0-6-0	Lima
	*†6	21x28	194,000	4-6-0	American
Cleve., Cin., Chic. & St. Louis	*†5	22x26	242,000	4-6-2	American
	1	21x28	170,000	0-6-0	American
Colorado & Southern...	*†5	30x32	367,850	2-10-2	Baldwin
Columbia, Newberry & Laurens	1	21x26	156,000	2-8-0	Baldwin
Copper River & No. West.	3	20x28	196,000	2-8-2	American
Crabbs-Reynold Taylor Co.	1			Elec. equip. only	Gen. Elec.

* Indicates superheater.

† Indicates brick arch.

‡ Indicates compound.

Purchaser	No.	Cylinders	Total Weight	Type	Builder	Purchaser	No.	Cylinders	Total Weight	Type	Builder
Crane Iron Works.....	†1	16x24	99,350	0-4-0	American	Nash. Chattanooga & St. Louis	*†5	25x30	264,300	2-8-2	Baldwin
Crossett Lumber Co.....	1	22x26	197,000	2-8-2	Lima		*†2	23x28	219,550	4-6-2	Baldwin
Crowell & Spencer Lbr. Co.	1	16x24	109,700	2-6-2	Baldwin		*†3	27&41x30	470,000	2-8-8-2	Baldwin
Cupez Sugar Co.....	1	11x16	39,000	0-4-0	American	Newburgh & South Shore New York Central.....	*†1	23x26	189,000	2-6-0	Baldwin
Cushing Traction Co.....	1		100,000	Electric	West. Bald.		1	21x26	146,000	4-8-2	American
Dantzler, L. N., Lbr. Co.	1		94,000	Geared	Heisler	N. J. Zinc Co. of Pa....				0-6-0	Baldwin
Davison Lbr. Co.....	1	11x12	100,000	Shay	Lima	New Orleans & North-eastern	*†2	22x28	209,500	2-8-2	Baldwin
Death Valley R. R.....	1			2-8-0	Baldwin	N. Y., New Haven & Hartford	*†25	25x30	260,000	2-8-2	American
Deep River Logging Co.	1	16x24	111,000	2-6-2	Baldwin		*†4	26x32	328,000	2-8-2	American
Delaware & Hudson.....	*†1	27x32	295,000	2-8-0	American		*†12	28x32	352,500	2-10-2	American
Delaware, Lackawanna & Western	*†5	27x28	310,500	4-6-2	American	N. Y., Ontario & Western Norfolk & Portsmouth	1			0-6-0	Baldwin
Delray Connecting	1	22x28	208,000	0-8-0	American	Belt	6			2-8-0	Baldwin
Delta Chemical Co.....	1	8x12	64,000	Shay	Lima	Norfolk Southern	*†30	22&35x32	406,000	2-6-6-2	American
Delta Land & Timb. Co.	*†1	18x24	143,200	2-8-2	Baldwin	Norfolk & Western.....	*†8	29x28	341,000	4-8-2	Co. Shops
Denver & Salt Lake.....	*†8	26x30	295,000	2-8-2	Lima		15		540,000	Electric	West. Bald.
Detroit Terminal	*†2	21x28	172,000	0-6-0	American						
	*†1	25x30	240,000	0-8-0	American	North, C. W., & Co....	1	6x10	26,000	Shay	Lima
Detroit United Rys.....	1		100,000	Electric	Westinghouse		1	6x10	26,000	Shay	Lima
Des Moines Union.....	†2	19x26	123,000	0-6-0	Baldwin	Oahu Ry. & Land Co....	1	15x20	86,000	4-6-0	American
Diamond Lbr. Co.....	1	10x12	84,000	Shay	Lima		1	16x20	102,000	2-8-0	American
Duluth & Iron Range...	*†3	27x30	300,000	2-8-2	Baldwin		1	14x20	68,000	0-6-0	American
Duluth, Missabe & No...	*†2	26&40x32	464,000	2-8-2	Baldwin	Ocean Shore	1	18x24	110,250	2-6-0	Baldwin
	*†6	28x32	342,000	2-10-2	Baldwin	Ogden, Logan & Idaho... Ozan Graysonia Lbr. Co.	2		102,000	Electric	West. Bald.
E. Tennessee & Western N. C.	1	16x22	96,000	4-6-0	Baldwin		2			2-8-2	Baldwin
	1			4-6-0	Baldwin	Pacific Electric	4		120,000	Electric	Westinghouse
Eccles, W. H., Lbr. Co.	1		80,000	Geared	Heisler	Pac. Portland Cement Co.	1	20½x28	177,000	2-8-2	Baldwin
Elgin, Joliet & Eastern...	*†9	24x28	215,000	0-8-0	American	Peninsular	1	19x24	152,000	2-8-2	Baldwin
	*†18	28x30	307,000	2-8-2	American	Pennsylvania R. R.....	*†76	27x30	319,300	2-8-2	Juniata Shops
Erie	*†10	31x32	415,400	2-10-2	Baldwin		*†53	22x24		0-6-0	Juniata Shops
	*†13	31x32	415,000	2-10-2	American		*†11	20x24		0-4-0	Juniata Shops
	*†5	31x32	395,000	2-10-2	American		*†75	27x30	319,300	2-8-2	Baldwin
	*†5	31x32	415,400	2-10-2	Lima		*†25	26x28	254,080	2-8-0	Baldwin
	*†12	36&36&36x32		2-8-8-8-2	Baldwin		*†15	26x28	254,080	2-8-0	Lima
	*†10	25x28		4-6-2	American		*†2	26x28	254,080	2-8-0	Lima
Eureka Nevada	†1	12x16	38,500	2-6-2	Porter		*†48	26x28	254,080	2-8-0	American
	†1	10x14	26,000	2-4-4	Porter	Philadelphia & Reading..	*†4	23½x26	230,800	4-4-4	Co. Shops
Fairchild & Northeastern	1	16x24	110,000	2-6-2	Lima		*†10	24x32	334,425	2-8-2	Baldwin
	1	16x24	104,000	2-6-0	Vulcan		*†20	24x32	334,425	2-8-2	Baldwin
Fairview Fluorspar & Lead Co.	†1	17x24	102,500	0-6-0	Baldwin	Phila., Balt. & Wash....	*†4	22x24		0-6-0	Juniata Shops
Ft. Dodge, Des Moines & So.	2		120,000	Electric	Gen. Elec.	Pickands Mather Co....	1	17x24	120,000	0-6-0	Lima
Fort Worth & Denver City	*†10	27x30	266,400	2-8-2	Baldwin	Pine Belt Lbr. Co.....	1	20x28	181,900	2-8-2	Baldwin
Frost-Johnson Lbr. Co...	1	16x24	101,600	2-6-2	Baldwin	Pittsburgh & Lake Erie...	*†10	27x30	322,000	2-8-2	American
Garden City Western.....	1	18x24	109,000	2-6-0	Baldwin		*†12	26&40x28	463,000	0-8-0	American
General Chemical Co....	2	9x14	24,000	0-4-0	Baldwin	Pittsburgh Steel Co....	1	20x24	126,000	0-6-0	American
Ga. Southern & Fla....	*†2	21x28	192,250	4-6-0	Baldwin	Pittsburgh Steel Ore Co.	†1	20x24	126,000	0-6-0	Baldwin
Gillespie, T. A., Co....	1	6x10	26,000	Shay	Lima	Poplarville Saw Mill Co.	1	16x22	87,500	2-8-0	Baldwin
Gillette, T. A., Co....	*†3	26x28	254,080	2-8-0	Lima	Port Huron Southern...	1	18x24	100,000	0-6-0	Baldwin
Grand Rapids & Indiana.	1	8x12	16,900	0-4-0	Baldwin	Portland Lbr. Co.....	1	11x12	100,000	Shay	Lima
Granby Min. & Smelt Co.	2	20x26	135,000	0-6-0	Baldwin	Portsmouth St. Ry. & Light Co.	1		100,000	Electric	Gen. Elec.
Guthrie, A., & Co., Inc.	2	20x26				Prescott & Northwestern Pub. Belt of New Or-	1			2-8-2	Baldwin
Harbeson, W. B., Lbr. Co.	1	15x24	96,250	2-6-2	Baldwin	leans	*†5	19x24	130,000	0-6-0	Baldwin
	1	10x14	40,000	2-4-2	Baldwin	Pullman R. R.....	2	21x26	142,000	0-6-0	American
	1	15x24	92,650	2-6-2	Baldwin	Quanan, Acme & Pac...	*†1	20x26	158,200	2-8-0	Baldwin
	1	15x24	92,650	2-6-2	Baldwin	Rapid City, Black Hills & Western	1	15x24	95,000	2-6-2	Baldwin
Harlan & Hollingsworth..	1	14x22	67,000	0-4-0	Baldwin	Raritan River	†2	20x24	167,000	2-8-2	Baldwin
Hebard Cypress Co.....	1	18x24	114,000	2-8-0	Baldwin	Red River & Gulf.....	1	18x26	126,300	4-6-0	Baldwin
Henderson L. & Lbr. Co.	1	12x15	140,000	Shay	Lima	Remington Arms—U. M. C. Co.	1	13x18	58,000	0-4-0	American
Holmes, Clair	1	6x10	26,000	Shay	Lima	Rep. Iron & Steel Co...	†1	22x26	155,200	0-6-0	Baldwin
House, A. C., Lbr. Co....	1		40,000	Geared	Heisler	Rich., Fred. & Potomac.	*†2	26x28	293,000	4-6-2	Baldwin
Illinois Central	*†47	27x30	283,850	2-8-2	Lima		4			4-6-2	Baldwin
	*†3	29x32	346,000	2-10-2	American	Rio Grande Ry.....	1		24,000	Electric	West. Bald.
	*†25	27x30	280,000	2-8-2	Lima	S. & A. Lbr. Co.....	1	15x20	86,800	2-6-2	Baldwin
	*†25	27x30	280,000	2-8-2	Lima	San Fernando Rock Co..	1	13x18	59,450	0-6-0	Baldwin
	*†4	27x30	284,400	2-8-2	Lima	Seotch Lbr. Co.....	1	18x24	120,240	2-8-0	Lima
Inland Crystal Salt Co...	1	16x24	98,000	0-6-0	Baldwin	Sheffield & Tionesta...	1	13x22	72,200	4-4-0	Baldwin
Intermountain	1	12x15	146,000	Shay	Lima	Simmons, Dennis, Lbr. Co.	1		44,000	Geared	Heisler
Interstate	*†3	25x32	231,000	2-8-0	Baldwin	South Dakota Central...	2	18x24	136,000	4-6-0	American
Ironton R. R.....	*†1	21x28	163,000	0-8-0	Baldwin		1	20x28	178,000	2-8-2	American
Jamestown, Westfield & N. W.	1		90,000	Electric	West. Bald.	Standard Oil Co.....	2	6x10	13,600	0-4-0	Baldwin
Kelly Bros.	1	6x10	26,000	Shay	Lima		1	17x24	110,500	0-6-0	Baldwin
Kress, F. J., Box Co...	1	8x12	64,000	Shay	Lima	St. Louis Stock Vds....	1	19x24	121,000	0-6-0	American
LaBelle Iron Wks.....	†1	17x24	102,700	0-4-0	Baldwin	St. Paul Bridge & Term.	1	20x26	154,000	2-6-0	American
L. E. Franklin & Clarion	1	22x28	180,000	2-8-0	American	St. Paul Union Depot...	*†2	19x26	129,000	Switch	Lima
Lake Erie & Northern...	2		120,000	Electric	West. Bald.	Sapulpa & Oil Field Ry.	†1		100,000	Electric	West. Bald.
Lake Sup. & Ishpeming...	*†3	26x30	270,000	2-8-0	Baldwin	Shevlin Hixon Co.....	1		120,000	Shay	Lima
La Salle & Bureau Cnty.	†1	22x26	150,400	0-6-0	Baldwin	Sierra Nevada Wood & Lbr. Co.	1	11x12	120,000	Shay	Lima
Lehigh & Hudson River...	*†4	25x30	290,000	2-8-2	Baldwin		1	19x24	117,000	0-6-0	American
Lehigh & New England...	*†2	22x28	207,850	0-8-0	Baldwin	Skaneateles R. R.....	1	18x24	118,000	2-6-0	American
	4			Switch	Baldwin	Solvay Process Co.....	1	21x26	156,000	0-6-0	American
Lehigh Valley	*†10	25x28	263,000	4-6-2	Co. Shops	Standard Oil Co.....	1	21x26	154,000	0-6-0	American
	*†10	27x30	318,400	2-8-2	Baldwin	Sumpter Valley	3	17x22	126,000	2-8-2	Baldwin
	*†10	27x30	318,400	2-8-2	Baldwin		1	16x20	91,000	4-6-0	Baldwin
Lehigh Vy. Coal Co....	1	10x16	39,700	0-4-0	Baldwin	Tall Timber Lbr. Co...	1	12x12	138,000	Shay	Lima
Ligonier Valley	†1	21x28	183,600	2-8-0	Baldwin	Tavares & Gulf.....	1			2-6-2	Baldwin
Louisiana Ry. & Nav. Co.	*†3	20x26	156,500	4-6-0	Baldwin		*†6	28x32	328,500	2-10-2	Baldwin
Maine Central	2	21x28	166,000	0-6-0	American		*†7	21x28	156,000	0-6-0	Baldwin
Maryland Electric	1		92,000	Electric	West. Bald.		1	19x24	122,350	2-6-0	Baldwin
Maryland Steel Co.....	†2	19x24	108,000	0-6-0	Baldwin	Texas State R. R.....	1	19x24	117,500	2-6-2	Baldwin
Michigan Central.....	*†7	23½x26	271,000	4-6-2	American	Thompson Bros. Lbr. Co.	1	16x24	160,000	2-8-0	American
Mine La Motte Co.....	1	17x24	128,500	2-6-2	Baldwin	Toledo-Detroit	2	21x28	120,000	Elec.	West. Bald.
Minneapolis & St. Louis.	*†5	24x30	259,900	2-8-2	American	Toledo, St. L. & Western Toledo Terminal.....	*†5	22x28	193,000	2-8-0	Lima
Minnesota Steel Co....	3				Porter		*†3	22x28	198,000	2-8-0	American
Minn., St. Paul & Sault Ste. Marie	*†6	20x26	149,000	0-6-0	American	Union Lbr. Co.....	1	15x22	110,100	2-6-2	Baldwin
Minn., St. P., Roch. & Dubuque	3		112,000	Gas-elec.	Gen. Elec.	Union R. R.....	5			2-8-0	Baldwin
Missouri, Kan. & Tex...	*†12	25x28	272,000	4-6-2	American	U. S. Gypsum Co.....	1	10x12	84,000	Shav	Lima
	*†35	28x30	319,000	2-8-2	American	U. S. Portland Cement Co.	1	8x14	21,000	0-4-0	Baldwin
Missouri, Okla. & Gulf...	*†4	23x28	230,900	2-8-2	Baldwin	United Steel Co.....	†1	17x24	109,000	0-4-0	Baldwin
Mobile & Ohio.....	*†3	27x30	272,940	2-8-2	Baldwin	University of Michigan.	1		56,000	Electric	Gen. Elec.
Monongahela Connecting.	*†3	21x26	152,000	0-6-0	Porter	Utah Copper Co.....	1			0-6-0	Baldwin
Monongahela R. R.....	*†6	22½x30	200,000	2-8-0	American		†1	18x24	122,000	0-6-0	Baldwin
Montour R. R.....	*†4	27x32	313,000	2-8-2	American	Venues, J. A., Lbr. Co..	1	10x12	64,000	Shav	Lima
Moore, Harry V.....	1	6x10	26,000	Shay	Lima	Upper Lehigh Coal Co..	1	10x14	32,700	0-4-0	Baldwin
Murley Cypress Lbr. Co.	1	8x10	56,000	Shay	Lima	Vandalia	*†10	26x28	254,080	2-8-0	Lima
Mountain Copper Co....	1	10x12	84,000	Shav	Lima		*†10	26x28	254,080	2-8-0	Lima
Mt. Hope Mineral & Munising, Marquette & Southwestern	†1	19x26	141,700	2-8-0	Baldwin	Verde Tunnel & Smelter	*†1	21x26	160,000	0-6-0	American
	*†1	26x30	270,000	2-8-0	Baldwin						

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

Purchaser	No.	Cylinders	Total Weight	Type	Builder
Vicksburg, Shreveport & Pac.	*†4	22x28	209,500	2-8-2	Baldwin
Victoria, Fisher & West.	1	15x20	87,950	2-6-2	Baldwin
Waccamaw Lbr. Co.	1	12x16	52,900	2-6-2	Baldwin
Wakefield Iron Co.	†1	17x24	102,300	0-6-0	Baldwin
Walterboro Lbr. Co.	1	12x18	62,000	2-6-2	Baldwin
Waycross & Southern ...	1				Baldwin
Waynesburg & Washington ...	1	13x20	50,000	2-6-0	American
Wawa Commercial Co.	1	7x12	36,000	Shay	Lima
Western Maryland.	*††15	26&40x30	495,000	2-8-8-2	Lima
Whitaker Glessner Co.	1	17x24	114,000	0-6-0	Lima
White, J. J., Lbr. Co.	1	12x15	140,000	Shay	Lima
Wilson Lbr. Co.	1	15x20	80,500	2-6-2	Baldwin
Wil., Brunswick & So.	1				Ga. Car.
Worth Bros. Co.	3	14x16	60,000	0-4-0	Baldwin
Wisconsin & Northern.	*1	20x26	168,000	4-6-0	American
Yellow Poplar Lbr. Co.	2	10x12	84,000	Shay	Lima
Yosemite Lbr. Co.	1	12x15	140,000	Shay	Lima
Youngstown Iron & Steel Co.	2				Porter
Youngstown Sheet & Tube Co.	2	22x26	151,000	0-6-0	Baldwin
	2	17x20	100,000	0-4-0	Baldwin

ORDERS FROM FOREIGN RAILWAYS

Belgian State Railways..	20	11½x16	48,000	0-6-0	American
Bethlehem Chile Iron Mines	1	19x24	123,000	0-6-0	American
Bresciana Ry.	3		Elec. equip. only	Gen. Elec.	
Buenos Ayres & Western	2		140,000 Electric	West. Bald.	
Central Ry. of Brazil...	3	21½x28	200,000	4-6-2	American
	3	22x24	146,000	2-8-0	American
Centrale Umbra	11		Elec. equip. only	Gen. Elec.	
Cuba R. R.	12	20x26	148,000	4-6-0	American
	10	20x26	152,000	4-6-0	American
Cuban Central	1	16x20	97,000	2-8-0	American
French Government	100	6.88x9.44	28,100	0-4-4-0	Baldwin
French Gov't—for Morocco	6			4-6-0	Baldwin
Frazar & Co.	1				Baldwin
Ginson Battle Co.—Australia	1	8x12	40,000	Shay	Lima
Girardot, F. C. de—Columbia	1	15x20	105,000	2-6-2	American
International Mach'y Co.—Chile	1	9x14	27,000	0-4-0	American
Madrid, Zaragoza & Alcantara—Spain	25	16.53&25.2x25.6	193,000	4-8-0	American
Mena, Gomez, Plantation Co.	1	18x24		2-6-0	American
Pacific Commercial Co.	1	13x18	52,000	0-4-0	American
Pekin-Kalgan—China ...	4	20x28	186,000	2-8-2	American
	2	20x26	183,000	4-6-2	American
Punta Alegre Sugar Co.	1	11x16	39,000	0-4-0	American
	2	12x18	50,000	2-6-0	American
	1	11x16	39,000	0-4-0	American
Russian Government...*	†250	25x28	196,000	2-10-0	Baldwin
	†100	25x28	197,000	2-10-0	American
	†50	25x28	190,000	2-10-0	Canadian
	15	11x16	40,000	2-6-0	American
	22		144,000		Porter
	11		134,000		Porter
	25				Porter
Samuel, Samuel, & Co.—Japan	1	8x10	56,000	Shay	Lima
Serbian Government....	12	15x20	81,000	2-8-0	American
	10	13&20½x20	128,000	2-6-6-2	American
	15	19x24	145,000	2-6-2	American
South African, Union of United Rys. of Havana.	6	20x26	158,000	2-8-0	American
	1		120,000	Electric Gen. Elec.	

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

TRANSPORTATION SALESMEN

By J. E. LIGHT

Traveling Freight and Passenger Agent, Southern Pacific Company

While the carriers are bending their efforts toward the creation of favorable public sentiment, it is possible they are overlooking the very department that could best secure this result.

I refer to the field men of the traffic department—transportation sellers. These representatives, more than any other class of railroad men, are in constant touch with the public. An efficient field man can accomplish much in creating a better understanding between the railroads and the public. By diplomacy and ability he can explain to the shipper and general public the reason for many actions of the carriers that—to them, because they do not understand—seem ridiculous and erroneous. To do this, however, such representatives must have a thorough working knowledge of railroad operation and traffic principles.

Commercial corporations feature this element of their business. They must do so or fail. There are many commercial salesmen selling groceries, coffee, produce, etc., and representing companies whose entire investment would not equal the outlay

in small station facilities, yet these men are carefully selected and paid much higher salaries than the salesmen for transcontinental carriers. Because of the nature of their business, commercial salesmen are able to show tangible results that warrant the investment. An efficient traffic representative, while unable to measure the result of his efforts in dollars and cents, could nevertheless produce returns that would justify greater consideration by his chief.

In the selection of these representatives care should be taken to appoint men who necessarily must possess enough diplomacy to heal many a breach between carrier and shipper; men with character and initiative to convince a shipper why his line should be used; men with dignity, personality and congeniality befitting a representative of a concern worth millions; men with the business ability and courage to handle a proposition with clever business men without calling on the busy general office for information on matters that they should know. It is my opinion that representatives with the above qualifications would be a profitable investment.

These men should be picked from the railroad ranks. Otherwise they would have no practical transportation knowledge. There are many men with this practical knowledge, obtained by actual experience, but this is the extent of their ability. Also many practical men superficially study the theoretical elements. These men are usually selected. In the majority of cases, however, the transportation knowledge found in these offices is sadly lacking. Most of them are chosen because of their purported good-fellowship and ability to "mix." When unable to secure a man with the above combined qualifications, the "good mixer" characteristic is deemed paramount.

The percentage of these representatives who are familiar with Emory Johnson, McPherson, Dunn, or even George B. McGinty, is indeed small. There is even a smaller percentage who could satisfactorily explain to a shipper why it is necessary and possible to haul a shipment across the continent for less than is charged to haul the same shipment 400 miles inland. Few, indeed, could expound the fallacies of the "zone" system or distance rates when applied to traffic generally.

There is perennial warfare between the various communities in an attempt to obtain for their respective territories an advantage in transportation costs. There are numerous transportation matters which, to the average shipper, are perplexing and confusing. The ability of a traffic field man to give a satisfactory explanation of these matters would create a much better feeling between the shipper and the railroads. Also it would most likely result in increased competitive takings for the line he represents.

I fully believe that the carriers will eventually recognize the importance of selecting efficient men for these positions. The result of such recognition would be a well-organized effort to select congenial young men with ability and train them for this particular work in the same manner employed by commercial concerns. Men of this character will always be a valuable asset to the railroads, even after competition is eliminated—should it ever be.

Public sentiment is largely responsible for the position of the carriers today. I cannot believe that the railroad chiefs realized the potent effect of adverse public sentiment until now. The public is learning something of the carriers' side, and I fully believe that the more they know the better it will be for the carriers' interests. Therefore they should use every means of disseminating information—and an efficient traffic field man would be an important factor in this work.

A BRITISH POOLING ARRANGEMENT.—The fish traffic from Aberdeen, hitherto sent daily by both the Caledonian and North British routes, is now, beginning December 1, being sent by only one route, each company taking all the traffic alternately for a period of two months. The Caledonian will take it for December and January, 1916, while the North British will take it for February and March.

New Railway Construction Statistics for 1915

Less Track Was Built in the United States Than for Any Year Since 1864. Canada Also Shows Decrease

During 1915, 933.24 miles of new first track was completed in the United States and 718.37 miles in Canada. In the same period 356.28 miles of second track was completed in the United States and 0.84 miles in Canada. There was also built during this period 64.70 miles of other multiple main tracks in the United States. Some activity is again noted in Mexico, where 36.50 miles of line was reported completed. The government railways of Alaska report 34 miles of line completed and 350 miles additional projected. These figures are based on reports made directly to us by the various railroads, supplemented by our own construction records and are as complete as it is possible to compile at this time.

As shown by the accompanying diagram and by the tabulation given below, the mileage of first track completed is much less

states and less than 10 miles for each of 16 states. Pennsylvania leads in mileage with 98.37 miles completed, while Oregon is second with 82.70 miles, Washington third with 70.88 miles and Kansas is fourth with 58.56 miles. Practically half the mileage reported was for the seven states of Pennsylvania, Oregon, Washington, Kansas, Alabama, Arizona and Kentucky.

The longest continuous line reported built during the year was that of the Gulf, Florida & Alabama from Broughton to Kimbrough, 52.40 miles. This is in marked contrast with extensions of 100 miles or more reported in previous years. The work was generally light in character, although there were one or two notable exceptions. The line involving the heaviest work was that of the Delaware, Lackawanna & Western from Clarks Summit, Pa., to Hallstead, 39.43 miles. This line, which has



New Mileage Curve from 1893 to 1915 Inclusive

than that for any of the 23 years during which we have collected such statistics. In fact, the mileage reported this year is only about 65 per cent of the smallest mileage reported for any previous year since 1893. The mileage of line completed this year is only 15 per cent of that completed in 1902, the record year since 1893, and only about 25 per cent of the mileage completed during an average year.

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

1893	3,024	1905	4,388
1894	1,760	1906	5,623
1895	1,428	1907	5,212
1896	1,692	1908	3,211
1897	2,109	1909	3,748
1898	3,265	1910	4,122
1899	4,569	1911	3,066
1900	4,894	1912	2,997
1901	5,368	1913	3,071
1902	6,026	1914	1,532
1903	5,652	1915	933
1904	3,832		

New mileage was reported completed in 38 states and territories. There are 11 states in which no new mileage was reported, while less than 5 miles was reported for each of 11

been described previously in these columns, was built at an expenditure of over \$12,000,000.

Our reports show that 356.28 miles of second track was completed in the United States in 1915 as compared with 566 miles in 1914; 1,264 in 1913, and 1,073 miles in 1912. This work was distributed over 25 states, although less than 10 miles was built in each of 16 states and 20 miles or more was built in only six states. The greatest mileage built in any single state was 81.03 miles in Virginia, the next largest was 44.80 in Pennsylvania and the third largest was 39.90 miles in North Carolina, 37.90, of which was built by the Southern Railway between Pelham and Denim. This road also completed 28.10 miles of the second track built in Virginia. The 64.70 miles of other multiple tracks were divided between third track, 36.11 miles; fourth track, 22.96 miles; fifth track, 2.30 miles, and sixth track, 3.30 miles. The third and fourth track mileage consisted principally of that laid on the Clarks Summit line of the Lackawanna in Pennsylvania.

At the present time 1,207.18 miles of new line is reported under construction, 1,624.25 as definitely surveyed, and 2,061.81 miles as projected. Also, 289.11 miles of second track is under con-

struction, 10 miles reported surveyed and 940 miles projected. These mileages compare with 1,015 miles of new first track under construction, 1,229 miles surveyed and 2,031 projected one year ago, and 1,522 miles under construction, 1,511 miles surveyed and 1,296 miles projected two years ago.

In 1914, for the first time, the mileage of line completed in Canada exceeded that in the United States. The mileage built in the Dominion this year, however, shows an even greater decrease than that in the United States, falling to 718.37, or less than 37 per cent of that of last year. The European war has, of course, practically put a stop to all construction projects in Canada. Of the mileage built in 1915, 165.95 miles was reported completed by the Canadian Northern (Western Lines) and 14 miles by the Winnipeg & Northern, a subsidiary of this same road. The Edmonton, Dunvegan & British Columbia and

ALASKA			
First Track		Miles.	Miles.
United States Government Railway—Ship Creek spur line, Ship Creek to Ship Creek Junction, 4.80 miles; Ship Creek Junction to Matanuska Junction, 50 miles; total..		34.80	34.80
Total of all track.....			34.80

ARIZONA			
First Track			
Mascot & Western—Willcox to Mascot.....		15.00	
Tucson, Cornelia & Gila Bend—Gila Bend mile post 0 to mile post 35.....		35.00	50.00
Total of all track.....			50.00

ARKANSAS			
First Track			
Memphis, Dallas & Gulf—Between Murfreesboro and Shawmut		19.00	19.00

NEW TRACK BUILT IN 1915

UNITED STATES—	No. Cos. building	Miles				Total
		First track	Second track	Third track	Fourth or more track	
Alabama	2	53.15	27.85	.....	.....	81.00
Alaska	1	34.80	.....	.....	.....	34.80
Arizona	2	50.00	.....	.....	.....	50.00
Arkansas	1	19.00	1.00	.....	.....	20.00
California	4	32.00	.....	.....	.....	32.00
Colorado	3	4.73	.....	.....	.....	4.73
Florida	6	38.65	.....	.....	.....	38.65
Georgia	5	31.64	.....	.....	.....	31.64
Idaho .....	..	.....	1.75	.....	.....	1.75
Illinois	4	6.90	24.78	.....	.....	31.68
Iowa .....	..	.....	3.43	.....	.....	3.43
Kansas	4	58.56	4.09	.....	.....	62.65
Kentucky	3	48.89	6.92	.....	.....	55.81
Maine	1	1.33	.....	.....	.....	1.33
Maryland	2	3.40	4.95	.....	.....	8.35
Massachusetts	2	2.00	.....	.....	.....	2.00
Michigan	2	18.50	1.00	.....	.....	19.50
Minnesota	4	46.76	28.18	.....	.....	74.94
Mississippi	1	3.50	13.25	.....	.....	16.75
Missouri	1	.16	3.85	.....	.....	4.01
Montana	1	8.51	.....	.....	.....	8.51
Nebraska	1	1.25	.....	.....	.....	1.25
Nevada	1	7.00	.....	.....	.....	7.00
New Jersey	1	.66	2.00	.....	.....	2.66
New Mexico	1	3.66	.....	.....	.....	3.66
New York	3	2.84	13.84	9.27	15.97	41.92
North Carolina	3	33.30	39.90	.....	.....	73.20
North Dakota	2	26.29	.....	.....	.....	26.29
Ohio	3	9.30	7.26	.....	.....	16.56
Oklahoma	3	34.74	.....	.....	.....	34.74
Oregon	4	82.70	.....	.....	.....	82.70
Pennsylvania	9	98.37	44.86	26.25	11.94	181.42
Rhode Island .....	..	.....	.....	.62	.65	1.27
South Carolina .....	..	.....	1.00	.....	.....	1.00
Tennessee	4	12.15	18.71	.....	.....	30.86
Texas	2	4.40	.50	.....	.....	4.90
Utah	1	14.95	7.76	.....	.....	22.71
Virginia	2	17.80	81.03	.....	.....	98.83
Washington	6	70.88	9.27	.....	.....	80.15
West Virginia	7	13.78	1.32	.....	.....	15.10
Wisconsin	1	29.32	7.78	.....	.....	37.10
Wyoming	1	7.37	.....	.....	.....	7.37
Total	104	933.24	356.28	36.14	28.56	1,354.22
Canada	17	718.37	.84	.....	.....	719.21
Mexico	2	36.50	.....	.....	.....	36.50

NEW TRACK BUILT IN 1914

UNITED STATES—	No. Cos. building	Miles				Total
		First track	Second track	Third track	Fourth or more track	
Alabama	4	1.00	33.81	.....	.....	34.81
Arkansas	5	27.10	.50	.....	.....	27.60
California	9	103.91	18.94	.....	.....	122.85
Connecticut	1	.....	2.10	.....	.....	2.10
Delaware	2	1.15	.....	.....	1.00	2.15
Florida	7	220.46	7.84	.....	.....	220.46
Georgia	5	14.66	7.84	.....	.....	22.50
Idaho	3	117.22	12.89	.....	.....	130.11
Illinois	6	3.17	9.24	1.61	2.29	16.31
Indiana	4	12.80	13.15	.....	2.26	28.21
Iowa	4	26.16	110.00	.....	.....	136.16
Kansas	2	11.00	.49	.....	.....	11.49
Kentucky	4	31.57	16.68	.....	.....	48.25
Louisiana	3	7.79	.....	.....	.....	7.79
Maine	2	.21	.61	.....	.....	.82
Maryland	2	.....	12.14	.....	.....	12.14
Massachusetts	2	.....	.13	1.50	1.35	2.98
Michigan	4	18.81	.....	.....	.....	18.81
Minnesota	2	8.42	.....	.....	.....	8.42
Mississippi	2	19.15	.....	.....	.....	19.15
Missouri	4	4.32	4.89	1.70	2.10	13.01
Montana	2	48.13	2.00	.....	.....	50.13
Nebraska	1	.88	.....	.....	.....	.88
Nevada	3	10.01	.70	.....	.....	10.71
New Jersey	2	.80	.....	1.16	4.53	6.49
New Mexico	2	29.47	.....	.....	.....	29.47
New York	6	10.45	9.90	.68	.....	21.03
North Carolina	5	34.00	71.61	.....	.....	105.61
North Dakota	4	63.24	4.33	.....	.....	67.57
Ohio	8	17.05	28.30	.....	.....	45.35
Oklahoma	1	4.00	5.00	.....	.....	9.00
Oregon	7	90.42	2.30	.....	.....	92.72
Pennsylvania	12	62.74	.97	.47	5.35	69.53
Rhode Island	1	.....	.....	.66	.66	1.32
South Carolina	2	66.60	.....	.....	.....	66.60
South Dakota	1	41.30	.....	.....	.....	41.30
Tennessee	4	11.21	45.56	.....	.....	56.77
Texas	6	50.86	.80	.....	.....	51.66
Utah	1	41.95	.....	.....	.....	41.95
Virginia	7	66.05	74.00	.....	.....	140.05
Washington	6	142.73	61.30	2.31	.....	206.34
West Virginia	4	10.80	5.99	.....	.21	26.00
Wisconsin	3	29.78	9.41	.....	.....	39.19
Wyoming	1	61.43	.....	.....	.....	61.43
Total	166	1,531.80	565.58	10.09	19.75	2,127.22
CANADA	21	1,978.07	152.50	.....	.....	2,130.57
MEXICO .....	..	.....	.....	.....	.....	.....

its subsidiary in Alberta, the Alberta & Great Waterways, completed 206 miles. The Canadian Pacific (Western Lines) reports only 22.80 miles, indicating that construction activities on this large system are practically at a standstill.

The comparative amounts of various classes of new tracks built in each state during 1915 are shown in the accompanying tables and in detail in the following data:

UNITED STATES.

ALABAMA.

First Track		Miles.	Miles.
Gulf, Florida & Alabama—Broughton to Kimbrough.....		32.40	
Tidewater Securities Corporation—Not specified.....		0.75	53.15

Second Track

Alabama Great Southern—York to Toomsuha.....		17.41	/
Nashville, Chattanooga & St. Louis—Stevenson to Bridgeport		9.69	
Tidewater Securities Corporation—Not specified.....		0.75	27.85
Total of all track.....			81.00

Second Track

Miles.		Miles.
Memphis, Dallas & Gulf—Between Murfreesboro and Shawmut		1.00
Total of all track.....		20.00

CALIFORNIA

First Track

California Southern—Blythe Junction to Red Hill.....		14.00	
Minkler Southern (A., T. & S. F. C. L.) Exeter to Lindsay		6.95	
San Diego & Arizona—United States-Mexican boundary to Campo, 5.9 miles; Corriso Pass to 1.1 miles west of station 6, 4.9 miles; total.....		10.80	
Stockton Terminal & Eastern—Not specified.....		0.25	32.00
Total of all track.....			32.00

COLORADO

First Track

Colorado & Southern—Tollerburg to Ben Canon.....		0.95	
Denver Union Terminal—At terminal.....		2.77	
Union Pacific—Shamrock Junction to Shamrock Mine....		1.01	4.73
Total of all track.....			4.73

FLORIDA

First Track

	Miles.	Miles.
East & West Coast—Between Bradentown and Arcadia....	4.80	
Fellsmere Railroad—2.58 miles west of Fellsmere to Broadmoor	3.65	
Jacksonville Municipal Railroad—At Jacksonville.....	1.93	
St. Andrews Bay Railway & Terminal (A. & St. A. B.)		
Between Panama City and St. Andrews.....	2.25	
Seaboard Air Line—Lake Wales extension.....	23.02	
Tampa & Gulf Coast—Not specified.....	3.00	38.65
Total of all track.....		38.65

GEORGIA

First Track

Americus, Hawkinsville & Eastern—Gaines to Flint River..	10.00	
Ocala, Pinebloom & Valdosta—Lax to Gladys.....	8.00	
Ocala Southern—Rochelle to Pope City.....	7.24	
Pelham & Havana—Calvary to Darsey, Fla.....	4.00	
Savannah & Southern—Willie to Duke.....	2.40	31.64
Total of all track.....		31.64

IDAHO

Second Track

Oregon Short Line—Idaho Junction to Montana Junction..	1.75	1.75
Total of all track.....		1.75

ILLINOIS

First Track

Belt Railway of Chicago—Between Chicago and Argo.....	2.21	
Chicago & Illinois Midland—Taylorville west.....	2.85	
Manufacturers Junction—At Hawthorne.....	0.30	
Paducah & Illinois—Between Metropolis and Illinois-Kentucky state line.....	1.54	6.90

Second Track

Belt Railway of Chicago—Between Chicago and Argo....	3.85	
Chicago, Burlington & Quincy—At Jacksonville, 0.02 miles; Concord to Pisgah, 0.70 miles; Centralia to Shattuc, 0.16 miles; Astoria to Adair, 17.59 miles; total.....	18.47	
Illinois Central—Parkway to Broadview.....	2.46	24.78
Total of all track.....		31.68

IOWA

Second Track

Chicago & North Western—Between Otis and Cedar Rapids	3.43	3.43
Total of all track.....		3.43

KANSAS

First Track

Anthony & Northern—Byers to Trousdale.....	14.00	
Atchison, Topeka & Santa Fe—At Salina.....	0.56	
Cudahy Packing Company's Line—From Fowler.....	8.00	
Salina Northern—Salina to Lincoln Center.....	36.00	58.56

Second Track

Kansas City Terminal—At Kansas City.....	0.09	
Salina Northern—Between Salina and Lincoln.....	4.00	4.09
Total of all track.....		62.65

KENTUCKY

First Track

Louisville & Nashville—Winchester to Ravenna, 26.69 miles; Typo to Harveys-ton, 5.29 miles; Lothair to Buffalo Creek, 1.37 miles; Lothair to Ashless, 0.39 miles; Ages to Kilday, 1.59 miles; total.....	35.33	
Paducah & Illinois—Between Paducah and Kentucky-Illinois state line	12.43	
Tug River & Kentucky (N. & W.)—Not specified.....	1.13	48.89

Second Track

Illinois Central—At Paducah, 1.10 miles; Princeton to Dulaucy, 5.82 miles; total.....	6.92	6.92
Total of all track.....		55.81

MAINE

First Track

Sandy River & Rangeley Lakes—Eustis branch to Langtown plantation	1.33	1.33
Total of all track.....		1.33

MARYLAND

First Track

Baltimore & Ohio—On Magnolia Cut off.....	0.58	
Western Maryland—Charlton to Maryland-West Virginia state line	2.82	3.40

Second Track

	Miles.	Miles.
New York, Philadelphia & Norfolk—Pokomoke to Maryland-Virginia state line.....	4.95	4.95
Total of all track.....		8.35

MASSACHUSETTS

First Track

Boston, Revere Beach & Lynn—Not specified.....	1.00	
South Boston Industrial Track—In South Boston.....	1.00	2.00
Total of all track.....		2.00

MICHIGAN

First Track

Boyne City, Gaylord & Alpena—Atlanta east.....	7.50	
Detroit, Bay City & Western—Sandusky to Peck.....	11.00	18.50

Second Track

Detroit & Toledo Shore Line—River Rouge to Dearoad....	1.00	1.00
Total of all track.....		19.50

MINNESOTA

First Track

Duluth & Northern Minnesota—Echo to Harlan.....	13.00	
Electric Short Line—Winsted to Hutchinson.....	18.25	
Minneapolis, St. Paul, Rochester & Dubuque, Electric—Minneapolis to Auto Club.....	14.62	
Northern Pacific—Cuyuna Northern branch connections..	0.89	46.76

Second Track

Chicago, Milwaukee & St. Paul—Hopkins to Cologne....	24.00	
Minneapolis, St. Paul, Rochester & Dubuque Electric—Minneapolis to Luce Line Junction, Minneapolis.....	3.24	
St. Paul Bridge & Terminal—At St. Paul.....	0.94	28.18
Total of all track.....		74.94

MISSISSIPPI

First Track

Meridian & Memphis—From Alabama-Vicksburg Junction into Meridian terminals.....	3.50	3.50
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Second Track

Alabama Great Southern—Russell to Meridian.....	10.65	
Yazoo & Mississippi Valley—Lake Cormorant to Mari-nette	2.60	13.25
Total of all track.....		16.75

MISSOURI

First Track

Missouri Pacific—At Sheffield.....	0.16	0.16
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Second Track

Kansas City Southern—Mile post 159 to mile post 163 (Saginaw Cut-off)	3.75	
Kansas City Terminal—At Kansas City.....	0.10	3.85
Total of all track.....		4.01

MONTANA

First Track

Northern Pacific—State line to Ollie.....	8.51	8.51
Total of all track.....		8.51

NEBRASKA

First Track

Chicago, Burlington & Quincy—Between Chalco and Yutan	1.25	1.25
Total of all track.....		1.25

NEVADA

First Track

Nevada Short Line—Between Oreana and Upper Rochester	7.00	7.00
Total of all track.....		7.00

NEW JERSEY

First Track

Pennsylvania Railroad—South Gloucester to Gloucester..	0.66	0.66
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Second Track

Raritan River—Parlin to South River.....	2.00	2.00
Total of all track.....		2.66

NEW MEXICO

First Track

Arizona & New Mexico—Lordburg to Eighty-five mine..	3.66	3.66
Total of all track.....		3.66

NEW YORK

First Track

	Miles.	Miles.
Grasse River—Cranberry Lake towards Carthage and Adirondack branch New York Central.....	1.00	
New York Central—Through Beacon (relocation).....	0.54	
New York Connecting—In Astoria.....	1.30	2.84

Second Track

Delaware, Lackawanna & Western—Jamesville to Syracuse.....	4.59	
Erie—Allegheny to Carrollton.....	5.80	
New York Central—Between Nepperbham and Gray Oaks, 0.61 miles; Through Beacon (relocation) 2.24 miles; total.....	2.85	
New York Connecting—In Astoria.....	0.60	13.84

Third Track

New York Central—Between Hyde Park and Lacey's Middle, 3.70 miles; Between Tivoli and Germantown, 4.24 miles; Through Beacon, 1.33 miles; total.....	9.27	9.27
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Fourth Track

New York Central—Between Hyde Park and Lacey's Middle, 3.70 miles; Between Tivoli and Germantown, 5.17 miles; Through Beacon, 0.90 miles; total.....	9.77	
New York, New Haven & Hartford—At Woodlawn Junction.....	0.60	10.37

Fifth Track

Long Island—Between Winfield Junction and Woodside.....	2.30	2.30
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Sixth Track

Long Island—Between Winfield Junction and Woodside....	3.30	3.30
Total of all track.....	41.92	

NORTH CAROLINA

First Track

Beulaville Railroad—Pink Hill to Beulaville.....	9.00	
Virginia-Carolina—Between state line and Elkland.....	20.00	
Watauga & Yadkin River—Denny to Darby.....	4.30	33.30

Second Track

Beulaville Railroad—Between Pink Hill and Beulaville....	2.00	
Southern Railway—Pelham to Denim.....	37.90	39.90
Total of all track.....	73.20	

NORTH DAKOTA

First Track

Minneapolis, St. Paul & Sault Ste. Marie—Van Hook to Sanish.....	8.90	
Northern Pacific—Beach to state line.....	17.39	26.29
Total of all track.....	26.29	

OHIO

First Track

Dayton, Lebanon & Cincinnati Railroad & Terminal—Lebanon Junction to Cleveland.....	1.61	
Lake Erie & Eastern—Between P. Y. & A. crossing and crossing No. 4.....	7.05	
Pittsburgh & Lake Erie—Struthers to P. Y. & A. crossing.....	0.64	9.30

Second Track

Baltimore & Ohio—From Piedmont.....	2.81	
Lake Erie & Eastern—Between P. Y. & A. crossing and crossing No. 4.....	2.69	
Norfolk & Western—Not specified.....	0.25	
Pittsburgh & Lake Erie—Struthers to P. Y. & A. crossing.....	0.64	
Toledo Terminal—Consaul street to Ironville.....	0.87	7.26
Total of all track.....	16.56	

OKLAHOMA

First Track

Beaver, Mead & Englewood—Between Beaver and Forgan Clinton & Oklahoma Western—Hammon Junction to Hammon.....	0.79	
Oil Fields & Santa Fe (A., T. & S. F.) Cushing to Dumright and Frey to Jennings.....	26.95	34.74
Total of all track.....	34.74	

OREGON

First Track

Oregon-Washington Railroad & Navigation Co.—Messner (formerly Coyote Junction) to Hinkle, 19.80 miles; Juntura to Riverside, 19.10 miles; total.....	38.90	
Southern Oregon Traction (Rogue River Valley)—In Medford.....	1.00	
Valley & Siletz—Crisp to Luckiamute river.....	5.00	
Willamette Pacific (So. Pac.)—From near Acme to north of Umpqua river, 23.30 miles; from 2 miles north of Northlake or 10 miles south of Umpqua river to North Bend, 14.50 miles; total.....	37.80	82.70
Total of all track.....	82.70	

PENNSYLVANIA

First Track

	Miles.	Miles.
Baltimore & Ohio—North Fork to Beesercher, 2.18 miles; Strum to Bowood Mine, 3.16 miles; total.....	5.34	
Central of New Jersey—Near Easton from Hope to terminus.....	4.45	
Delaware, Lackawanna & Western—Clarks Summit to Hallstead (relocation).....	39.43	
Indian Creek Valley—Not specified.....	1.00	
Lehigh & New England Hauto to Nesquehoning.....	2.07	
Montour Railroad—North Star Junction to Longview Junction.....	30.70	
Pennsylvania Railroad—Between Philadelphia and Pittsburgh.....	12.83	
Philadelphia & Reading—Nictown Junction to Newtown Junction.....	1.84	
Pittsburg & Shawmut Cadogan to end of track.....	0.71	98.37

Second Track

Bessemer & Lake Erie—Cunningham to Culmerville.....	1.61	
Delaware, Lackawanna & Western—Between Clarks Summit and Hallstead (relocation).....	39.43	
Pennsylvania Lines West—At Pittsburgh.....	0.79	
Pennsylvania Railroad—Between Philadelphia and Pottsville.....	1.20	
Philadelphia & Reading Nictown Junction to Newtown Junction.....	1.83	44.86

Third Track

Delaware, Lackawanna & Western—Between Clarks Summit and Hallstead.....	21.92	
Pennsylvania Lines West—Dinsmore to Hanlin.....	3.98	
Pennsylvania Railroad—At Philadelphia.....	0.35	26.25

Fourth Track

Delaware, Lackawanna & Western—Between Clarks Summit and Hallstead.....	11.59	
Pennsylvania Railroad—At Philadelphia.....	0.35	11.94
Total of all track.....	181.42	

RHODE ISLAND

Third Track

New York, New Haven & Hartford—Pawtucket to Central Falls.....	0.62	0.62
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Fourth Track

New York, New Haven & Hartford—Pawtucket to Central Falls.....	0.65	0.65
Total of all track.....	1.27	

SOUTH CAROLINA

Second Track

Orangeburg Railway—Wolfon to Sheriff siding.....	1.00	1.00
Total of all track.....	1.00	

TENNESSEE

First Track

Memphis-Chattanooga Railway (So. Ry.)—Chattanooga to Wauhatchie Railway.....	2.88	
Oncida & Western—Toomey to Bib South Fork bridge.....	4.50	
Tennessee Railway—Charley's Branch to Double Camp....	2.00	
Wauhatchie Railway (So. Ry.)—Wauhatchie to connection with Memphis-Chattanooga Railway at point west of Chattanooga.....	2.77	12.15

Second Track

Cincinnati, New Orleans & Texas Pacific—Robbins to H. F. tower.....	8.20	
Louisville & Nashville—South Nashville to Mayton.....	4.01	
Memphis-Chattanooga Railway (So. Ry.)—Chattanooga west to Wauhatchie Railway.....	2.88	
Nashville, Chattanooga & St. Louis—In yard at Chattanooga.....	0.85	
Wauhatchie Railway (So. Ry.)—Wauhatchie to connection with Memphis-Chattanooga Railway at point west of Chattanooga.....	2.77	18.71
Total of all track.....	30.86	

TEXAS

First Track

Port Worth Belt—In Fort Worth.....	0.16	
Rohy & Northern—North Rohy to Roby.....	4.24	4.40

Second Track

Rohy & Northern—North Rohy to main line.....	0.50	0.50
Total of all track.....	4.90	

UTAH

First Track

San Pedro, Los Angeles & Salt Lake—Delta to Lucerne...	14.95	14.95
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Second Track

Union Pacific—Devils Gate Bridge to Riverdale.....	7.76	7.76
Total of all track.....	22.71	

VIRGINIA

First Track

	Miles.	Miles.
Carolina, Clinchfield & Ohio—Bear Hollow to south end Sandy Ridge Tunnel.....	5.30	
Virginia-Blue Ridge—Nelmont to Woodson.....	12.50	17.80

Second Track

Chesapeake & Ohio—Between Greenlee and Balcony Falls.....	3.00	
New York, Philadelphia & Norfolk—Maryland-Virginia state line to New Church.....	1.67	
Norfolk & Western—Burkeville to Pamplin, 36.93 miles—Not specified; 11.03 miles; total.....	47.96	
Southern Railway—Charlottesville to Arrowhead, 7.40 miles; Elma to Tye River, 9.00 miles; Danville to Dry Fork, 12.00 miles; total.....	28.40	81.03
Total of all track.....		98.83

WASHINGTON

First Track

Chicago, Milwaukee & St. Paul—Rockdale to Keechelus..	5.00	
Columbia & Nehalem River—Mile 15 to mile 23.....	8.00	
Goodyear Logging Company—West Callam to timberlands	6.50	
Northern Pacific—Snohomish to Everett.....	0.83	
Puget Sound & Willapa Harbor—Between Maytown and Raymond.....	28.00	
Seattle, Port Angeles & Western (C. M. & St. P.)—Port Angeles to a point near Fairmount.....	22.55	70.88

Second Track

Great Northern—Between Ballard and Seattle.....	2.63	
Northern Pacific—Between Easton and Lester.....	6.64	9.27
Total of all track.....		80.15

WEST VIRGINIA

First Track

Baltimore & Ohio—On Magnolia Cut-off.....	0.56	
Horse Creek Land & Mining Company's Line—From Horse Creek branch of C. & O. to Sulphur Spring Fork.....	2.00	
Kanawha, Glen Jean & Eastern—Dun Loop to Klondyke..	0.20	
Norfolk & Western—Alma branch extension, 1.86 miles; Widemouth branch extension, 1.83 miles; Jacobs Fork branch 5.21 miles; total.....	8.90	
Tug River & Kentucky (N. & W.) Not specified.....	0.07	
Virginian Railway—From Amigo.....	1.13	
Williamsport, Nettle & Martinsburg—Potomac River to Nettle.....	0.92	13.78

Second Track

Virginian Railway—Elmore to Mullens.....	1.32	1.32
Total.....		15.10

WISCONSIN

First Track

Wisconsin & Northern—North of Van Ostrand to Crandon	29.32	29.32
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Second Track

Chicago, Burlington & Quincy—Ferryville to De Sota.....	7.78	7.78
Total of all track.....		37.10

WYOMING

First Track

Chicago, Burlington & Quincy—Between Guernsey and Wendover.....	7.37	7.37
Total of all track.....		7.37

CANADA

First Track

Alberta & Great Waterways (E. D. & B. C.)—In Alberta, mile 78 to mile 175.....	97.00	
Canadian Northern (Western Lines)—In Saskatchewan, Bientait to Estevan, 8.91 miles; Canora to Sturgis, 21.44 miles; MacRorie Westerly branch, Elrose to Eston, 34.59 miles; Wroxton to Yorkton branch, 41.01 miles; In Alberta, Camrose southeasterly, 60 miles; total.....	165.95	
Canadian Northern Ontario (C. N. Eastern Lines)—Not specified.....	7.90	
Canadian Northern Pacific—Between Vancouver, B. C., and Yellowhead Pass.....	22.00	
Canadian Pacific (Western Lines)—In Alberta, Coronation northwest, 0.50 miles; Foremost to Pokowki, 22.30 miles; total.....	22.80	
Canadian Northern Quebec (C. N. Eastern Lines)—Not specified.....	5.06	
Central Canada (E. D. & B. C.)—In Alberta to Peace River Crossing.....	50.00	
Dominion Atlantic—In Nova Scotia, not specified.....	14.81	
Edmonton, Dunvegan & British Columbia—In Alberta, mile 248 to mile 357.....	109.00	
Essex Terminal—To Ojilway, Ont.....	1.00	
Grand Trunk Pacific—In Saskatchewan, Prince Albert branch mile 83 to mile 87.....	4.00	
Hudson Bay Railway—In Manitoba, not specified.....	44.00	
Intercolonial—Not specified.....	0.85	
Kettle Valley—Osprey Lake, B. C., to Princeton, 31.00 miles; Coquihala branch 33.00 miles; total.....	64.00	
Pacific Great Eastern—P'Arcy, B. C., to Clifton.....	82.00	
Quebec Central—From 5 miles east of St. Camille, Que., to English Lake.....	14.00	
Winnipeg & Northern (Can. Nor.)—Grand Marais, Man., to Victoria Beach.....	14.00	718.17

CANADA—Continued.

Second Track

	Miles.	Miles.
Essex Terminal—Near Windsor, Ont.....	0.84	0.84
Total of all track.....		719.21

MEXICO

First Track

San Diego & Arizona—Lower California from 2.6 miles east of Tecate to Mexican-United States boundary....	4.50	
Tampico & Panuco Valley—In Vera Cruz, between Tampico and Panuco.....	32.00	36.50
Total of all track.....		36.50

THE AGITATOR AND THE LAKE LINES

[From the Northwestern Miller.]

The Lehigh Valley Railroad Company has petitioned the Interstate Commerce Commission for a rehearing on its application to be allowed to continue its lake service, which, in common with that of other railways operating lines on the lakes, was ordered stopped because the commission held that such service violated the terms of the Panama Canal act.

This act, commonly supposed to apply specifically to lines operating through the Panama Canal, was given general application by the simple inclusion of two words "and elsewhere," thus bringing under its provisions the Great Lakes, according to the ruling of the Interstate Commerce Commission, a result no doubt never contemplated by the majority of those who voted for the measure in Congress, believing it to be intended only for regulating traffic through the canal.

Taking advantage of this opportunity, the Interstate Commerce Commission promulgated a ruling which is one of the most preposterously destructive acts ever perpetrated by this body, totally disrupting and destroying an established system of lake transportation, which has been of incalculable benefit to the Western shipper and receiver, in the hope of encouraging an imaginary system of so-called "independent" transportation, which, by a disjointed and disconnected service, is to accomplish what the commission considers "competition," but which actually would be a state of irresponsible chaos. Thereby it is the desire of the commission to turn backward the wheels of progress to a system of transportation which was out of date 25 years ago.

In its interpretation of the meaning of the act, the commission is doubtless sincere, believing that in some mysterious way an independent system will come into being which shall give shippers the benefit of a competition which they do not at present have, and cannot, under existing conditions, obtain.

The commission has been led into this belief by the persistent outcry of the paid agitators employed by certain associations and trade organizations. For some time actual shippers have been aware that, on the whole, the work of these agitators has been mischievous and even dangerous, but they were powerless to restrain them; the machinery for their employment having been put in operation, no way is provided either for directing them wisely or suppressing them altogether.

The civic organizations that support and keep in motion these "experts" rarely represent the real shippers either by their membership or their published sentiments. Mostly they are composed of real estate operators, local bankers, retailers and a vast conglomeration of clerks, salesmen and subordinates, who like to imagine themselves representative citizens. Shippers who have a large and comprehensive view of traffic matters have long since withdrawn their support.

Such influences as these, which really signify nothing but a distorted sense of local patriotism, are responsible for the hue and cry raised against the railway-controlled lake lines which are now threatened with extinction. To these the Interstate Commerce Commission has evidently listened—not wisely but too well. If its ruling is not reversed, the Western shipper and receiver, now so dependent upon lake transportation, will find themselves facing a situation nothing short of calamitous in the very near future. For this they may thank the walking delegates of their local trade-unions, whether or not they themselves are members in good standing.

Mileage of American Railroads Block Signaled

Space Interval in Use on Nearly One Hundred Thousand Miles. Another Thousand, Automatic, Planned for

The mileage of railroad in the United States operated under the block system on January 1, 1916, as shown in the large table printed herewith is 97,809 miles. The increase over the total given in our table printed one year ago is 9,677 miles. As is well known, however, the manual block system is used on a large mileage of single track lines for the protection only of passenger trains and the more significant total is that of automatic block signal mileage; of this we record now 31,160 miles of road as compared with 29,689 miles in the table for January 1, 1915. The increase in automatic mileage during the past 12 months is comparatively small, as might have been expected.

As in former years, a considerable portion of the new automatic mileage consists of signals installed on lines where the manual system had been in use, and the total length of road worked under the space interval system, automatic and non-automatic together, is not increased by such items; but in 1915 there has been a net increase of 8,206 miles in manual block signal mileage.

The detailed comparison of the totals of the *Railway Age Gazette* tables for the four years last past is as follows:

Miles of Road Worked by the Block System

	—Automatic—		—Manual—		—Total—	
	Jan. 1	Increase over prev. year	Jan. 1	Increase over prev. year	Jan. 1	Increase over prev. year
1916.....	31,160	1,471	66,649	8,206	97,809	9,677
1915.....	29,689	3,566	58,443	Decrease	88,132	943
1914.....	26,123	3,827	61,062	5,127	87,185	8,954
1913.....	22,296	1,961	55,935	Decrease	78,231	1,821

These figures are to be understood with the usual conditions, with which the reader is familiar. A number of roads exclude from their statement of total mileage operated all lines on which there is regularly in service only one locomotive, and also lines on which only freight trains are run. Among the roads thus reporting are the Baltimore & Ohio, the Chesapeake & Ohio, the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St. Paul, the New York Central, the Pennsylvania and the Southern Pacific. A number of roads have long sections of road used exclusively for freight trains which are equipped with automatic block signals; notably the Pennsylvania, the Erie and the Lehigh Valley.

The Panama Railroad is operated throughout by the block system, nearly all automatic.

Canada.—The block system is operated in Canada on 8,787 miles of road, of which 611 miles is automatic, as shown in the small table. In the Canadian manual mileage there is included 75 miles worked by train staff.

Lines in Canada Worked by the Block System

	Automatic miles of road	Manual miles of road	Total miles of road
Canadian Government, Intercolonial.....	43	.....	43
Canadian Pacific, East of Fort William.....	222	4,535	4,757
Canadian Pacific, Western Lines.....	34	18	52
Dominion Atlantic† .....	...	273	273
Grand Trunk	5	3,350	3,355
Michigan Central	245	.....	245
Toronto, Hamilton & Buffalo.....	62	.....	62
	611	8,176	8,787

† No report received. Figures repeated from last year.

PLANS FOR 1916

Roads which have given information concerning proposed new work, including both block and interlocking signals, for next year, are not so numerous as one year ago, but it is to be noted that most of the large roads have given no information on this point; they say that their plans are not yet settled. One road intends, during 1916, to equip 400 miles of line with automatic block signals (in place of manual); but is not yet quite ready to have the figures appear in our list. The Long Island is the

only company which plans to install any considerable length of manually operated block signals. A comparison will show that, in some cases, the expectations for 1916 are but a repetition of those formulated a year ago for 1915; but, no doubt, everybody's expectations have at the present time a better basis of facts than they had one year ago.

The Alabama Great Southern plans during the coming year to install automatic block signals on 5.4 miles of line. This number of miles is exactly the difference between the mileage reported as now operated under automatic block signals and the total mileage of road on which passenger trains are run, indicating that at the end of the year the whole of the line will be signaled.

The Atchison, Topeka & Santa Fe plans during the coming year to install automatic block signals on seven miles of its line, double track, between Standish, Mo., and Carrollton; ten miles, double track, between Le Loup, Kan., and H. U. Tower and between Claremont, Cal., and Arcadia, 20 miles, single track. Of these three installations, the two last named have already been begun. During 1916, the company proposes to install electric interlocking, 36 levers, at Arcadia, Cal., jointly with the Southern Pacific and the Pacific Electric, and at Los Angeles, Cal., electric interlocking, 80 levers, jointly with the Salt Lake Route and the Southern Pacific.

The Atlantic Coast Line reports that the length of road equipped with automatic block signals, given in the table as 252 miles, will soon be increased to 320, signals having been nearly completed on 68 miles (double track), but not yet put in operation.

The Boston & Maine is to install an electro-mechanical interlocking at Newburyport, Mass.; 20 mechanical and 7 electric levers.

The Chesapeake & Ohio plans during the coming year to install automatic block signals on 8 miles of its line, double track, and 21 miles single track.

The Chicago & Northwestern plans during the coming year to put in an electric interlocking plant at Deering, Ill., of 44 levers. This is at the crossing of the Chicago river. Another electric interlocking of 100 working levers is to be put in at Washington street, Milwaukee, to take the place of two mechanical interlockings.

The Chicago, Indianapolis & Louisville is to install mechanical interlocking at the crossing of its line with the Grand Trunk at Haskells, Ind. The machine will have 25 levers and the distant signals will be power operated.

The Chicago, Milwaukee & St. Paul, on its electrified line between Butte, Mont., and Finlen, Mont., 16 miles, will install light signals, automatic, in place of manual block signals; and this work together with 39 miles, in the same vicinity, which has already been changed from automatic semaphore signals will make 55 miles of road equipped with light signals.

The plans of the Chicago, Rock Island & Pacific for the ensuing year include the installation of automatic block signals on five miles of road, double track.

The Cincinnati, Hamilton & Dayton plans to install automatic block signals on 21 miles of its line, double track, during 1916; and an additional length of 6 miles will be changed from single track to double track.

The Cleveland, Cincinnati, Chicago & St. Louis contemplates the installation of automatic block signals during the coming year on its line from Bellefontaine, Ohio, to Anderson, Ind., 106 miles, single track.

The Cumberland Valley proposes during the coming year to install automatic block signals on its line near Berkeley, six miles, single track.

The Erie will install automatic block signals in 1916, in place

LENGTH OF RAILWAYS IN THE UNITED STATES WORKED BY THE BLOCK SYSTEM, JANUARY 1, 1916

Name of Road	Miles of Road						Total passenger lines operated	Percentage of total block signaled	
	Automatic			Non-automatic					
	Single track	Two or more tracks	Total	Single track	Two or more tracks	Total			
Albany Southern†.....	...	...	...	27	16	43	43	43	100
Ann Arbor.....	...	...	...	1	...	1	1	294	...
Arizona & New Mexico.....	1	...	1	...	...	...	1	110	...
Atchison, Topeka & Santa Fe (including Gulf, Col. & Santa Fe).....	126	444	570	1,021	507	1,528	2,098	9,640	21
Atlanta & West Point.....	...	...	...	...	6	6	6	86	13
Atlantic Coast Line.....	11	241	252	141	12	153	405	3,810	11
Baltimore & Ohio.....	39	374	413	1,921	771	2,692	3,105	3,105	100
Baltimore & Ohio Chicago Terminal.....	1	20	21	...	...	...	21	43	50
Baltimore & Ohio Southwestern.....	35	25	60	867	36	903	963	963	100
Cincinnati, Hamilton & Dayton.....	19	35	54	447	19	466	520	547	95
Staten Island.....	...	24	24	...	...	...	24	24	100
Baltimore, Chesapeake & Atlantic†.....	...	...	...	87	...	87	87	87	100
Bangor & Aroostook.....	6	...	6	...	1	7	7	622	...
Bessemer & Lake Erie†.....	...	...	...	65	130	195	195	191	100
Boston & Maine.....	550	624	1,174	...	...	...	1,174	2,213	53
Boston Elevated (Rapid Transit Lines).....	...	17	17	...	...	...	17	...	...
Boston, Revere Beach & Lynn.....	...	14	14	...	...	...	14	14	100
Buffalo, Rochester & Pittsburgh.....	140	83	223	175	41	216	439	408	...
Butte, Anaconda & Pacific.....	8	...	8	...	...	...	8	58	14
Canadian Pacific.....	...	...	...	200	...	200	200	200	100
Carolina & North Western.....	...	...	...	2	...	2	2	133	...
Carolina, Clinchfield & Ohio.....	13	...	13	...	...	...	13	282	5
Central New England.....	1	36	37	...	37	37	74	300	24
Central of Georgia.....	...	2	2	48	7	55	57	1,767	3
Central of New Jersey.....	41	201	242	...	...	...	242	460	52
Central Vermont.....	...	...	...	396	6	402	402	402	100
Cherrytree & Dixonville.....	...	...	...	31	...	31	31	31	100
Chesapeake & Ohio.....	...	455	455	1,395	21	1,416	1,871	1,895	...
Chesapeake Beach.....	...	...	...	2	...	2	2	28	...
Chicago & Alton.....	411	188	599	106	37	143	742	1,052	71
Chicago & Eastern Illinois.....	58	154	212	181	31	212	424	1,006	42
Chicago & North Western.....	208	930	1,138	2,559	25	2,584	3,722	7,332	51
Chicago & Western Indiana.....	...	20	20	...	7	7	27	27	100
Chicago, Burlington & Quincy.....	159	110	269	7,923	782	8,705	8,974	8,693	100
Chicago Great Western.....	256	90	346	49	...	49	395	1,427	28
Chicago, Indianapolis & Louisville.....	294	...	294	...	...	...	294	578	51
Chicago Junction.....	...	...	...	1	...	1	1	...	...
Chicago, Lake Shore & South Bend.....	10	...	10	...	...	...	10	...	...
Chicago, Milwaukee & St. Paul.....	365	963	1,328	3,058	43	3,101	4,429	8,644	51
Bellingham & Northern.....	...	...	...	55	...	55	55	55	100
Gallatin Valley.....	...	...	...	48	...	48	48	48	100
Idaho & Washington Northern.....	...	...	...	112	...	112	112	112	100
Puget Sound & Wallapa Harbor.....	...	...	...	66	...	66	66	66	100
Tacoma & Eastern.....	...	...	...	76	...	76	76	76	100
White Sulphur Springs & Yellowstone Park.....	...	...	...	19	...	19	19	19	100
Chicago, Ottawa & Peoria.....	16	...	16	...	...	...	16	108	15
Chicago, Peoria & St. Louis.....	...	...	...	247	...	247	247	247	100
Chicago, Rock Island & Pacific.....	700	284	984	1,087	...	1,087	2,071	8,041	26
Chicago, Rock Island & Gulf.....	33	...	33	...	...	...	33	469	7
Chicago, St. Paul, Minneapolis & Omaha.....	23	173	196	629	...	629	825	1,673	49
Chicago, South Bend & Northern Indiana†.....	10	...	10	...	...	...	10	...	...
Chicago, Terre Haute & Southeastern.....	1	...	1	...	...	...	1	178	...
Cincinnati, Indianapolis & Western.....	98	...	98	198	...	198	296	296	100
Colorado Midland.....	...	...	...	2	...	2	2	261	...
Columbia & Puget Sound.....	10	9	19	...	...	...	19	51	37
Copper Range†.....	...	...	...	79	...	79	79	79	100
Cornwall & Lebanon†.....	...	...	...	9	13	22	22	22	100
Cumberland & Pennsylvania†.....	...	...	...	4	3	7	7	31	23
Cumberland Valley.....	7	56	63	105	...	105	168	164	100
Delaware & Hudson.....	187	247	434	333	35	368	802	802	100
Delaware, Lackawanna & Western.....	281	539	820	9	...	9	829	960	86
Denver & Salt Lake†.....	...	...	...	34	...	34	34	214	16
Duluth & Iron Range.....	...	17	17	...	...	...	17	200	8
Duluth, South Shore & Atlantic.....	...	...	...	24	...	24	24	519	...
Durham & Southern.....	...	...	...	57	...	57	57	59	96
Eastern Kentucky†.....	...	...	...	4	...	4	4	36	11
Elgin, Joliet & Eastern†.....	7	3	10	9	...	9	10	...	...
El Paso & Southwestern.....	188	...	188	...	...	...	188	817	23
Empire United (Electric).....	41	6	47	1	...	1	48	135	36
Amherst & Syracuse.....	2	...	2	...	...	...	2	...	...
Erie (including Subsidiary Lines).....	27	892	919	665	229	894	1,813	2,183	...
Fort Dodge, Des Moines & Southern.....	16	...	16	102	...	102	118	118	100
Flt. Wayne & Northern Indiana.....	51	...	51	...	...	...	51	...	...
Grand Trunk.....	2	99	101	867	215	1,082	1,183	1,183	100
Great Northern.....	189	346	535	320	...	320	855	8,326	11
Hocking Valley.....	...	2	2	281	...	281	331	331	85
Hudson & Manhattan.....	...	8	8	...	...	...	8	8	100
Huntingdon & Broad Top Mountain†.....	5	...	5	...	...	...	5	40	10
Illinois Central.....	290	474	770	9	...	9	770	4,555	17
Yazoo & Mississippi Valley.....	93	...	93	...	...	...	93	1,370	7
Illinois Traction.....	120	2	122	...	...	...	122	443	28
Interborough (New York City).....	...	7	7	...	...	...	7	...	...
International (Buffalo)†.....	5	...	5	...	...	...	5	34	...
Kanawha & Michigan.....	2	...	2	2	...	2	4	164	...
Kansas City Terminal.....	...	7	7	...	...	...	7	...	...
Kentucky & Indiana Terminal.....	...	...	...	3	8	11	11	11	100
Kentwood & Eastern.....	...	...	...	3	...	3	3	30	10
Lackawanna & Wyoming Valley.....	...	...	...	1	2	3	3	23	...
Lehigh & Hudson River.....	73	...	73	...	...	...	73	73	100
Lehigh & New England.....	3	...	3	...	...	...	3	74	...
Lehigh Valley.....	71	519	590	593	49	642	1,232	1,218	100
Ligonier Valley.....	...	...	...	14	...	14	14	14	100
Long Island.....	1	114	115	37	17	54	160	361	47
Louisville & Nashville.....	213	150	363	90	53	143	506	4,793	11
Louisville & Nor. Ry. & Light.....	4	...	4	...	...	...	4	16	25
Maine Central.....	437	63	500	...	...	...	500	1,103	45
Portland Terminal.....	5	12	17	...	...	...	17	20	85
Maryland, Delaware & Virginia†.....	...	...	...	77	...	77	77	77	100
Mineral Point & Northern†.....	...	...	...	26	...	26	26	26	100
Mineral Range.....	...	...	...	5	...	5	5	77	...
Minneapolis & St. Louis.....	...	...	...	11	...	11	11	1,538	...
Minneapolis, St. Paul & Sault Ste. Marie.....	...	...	...	1,410	12	1,422	1,422	3,480	40
Missouri, Kansas & Texas.....	6	...	6	10	...	10	19	1,600	...
Missouri, Kansas & Texas of Texas.....	92	...	101	...	...	...	101	1,632	...
Missouri Pacific.....	59	30	89	3,527	20	3,547	3,645	3,890	94
St. Louis, Iron Mountain & Southern.....	120	13	133	2,676	169	2,845	2,978	3,251	92
Mobile & Ohio.....	5	...	5	38	...	38	43	949	...
Monongahela.....	...	2	2	...	...	...	2	97	...
Munising, Marquette & Southeastern.....	...	...	...	4	...	4	4	110	...

LENGTH OF RAILWAYS IN THE UNITED STATES WORKED BY THE BLOCK SYSTEM, JANUARY 1, 1916—Continued

Name of Road	Miles of Road						Total both kinds	Total passenger lines operated	Percentage of total block signaled
	Single track	Automatic Two or more tracks	Total	Single track	Non-automatic Two or more tracks	Total			
Nashville, Chattanooga & St. Louis.....	111	...	111	...	...	...	111	1,230	9
Nashville Terminalst.....	...	2	2	4	...	4	6	...	...
Nevada Northern.....	1	...	1	...	...	...	1	155	...
Newburgh & South Shore.....	...	...	...	...	5	5	5	...	...
New York & Long Branch.....	...	38	38	...	...	...	38	38	100
New York Central Lines:									
Boston & Albany.....	3	209	212	...	1	1	213	378	56
Cincinnati Northern.....	...	...	...	205	...	205	205	205	100
Cleveland, Cincinnati, Chicago & St. Louis.....	24	98	122	733	285	1,018	1,140	2,203	51
Lake Erie & Western.....	48	9	57	815	...	815	872	872	100
Lake Erie & Pittsburgh (Freight Road).....	...	...	...	28	...	28	28	28	100
Michigan Central.....	...	272	272	872	19	891	1,163	1,163	100
New York Central, Eastern Lines.....	2	696	698	1,688	542	2,230	2,928	2,942	99
New York Central, Western Lines.....	28	574	602	1,318	63	1,381	1,983	1,998	99
Peoria & Eastern (inc. in C. C. C. & St. L.)	...	...	...	...	...	...	...	...	...
Pittsburgh & Lake Erie.....	...	160	160	3	...	3	163	166	98
Toledo & Ohio Central.....	2	5	7	382	1	383	390	390	100
Zanesville & Western.....	1	...	1	68	...	68	69	...	...
New York, Chicago & St. Louis.....	146	12	158	...	...	...	158	513	31
New York, New Haven & Hartford.....	2	344	346	1,034	388	1,422	1,768	1,923	92
New York, Ontario & Western.....	49	150	199	...	...	...	199	493	40
New York, Philadelphia & Norfolk.....	...	9	9	33	70	103	112	112	100
Cape Charles.....	...	...	...	9	...	9	9	9	100
New York State Railways.....	72	5	77	...	...	...	77	...	...
New York, Westchester & Boston.....	...	18	18	...	...	...	18	18	100
Norfolk & Western.....	142	521	663	940	8	948	1,611	1,879	86
Northern Pacific.....	683	500	1,183	258	81	339	1,522	5,666	27
Northwestern Pacific.....	11	16	27	...	...	...	27	407	7
Oakland, Antioch & Eastern.....	82	...	82	...	...	...	82	99	...
Ohio Electric.....	5	...	5	...	...	...	5	552	...
Ohio Valley Electric.....	...	...	...	11	...	11	11	22	...
Pacific Electric.....	...	12	12	...	...	...	12	...	...
Pennsylvania (inc. all east of Pittsburg).....	3	730	733	2,944	948	3,892	4,625	4,625	100
Grand Rapids & Indiana.....	...	...	...	225	2	227	227	546	41
Pennsylvania Co.....	...	528	528	836	206	1,042	1,570	1,651	95
Pennsylvania Terminal (Louisville).....	...	...	...	2	1	3	3	3	100
Pittsburgh, C., C. & St. Louis.....	...	30	30	741	621	1,362	1,392	1,415	98
Vandalia.....	...	...	6	303	61	364	370	782	48
Peoria & Pekin Union.....	...	...	...	...	6	6	6	16	...
Pere Marquette.....	136	11	147	...	...	...	147	1,629	9
Philadelphia & Reading.....	41	519	560	307	64	371	931	1,351	69
Philadelphia Rapid Transit.....	...	7	7	...	...	...	7	...	...
Piedmont & Northern.....	...	3	4	126	...	126	130	130	100
Pittsburgh, Shawmut & Northern.....	...	...	...	...	...	...	...	...	...
Portland Ry., Light & Power.....	21	...	21	...	...	...	21	295	...
Quincy, Omaha & Kansas City, and Iowa & St. Louis.....	...	...	...	296	...	296	296	296	100
Queen & Crescent Route:									
Alabama & Vicksburg.....	78	...	78	...	...	...	78	142	54
Alabama Great Southern.....	249	36	285	...	...	...	285	290	98
Cincinnati, New Orleans & T. P.....	197	129	326	9	...	9	335	335	100
New Orleans & Northeastern.....	98	15	113	...	...	...	113	196	58
Richmond, Fredericksburg & Potomac.....	...	19	19	10	59	69	88	88	100
St. Louis & San Francisco.....	708	34	742	11	...	11	753	4,749	16
Beaumont, Sour Lake & Western.....	...	...	...	...	...	...	...	...	...
Orange & Northwestern.....	...	...	...	...	...	...	...	...	...
St. Louis, Brownsville & Mexico.....	...	...	...	...	...	...	...	...	...
St. Louis Merchants' Bridge Terminal.....	...	6	6	...	1	1	7	10	7
St. Louis Southwestern (less than 1 mile)	...	...	...	...	...	...	...	...	...
Southern Illinois & Missouri Bridge.....	...	5	5	...	...	...	5	5	100
San Francisco-Oakland Terminal.....	...	4	4	...	...	...	4	22	...
San Pedro, Los Angeles & Salt Lake.....	4	...	4	...	...	...	4	1,094	...
Seaboard Air Line.....	...	...	...	303	10	313	313	2,828	11
Southern.....	18	422	440	1,747	66	1,813	2,253	6,444	35
Virginia & Southwestern.....	...	...	...	2	...	2	2	204	...
Southern Pacific:									
Galveston, H. & San Antonio.....	276	...	276	998	4	1,002	1,278	1,281	...
Houston & Shreveport.....	...	...	...	40	...	40	40	40	100
Houston & Texas Central.....	3	...	3	812	...	812	815	750	...
Houston, East & West Texas.....	3	...	3	188	...	188	191	191	100
Iberia & Vermilion.....	16	...	16	...	...	...	16	16	100
Lake Charles & Northern.....	...	...	...	45	...	45	45	45	100
Louisiana Western.....	103	...	103	93	...	93	196	...	...
Morgan's La. & Texas.....	95	...	95	141	40	181	276	...	...
Texas & New Orleans.....	113	...	113	318	1	319	432	...	...
Southern Pacific—Pacific System.....	2,403	414	2,817	3,588	...	3,588	6,405	6,405	100
Spokane, Portland & Seattle.....	...	7	7	...	...	...	7	541	...
Oregon Electric.....	...	7	7	...	...	...	7	154	...
Spokane & I. E. (less than 1 mile)	...	...	...	...	...	...	...	...	...
United Railways.....	1	...	1	...	...	...	1	19	...
Terminal R. R. Ass'n of St. Louis.....	...	6	6	...	1	1	7	13	56
Terre Haute, Ind. & Eastern Traction.....	48	...	48	...	...	...	48	366	...
Texas & Pacific.....	1	...	1	78	...	78	79	1,937	4
Tidewater Power Co.†.....	...	...	...	6	...	6	6	11	...
Toledo, Peoria & W. (less than 1 mile)	...	...	...	...	...	...	...	...	...
Toledo, St. Louis & Western.....	...	...	...	188	...	188	188	450	42
Ulster & Delaware†.....	24	...	24	...	...	...	24	130	18
Union (Pa.) (less than 1 mile)	...	...	...	...	...	...	...	...	...
Union Pacific:									
Oregon Short Line.....	519	105	624	...	...	...	624	2,199	28
Oregon Washington R. R. & N. Co.....	599	28	627	1	...	1	628	2,019	31
Union Traction Company of Indiana.....	50	...	50	...	...	...	50	363	...
Virginia & Kentucky (less than 1 mile)	...	...	...	...	...	...	...	...	...
Virginian.....	...	...	...	13	...	13	13	484	...
Wabash.....	89	95	184	2,079	256	2,335	2,519	2,519	100
Wabash-Pittsburgh Terminal.....	...	4	4	...	...	...	4	63	...
Washington, Baltimore & Annapolis.....	14	...	14	...	...	...	14	52	26
Washington Southern.....	...	6	6	...	26	26	32	32	100
Washington Terminal.....	...	2	2	...	...	...	2	2	100
Washington Water Power Co.†.....	22	...	22	...	...	...	22	22	100
Western Pacific.....	11	...	11	...	...	...	11	941	12
Western Maryland.....	103	...	103	...	...	...	103	647	16
Total.....	14,377	16,783	31,160	59,453	7,196	66,649	97,809	...	...

† No report received; figures repeated from last year. Interboro Rapid Transit: Only the four-track line is included.

of the manual block system, on 84 miles of road, namely: Solon, Ohio, to Cleveland, 16 miles, double track; Kent, Ohio, to Leavittsburg, 27 miles, double track; Buchanan Junction, Pa., to Pymatuning, 26 miles single track and 6 miles double track; Columbus, Pa., to Niobe Junction, 9 miles. Also on the controlled line, the New York, Susquehanna & Western, automatic block signals will be installed on 14 miles, double track, to take the place of the manual block system.

The El Paso & Southwestern proposes to install automatic block signals this year on its line between Lee, Ariz., and Moores Spur, Ariz., 25 miles.

The Great Northern Railway plans to install during the coming year automatic block signals on 200 miles of its line. The plans for the year include also the installation of a 22-lever interlocking plant at Aberdeen, S. D., where the line crosses the Chicago, Milwaukee & St. Paul; and a nine-lever interlocking at Calumet, Minn., where the line crosses the Duluth, Missabe & Northern.

The Illinois Central plans to install automatic block signals during the coming year on 180 miles of its lines, as follows: Gilman, Ill., to Mattoon, 90 miles, double track; Dugan, Ky., to Cecilia, 8 miles; East View to Leitchfield, Ky., 14 miles; Horse Branch, Ky., to Beaver Dam, 12 miles; Rockport, Ky., to Mercer, 12 miles, and Eddyville, Ky., to Paducah, 35 miles, all single track; Woodstock, Tenn., toward Memphis, 8 miles, single track, and Branch Junction, Ill., to Centralia, 2 miles, double track.

The Interboro Rapid Transit Company, New York City, will install automatic block signals on 30 miles of track during 1916. This is the centre track, now being built, which will change the principal parts of the elevated lines in Manhattan from two-track to three-track road. These new tracks will be signaled for the movement of trains in both directions. The company also plans to install 17 electro-pneumatic interlocking plants, nine on the Manhattan Elevated lines and eight on the extensions to the subway line. One of these machines will have 107 levers, and others range from 55, 39, 31, down to 7 levers each.

The Long Island Road during 1916 plans to install the manual block system on 58.4 miles of line.

The Monongahela Railway proposes to install during the coming year automatic block signals on its line, single track, from South Brownsville, Pa., to the West Virginia line, 33 miles.

The plans of the New York, New Haven & Hartford for 1916 include extensive reconstruction on the New York division, four-track, between New Haven and South Mt. Vernon, as heretofore announced. From Stamford to South Mt. Vernon, 20 miles, the controlled manual system is to be abandoned and a complete system of automatic signals put in, to be worked by alternating-current apparatus, and the signal aspects to be in the upper left-hand quadrant. On the eastern part of the division, New Haven to Stamford, 40 miles, automatic signals are already in service, but these will be changed from two-arm, two-position, to one-arm, three-position; and the semaphores will work in the upper left-hand quadrant.

In connection with these changes in the block signaling, a number of new interlockings will be installed. At Stamford an electric interlocking, type F, with 53 levers, will be installed in the place of two large mechanical plants. New electro-mechanical plants will be installed at Cos Cob drawbridge, at Greenwich, and at Rye, each to have a 16-lever frame. Five manual block stations will be discontinued. New electro-mechanical interlockings, 16 levers each, will be put in at Greens Farms and at Westport drawbridge.

The New York, Ontario & Western plans to install a mechanical interlocking, 56 levers, at Campbell Hall, N. Y. This plant was included in the estimates for 1915, but it was not built.

The Norfolk & Western plans during the coming year to install automatic block signals on 62 miles of line, as follows: On the new line now under construction between Burkeville, Va., and Pamplin, 37 miles; and on lines now operated under the manual block system, 25 miles, as follows: Poe to Jack, Jack to Church Road, Pepper to Belspring and Pembroke to Ripplemead. The company proposes also to install four electric interlocking plants;

Burkeville, Va., 15 working levers, A. C.; Pamplin, Va., 33 working levers, A. C.; Jack, Va., 19 working levers, A. C.; and Low Grade Tunnel, Va., 26 working levers, D. C. At City Point, Va., an electro-mechanical plant is to be installed, 11 mechanical and 5 electric levers.

The San Pedro, Los Angeles & Salt Lake plans to install automatic block signals during the coming year on its line between Los Angeles and Riverside, 58 miles. A manual interlocking plant is being put in at Magnolia avenue, Riverside, where the line is crossed by the Pacific Electric Railway. This machine will have 12 levers.

The Southern Railway proposes during 1916 to install automatic block signals on 178 miles of its line. The plans for the coming year include also two large mechanical interlocking plants; one at Charlottesville, Va., 48 levers, and one at Danville, Va., 40 levers.

The Southern Pacific's plans for new work during the coming year include three interlocking machines, Saxby & Farmer, 8 levers each, at three drawbridges in Oregon.

The Sunset Central Lines propose during 1916 to install two mechanical interlocking plants; one at Bellaire Junction, crossing the San Antonio & Aransas Pass, 13 levers; and one at San Antonio at the crossing of the same road, 16 levers.

The Wabash Railway plans during the coming year to install automatic block signals on 43 miles of its road, single track.

The Western Maryland proposes during the coming year to install automatic block signals on 106 miles of its line.

FREIGHT EMBARGOES STILL IN EFFECT

The committee of railroad officers which is watching the freight situation at New York City reports this week that the embargoes have begun to produce some relief, but the congestion is still very great, and some new embargoes have been placed. The number of loaded cars awaiting delivery at and near New York, and on the way from the western termini of the Trunk Lines rose before Christmas to about 50,000, or 10,000 more than the number thus on hand and detained when the committee began its work; but there has since been some reduction. The Pennsylvania extended its embargo on eastbound freight to include shipments originating on its own lines; but made an exception of foodstuffs, livestock and perishable freight destined to New England. The congestion was aggravated by the blockade on the New Haven Road, due to the snow-storm. The effect of the congestion at the Atlantic seaboard is felt at Chicago and even farther west, and many shipments are held back by lack of box cars.

The Chesapeake & Ohio has removed its embargo on export oats at Newport News, but has now embargoed wheat. The Pennsylvania has been releasing 1,000 cars a day at Philadelphia and Baltimore, and it is hoped to remove the embargoes there early in January.

A heavy movement of grain at western primary markets continues, but scarcity of cars is a factor in reducing the deliveries.

On December 24 the New York Central extended its embargo to all export freight. This road now has about 350 barges and lighters in service in New York harbor, or nearly double its normal quota. Within the last 18 months it has chartered 180 extra barges. On December 26 the New York, New Haven & Hartford, largely on account of storms, embargoed everything except coal, food and perishable freight for all points in its Western district, except Hartford and the junctions of the Boston & Albany.

On Tuesday of this week, December 28, the Pennsylvania removed its embargo on domestic freight for New York and Brooklyn. In New York City, coal dealers begin to threaten an advance in prices owing to scarcity, and contractors using large quantities of cement and structural steel fear they will have to suspend work because of non receipt of supplies.

ENGLISH RAILWAY MEN AND THE WAR—The National Union of Railway Men has already lost over 1,020 members by death in the war.

General News Department

The Lehigh Valley has advanced the pay of car inspectors from 19 cents an hour to 22 cents.

Beginning with January the railroads of Texas, in accordance with a new law, will pay their employees twice a month.

The Interstate Commerce Commission announces a hearing at Washington, January 26, for further argument on questions relating to physical valuation of railroads.

The American Museum of Safety, New York City, has awarded to the Hudson & Manhattan Railroad (New York, Jersey City and Hoboken) the Travelers' Insurance Company medal for good results in prevention of accidents.

Southbound passenger train No. 1 of the Kansas City Southern was stopped by robbers on the morning of December 16 near Eagleton, Ark., and a safe in the express car was blown open, and the mail car robbed of the registered mail. The passengers were not molested.

At Middletown, Conn., December 22, Antonio Vernaie and Paul Karuba pleaded guilty to the charge of wrecking a passenger train on the New York, New Haven & Hartford at Maromas, Conn., in August, 1911, and were sentenced to imprisonment for from 5 to 15 years. The men are already serving prison sentences for other crimes.

The Pullman Company has announced that, effective on January 1, it will increase the pay of its conductors and porters and miscellaneous employees in its operating department by approximately 10 per cent. This will amount to an increase in payroll of about \$600,000 a year, and will affect about 9,000 conductors and porters.

The Chicago, Burlington & Quincy has completed work on the Wendover cut-off and has opened it for freight traffic. The cut-off is about 8½ miles long, extending from Guernsey, Wyo., to Wendover, and is one of the units in the Omaha-Montana short line which, when completed, will mean a "water grade" from the Rocky mountains to the Missouri river.

The College of Engineering of the University of Illinois has received a Mogul type locomotive from the Illinois Central. It has 19-in. by 26-in. cylinders, and weighs with its tender 206,000 lb. It was taken from service and put through general repairs before delivery to the university. The locomotive will be used under the general direction of Prof. E. C. Schmidt for instructional work in the locomotive laboratory.

The Interborough Rapid Transit Company has advanced the wages of conductors and guards 10 cents a day and has made considerable increases in the pay of different grades of motormen, those working their first year being advanced from \$3 a day to \$3.25. Advances have been made in the pay of train despatchers and others. Advances in pay have been announced also by the New York Railways Company, operating surface street car lines in Manhattan; by the Third Avenue (street) Railway, and by the Brooklyn Rapid Transit Company.

Mr. Cox, of Indiana, has introduced in Congress a bill to amend the Interstate Commerce law by including in the term "railroad" all bridges used by wagons, automobiles, etc., in transportation from one state to another. Mr. Dyer, of Missouri, has introduced a bill to authorize the Interstate Commerce Commission to hold competitive examinations to get men for the positions of roadmaster, foremen and certain other railroad places. Carriers would be required to fill vacancies in these positions only with persons certified by the commission.

Frank Trumbull, chairman of the board of directors of the Chesapeake & Ohio, has been made chairman of the committee on immigration recently organized by the Chamber of Commerce of the United States. Mr. Trumbull's associates on the committee are: Julius Rosenwald, Sears-Roebuck Company, Chicago, Ill.; J. F. Denechaud, chairman, Louisiana Immigration Commission, New Orleans, La.; B. J. Rothwell, president, Bay State

Milling Company, Boston, Mass.; Malcolm McDowell, formerly vice-president Southern Development Company, Washington, D. C.; B. L. Winchell, traffic director, Union Pacific, Chicago, Ill.; Herbert Myrick, editor, New England Homestead, Springfield, Mass.; A. C. Weiss, publisher, Duluth Herald, Duluth, Minn. It is expected that in the near future other names will be added to the committee.

Keswick Collision

An officer of the Baltimore & Ohio calls our attention to an error in the *Railway Age Gazette* train accident record for November, printed December 24, page 1201, where a rear collision at Keswick, Va., on the Chesapeake & Ohio, November 2, is entered as occurring on the Baltimore & Ohio.

American Association of Railroad Superintendents

The executive and advisory committee of the American Association of Railroad Superintendents, at its meeting on Monday at St. Louis, decided to hold the 1916 annual meeting of the association at Memphis, Tenn., on August 16, 17 and 18. The membership of the association has more than doubled during the past year.

High Water Carries Out Falsework at the Memphis Bridge

On the night of December 23 high water carried out 418 ft. of falsework for the new Harahan bridge across the Mississippi river at Memphis, now being built by the Rock Island, the Missouri Pacific and the "Cotton Belt." This falsework was for the west or 418-ft. semi-suspended span between piers 3 and 4. Fortunately no part of the span had been erected, though the wrecking of the falsework carried with it the traveler, a mule derrick, four hoisting engines and stringers for the high-way floor temporarily used as runways for the traveler. At the time of the accident the anchor arm on the east end and the 621-ft. center fixed span had been erected, although falsework is still in place under the latter. The bottom chord and the floor system for the 186-ft. cantilever arm to support the east end of the semi-suspended span were also in place on falsework and the traveler was just about to commence erection of the semi-suspended span. The falsework under the fixed span and cantilever arm did not go out. The accident is the result of unprecedented high water for this time of the year which rose from 13 ft. to 28½ ft. in a few days. The exact extent of the damage will not be known until a fall of water will permit an estimate of the salvage.

Quite a List of Reasons

In the Supreme Court of New Jersey, last week, the Erie Railroad, appealing from an order of the Public Utility Commission requiring the abolition of 15 grade crossings in Paterson within eight years, at an estimated cost of \$3,000,000, argued:

That the act of 1913 is unconstitutional because it confers upon the board arbitrary power to make or refuse to make an order for the alteration of a grade crossing; provides for the taking of property for private use and for public use without just compensation; impairs the obligation of contract as existing between the railroad and the holders of its securities, between the state and the railroad and between the railroad and the Public Service Railway Company, also involved in the proceedings; constitutes an unreasonable exercise of the police power of the state; requires changes in the property of private corporations and municipalities; fails to give the Erie the alternative of eliminating the alleged danger to the public and impediment to travel by either decreasing the number of train movements or by abandoning the railroad; and impairs the powers of the equity and law courts of the state. Last, but not least, it was stated that the Erie has not the funds to carry out the provisions of the order and in all probability will not be in a position to obtain them.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.**—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, January, 1916, Atlanta, Ga.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.**—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.**—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.
- CANADIAN RAILWAY CLUB.**—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.**—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.**—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.**—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.**—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.**—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- NEW ENGLAND RAILROAD CLUB.**—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.**—Harry D. Vought, 95 Liberty St., New York. Regular meeting, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.**—E. N. Frankenberger, 623 Brishane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.**—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.**—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILROAD MEN'S IMPROVEMENT SOCIETY.**—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.
- RAILWAY BUSINESS ASSOCIATION.**—Frank W. Noxon, 30 Church St., New York. Annual meeting, January 27, 1916, Waldorf-Astoria Hotel, New York.
- RAILWAY CLUB OF PITTSBURGH.**—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RICHMOND RAILROAD CLUB.**—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.**—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.**—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.**—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.**—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRAFFIC CLUB OF NEWARK.**—Roy S. Rushy, Firemen's Bldg., Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.
- TRAFFIC CLUB OF NEW YORK.**—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- TRAFFIC CLUB OF PITTSBURGH.**—D. L. Wells, Gen'l Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.**—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings, October to May.
- TRANSPORTATION CLUB OF DETROIT.**—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- UTAH SOCIETY OF ENGINEERS.**—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.**—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.**—J. W. Taylor, 1112 Karpen Building, Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.**—E. N. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

In West Virginia, where a new prohibitory law is in operation, the principal railroads are trying to carry out an order of the court forbidding the acceptance of baggage of passengers whenever the trunk or bag offered baggage contains intoxicating liquor.

The Oregon Short Line has issued an announcement that after February 15, 1916, the Ogden gateway will be closed to through passenger traffic by way of the Denver & Rio Grande. This action is in accordance with a ruling of the Interstate Commerce Commission made last summer.

The Missouri roads have filed with the State Railroad Commission an application for a rehearing of the intrastate rate case. They complain that both freight and passenger rates are too low, and ask that they be raised to the basis of the rates recently authorized by the Interstate Commerce Commission, for interstate traffic in Missouri and adjacent territory.

The annual comparative statement of lake commerce passing through the canals at Sault Ste. Marie, Mich., and Ontario for the seasons of 1914 and 1915 shows a total of 71,290,304 tons in 1915, as compared with 55,369,934 in 1914—an increase of 29 per cent. Of the freight traffic in 1915 63,548,993 tons passed through the United States canal and 7,741,311 through the Canadian canal.

At the annual meeting of the Salt Lake City Passenger Association, held on December 18, the following officers were elected: President, C. L. McFaul, district freight and passenger agent, Southern Pacific; first vice-president, F. J. Bambach, traveling passenger agent, New York Central Lines; second vice-president, R. D. Staley, traveling passenger agent, Rock Island Lines; secretary and treasurer, J. S. Earley, city passenger agent, San Pedro, Los Angeles & Salt Lake.

The following have been elected members of the railroad subdivision of the Ways and Means Committee of the Chicago Association of Commerce: Chairman, J. C. Clair, industrial and immigration commissioner, Illinois Central; vice-chairman, James Webster, assistant freight traffic manager of the New York Central Lines; F. A. Spink, traffic manager of the Chicago & Western Indiana; C. H. Caswel, general agent of the Chicago, Rock Island & Pacific; and W. H. Wharton, commercial agent, Nashville, Chattanooga & St. Louis.

The baggage and milk department of the Baltimore & Ohio has been enlarged. John P. Dugan is general baggage and milk agent, and W. E. Shetrone, an experienced dairyman, is to be traveling milk agent. The company aims to assist farmers adjacent to its lines in bettering the economic methods of selecting dairy cattle and feeding their herds. Mr. Shetrone is a graduate of Pennsylvania State College, and since his graduation has been in charge for two years of the Bradford County Cow-Testing Association, at Le Royville, Pa. His headquarters will be at Baltimore.

Officers of the International Railways of Central America and the National Railways of Mexico are making preparations looking to the inauguration of through freight and passenger traffic between Mexico and Guatemala. They expect to run through sleeping cars between the capitals of the two countries. The Guatemala Central division of the International Railways of Central America was completed to a connection with the Pan-American division of the National Railways of Mexico at Ayutla several months ago, but on account of the bad condition of internal affairs of Mexico no interchange of cars was permitted.

In the United States District Court of Kansas City, Mo., December 21, a fine of \$40 was imposed on the Richards & Conover Hardware Company of Kansas City, for violation of the interstate commerce law in misbilling freight as hardware when the packages contained articles which should take a higher rate. This company, with two others, was indicted by the grand jury November 12, on information filed by the Interstate Commerce Commission.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

1915 Western Rate Advance Case—Part II

Rate increases in western classification territory. Opinion by Commissioner Daniels:

Many of the schedules here in issue propose increases in carload rates on various commodities, while others propose increases in less-than-carload rates on some commodities, and still others propose charges for special transportation services, such as switching incident to storage in transit, for which no charge is now made. The general region in which the increases and additional charges are proposed is the same as that involved in the *Western Rate Advance Case* (35 I. C. C., 497). While some of the increases are proposed as part of the general increases proposed in the *Western Rate Case*, others are proposed for the purpose of removing discrimination, or to correct mistakes in tariffs. Those increases here proposed, which were intended as a part of the general increase proposed in the *Western Rate Advance Case* and also the proposed charges for special transportation services, were placed in this docket for investigation rather than in the *Western Rate Advance Case*, for the reason that the effort was made to constitute that investigation "one of the propriety of increased rates which the carriers seek to impose upon a relatively small number of articles of heavy movement in the territory affected." The testimony heard in that proceeding relating to the financial needs of the carriers was made a part of the record in this case.

The commission finds that the carriers have justified increased carload rates on agricultural implements except to points in Louisiana and on canned goods and flue lining in western trunk line territory. They have not justified proposed increased carload rates on eggs from points in Kansas and other points to southwestern points, and on cider vinegar from interstate points to Kansas and Missouri. Proposed increased carload rates on bauxite ore to certain points only are found justified. The carriers may increase their carload rates on boots and shoes, leather, and boot and shoe findings between Missouri manufacturing points and interstate points, but not their less-than-carload rates between the same points or their carload minima on this traffic.

The carriers have also justified proposed increased rates on dried and evaporated fruits in portions of western trunk line territory; proposed increased carload rates on furniture from Kansas City and other points to Oklahoma, groups 6, 7 and 8; proposed charges for switching "run-by and setback" grain; proposed transit charges on fruits and vegetables in western trunk line and trans-Missouri territory and some of the proposed increases upon miscellaneous items. They have not justified a proposed readjustment of rates to Louisiana; proposed increases in carload rates on furniture from Kansas City and other points to Oklahoma, group point 9. Proposed increased less-than-carload rates to and from manufacturing points in Missouri on various commodities are found unlawful when made to vary with the quantity shipped.

COURT NEWS

The Supreme Court of Alabama by a vote of four to three has decided a case in the long-drawn-out litigation between the Louisville & Nashville and the Western Union Telegraph Company, against the telegraph company, holding that on certain divisions of the road, which figure in this case, there is no public necessity justifying the court in forcing the railroad to allow the telegraph company to continue the use of its right of way.

In the United States District Court at Buffalo, N. Y., December 17, the Northern Central Railway (Pennsylvania) was found guilty on 17 counts of paying illegal rebates on large quantities of coal shipped by the Mineral Railroad & Mining Company. In the same court, December 23, the Delaware, Lackawanna & Western Coal Company, indicted for illegal reduction in rates for transportation of coal by means of improper reduction of the rental charged the coal company by the railroad company, for the use of trestles at Buffalo, were acquitted by the jury.

Railway Officers

Executive, Financial, Legal and Accounting

Stewart C. Pratt has been appointed assistant general solicitor of the Lehigh Valley, with office at New York.

Woodward Hudson, counsel of the Boston & Albany, at Boston, Mass., has been appointed vice-president and general counsel of the Boston & Maine, with office at Boston, Mass. Effective January 1.

Walter D. Owens, chief clerk to the controller and secretary of the valuation committee of the Baltimore & Ohio, has been promoted to auditor of subsidiary lines of the Baltimore & Ohio, with headquarters at Baltimore, Md., succeeding J. L. Kirk, deceased.

G. N. Orcutt, assistant to president of the Erie at New York, has been elected a vice-president in charge of the purchasing, land and tax and federal valuation departments, with headquarters at New York. G. A. Richardson, vice-president at New York in charge of the financial and accounting departments, has resigned, effective January 1, 1916.

Operating

J. J. Prentice has been appointed assistant superintendent of the western division of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. James, Minn., vice Peter Cope land assigned to other duties. E. R. Gorman has been appointed trainmaster of the northern division, with headquarters at Spooner, Wis. Effective December 22.

John B. Dickson, general superintendent of the Erie at Cleveland, Ohio, has been appointed general manager of the lines west, with office at Cleveland. Franklin G. Robins, division superintendent at Buffalo, N. Y., has been appointed general superintendent of the lines west, with office at Youngstown, Ohio. Charles P. Eckels, division superintendent at Susquehanna, Pa., has been appointed superintendent of the Buffalo division at Buffalo, N. Y., and Joseph W. Foote, trainmaster at Susquehanna, Pa., has been appointed superintendent of the Delaware division, with office at Susquehanna, effective January 1, 1916.

The Chicago, Rock Island & Pacific has changed its operating organization and will have two instead of three districts, the second district being abolished. The new first and second districts will have their headquarters at Des Moines, Ia., and El Reno, Okla., respectively. The Nebraska and Colorado divisions are added to the first district, and the St. Louis, the Kansas City Terminal, the Kansas, and the El Paso divisions will be added to the new second district. A. E. Sweet, general manager of the second district, has resigned, to go to the Denver & Rio Grande, as reported last week. G. W. Rourke, assistant general manager of the second district, goes to El Reno to become assistant general manager of the new second district, succeeding A. B. Copley, deceased. C. W. Jones remains general manager of the first district as enlarged. T. H. Beacon, general manager of the old third, is general manager of the new second district. The other officers of the present first and second districts have their authority extended correspondingly. F. T. Beckett is engineer of maintenance of way of the new second district, and R. L. Stewart, mechanical superintendent.

Traffic

John T. Monroe has been appointed assistant general passenger agent of the Sunset-Central Lines, with office at Houston, Tex.

E. R. Whelen, general agent of the Cleveland, Cincinnati, Chicago & St. Louis at Cincinnati, Ohio, has been transferred to Chicago, Ill.

A. P. Johnson has been appointed division passenger agent of the St. Louis & San Francisco with office at Memphis, Tenn., effective January 1.

G. P. Ruickbie has been appointed district freight agent of the Canadian Pacific, Eastern division, at Ottawa, Ont., vice J. J. Kelly, acting district freight agent, transferred.

William L. Donaldson, assistant to general freight agent of the Lehigh Valley at New York, has been appointed assistant general freight agent, with headquarters at Buffalo, N. Y., succeeding Samuel A. Story, resigned to go into other business.

George A. Walton, general agent of the Canadian Pacific at Chicago, has been appointed general passenger agent with office at Winnipeg, Man., succeeding A. C. Shaw; T. J. Wall, general agent at Minneapolis, Minn., succeeds Mr. Walton as general agent at Chicago.

J. H. R. Parson, general passenger agent of Morgan's Louisiana & Texas Railroad & Steamship Company, with office at New Orleans, La., has been appointed general passenger agent of the Sunset-Central Lines of the Southern Pacific, with office at Houston, Tex.

C. E. Stone, general traffic manager of the Great Northern Pacific Steamship Company at San Francisco, Cal., has been appointed passenger traffic manager of the Great Northern. H. A. Noble, general passenger agent of the Great Northern, has been appointed general manager of the Glacier Park Hotel Company, effective January 1.

Engineering and Rolling Stock

Robert S. Parsons, general manager of the Erie, at Cleveland, Ohio, has been appointed chief engineer, with office at New York.

I. C. Newmarch, general foreman in the Collinwood, Ohio, locomotive shops, of the New York Central, has been appointed superintendent of shops, with headquarters at Collinwood locomotive shops, vice R. H. Montgomery, deceased.

O. S. Beyer, Jr., general foreman of the Horton, Kan., shops of the Chicago, Rock Island & Pacific, has been appointed first assistant in the engineering experiment station in the department of railway engineering of the University of Illinois.

H. C. May, superintendent of motive power of the Chicago, Indianapolis & Louisville, has been appointed to the same position on the Lehigh Valley, with office at South Bethlehem, Pa., succeeding F. N. Hibbits, resigned. Mr. May's first railroad service was with the Chesapeake & Ohio at Covington, Ky., where he served as machinist apprentice from 1892 to 1896. He was then machinist for three years at the same place. In 1899 he became a student in the Mechanical Engineering School of Purdue University at Lafayette, Ind., from which he graduated in 1902. He was then appointed master mechanic on the Cleveland, Cincinnati, Chicago & St. Louis at Louisville, Ky., remaining in that position until 1907. From 1907 to 1910 he served on the Louisville & Nashville as master mechanic at New Decatur, Ala., and at South Louisville, Ky., and since 1910 was superintendent of motive power of the Chicago, Indianapolis & Louisville.

OBITUARY

William C. Hayes, superintendent of locomotive operation of the Erie, at New York, died on December 25 at his home in New York.

Arthur A. Hurd, special counsel in Kansas of the Atchison, Topeka & Santa Fe, died at his home in Topeka on December 20, at the age of 66.

O. T. Maier, vice-president and general manager of the New Orleans, Southern & Grand Isle, committed suicide at New Orleans, La., on December 20.

George V. Sueden, engineer maintenance of way of the New York & Long Branch at Long Branch, N. J., died on December 24, at his home in Red Bank at the age of 60.

A. W. Swanitz, formerly chief engineer and manager of the Alaska Northern, with headquarters at Seward, Alaska, died at Alameda, Cal., on December 22. He participated in the construction of a number of railroads in various parts of the country.

Homer Eads, formerly division superintendent of the International & Great Northern at San Antonio, Tex., died in that city on December 19. He resigned his position with the railroad in September, 1911, and since that time has been engaged in private business enterprises.

Equipment and Supplies

LOCOMOTIVES

THE MINERAL RANGE is inquiring for 2 consolidation locomotives.

THE CAMBRIA STEEL COMPANY has ordered 2 six-wheel switching locomotives from the Baldwin Locomotive Works.

THE LEHIGH & NEW ENGLAND has ordered 4 switching and 1 consolidation locomotives from the Baldwin Locomotive Works.

THE RICHMOND, FREDERICKSBURG & POTOMAC has ordered 4 Pacific type locomotives from the Baldwin Locomotive Works.

THE EAST TENNESSEE & WESTERN NORTH CAROLINA has ordered one ten-wheel locomotive from the Baldwin Locomotive Works.

THE NORFOLK SOUTHERN, reported in last week's issue as having ordered 4 consolidation locomotives from the Baldwin Locomotive Works, has increased this order to 6 locomotives.

THE INTER-URBAN RAILWAY has ordered one 60-ton electric locomotive from the McGuire-Cummings Manufacturing Company. The electrical equipment will be supplied by the Westinghouse Electric & Manufacturing Company.

FREIGHT CARS

THE SOUTH DAKOTA CENTRAL is asking prices on 2 refrigerator cars.

THE ANACONDA COPPER COMPANY has issued inquiries for 100 hopper cars.

THE BESSEMER & LAKE ERIE is reported as contemplating the purchase of 2,000 ore cars.

THE VIRGINIAN has given the Standard Steel Car Company an order to repair 250 box cars.

THE DIAMOND ALKALI COMPANY has ordered one tank car from the Pressed Steel Car Company.

THE UNITED STATES NAVY has ordered 2 tank cars from the German-American Car Company.

THE MINERAL RANGE has ordered 100 rock cars from the American Car & Foundry Company.

THE ILLINOIS CENTRAL has withdrawn its inquiry for 1,500 center sills mentioned in the issue of December 17.

EAST BROAD TOP.—The item in last week's issue to the effect that this company is in the market for 5 narrow gage hopper cars has been denied.

THE TUCSON, CORNELIA & GILA BEND has ordered 2 6,000-gal. tank cars from the German-American Car Company and 4 50-ton flat and 2 50-ton box cars from the McGuire Cummings Manufacturing Company.

THE UNION PACIFIC, reported in last week's issue as being in the market for box and stock cars, has issued inquiries for 1,500 box and 500 stock cars, but it is understood that the company intends to make total purchases of 4,000 cars.

DELAWARE & HUDSON.—It is reported, but not confirmed, that this company, which was reported in the *Railway Age Gazette* of December 3, as being in the market for 1,000 underframes, has ordered these underframes from the American Car & Foundry Company.

PASSENGER CARS

THE SOUTH DAKOTA CENTRAL is inquiring for 2 coaches.

THE BOSTON & MAINE has issued inquiries for 2 combination baggage and mail cars.

THE EAST BROAD TOP RAILROAD is contemplating the purchase of 4 or 5 second hand narrow gage coaches.

THE NATIONAL RAILWAY OF MEXICO are reported to have ordered 30 sleeping and dining cars from the Pullman Company.

THE BOSTON & ALBANY will install steel underframes on 20 wooden coaches and 13 wooden baggage cars. See also New York Central.

THE CHESAPEAKE & OHIO, reported in the *Railway Age Gazette* of December 10 as being in the market for 12 express cars and 6 coaches, will also buy 2 chair cars.

THE MISSOURI, KANSAS & TEXAS has ordered 15 70-ft. steel baggage cars, 4 72½-ft. steel dining cars and 2 60-ft. steel postal cars from the American Car & Foundry Company.

THE CHICAGO, BURLINGTON & QUINCY has ordered 8 dining cars, 9 passenger and baggage cars, 15 coaches, 15 chair cars, 2 road and smoking cars and 5 postal cars from the American Car & Foundry Company. All these cars will be of all steel construction.

THE NEW YORK CENTRAL was reported in last week's issue as having placed orders for 105 coaches, as follows: Barney-Smith Car Company, 15 coaches for the Cleveland, Cincinnati, Chicago & St. Louis; Osgood Bradley Car Company, 25 for the Boston & Albany; American Car & Foundry Company, 45 for the New Central itself, and the Standard Steel Car Company, 20. This report is slightly incomplete in that only 30 of the cars ordered from the American Car & Foundry Company are for the New York Central proper; the remaining 15 are for the Michigan Central. The 20 cars ordered from the Standard Steel Car Company will also be built by the Osgood-Bradley Car Company, and are for the New York Central itself.

IRON AND STEEL

THE LEHIGH VALLEY has placed an order for 2,500 tons of 136-lb. rails.

THE CHICAGO & EASTERN ILLINOIS has ordered 10,000 tons of rails from the Illinois Steel Company.

THE CHICAGO, BURLINGTON & QUINCY has ordered 5,000 tons of rails from the Lackawanna Steel Company.

THE INTERNATIONAL & GREAT NORTHERN has ordered 3,000 tons of rails from the Lackawanna Steel Company.

THE DULUTH, MISSABE & NORTHERN has ordered 469 tons of steel for the Lawrence Lake viaduct at Bovey, Minn., from the American Bridge Company.

MACHINERY AND TOOLS

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for a shear for cutting sheet bars or skelp, with a capacity of 12 in. in width and one inch thick. The shearing will be done cold. A 19-in. blade will be adequate.

THE NEW YORK CENTRAL has recently issued inquiries for a 42-in. car wheel boring machine, a double axle lathe, a 400-ton double end wheel press and a 6-in. forging machine for its shops at Air Line Junction, Ohio, and for a combination punch and shear for the shops at Englewood, Ill.

LIGHT RAILWAYS ON THE WESTERN FRONT.—From an article which recently appeared in one of the London papers it appears that the backbone of the German railway system in Champagne, the Bazancourt-Challerange line, is now within range of the French batteries, but this line has the advantage of being linked up with a comprehensive network of light railways. The German trains are run so near to the actual firing line "that their locomotives can at times be heard in the night." Tunnels have even been built in the danger zone for the handling of this traffic. Light railways of this nature are stated to have been laid throughout Belgium and the occupied districts of France with the object of relieving the pressure on the highways and of releasing cars for service in the Eastern theater of war, where the railway facilities are inferior. A uniform method of construction has been employed. The rails are light, but of high grade steel, laid on steel ties. They are built up in sections, which can thus be laid in a "ready-made" condition, so to speak. It is this feature which permits of track laying on level ground at the rate of some ten miles a day, which may be taken as equivalent to the average daily advance of an army. The lines are, of course, narrow gauge, but the passenger cars can seat five people a side.

Supply Trade News

E. F. Carry, first vice-president and general manager of the American Car & Foundry Company has been elected president of the Haskell & Barker Car Company of Michigan City, succeeding Mr. W. T. McBride. Mr. Carry has been associated with the American Car & Foundry Company or its predecessors since 1888, and vice-president of the company since its formation in 1899.

The Economy Devices Corporation, New York, has opened a western office at room 1634, McCormick building, Chicago, under the management of Joseph Siukler.

Warren Moore Osborn has been appointed representative for the Track Specialties Company, New York in the Chicago district with headquarters in the McCormick building in that city.

Graham Fraser, from 1904 until a short while ago director of the works of the Dominion Iron & Steel Company, and a director of the company, died recently at New Glasgow, N. S.

The Roberts & Schaefer Company, Chicago, have recently been awarded a contract for a 300-ton capacity, two-track automatic counterbalanced bucket locomotive coaling plant by the Chesapeake & Ohio for installation at Paintsville, Ky.

John C. Neale has been appointed general manager of sales of the Midvale Steel Company and the Worth Brothers Company. As such he will have complete charge of all sales matters. His office will be in the Widener Building, Philadelphia.

The Pilliod Company, New York, has received orders during the past 10 days for Baker valve gear to replace the Stephenson gear on 59 old engines. Included are orders from the Santa Fe; the Erie; Norfolk & Western; Pittsburgh & Lake Erie; New York, Ontario & Western, the Illinois Central, and the New York Central.

The American Mason Safety Tread Company, Lowell, Mass., announces that, effective January 1, 1916, Joseph T. Ryerson & Son, of Chicago, will act as general western distributors for its various types of Mason safety treads. A large stock of both lead and carborundum filled tread will be carried in stock for immediate deliveries.

Because of changes in the organization of Pierson, Roeding & Co., San Francisco, Cal., who have acted as the sales agents of the Electric Storage Battery Company of Philadelphia on the Pacific coast since 1910, the Battery Company will hereafter conduct its business on the coast through George R. Murphy, soliciting agent. Mr. Murphy will have offices in the Rialto building, 118 Montgomery street, San Francisco.

The Poland-Miller is a new company which has been organized with offices in the Erie building, Cleveland, Ohio, to conduct a general engineering business and to specialize in the design and inspection of coal, coke and ore handling machinery, docks and industrial plants. The company consists of J. F. Poland, formerly associated with the Brown Hoisting Machinery Company, and recently with the J. W. Frazier Company, in each case in the capacity of civil and structural engineer, and R. E. Miller, recently mechanical and electrical engineer of the J. W. Frazier Company.

William Claflin Andrews, advertising manager of the Edison Storage Battery Company, Orange, N. J., died in New York City, December 21. Mr. Andrews was a graduate of Columbia University. He was for a time sales engineer of the Stanley Instrument Company, Great Barrington, Mass., and later became connected with the General Electric Company in Schenectady, N. Y. and Harrison, N. J. He was for two years secretary of the Rae Company, New York, leaving to join the Edison Storage Battery Company in April, 1913, where he was advertising manager until his death.

The directorate of the Haskell & Barker Car Company, which company was recently organized, as noted in last week's issue, by a syndicate headed by Potter, Choate & Prentice and F. B. Keech & Co., will include Ambrose Monell, president of the International Nickel Company; William E. Corey, president of the Midvale Steel & Ordnance Corporation; Frank A. Vanderlip,

president of the National City Bank of New York; Edwin S. Webster, member of the firm of Stone & Webster; John Movrin, president of the Atlas Portland Cement Company; J. W. Harriman, president of the Harriman National Bank, and Arthur O. Choate, member of the firm of Potter, Choate & Prentice. The remaining members have not yet been chosen.

W. L. Conwell, vice-president and treasurer of the Transportation Utilities Company, New York, has been appointed assistant to the president of the Safety Car Heating & Lighting Company, effective January 1. Mr.



W. L. Conwell

Conwell has been in the service of the Transportation Utilities Company since 1911. He was born at Covington, Ky., January 25, 1887. He received his education in the public schools of Philadelphia and at the University of Pennsylvania, from which he graduated in 1898 with the degree of electrical engineer. He then passed the examinations for first assistant engineer for the United States Navy, but received no appointment because of the cessation of hostilities. He was employed in contracting work as a time-keeper for the Tennis Construction Company, Philadelphia, becoming later chief engineer and secretary of the company. In 1901 he resigned to become city salesman of the Westinghouse Electric & Manufacturing Company in New York. He was later placed in charge of the isolated plant department of the company, and for five years, ending in 1911, was engaged in railway work. In that year he became vice-president of the Transportation Utilities Company.

Paul M. Lincoln, for over 23 years connected with the operating and engineering activities of the Westinghouse companies, will on January 1 become associated with the sales department of the Westinghouse Electric & Manufacturing Company, with the title of commercial engineer.



P. M. Lincoln

Mr. Lincoln, shortly after his graduation from Ohio State University in 1892, entered the employ of the Short Electric Company in Cleveland. He then went to the Westinghouse Electric & Manufacturing Company, and was engaged in the testing-room, and in general engineering work. When the plant of the Niagara Falls Power Company was opened he became its electrical superintendent, and as such had much to do with the first transmission line to Buffalo. In 1902 he returned to the Westinghouse Company, specializing on the general engineering of power stations and transmission lines. He was for several years in charge of the power engineering department, but was transferred to the engineering department when that was organized. Mr. Lincoln is well known in engineering circles through his active work in the American Institute of Electrical Engineers of which at one time he was president. He is a well-known writer on technical subjects and has also been identified with educational work for some time,

filling the chair of professor of electrical engineering at the University of Pittsburgh.

Kelly, Cooke & Co. have recently opened offices in the Drexel building, Philadelphia, to conduct a general engineering practice in the public utility and industrial fields. Their organization is equipped for the design and supervision of construction for railways, light and power properties and industrial plants, engineering reports, appraisals and rate developments for public utilities. The firm also investigates industrial situations to develop ways and means for reducing manufacturing costs. William F. Kelly, senior member, received the degree of Mechanical Engineer from the University of Pennsylvania in 1893. For several years thereafter he was on the engineering staff of the Union Traction Company of Philadelphia and from 1901 to 1915 was a member of the staff of Ford, Bacon & Davis, acting as engineer in charge of several of their larger operations, including the construction and reconstruction of the Knoxville Railway & Light Company and the Birmingham Railway, Light & Power Company. Charles B. Cooke, Jr., was also graduated from the University of Pennsylvania and entered the shops of the Westinghouse Machine Company, East Pittsburgh, working up finally to the position of assistant commercial engineer of the company, which position he occupied for two years prior to joining the staff of Ford, Bacon & Davis. During his connection with the latter firm Mr. Cooke specialized on financial engineering reports and also had personal charge of a number of important rate developments and reports for public utility companies.

TRADE PUBLICATIONS

ELECTRICAL APPARATUS.—One of the recent publications of the railway and lighting department of the Westinghouse Electric & Manufacturing Company is an illustrated booklet containing a paper presented before the Railway Club of Pittsburgh by E. M. Herr, entitled "Notes on Electric Power Development."

BOILERS.—One of the recent booklets issued by the Harrison Safety Boiler Works, Philadelphia, Pa., is a reprint of an article by George H. Gibson on the subject, "Establishing and Maintaining Boiler Room Economy." The paper is taken from a recent issue of the Journal of the Ohio Society of Mechanical, Electrical and Steam Engineers.

ELECTRICAL APPARATUS.—The Esterline Company, Indianapolis, Ind., in its recently issued bulletin No. 365 describes the new line of Esterline graphic meters. These instruments are intended for checking up voltage and current on alternating current circuits and have been designed for use where the usual high price of graphic meters may possibly be prohibitive.

LOCOMOTIVES.—Bulletin No. 1, recently issued by the Lima Locomotive Corporation, contains illustrations and general descriptions of a number of locomotives which the company has built for representative railroads. Included are the Erie Pacific, Mikado and six-wheel switching locomotives, a Duluth & Iron Range Mikado locomotive, a Pennsylvania Lines West six-wheel switching locomotive, a Lackawanna eight-wheel switching locomotive, etc.

CORK INSULATION.—The Armstrong Cork & Insulation Company, Pittsburgh, Pa., has issued a 152-page book describing its Nonpareil corkboard insulation. This book, which is prepared in an attractive manner, describes briefly the preparation of cork and more in detail the merits of this material for different purposes and tests to which it has been subjected. Nearly one-half the book is devoted to specifications covering the methods of erecting Nonpareil corkboard for a wide variety of conditions. The book is well illustrated with photographs of typical installations of this material.

WELDING.—The Goldschmidt Thermit Company, 90 West street, New York, has recently issued three attractive bulletins relative to the Thermit process of welding. One is a folder, treating in a somewhat general way of the subject of locomotive repairs. The other two are much more elaborate and are entitled, respectively "Thermit Locomotive Repairs" and "Thermit Mill and Foundry Practice." These books contain instructions for the use of Thermit and are illustrated with drawings and other views showing the necessary steps to be taken. There are also a number of views showing the results which may be obtained.

Railway Construction

ALABAMA ROADS.—Bids were received recently, it is said, by the Bell Lumber Company for grading about three miles of a seven-mile lumber line. The Alabama Engineering Corporation, C. M. Ayres, president, Tuscaloosa, Ala., will locate and supervise the construction of the line.

GRAHAM COUNTY RAILROAD.—According to press reports, a contract has been given to the Wright-Johnston Construction Company, Andrews, N. C., to grade 12 miles between Topton, N. C., and Robbinsville. The headquarters of the company are at Andrews. The Graham County Lumber Company is said to be interested in the project. (October 29, p. 828.)

GUTHRIE-EDMOND (ELECTRIC).—Incorporated in Oklahoma with \$500,000 capital, it is said, to build an extension of the Oklahoma Railway from Edmond, Okla., north to Guthrie, 15.5 miles. The incorporators include B. Shartel, G. B. Treat and E. J. Reichart, Oklahoma City.

LUTCHER & MOORE LUMBER COMPANY.—This company will extend its present logging railroad from its northern terminus in Louisiana 35 miles northeast to the vicinity of Stables, La. The road is now about 35 miles long and extends from Sabine river at Nibett's Bluff into the adjacent lumber country. The extension will cross the Gulf, Colorado & Santa Fe near Merryville, La. At present the southern terminus of the road, Nibett's Bluff, is 18 miles from the company's mills at Orange, Tex., and it is planned eventually to lay track over this distance also. The work has not yet passed the survey stage.

NEW BRUNSWICK ROADS.—Application has been made to the Legislature for a guarantee of \$20,000 a mile to build a railway from a point on the Canadian Pacific to connect with Beaver Harbor, N. B., Black's Harbor, LeTang and Eastport, Maine. L. Connors, president of Connors Brothers, Limited, Black's Harbor, N. B., is back of the project.

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, will advertise for bids, to be opened January 14, for the construction of Section No. 2-A of Route No. 12, a part of the Broadway-Fourth Avenue Rapid Transit Railroad. Section 2-A extends from Prospect Park plaza at Flatbush avenue to a point at the intersection of Flatbush avenue, Ocean avenue and Malbone street in the borough of Brooklyn. It will be a two-track line and will connect with the Brighton Beach railroad at Malbone street. The commission also authorized the New York Municipal Railway Corporation to award the contract for the reconstruction of the Brighton Beach line, to connect with this section of the subway, to the Inter-Continental Construction Company, the lowest bidder. The work will cost over \$1,900,000, and is to be completed within 24 months.

NORFOLK & WESTERN. This company plans to carry out during 1916 second track work between Walton, Va., and Ripplemead, on 8.65 miles.

OKLAHOMA RAILWAY.—See Guthrie-Edmond.

SALEM & PENNSGROVE TRACTION.—The Board of Public Utility Commissioners of New Jersey has approved the general plan of this company for the construction of an electric line from Salem, N. J., north via Pennsville to Pennsgrove, about 12 miles. It is understood that construction work will be started at once from the Pennsgrove end. A. B. Smith, secretary and treasurer of the Smith Davis Lumber Company, Salem, N. J., is interested. (September 3, p. 449.)

SAVANNAH & NORTHWESTERN.—The Savannah & Atlantic has been incorporated with \$500,000 capital, it is said, to build the extension of the Savannah & Northwestern from St. Clair northwest about 35 miles. (October 8, p. 670.)

SOUTH BOSTON INDUSTRIAL TRACK.—Under this name work is now being carried out on a 2-mile railway from a point on the New York, New Haven & Hartford South Boston to the waterfront. Track has already been laid on one mile. The New York, New Haven & Hartford and F. T. Ley & Co., Inc., are carrying out the work.

STATEVILLE AIR LINE. Grading work is now under way from Stateville, N. C., to Mt. Airy, 62 miles. The work is being carried out from Stateville north, and has already been completed on a section of about 20 miles. D. M. Ausley, treasurer and general manager, Stateville, N. C. (July 2, p. 39.)

TEXAS ROADS (ELECTRIC).—The Pecos Valley Railroad Association, Buenavista, Tex., plans to build a gas-electric interurban line from a point on the Kansas City, Mexico & Orient in Texas, northwest up the Pecos Valley in Pecos county for 25 or 35 miles. Such a line would supply railway facilities for the Imperial, Zimmerman and Grand Falls irrigation systems. The line will probably be extended later up the valley to connect with other railroads. V. L. Sullivan, chairman, Buenavista, Tex. (See Texas Roads, Oct. 29, p. 829.)

TORONTO, HAMILTON & BUFFALO.—Surveys are now being made to build an extension of the Dunnville branch from Dunnville, Ont., to Port Maitland, 3.12 miles.

VANDALIA.—This railroad has begun the construction of additional tracks at Rose Lake Yard, Ill., which will increase the capacity of the yards for handling cars about 50 per cent, and will cost about \$80,000. The new tracks will measure 33,710 ft., and will be apportioned as follows: A westward running track between Rose Lake Yard and Willows, three repair yard tracks, extension of one repair yard track, four westward storage tracks, a caboose track, a wreck train track, five tracks in the eastward yard, a stock car cleaning track, necessary cross-overs and ladder tracks. The work is being done by a force of 100 men, and will be completed early in January. F. T. Hatch, chief engineer.

YELLVILLE-RUSH & MINERAL BELT.—Incorporated in Arkansas with \$140,000 capital, it is said, to build a 19-mile line through Yell county, Ark. It is understood that work will be started early in 1916 on the line. J. C. Shepard, president, Rush, Ark.

RAILWAY STRUCTURES

BUTTE, MONT.—The Chicago, Milwaukee & St. Paul is preparing plans for a new passenger station. The depot will be used also by the Butte, Anaconda & Pacific.

HOUSTON, TEX.—This city will soon begin the construction of railway yards near the turning basin of the Galveston-Houston ship canal on the south side of the bayou. As soon as the yards are completed a switch-engine will be purchased, and all cars over the municipal wharves, most of which are already constructed, will be handled by the city.

JERSEY CITY, N. J.—The Lehigh Valley is building, at its Jersey City terminal, a new open pile pier, 580 ft. long by 67 ft. wide. This pier is to have five tracks. Freight can be loaded direct from the cars to lighters or small vessels. In addition, two other piers are being remodelled at the same location. The total cost of these improvements will be about \$100,000.

LOUISVILLE, KY.—The Pennsylvania Lues West contemplate reconstructing the bridge crossing the Ohio river here. The present structure is a mile in length and carries a single track; it consists of a draw span over the canal, a 370-ft. through span called the Kentucky Chute, a 400-ft. through span for the Indiana Chute, and a succession of deck trusses with spans ranging from 149½ ft. to 245½ ft. The entire structure eventually will be rebuilt to carry two tracks, according to the plans of the company, but the work has been divided into five parts and the five spans at the Indiana end of the bridge, comprising a length of about 790 ft., will be reconstructed first.

PENROSE, COLO.—The Beaver, Penrose & Northern has completed a combination engine-house and pumping station. The building is of cement and timber construction, 60 ft. by 170 ft. Cost, \$4,000. G. E. Whitlock, engineer.

PERTH AMBOY, N. J.—The Lehigh Valley is rebuilding its old clay pier at Perth Amboy. When completed, this pier will be 825 ft. long by 69 ft. wide, and will cost \$105,000.

SAN ANTONIO, TEX.—Work on new yards and shops to be constructed for the International & Great Northern on an 80-acre tract purchased recently, will begin on January 1. Rails and material are expected to arrive this week. The plans call for an expenditure of \$250,000.



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